

# SANTOSH

Deemed to be University



1.1.1 Curricula developed and implemented have relevance to the local, national, regional and global health care needs which are visible in Programme Outcomes (POs), and Course Outcomes (COs) offered by the University, as per the norms of the Regulatory Bodies.

## Curricula implemented by the University

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1	MBBS	1 - 1219
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5	M.Sc	1604 - 1618
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7	B. Optometry	1627 - 1702
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13	B.Sc. Operation Theatre & Anesthesia Technology	1838 - 1861
14	Master of Optometry	1862 - 1885
16	Dental Mechanic	1886 - 1887
17	Dental Hygiene	1886 - 1887





# **SANTOSH DEEMED TO BE UNIVERSITY**

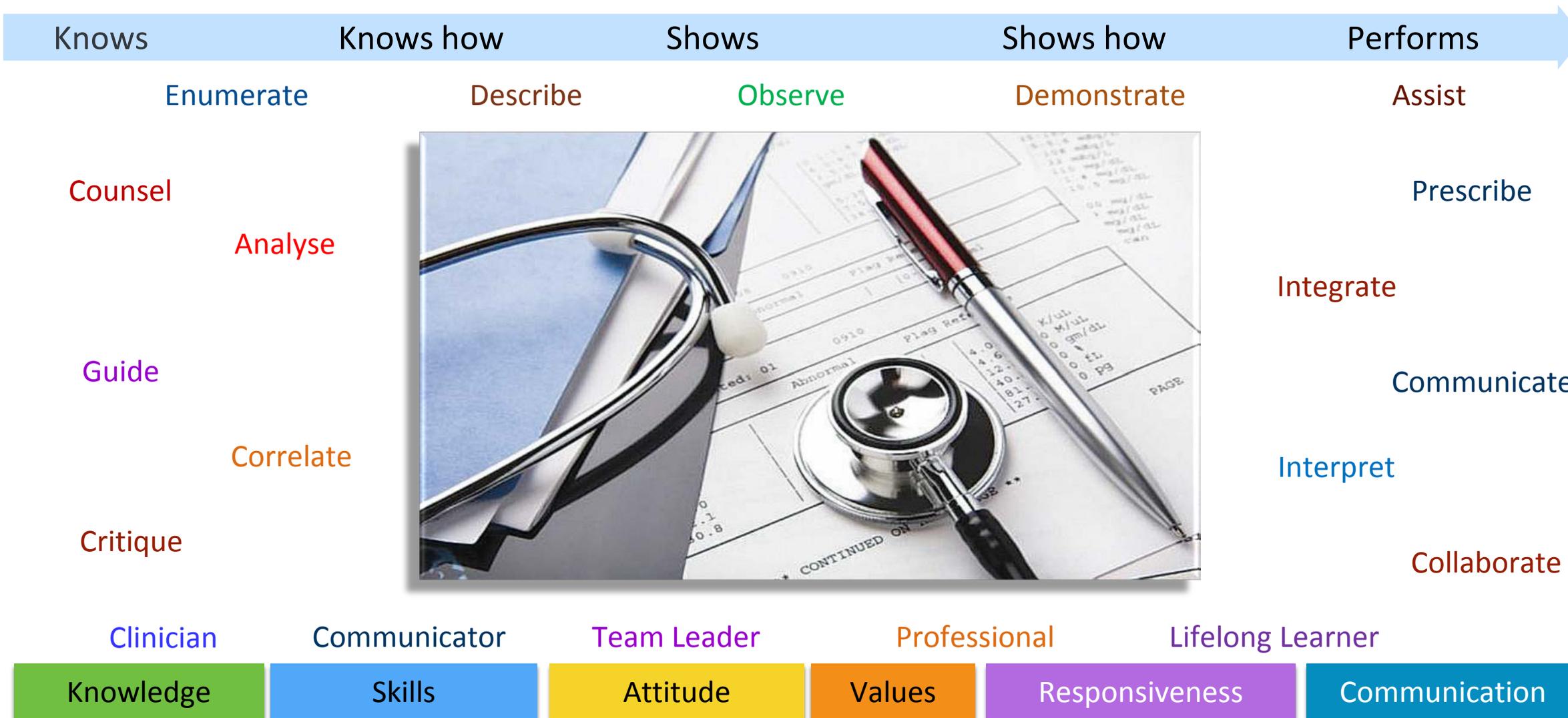
**SANTOSH MEDICAL COLLEGE & HOSPITAL,**  
**GHAZIABAD.**

**REGULATIONS AND SYLLABUS CUM TEACHING SCHEDULE**  
**OF MBBS PHASE – I**  
**BATCH AUGUST - 2019**



# MEDICAL COUNCIL OF INDIA

## COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR THE INDIAN MEDICAL GRADUATE



VOLUME-I (2018)

**COMPETENCY BASED UNDERGRADUATE CURRICULUM  
FOR THE  
INDIAN MEDICAL GRADUATE**

**2018**



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## भारतीय आयुर्विज्ञान परिषद के अधिक्रमण में शासी बोर्ड

### BOARD OF GOVERNORS IN SUPERSESSION OF MEDICAL COUNCIL OF INDIA

#### FOREWORD

The Medical Council of India, aware of its responsibilities in creation of trained health manpower, has been engaged for the past few years in updating the medical curriculum for undergraduates and postgraduates to be in consonance with the changing health needs of the country. The task of updating and reorganization of the postgraduate curriculum in nearly 50 broad specialty disciplines to the competency pattern was accomplished by the Academic Cell of the Council with the help of subject experts and members of its Reconciliation Board and have been uploaded on the Council Website for use of the medical fraternity.

The Council visualized that the Indian Medical Graduate, at the end of the undergraduate training program, should be able to recognize "health for all" as a national goal and should be able to fulfill his/her societal obligations towards the realization of this goal. To fulfill the mandate of the undergraduate medical curriculum which is to produce a clinician, who understands and is able to provide preventive, promotive, curative, palliative and holistic care to his patients, the curriculum must enunciate clearly the competencies the student must be imparted and must have learnt, with clearly defined teaching-learning strategies and effective methods of assessment. The student should be trained to effectively communicate with patients and their relatives in a manner respectful of the patient's preferences, values, beliefs, confidentiality and privacy and to this purpose, a book on Attitude, Ethics & Communication was prepared by the Medical Council of India; the teaching faculty of medical colleges have been receiving training on this module since 2015.

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-2-

Competency based Medical Education provides an effective outcome-based strategy where various domains of teaching including teaching learning methods and assessment form the framework of competencies. Keeping this objective as the core ingredient, the Medical Council of India with the help of panel of experts drawn from across the country, laid the basic framework for the revised undergraduate medical curriculum. Over the past four years, a group of highly committed medical professionals working as Members of the MCI Reconciliation Board developed this information into a document incorporating appropriate teaching-learning strategies, tools and techniques of teaching, and modes of assessment which have culminated in the current competency based undergraduate curriculum. We understand that maximum efforts were made to encourage integrated teaching between traditional subject areas using a problem-based learning approach starting with clinical or community cases and exploring the relevance of various preclinical disciplines in both the understanding and resolution of the problem. All efforts have been made to de-emphasize compartmentalisation of disciplines so as to achieve both horizontal and vertical integration in different phases. We are proud of their work accomplishment and congratulate them in the onerous task accomplished.

It gives us great satisfaction to state that the '**competency based undergraduate curriculum**' that has been prepared by the Medical Council of India would definitely serve the cause of medical education and in creating a competent Indian Medical Graduate to serve the community.

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## **Grant of Copyright to the Competency based Undergraduate Curriculum**

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# **COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR THE INDIAN MEDICAL GRADUATE**

## **Preamble**

The new Graduate Medical Education Regulations attempts to stand on the shoulder of the contributions and the efforts of resource persons, teachers and students (past and present). It intends to take the learner to provide health care to the evolving needs of the nation and the world.

More than twenty years have passed since the existing Regulations on Graduate Medical Education, 1997 was notified, necessitating a relook at all aspects of the various components in the existing regulations and adapt them to the changing demography, socio-economic context, perceptions, values and expectations of stakeholders. Emerging health care issues particularly in the context of emerging diseases, impact of advances in science and technology and shorter distances on diseases and their management also need consideration. The strong and forward looking fundamentals enshrined in the Regulations on Graduate Medical Education, 1997 has made this job easier. A comparison between the 1997 Regulations and proposed Graduate Medical Education Regulations, 2018 will reveal that the 2018 Regulations have evolved from several key principles enshrined in the 1997 Regulations.

The thrust in the new regulations is continuation and evolution of thought in medical education making it more learner-centric, patient-centric, gender-sensitive, outcome -oriented and environment appropriate. The result is an outcome driven curriculum which conforms to global trends. Emphasis is made on alignment and integration of subjects both horizontally and vertically while respecting the strengths and necessity of subject-based instruction and assessment. This has necessitated a deviation from using “broad competencies”; instead, the reports have written end of phase subject (sub) competencies. These “sub-competencies” can be mapped to the global competencies in the Graduate Medical Education Regulations.

A significant attempt has been made in the outcome driven undergraduate curriculum to provide the orientation and the skills necessary for life-long learning to enable proper care of the patient. In particular, the curriculum provides for early clinical exposure, electives and longitudinal care. Skill acquisition is an indispensable component of the learning process in medicine. The curriculum reinforces this aspect by necessitating certification of certain essential skills. The experts and the writing group have factored in patient availability, access, consent, number of students in a class etc. in suggesting skill acquisition and assessment methods; use of skills labs, simulated and guided environments are encouraged. In the pre-internship years,- the highest level of skill acquisition is a show how (SH) in a simulated or guided environment; few skills require independent performance and certification - these are marked with P (for performance). Opportunity to 'perform' these skills will be available during internship.

The importance of ethical values, responsiveness to the needs of the patient and acquisition of communication skills is underscored by providing dedicated curriculum time in the form of a longitudinal program based on Attitude, Ethics and Communication (AETCOM) competencies. Great emphasis has been placed on collaborative and inter-disciplinary teamwork, professionalism, altruism and respect in professional relationships with due sensitivity to differences in thought, social and economic position and gender.

In addition to the above, an attempt has been made to allow students from diverse educational streams and backgrounds to transition appropriately through a Foundation Course. Dedicated time has been allotted for self directed learning and co-curricular activities.

Formative and internal assessments have been streamlined to achieve the objectives of the curriculum. Minor tweaks to the summative assessment have been made to reflect evolving thought and regulatory requirements. Curricular governance and support have been strengthened, increasing the involvement of Curriculum Committee and Medical Education Departments/Units.

The curriculum document in conjunction with the new Graduate Medical Education Regulations (GMR), when notified, must be seen as a "living document" that should evolve as stakeholder requirements and aspirations change. We hope that the current GMR does just that. The Medical Council of India is

grateful to all the teachers, subject experts, process experts, patients, students and trainees who have contributed through invaluable inputs, intellectual feedbacks and valuable time spent to make this possible. This document would not have been possible without the dedicated and unstinting intellectual, mental and time-consuming efforts of the members of the Reconciliation Board of the Council and the Academic Cell of MCI.

## How to use the Manual

This Manual is intended for curriculum planners in an institution to design learning and assessment experiences for the MBBS student. Contents created by subject experts have been curated to provide guidance for the curriculum planners, leaders and teachers in medical schools. They must be used with reference to and in the context of the Regulations.

### Section 1

#### Competencies for the Indian Medical Graduate

**Section 1** - provides the global competencies extracted from the Graduate Medical Education Regulations, 2018. The global competencies identified as defining the roles of the **Indian Medical Graduate** are the broad competencies that the learner has to aspire to achieve; teachers and curriculum planners must ensure that the learning experiences are aligned to this Manual.

#### Extract from the Graduate Medical Education Regulations, 2018

##### 2. Objectives of the Indian Graduate Medical Training Programme

The undergraduate medical education program is designed with a goal to create an “Indian Medical Graduate” (IMG) possessing requisite knowledge, skills, attitudes, values and responsiveness, so that she or he may function appropriately and effectively as a physician of first contact of the community while being globally relevant. To achieve this, the following national and institutional goals for the learner of the Indian Medical Graduate training program are hereby prescribed:-

## **2.1. National Goals**

At the end of undergraduate program, the Indian Medical Graduate should be able to:

- (a) recognize “health for all” as a national goal and health right of all citizens and by undergoing training for medical profession fulfill his/her social obligations towards realization of this goal.
- (b) learn every aspect of National policies on health and devote herself/himself to its practical implementation.
- (c) achieve competence in practice of holistic medicine, encompassing promotive, preventive, curative and rehabilitative aspects of common diseases.
- (d) develop scientific temper, acquire educational experience for proficiency in profession and promote healthy living.
- (e) become exemplary citizen by observance of medical ethics and fulfilling social and professional obligations, so as to respond to national aspirations.

## **2.2. Institutional Goals**

In consonance with the national goals, each medical institution should evolve institutional goals to define the kind of trained manpower (or professionals) they intend to produce. The Indian Medical Graduates coming out of a medical institute should:

- (a) be competent in diagnosis and management of common health problems of the individual and the community, commensurate with his/her position as a member of the health team at the primary, secondary or tertiary levels, using his/her clinical skills based on history, physical examination and relevant investigations.
- (b) be competent to practice preventive, promotive, curative and rehabilitative medicine in respect to the commonly encountered health problems.
- (c) appreciate rationale for different therapeutic modalities, be familiar with the administration of the "essential drugs" and their common side effects.
- (d) be able to appreciate the socio-psychological, cultural, economic and environmental factors affecting health and develop humane attitude towards the patients in discharging one's professional responsibilities.

- (e) possess the attitude for continued self learning and to seek further expertise or to pursue research in any chosen area of medicine, action research and documentation skills.
- (f) be familiar with the basic factors which are essential for the implementation of the National Health Programs including practical aspects of the following:
  - (i) Family Welfare and Maternal and Child Health (MCH);
  - (ii) Sanitation and water supply;
  - (iii) Prevention and control of communicable and non-communicable diseases;
  - (iv) Immunization;
  - (v) Health Education;
  - (vi) Indian Public Health Standards (IPHS) at various level of service delivery;
  - (vii) Bio-medical waste disposal; and
  - (viii) Organizational and or institutional arrangements.
- (g) acquire basic management skills in the area of human resources, materials and resource management related to health care delivery, General and hospital management, principal inventory skills and counseling.
- (h) be able to identify community health problems and learn to work to resolve these by designing, instituting corrective steps and evaluating outcome of such measures.
- (i) be able to work as a leading partner in health care teams and acquire proficiency in communication skills.
- (j) be competent to work in a variety of health care settings.
- (k) have personal characteristics and attitudes required for professional life including personal integrity, sense of responsibility and dependability and ability to relate to or show concern for other individuals.

All efforts must be made to equip the medical graduate to acquire the skills as detailed in Table 11 Certifiable procedural skills – A Comprehensive list of skills recommended as desirable for Bachelor of Medicine and Bachelor of Surgery (MBBS) – Indian Medical Graduate, as given in the Graduate Medical Education Regulations, 2018

### **2.3. Goals for the Learner**

In order to fulfil this goal, the Indian Medical Graduate must be able to function in the following roles appropriately and effectively:-

2.3.1. Clinician who understands and provides preventive, promotive, curative, palliative and holistic care with compassion.

2.3.2. Leader and member of the health care team and system with capabilities to collect, analyze, synthesize and communicate health data appropriately.

2.3.3. Communicator with patients, families, colleagues and community.

2.3.4. Lifelong learner committed to continuous improvement of skills and knowledge.

2.3.5. Professional, who is committed to excellence, is ethical, responsive and accountable to patients, community and profession.

### **3. Competency Based Training Programme of the Indian Medical Graduate**

Competency based learning would include designing and implementing medical education curriculum that focuses on the desired and observable ability in real life situations. In order to effectively fulfil the roles as listed in clause 2, the Indian Medical Graduate would have obtained the following set of competencies at the time of graduation:

#### **3.1. *Clinician, who understands and provides preventive, promotive, curative, palliative and holistic care with compassion***

3.1.1 Demonstrate knowledge of normal human structure, function and development from a molecular, cellular, biologic, clinical, behavioral and social perspective.

3.1.2. Demonstrate knowledge of abnormal human structure, function and development from a molecular, cellular, biological, clinical, behavioural and social perspective.

3.1.3 Demonstrate knowledge of medico-legal, societal, ethical and humanitarian principles that influence health care.

- 3.1.4 Demonstrate knowledge of national and regional health care policies including the National Health Mission that incorporates National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM), frameworks, economics and systems that influence health promotion, health care delivery, disease prevention, effectiveness, responsiveness, quality and patient safety.
- 3.1.5. Demonstrate ability to elicit and record from the patient, and other relevant sources including relatives and caregivers, a history that is complete and relevant to disease identification, disease prevention and health promotion.
- 3.1.6. Demonstrate ability to elicit and record from the patient, and other relevant sources including relatives and caregivers, a history that is contextual to gender, age, vulnerability, social and economic status, patient preferences, beliefs and values.
- 3.1.7 Demonstrate ability to perform a physical examination that is complete and relevant to disease identification, disease prevention and health promotion.
- 3.1.8 Demonstrate ability to perform a physical examination that is contextual to gender, social and economic status, patient preferences and values.
- 3.1.9 Demonstrate effective clinical problem solving, judgment and ability to interpret and integrate available data in order to address patient problems, generate differential diagnoses and develop individualized management plans that include preventive, promotive and therapeutic goals.
- 3.1.10 Maintain accurate, clear and appropriate record of the patient in conformation with legal and administrative frameworks.
- 3.1.11 Demonstrate ability to choose the appropriate diagnostic tests and interpret these tests based on scientific validity, cost effectiveness and clinical context.
- 3.1.12 Demonstrate ability to prescribe and safely administer appropriate therapies including nutritional interventions, pharmacotherapy and interventions based on the principles of rational drug therapy, scientific validity, evidence and cost that conform to established national and regional health programmes and policies for the following:
  - i) Disease prevention,
  - ii) Health promotion and cure,
  - iii) Pain and distress alleviation, and
  - iv) Rehabilitation and palliation.

- 3.1.13 Demonstrate ability to provide a continuum of care at the primary and/or secondary level that addresses chronicity, mental and physical disability.
- 3.1.14 Demonstrate ability to appropriately identify and refer patients who may require specialized or advanced tertiary care.
- 3.1.15 Demonstrate familiarity with basic, clinical and translational research as it applies to the care of the patient.

**3.2. *Leader and member of the health care team and system***

- 3.2.1 Work effectively and appropriately with colleagues in an inter-professional health care team respecting diversity of roles, responsibilities and competencies of other professionals.
- 3.2.2 Recognize and function effectively, responsibly and appropriately as a health care team leader in primary and secondary health care settings.
- 3.2.3 Educate and motivate other members of the team and work in a collaborative and collegial fashion that will help maximize the health care delivery potential of the team.
- 3.2.4 Access and utilize components of the health care system and health delivery in a manner that is appropriate, cost effective, fair and in compliance with the national health care priorities and policies, as well as be able to collect, analyze and utilize health data.
- 3.2.5 Participate appropriately and effectively in measures that will advance quality of health care and patient safety within the health care system.
- 3.2.6 Recognize and advocate health promotion, disease prevention and health care quality improvement through prevention and early recognition: in a) life style diseases and b) cancer, in collaboration with other members of the health care team.

**3.3. *Communicator with patients, families, colleagues and community***

- 3.3.1 Demonstrate ability to communicate adequately, sensitively, effectively and respectfully with patients in a language that the patient understands and in a manner that will improve patient satisfaction and health care outcomes.
- 3.3.2 Demonstrate ability to establish professional relationships with patients and families that are positive, understanding, humane, ethical, empathetic, and trustworthy.
- 3.3.3 Demonstrate ability to communicate with patients in a manner respectful of patient's preferences, values, prior experience, beliefs, confidentiality and privacy.

3.3.4 Demonstrate ability to communicate with patients, colleagues and families in a manner that encourages participation and shared decision-making.

**3.4. Lifelong learner committed to continuous improvement of skills and knowledge**

3.4.1. Demonstrate ability to perform an objective self-assessment of knowledge and skills, continue learning, refine existing skills and acquire new skills.

3.4.2. Demonstrate ability to apply newly gained knowledge or skills to the care of the patient.

3.4.3. Demonstrate ability to introspect and utilize experiences, to enhance personal and professional growth and learning.

3.4.4. Demonstrate ability to search (including through electronic means), and critically reevaluate the medical literature and apply the information in the care of the patient.

3.4.5. Be able to identify and select an appropriate career pathway that is professionally rewarding and personally fulfilling.

**3.5. *Professional who is committed to excellence, is ethical, responsive and accountable to patients, community and the profession***

3.5.1. Practice selflessness, integrity, responsibility, accountability and respect.

3.5.2. Respect and maintain professional boundaries between patients, colleagues and society.

3.5.3. Demonstrate ability to recognize and manage ethical and professional conflicts.

3.5.4. Abide by prescribed ethical and legal codes of conduct and practice.

3.5.5. Demonstrate a commitment to the growth of the medical profession as a whole.

## Section 2

### Subject-wise outcomes

Section 2 contains subject-wise outcomes so called “sub-competencies” that must be achieved at the end of instruction in that subject. These are organised in tables and have two parts. The core subject outcomes are in first part. The second part in the same document (titled Integration) contains outcomes/competencies in other subjects which have been identified by experts in those subjects as requiring alignment or integration with the core subject.

Outcomes (competencies) in each subject are grouped according to topics number-wise. It is important to review the individual outcomes (competencies) in the light of the topic outcomes as a whole. For each competency outlined - the learning domains (Knowledge, Skill, Attitude, Communication) are identified. The expected level of achievement in that subject is identified as – [knows (K), knows how (KH), shows how (SH), perform (P)]. As a rule, ‘perform’ indicates independent performance without supervision and is required rarely in the pre-internship period. The outcome is a core (Y - must achieve) or a non-core (N - desirable) outcome. Suggested learning and assessment methods (these are suggestions) and explanation of the terms used are given under the section “definitions used in this document”. The suggested number of times a skill must be performed independently for certification in the learner’s log book is also given. Last two columns indicate subjects within the same phase and other phases with which the topic can be taught - together - aligned (temporal coordination), shared, correlated or nested.

The number of topics and competencies in each subject are given below:

## **Topics & outcomes in Pre-clinical & Para-clinical subjects**

<b>Sr. No.</b>	<b>Subjects</b>	<b>Number of topics</b>	<b>Number of outcomes</b>
1.	<b>Human Anatomy</b>	82	409
2.	<b>Physiology</b>	11	137
3.	<b>Biochemistry</b>	11	89
4.	<b>Pharmacology</b>	05	85
5.	<b>Pathology</b>	36	182
6.	<b>Microbiology</b>	08	54
7.	<b>Forensic Medicine &amp; Toxicology</b>	14	162
	<b>Total</b>	<b>167</b>	<b>1118</b>

## **Topics & outcomes in Medicine and Allied subjects**

<b>Sr. No.</b>	<b>Subjects</b>	<b>Number of topics</b>	<b>Number of outcomes</b>
<b>1.</b>	<b>Community Medicine</b>	20	107
<b>2.</b>	<b>General Medicine</b>	26	506
<b>3.</b>	<b>Respiratory Medicine</b>	02	47
<b>4.</b>	<b>Pediatrics</b>	35	406
<b>5.</b>	<b>Psychiatry</b>	19	117
<b>6.</b>	<b>Dermatology, Venereology &amp; Leprosy</b>	18	73
<b>7.</b>	<b>Physical Medicine &amp; Rehabilitation</b>	09	43
	<b>Total</b>	<b>129</b>	<b>1299</b>

## **Topics & outcomes in Surgery and Allied subjects**

<b>Sr. No.</b>	<b>Subjects</b>	<b>Number of topics</b>	<b>Number of outcomes</b>
<b>1.</b>	<b>General Surgery</b>	30	133
<b>2.</b>	<b>Ophthalmology</b>	09	60
<b>3.</b>	<b>Otorhinolaryngology</b>	04	76
<b>4.</b>	<b>Obstetrics &amp; Gynaecology</b>	38	126
<b>5.</b>	<b>Orthopedics</b>	14	39
<b>6.</b>	<b>Anesthesiology</b>	10	46
<b>7.</b>	<b>Radiodiagnosis</b>	01	13
<b>8.</b>	<b>Radiotherapy</b>	05	16
<b>9.</b>	<b>Dentistry</b>	05	23
	<b>Total</b>	<b>116</b>	<b>532</b>

## **Section 3**

### **Sample topics used for alignment & integration**

Section 3 contains a sample selection of topics that run across the phases which can be used for alignment and integration. These are suggestions and institutions can select their own set of topics which can run across phases.

It is important to design the curriculum with a view to ensure with several broad outcomes in mind: a) achievement of the broad competencies by the learner at the end of the MBBS program, b) retain the subject - wise character of learning and assessment and ensure that phase-wise subject outcomes are met and assessed, c) teaching topics that are similar together thereby reducing redundancy and allowing the learner to integrate the concept as the most important step in integration (alignment or temporal coordination) (see document on integration), and d) align learning and assessment experiences to the outcome and the level of achievement specified.

## **Understanding the competencies table**

## Understanding the competencies table

A	B	C	D	E	F	G	H	I	J
No.	Competencies	Domain	K/KH/SH/P	Core	Suggested Teaching Learning Method	Suggested Assessment method	No. required to certify (P)	Vertical Integration	Horizontal Integration
<b>Physiology</b>									
<b>Summary</b>									
Name of Topic: <b>General Physiology</b>									
Number of Competencies: <b>(08)</b>									
PY1.1	Describe the structure and functions of a	K	KH	Y	Lectures, Small group discussion	Written/Viva			Biochemistry
IM15.4	Elicit <i>document</i> and present a medical history that helps delineate the	S	SH	Y	Bed Side clinic, DOAP	Skill assessment		Community Medicine	

Description of competency

Unique number of the competency. First two alphabets represent the subject (see list); number following alphabet reflects topic number, following period is a running number.

Identifies the domain or domains addressed  
 K - Knowledge  
 S - Skill  
 A - Attitude  
 C - Communication

Identifies the level of competency required based on the Miller's pyramid  
 K - Knows  
 KH - Knows How  
 S - Skill  
 SH - Show How  
 P - Perform independently

Identifies if the competency is core or desirable.  
 Y indicates Core;  
 N-non-core

Identifies the suggested learning method.  
 DOAP - Demonstrate (by Student) Observe, Assist Perform)

Identifies the suggested assessment method  
 Skill assessment - Clinics, Skills lab, Practicals etc.

no of times a skill needs to be done independently to be certified for independent performance;  
 Rarely used in UG

Subject (s) in other phases with which the competency can be vertically integrated to increase relevance or improve basic understanding

Subject (s) in the same phase with which the competency can be horizontally integrated or aligned to allow a more wholesome understanding

**\*Numbers given are for illustrative purposes only and should not be compared with the same in curriculum documents**

## **Deriving learning objectives from competencies**

## Deriving learning objectives from competencies

K	Knows	A knowledge attribute – Usually enumerates or describes
KH	Knows how	A higher level of knowledge – is able to discuss or analyse
S	Shows	A skill attribute: is able to identify or demonstrate the steps
SH	Shows how	A skill attribute: is able to interpret / demonstrate a complex procedure requiring thought, knowledge and behaviour
P	Performs (under supervision or independently)	Mastery for the level of competence - When done independently under supervision a pre-specified number of times - certification or capacity to perform independently results

**Competency:** An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

PA42.3*	Identify the etiology of meningitis based on given CSF parameters	K/S	SH	Y
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PA42.1*	At the end of the session the <b>phase II student</b> must be able to enumerate the most common causes of meningitis correctly
PA42.2*	At the end of the session the <b>phase II student</b> must be able to enumerate the components of CSF analysis correctly
PA42.3*	At the end of the session the <b>phase II student</b> must be able to <b>describe</b> the CSF features for a given etiology of meningitis <b>accurately</b>
PA42.4*	At the end of the session the <b>phase II student</b> must be able to identify the aetiology of meningitis correctly from a <b>given set of CSF parameters</b>

Audience - who will do the behavior

Behavior - What should the learner be able to do?

Condition - Under what conditions should the learner be able to do it?

Degree – How well must it be done

**Objective:** Statement of what a learner should be able to do at the end of a specific learning experience

**\*Numbers given are for illustrative purposes only and should not be compared with the same in curriculum documents**

## **Deriving learning methods from competencies**

## Deriving learning methods from competencies

**Competency:** An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

PA42.3*	Identify the etiology of meningitis based on given CSF parameters	K/S	SH	Y
---------	---	-----	----	---

**Objective:** Statement of what a learner should be able to do at the end of a specific learning experience

PA42.1*	At the end of the session the <b>Phase II student</b> must be able to enumerate the most common causes of meningitis <b>correctly</b>	Lecture → small group discussion
PA42.2*	At the end of the session the <b>Phase II student</b> must be able to enumerate the components of a CSF analysis <b>correctly</b>	Related objectives can be combined into one teaching session
PA42.3*	At the end of the session the <b>Phase II student</b> must be able to <b>describe</b> the CSF features for a given etiologic of meningitis <b>accurately</b>	
PA42.4*	At the end of the session the <b>Phase II student</b> must the able to identify the aetiology of meningitis correctly from a <b>given set of CSF parameters</b>	small group discussion, practical session

\*Numbers given are for illustrative purposes only and should not be compared with the same in curriculum documents

## **Deriving assessment methods from competencies**

## Deriving assessment methods from competencies-1

**Competency:** An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

PA42.3*	Identify the etiology of meningitis based on given CSF parameters	K/S	SH	Y
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**Objective:** Statement of what a learner should be able to do at the end of a specific learning experience

PA42.1*	At the end of the session the <del>Phase I</del> <b>Phase II student</b> must be able to enumerate the most common causes of meningitis correctly	Short note or part of structured essay: Enumerate 5 causes of meningitis based on their prevalence in India
PA42.2*	At the end of the session the <b>Phase II student</b> must be able to enumerate the components of a CSF analysis correctly	Short note or part of structured essay: Enumerate the components tested in a CSF analysis
PA42.3*	At the end of the session the <b>Phase II student</b> must be able to <b>describe</b> the CSF features for a given aetiology of meningitis <b>accurately</b>	Short note or part of structured essay: Describe the CSF findings that are characteristic of tuberculous meningitis
PA42.4*	At the end of the session the <b>Phase II student</b> must be able to identify the aetiology of meningitis correctly from a <b>given set of CSF parameters</b>	Short note / part of the structured essay/ Skill station/ Viva voce Review the CSF findings in the following patient and identify (write or vocalise) the most likely etiology

\* Numbers given are for illustrative purposes only and should not be compared with numbers in the curriculum document

## Deriving assessment methods from competencies-2

**Competency:** An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

MI2.4*	List the common microbial agents causing anemia. Describe the morphology, mode of infection and discuss the pathogenesis, clinical course, diagnosis and prevention and treatment of the common microbial agents causing Anemia.	K	KH	Y	Didactic Small group discussion	Written/ Viva voce	Medicine	Pathology
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**Objective:** Statement of what a learner should be able to do at the end of a specific learning experience

MI2.1*	Enumerate the common microbial agents causing anaemia
MI2.2*	Describe the morphology of agent (1,2 etc)
MI2.3*	Describe the mode of infection of agent in humans
MI2.4*	Discuss the pathogenesis of anemia caused by agent
MI2.5*	Describe the clinical course of infection by agent
MI2.6*	Enumerate the diagnostic tests to identify the aetiology of agent as a cause of anemia
MI2.7*	Discuss the methods to prevent infection by agent
MI2.8*	Describe the treatment of infection by agent

Integrate concept - not necessarily teachers  
Plan session with teachers of both subjects -teachers from both subjects usually not needed. Ensure redundancy and duplication by reviewing both subjects



Horizontally aligned and integrated with pathology

Vertically integrated with General Medicine



Integrate concept - not necessarily teachers Plan session with teachers from both phases. Make a decision on how much of the information needs to be brought down to this phase to make it relevant. Consider how a competency can ascend over phases: for eg. - can be at a KH -( know how) in phase II but becomes SH in phase III. For vertical integration with clinical subjects, use of a case to link the concept (a well written paper, case is sufficient). Using teachers from both phases is rarely required

# The concept of integration

## Concept of integration used in the Manual

*Integration is a learning experience that allows the learner to perceive relationships from blocks of knowledge and develop a unified view of its basis and its application.* The GMR 2018 applies these principles to the extent that will retain the strengths of silo - based education and assessment while providing experiences that will allow learners to integrate concepts.

Keeping this in mind, the Regulations recommend temporal coordination as described by Harden (called alignment in this document) as the major method to be followed allowing similar topics in different subjects to be thought separately but during the same time frame (Figure 1a ).

In a small proportion - not to exceed 20% of the total curriculum an attempt can be made to Share (Figure 1b) topics or Correlate (Figure 1c) topics by using an integration session. The integration session most preferred will be a case based discussion in an appropriate format ensuring that elements in the same phase (horizontal) and from other phases are addressed. Care must be taken to ensure that achievement phase - based objectives are given primacy - the integrative elements from other phases are used only to provide adequate recall and understand the clinical application of concepts. It must be emphasized that integration does not necessarily require multiple teachers in each class. Experts from each phase and subject may be involved in the lesson planning but not it in its delivery unless deemed necessary.

As much as possible the necessary correlates from other phases must also be introduced while discussing a topic in a given subject - Nesting (Figure 1d) (Harden). Topics that cannot be aligned and integrated must be provided adequate time in the curriculum throughout the year.

Assessment will continue to be subject based. However, efforts must be made to ensure that phase appropriate correlates are tested to determine if the learner has internalized and integrated the concept and its application.

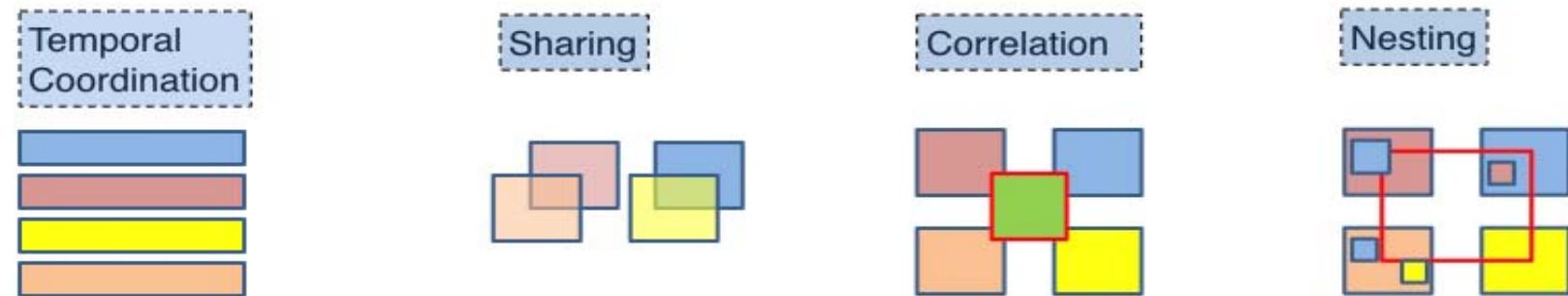


Figure 1 : Integration concepts framed in the GMR. Coloured boxes represent subjects. 1 a. Temporal coordination: The timetable is adjusted so that topics within the subjects or disciplines which are related, are scheduled at the same time. b. Sharing: Two disciplines may agree to plan and jointly implement a teaching program c. Correlation: the emphasis remains on disciplines or subjects with subject-based courses taking up most of the curriculum time. Within this framework, an integrated teaching session or course is introduced in addition to the subject-based teaching (green box with red border) d. Nesting: the teacher targets, within a subject-based course, skills relating to other subjects. Adapted from Harden R Med Edu 2000. 34; 551

## Definitions used in the Manual

1. **Goal:** A projected state of affairs that a person or system plans to achieve.

In other words: Where do you want to go? or What do you want to become?

2. **Competency:** The habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and community being served.

In other words: What should you have? or What should have changed?

3. **Objective:** Statement of what a learner should be able to do at the end of a specific learning experience.

In other words: What the Indian Medical Graduate should know, do, or behave.

### Action Verbs used in this manual

Knowledge	Skill	Attitude/communicate
Enumerate	Identify	Counsel
List	Demonstrate	Inform
Describe	Perform under supervision	Demonstrate understanding of
Discuss	Perform independently	
Differentiate	Document	
Define	Present	
Classify	Record	
Choose	Interpret	
Elicit		
Report		

**Note:**

1. Specified essential competencies only will be required to be performed independently at the end of the final year MBBS.
2. The word 'perform' or 'do' is used ONLY if the task has to be done on patients or in laboratory practical in the pre/para- clinical phases.
3. Most tasks that require performance during undergraduate years will be performed under supervision.
4. If a certification to perform independently has been done, then the number of times the task has to be performed under supervision will be indicated in the last column.

## Explanation of terms used in this manual

Lecture	Any instructional large group method including traditional lecture and interactive lecture
Small group discussion	Any instructional method involving small groups of students in an appropriate learning context
DOAP (Demonstration- Observation - Assistance - Performance)	A practical session that allows the student to observe a demonstration, assist the performer, perform in a simulated environment, perform under supervision or perform independently
Skill assessment	A session that assesses the skill of the student including those in the practical laboratory, skills lab, skills station that uses mannequins/ paper case/simulated patients/real patients as the context demands
Core	A competency that is necessary in order to complete the requirements of the subject (traditional must know)
Non-Core	A competency that is optional in order to complete the requirements of the subject (traditional nice (good) to know/ desirable to know)
National Guidelines	Health programs as relevant to the competency that are part of the National Health Program

### Domains of learning

K	Knowledge
S	Skill
A	Attitude
C	Communication

### Levels of competency

K	Knows	A knowledge attribute - Usually enumerates or describes
KH	Knows how	A higher level of knowledge - is able to discuss or analyze
S	Shows	A skill attribute: is able to identify or demonstrate the steps
SH	Shows how	A skill attribute: is able to interpret/ demonstrate a complex procedure requiring thought, knowledge and behavior
P	Performs (under supervision or independently)	Mastery for the level of competence - When done independently under supervision a pre-specified number of times - certification or capacity to perform independently results

**Note:**

In the table of competency - the highest level of competency acquired is specified and implies that the lower levels have been acquired already. Therefore, when a student is able to SH - Show how - an informed consent is obtained - it is presumed that the preceding steps - the knowledge, the analytical skills, the skill of communicating have all been obtained.

It may also be noted that attainment of the highest level of competency may be obtained through steps spread over several subjects or phases and not necessarily in the subject or the phase in which the competency has been identified.

# **Volume I**

## **Competency based Undergraduate Curriculum in Pre-clinical and Para-clinical subjects**

**HUMAN ANATOMY (CODE: AN)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Human Anatomy</b>									
<b>Topic: Anatomical terminology</b>		<b>Number of competencies: (2)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN1.1	Demonstrate normal anatomical position, various planes, relation, comparison, laterality & movement in our body	K/S	SH	Y	Lecture, DOAP session	Written/ Viva voce/skills assessment			
AN1.2	Describe composition of bone and bone marrow	K	KH	Y	Lecture	Written/ Viva voce			
<b>Topic: General features of bones &amp; Joints</b>		<b>Number of competencies: (6)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN2.1	Describe parts, blood and nerve supply of a long bone	K	KH	Y	Lecture, DOAP session	Written/ Viva voce			
AN2.2	Enumerate laws of ossification	K	KH	N	Lecture	Written			
AN2.3	Enumerate special features of a sesamoid bone	K	KH	N	Lecture	Written			
AN2.4	Describe various types of cartilage with its structure & distribution in body	K	KH	Y	Lecture	Written/ Viva voce		Orthopedics	
AN2.5	Describe various joints with subtypes and examples	K	KH	Y	Lecture	Written/ Viva voce		Orthopedics	
AN2.6	Explain the concept of nerve supply of joints & Hilton's law	K	KH	Y	Lecture	Written/ Viva voce			
<b>Topic: General features of Muscle</b>		<b>Number of competencies: (3)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN3.1	Classify muscle tissue according to structure & action	K	KH	Y	Lecture	Written/ Viva voce			Physiology
AN3.2	Enumerate parts of skeletal muscle and differentiate between tendons and aponeuroses with examples	K	KH	Y	Lecture	Written/ Viva voce			
AN3.3	Explain Shunt and spurt muscles	K	KH	N	Lecture	Written			
<b>Topic: General features of skin and fascia</b>		<b>Number of competencies: (5)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN4.1	Describe different types of skin & dermatomes in body	K	KH	N	Lecture, DOAP session	Written			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN4.2	Describe structure & function of skin with its appendages	K	KH	Y	Lecture, DOAP session	Written/ Viva voce		Dermatology, Venereology & Leprosy	
AN4.3	Describe superficial fascia along with fat distribution in body	K	KH	Y	Lecture, DOAP session	Written/ Viva voce			
AN4.4	Describe modifications of deep fascia with its functions	K	KH	Y	Lecture, DOAP session	Written/ Viva voce		Dermatology, Venereology & Leprosy	
AN4.5	Explain principles of skin incisions	K	KH	N	Lecture	Written		Dermatology, Venereology & Leprosy	
<b>Topic: General features of the cardiovascular system</b>		<b>Number of competencies: (8)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN5.1	Differentiate between blood vascular and lymphatic system	K	KH	Y	Lecture	Written/ Viva voce			Physiology
AN5.2	Differentiate between pulmonary and systemic circulation	K	KH	Y	Lecture	Written/ Viva voce			Physiology
AN5.3	List general differences between arteries & veins	K	KH	Y	Lecture	Written/ Viva voce			
AN5.4	Explain functional difference between elastic, muscular arteries and arterioles	K	KH	Y	Lecture	Written/ Viva voce			
AN5.5	Describe portal system giving examples	K	KH	Y	Lecture	Written/ Viva voce			
AN5.6	Describe the concept of anastomoses and collateral circulation with significance of end-arteries	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN5.7	Explain function of meta-arterioles, precapillary sphincters, arterio-venous anastomoses	K	KH	N	Lecture	Written			Physiology
AN5.8	Define thrombosis, infarction & aneurysm	K	KH	N	Lecture	Written		Pathology	Physiology
<b>Topic: General Features of lymphatic system</b>		<b>Number of competencies: (3)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN6.1	List the components and functions of the lymphatic system	K	KH	N	Lecture	Written			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN6.2	Describe structure of lymph capillaries & mechanism of lymph circulation	K	KH	N	Lecture	Written			
AN6.3	Explain the concept of lymphoedema and spread of tumors via lymphatics and venous system	K	KH	N	Lecture	Written		General Surgery	
<b>Topic: Introduction to the nervous system</b>		<b>Number of competencies: (8)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN7.1	Describe general plan of nervous system with components of central, peripheral & autonomic nervous systems	K	KH	Y	Lecture	Written			
AN7.2	List components of nervous tissue and their functions	K	KH	Y	Lecture	Written/ Viva voce			Physiology
AN7.3	Describe parts of a neuron and classify them based on number of neurites, size & function	K	KH	Y	Lecture	Written/ Viva voce			Physiology
AN7.4	Describe structure of a typical spinal nerve	K	KH	Y	Lecture	Written/ Viva voce			
AN7.5	Describe principles of sensory and motor innervation of muscles	K	KH	N	Lecture	Written		General Medicine	Physiology
AN7.6	Describe concept of loss of innervation of a muscle with its applied anatomy	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	
AN7.7	Describe various type of synapse	K	KH	N	Lecture	Written			Physiology
AN7.8	Describe differences between sympathetic and spinal ganglia	K	KH	N	Lecture	Written			
<b>Topic: Features of individual bones (Upper Limb)</b>		<b>Number of competencies: (6)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN8.1	Identify the given bone, its side, important features & keep it in anatomical position	K/S	SH	Y	DOAP session	Viva voce/ Practicals/ OSPE			
AN8.2	Identify & describe joints formed by the given bone	K/S	SH	Y	Lecture, DOAP session	Viva voce			
AN8.3	Enumerate peculiarities of clavicle	K	KH	Y	Lecture, DOAP session	Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN8.4	Demonstrate important muscle attachment on the given bone	K/S	SH	Y	Practical DOAP session, Small group teaching	Viva voce Practicals		Orthopedics	
AN8.5	Identify and name various bones in articulated hand, Specify the parts of metacarpals and phalanges and enumerate the peculiarities of pisiform	K/S	SH	Y	Practical, F91 DOAP session, Small group teaching	Viva voce Practicals			
AN8.6	Describe scaphoid fracture and explain the anatomical basis of avascular necrosis	K	KH	N	DOAP session	Viva voce		Orthopedics	
<b>Topic: Pectoral region</b>		<b>Number of competencies: (3)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN9.1	Describe attachment, nerve supply & action of pectoralis major and pectoralis minor	K	KH	Y	Lecture, Practical	Written			
AN9.2	Breast: Describe the location, extent, deep relations, structure, age changes, blood supply, lymphatic drainage, microanatomy and applied anatomy of breast	K	KH	Y	Practical, Lecture	Written/ Viva voce		General Surgery	
AN9.3	Describe development of breast	K	KH	N	Lecture	Written			
<b>Topic: Axilla, Shoulder and Scapular region</b>		<b>Number of competencies: (13)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN10.1	Identify & describe boundaries and contents of axilla	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN10.2	Identify, describe and demonstrate the origin, extent, course, parts, relations and branches of axillary artery & tributaries of vein	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN10.3	Describe, identify and demonstrate formation, branches, relations, area of supply of branches, course and relations of terminal branches of brachial plexus	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN10.4	Describe the anatomical groups of axillary lymph nodes and specify their areas of drainage	K	KH	Y	Practical, Lecture	Written/ Viva voce		General Surgery	
AN10.5	Explain variations in formation of brachial plexus	K	KH	Y	Practical, Lecture	Written/ Viva voce			
AN10.6	Explain the anatomical basis of clinical features of Erb's palsy and Klumpke's paralysis	K	KH	N	Lecture	Written		General Surgery	
AN10.7	Explain anatomical basis of enlarged axillary lymph nodes	K	KH	N	Lecture	Written		General Surgery	
AN10.8	Describe, identify and demonstrate the position, attachment, nerve supply and actions of trapezius and latissimus dorsi	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN10.9	Describe the arterial anastomosis around the scapula and mention the boundaries of triangle of auscultation	K	KH	N	Lecture	Written			
AN10.10	Describe and identify the deltoid and rotator cuff muscles	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN10.11	Describe & demonstrate attachment of serratus anterior with its action	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN10.12	Describe and demonstrate shoulder joint for- type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements, muscles involved, blood supply, nerve supply and applied anatomy	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		Orthopedics	
AN10.13	Explain anatomical basis of Injury to axillary nerve during intramuscular injections	K	KH	N	Lecture	Viva voce			

**Topic: Arm & Cubital fossa**

**Number of competencies: (6)**

**Number of procedures for certification: (NIL)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN11.1	Describe and demonstrate muscle groups of upper arm with emphasis on biceps and triceps brachii	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN11.2	Identify & describe origin, course, relations, branches (or tributaries), termination of important nerves and vessels in arm	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN11.3	Describe the anatomical basis of Venepuncture of cubital veins	K	KH	Y	Practical, Lecture	Written/ Viva voce		General Surgery	
AN11.4	Describe the anatomical basis of Saturday night paralysis	K	KH	Y	Practical, Lecture	Written/ Viva voce		Orthopedics	
AN11.5	Identify & describe boundaries and contents of cubital fossa	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN11.6	Describe the anastomosis around the elbow joint	K	KH	N	Lecture	Written			
<b>Topic: Forearm &amp; hand</b>		<b>Number of competencies: (15)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN12.1	Describe and demonstrate important muscle groups of ventral forearm with attachments, nerve supply and actions	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN12.2	Identify & describe origin, course, relations, branches (or tributaries), termination of important nerves and vessels of forearm	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN12.3	Identify & describe flexor retinaculum with its attachments	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN12.4	Explain anatomical basis of carpal tunnel syndrome	K	KH	Y	Lecture	Written/ Viva voce			
AN12.5	Identify & describe small muscles of hand. Also describe movements of thumb and muscles involved	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN12.6	Describe & demonstrate movements of thumb and muscles involved	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN12.7	Identify & describe course and branches of important blood vessels and nerves in hand	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN12.8	Describe anatomical basis of Claw hand	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN12.9	Identify & describe fibrous flexor sheaths, ulnar bursa, radial bursa and digital synovial sheaths	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN12.10	Explain infection of fascial spaces of palm	K	KH	N	Lecture	Written		General Surgery	
AN12.11	Identify, describe and demonstrate important muscle groups of dorsal forearm with attachments, nerve supply and actions	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN12.12	Identify & describe origin, course, relations, branches (or tributaries), termination of important nerves and vessels of back of forearm	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN12.13	Describe the anatomical basis of Wrist drop	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN12.14	Identify & describe compartments deep to extensor retinaculum	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN12.15	Identify & describe extensor expansion formation	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
<b>Topic: General Features, Joints, radiographs &amp; surface marking</b>		<b>Number of competencies: (8)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN13.1	Describe and explain Fascia of upper limb and compartments, veins of upper limb and its lymphatic drainage	K	KH	Y	Lecture	Written/ Viva voce			
AN13.2	Describe dermatomes of upper limb	K	KH	N	Lecture	Written/ Viva voce			
AN13.3	Identify & describe the type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements, blood and nerve supply of elbow joint, proximal and distal radio-ulnar joints, wrist joint & first carpometacarpal joint	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN13.4	Describe Sternoclavicular joint, Acromioclavicular joint, Carpometacarpal joints & Metacarpophalangeal joint	K	KH	N	Lecture	Written			
AN13.5	Identify the bones and joints of upper limb seen in anteroposterior and lateral view radiographs of shoulder region, arm, elbow, forearm and hand	K/S	SH	Y	Practical, Small group discussion, DOAP session	Viva voce/ skill assessment		Radiodiagnosis	
AN13.6	Identify & demonstrate important bony landmarks of upper limb: Jugular notch, sternal angle, acromial angle, spine of the scapula, vertebral level of the medial end, Inferior angle of the scapula	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Viva voce/ skill assessment			
AN13.7	Identify & demonstrate surface projection of: Cephalic and basilic vein, Palpation of Brachial artery, Radial artery, Testing of muscles: Trapezius, pectoralis major, serratus anterior, latissimus dorsi, deltoid, biceps brachii, Brachioradialis	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Viva voce/ skill assessment			



Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN15.5	Describe and demonstrate adductor canal with its content	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
<b>Topic: Gluteal region &amp; back of thigh</b> <span style="float: right;">Number of competencies: (6)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN16.1	Describe and demonstrate origin, course, relations, branches (or tributaries), termination of important nerves and vessels of gluteal region	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN16.2	Describe anatomical basis of sciatic nerve injury during gluteal intramuscular injections	K	KH	Y	Lecture, DOAP session	Written/ Viva voce		General Surgery	
AN16.3	Explain the anatomical basis of Trendelenburg sign	K	KH	Y	Lecture, DOAP session	Written/ Viva voce		General Surgery	
AN16.4	Describe and demonstrate the hamstrings group of muscles with their attachment, nerve supply and actions	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN16.5	Describe and demonstrate the origin, course, relations, branches (or tributaries), termination of important nerves and vessels on the back of thigh	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN16.6	Describe and demonstrate the boundaries, roof, floor, contents and relations of popliteal fossa	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
<b>Topic: Hip Joint</b> <span style="float: right;">Number of competencies: (3)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN17.1	Describe and demonstrate the type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements and muscles involved, blood and nerve supply, bursae around the hip joint	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN17.2	Describe anatomical basis of complications of fracture neck of femur	K	KH	N	Lecture	Written/ Viva voce		Orthopedics	
AN17.3	Describe dislocation of hip joint and surgical hip replacement	K	KH	N	Lecture	Written/ Viva voce		Orthopedics	
<b>Topic: Knee joint, Anterolateral compartment of leg &amp; dorsum of foot</b> <span style="margin-left: 200px;"><b>Number of competencies: (7) ♂</b></span> <span style="margin-left: 200px;"><b>Number of procedures for certification: (NIL)</b></span>									
AN18.1	Describe and demonstrate major muscles of anterolateral compartment of leg with their attachment, nerve supply and actions	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN18.2	Describe and demonstrate origin, course, relations, branches (or tributaries), termination of important nerves and vessels of anterior compartment of leg	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN18.3	Explain the anatomical basis of foot drop	K	KH	Y	Lecture, DOAP session	Written/ Viva voce		General Surgery	
AN18.4	Describe and demonstrate the type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements and muscles involved, blood and nerve supply, bursae around the knee joint	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN18.5	Explain the anatomical basis of locking and unlocking of the knee joint	K	KH	Y	Small group teaching	Written/ Viva voce			
AN18.6	Describe knee joint injuries with its applied anatomy	K	KH	N	Lecture	Written/ Viva voce		Orthopedics	
AN18.7	Explain anatomical basis of Osteoarthritis	K	KH	N	Lecture	Written/ Viva voce		Orthopedics	
<b>Topic: Back of Leg &amp; Sole</b> <span style="margin-left: 200px;"><b>Number of competencies: (7)</b></span> <span style="margin-left: 200px;"><b>Number of procedures for certification: (NIL)</b></span>									
AN19.1	Describe and demonstrate the major muscles of back of leg with their attachment, nerve supply and actions	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN19.2	Describe and demonstrate the origin, course, relations, branches (or tributaries), termination of important nerves and vessels of back of leg	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN19.3	Explain the concept of "Peripheral heart"	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN19.4	Explain the anatomical basis of rupture of calcaneal tendon	K	KH	N	Lecture	Written/ Viva voce		Orthopedics	
AN19.5	Describe factors maintaining importance arches of the foot with its importance	K	KH	Y	Lecture	Written/ Viva voce			
AN19.6	Explain the anatomical basis of Flat foot & Club foot	K	KH	N	Lecture	Written/ Viva voce		Orthopedics	
AN19.7	Explain the anatomical basis of Metatarsalgia & Plantar fasciitis	K	KH	N	Lecture	Written/ Viva voce		Orthopedics	
<b>Topic: General Features, Joints, radiographs &amp; surface marking</b> <span style="margin-left: 150px;"><b>Number of competencies: (10)</b></span> <span style="margin-left: 150px;"><b>Number of procedures for certification: (NIL)</b></span>									
AN20.1	Describe and demonstrate the type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements and muscles involved, blood and nerve supply of tibiofibular and ankle joint	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN20.2	Describe the subtalar and transverse tarsal joints	K	KH	N	Lecture, DOAP session	Written/ Viva voce			
AN20.3	Describe and demonstrate Fascia lata, Venous drainage, Lymphatic drainage, Retinacula & Dermatomes of lower limb	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN20.4	Explain anatomical basis of enlarged inguinal lymph nodes	K	KH	N	Lecture	Written/ Viva voce		General Surgery	
AN20.5	Explain anatomical basis of varicose veins and deep vein thrombosis	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN20.6	Identify the bones and joints of lower limb seen in anteroposterior and lateral view radiographs of various regions of lower limb	K/S	SH	Y	Lecture, Small group discussion, DOAP session	Viva voce/ skill assessment		Radiodiagnosis	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN20.7	Identify & demonstrate important bony landmarks of lower limb: -Vertebral levels of highest point of iliac crest, posterior superior iliac spines, iliac tubercle, pubic tubercle, ischial tuberosity, adductor tubercle, -Tibial tuberosity, head of fibula, -Medial and lateral malleoli, Condyles of femur and tibia, sustentaculum tali, tuberosity of fifth metatarsal, tuberosity of the navicular	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Viva voce/ skill assessment			
AN20.8	Identify & demonstrate palpation of femoral, popliteal, post tibial, anti tibial & dorsalis pedis blood vessels in a simulated environment	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Viva voce/ skill assessment		General Medicine	
AN20.9	Identify & demonstrate Palpation of vessels (femoral, popliteal, dorsalis pedis, post tibial), Mid inguinal point, Surface projection of: femoral nerve, Saphenous opening, Sciatic, tibial, common peroneal & deep peroneal nerve, Great and small saphenous veins	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Viva voce/ skill assessment		General Medicine, General Surgery	
AN20.10	Describe basic concept of development of lower limb	K	KH	N	Lecture	Viva voce			

**Topic: Thoracic cage**

**Number of competencies: (11)**

**Number of procedures for certification: (NIL)**

AN21.1	Identify and describe the salient features of sternum, typical rib, 1 <sup>st</sup> rib and typical thoracic vertebra	K/S	SH	Y	Lecture, DOAP session	Viva voce/ skill assessment			
AN21.2	Identify & describe the features of 2 <sup>nd</sup> , 11 <sup>th</sup> and 12 <sup>th</sup> ribs, 1 <sup>st</sup> , 11 <sup>th</sup> and 12 <sup>th</sup> thoracic vertebrae	K/S	SH	N	Lecture, DOAP session	Viva voce/ skill assessment			
AN21.3	Describe & demonstrate the boundaries of thoracic inlet, cavity and outlet	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN21.4	Describe & demonstrate extent, attachments, direction of fibres, nerve supply and actions of intercostal muscles	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN21.5	Describe & demonstrate origin, course, relations and branches of a typical intercostal nerve	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN21.6	Mention origin, course and branches/ tributaries of: 1) anterior & posterior intercostal vessels 2) internal thoracic vessels	K	KH	Y	Practical, Lecture	Written/ Viva voce			
AN21.7	Mention the origin, course, relations and branches of 1) atypical intercostal nerve 2) superior intercostal artery, subcostal artery	K	KH	N	Lecture	Written			
AN21.8	Describe & demonstrate type, articular surfaces & movements of manubriosternal, costovertebral, costotransverse and xiphisternal joints	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN21.9	Describe & demonstrate mechanics and types of respiration	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			Physiology
AN21.10	Describe costochondral and interchondral joints	K	KH	N	Lecture	Written			
AN21.11	Mention boundaries and contents of the superior, anterior, middle and posterior mediastinum	K	KH	Y	Practical, Lecture	Written/ Viva voce			
<b>Topic: Heart &amp; Pericardium</b> <span style="margin-left: 200px;"><b>Number of competencies: (7)</b></span> <span style="margin-left: 200px;"><b>Number of procedures for certification: (NIL)</b></span>									
AN22.1	Describe & demonstrate subdivisions, sinuses in pericardium, blood supply and nerve supply of pericardium	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN22.2	Describe & demonstrate external and internal features of each chamber of heart	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			Physiology
AN22.3	Describe & demonstrate origin, course and branches of coronary arteries	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			Physiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN22.4	Describe anatomical basis of ischaemic heart disease	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN22.5	Describe & demonstrate the formation, course, tributaries and termination of coronary sinus	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN22.6	Describe the fibrous skeleton of heart	K	KH	Y	Lecture	Written			
AN22.7	Mention the parts, position and arterial supply of the conducting system of heart	K	KH	Y	Lecture	Written		General Medicine	Physiology
<b>Topic: Mediastinum</b> <span style="margin-left: 200px;"><b>Number of competencies: (7)</b></span> <span style="margin-left: 200px;"><b>Number of procedures for certification: (NIL)</b></span>									
AN23.1	Describe & demonstrate the external appearance, relations, blood supply, nerve supply, lymphatic drainage and applied anatomy of oesophagus	K/S	SH	Y	Practical, Lecture, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN23.2	Describe & demonstrate the extent, relations tributaries of thoracic duct and enumerate its applied anatomy	K/S	SH	Y	Practical, Lecture, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN23.3	Describe & demonstrate origin, course, relations, tributaries and termination of superior venacava, azygos, hemiazygos and accessory hemiazygos veins	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN23.4	Mention the extent, branches and relations of arch of aorta & descending thoracic aorta	K	KH	Y	Practical, Lecture	Written/ Viva voce			
AN23.5	Identify & Mention the location and extent of thoracic sympathetic chain	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN23.6	Describe the splanchnic nerves	K	KH	N	Lecture	Written			
AN23.7	Mention the extent, relations and applied anatomy of lymphatic duct	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Lungs &amp; Trachea</b>									
<b>Number of competencies: (6)</b>				<b>Number of procedures for certification: (NIL)</b>					
AN24.1	Mention the blood supply, lymphatic drainage and nerve supply of pleura, extent of pleura and describe the pleural recesses and their applied anatomy	K	KH	Y	Practical, Lecture	Written/ Viva voce		General Medicine	Physiology
AN24.2	Identify side, external features and relations of structures which form root of lung & bronchial tree and their clinical correlate	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Medicine	Physiology
AN24.3	Describe a bronchopulmonary segment	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN24.4	Identify phrenic nerve & describe its formation & distribution	K/S	SH	Y	Lecture, Practical	Written/ Viva voce			
AN24.5	Mention the blood supply, lymphatic drainage and nerve supply of lungs	K	KH	Y	Lecture	Written/ Viva voce			
AN24.6	Describe the extent, length, relations, blood supply, lymphatic drainage and nerve supply of trachea	K	KH	N	Lecture	Written			
<b>Topic: Thorax</b>									
<b>Number of competencies: (9)</b>				<b>Number of procedures for certification: (01)</b>					
AN25.1	Identify, draw and label a slide of trachea and lung	K/S	SH	Y	Lecture, Practical	Written/ skill assessment	1		
AN25.2	Describe development of pleura, lung & heart	K	KH	Y	Lecture	Written			
AN25.3	Describe fetal circulation and changes occurring at birth	K	KH	Y	Lecture	Written		General Medicine	Physiology
AN25.4	Describe embryological basis of: 1) atrial septal defect, 2) ventricular septal defect, 3) Fallot's tetralogy & 4) tracheo-oesophageal fistula	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics	Physiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN25.5	Describe developmental basis of congenital anomalies, transposition of great vessels, dextrocardia, patent ductus arteriosus and coarctation of aorta	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics	Physiology
AN25.6	Mention development of aortic arch arteries, SVC, IVC and coronary sinus	K	KH	N	Lecture	Written/ Viva voce			
AN25.7	Identify structures seen on a plain x-ray chest (PA view)	K/S	SH	Y	Practical, DOAP session	Written/ Viva voce		Radiodiagnosis, General Medicine	
AN25.8	Identify and describe in brief a barium swallow	K/S	SH	N	Practical, DOAP session	Written/ Viva voce		Radiodiagnosis, General Medicine	
AN25.9	Demonstrate surface marking of lines of pleural reflection, lung borders and fissures, trachea, heart borders, apex beat & surface projection of valves of heart	K/S	SH	Y	Practical	Viva voce/ skill assessment		General Medicine, Pediatrics	Physiology
<b>Topic: Skull osteology</b> <span style="margin-left: 200px;"><b>Number of competencies: (7)</b></span> <span style="margin-left: 200px;"><b>Number of procedures for certification: (NIL)</b></span>									
AN26.1	Demonstrate anatomical position of skull, Identify and locate individual skull bones in skull	K/S	SH	Y	Lecture, DOAP session	Viva voce/ skill assessment			
AN26.2	Describe the features of norma frontalis, verticalis, occipitalis, lateralis and basalis	K/S	SH	Y	Lecture, DOAP session	Viva voce/ skill assessment			
AN26.3	Describe cranial cavity, its subdivisions, foramina and structures passing through them	K/S	SH	Y	Lecture, DOAP session	Viva voce/ skill assessment			
AN26.4	Describe morphological features of mandible	K/S	SH	Y	Lecture, DOAP session	Viva voce/ skill assessment			
AN26.5	Describe features of typical and atypical cervical vertebrae (atlas and axis)	K/S	SH	Y	Lecture, DOAP session	Viva voce/ skill assessment			
AN26.6	Explain the concept of bones that ossify in membrane	K	KH	N	Lecture	Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN26.7	Describe the features of the 7 <sup>th</sup> cervical vertebra	K/S	SH	N	DOAP session	Viva voce			
<b>Topic: Scalp</b>		<b>Number of competencies: (2)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN27.1	Describe the layers of scalp, its blood supply, its nerve supply and surgical importance	K	KH	Y	Practical, Lecture	Written/ Viva voce		General Surgery	
AN27.2	Describe emissary veins with its role in spread of infection from extracranial route to intracranial venous sinuses	K	KH	Y	Lecture	Written			
<b>Topic: Face &amp; parotid region</b>		<b>Number of competencies: (10)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN28.1	Describe & demonstrate muscles of facial expression and their nerve supply	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN28.2	Describe sensory innervation of face	K	KH	Y	Practical, Lecture	Written/ Viva voce			
AN28.3	Describe & demonstrate origin /formation, course, branches /tributaries of facial vessels	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN28.4	Describe & demonstrate branches of facial nerve with distribution	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN28.5	Describe cervical lymph nodes and lymphatic drainage of head, face and neck	K	KH	Y	Practical, Lecture	Written/ Viva voce			
AN28.6	Identify superficial muscles of face, their nerve supply and actions	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN28.7	Explain the anatomical basis of facial nerve palsy	K	KH	Y	Lecture	Written		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN28.8	Explain surgical importance of deep facial vein	K	KH	Y	Lecture	Written		General Surgery	
AN28.9	Describe & demonstrate the parts, borders, surfaces, contents, relations and nerve supply of parotid gland with course of its duct and surgical importance	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN28.10	Explain the anatomical basis of Frey's syndrome	K	KH	N	Lecture	Written		General Surgery	
<b>Topic: Posterior triangle of neck</b> <span style="float: right;">Number of competencies: (4)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN29.1	Describe & demonstrate attachments, nerve supply, relations and actions of sternocleidomastoid	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN29.2	Explain anatomical basis of Erb's & Klumpke's palsy	K	KH	Y	Lecture	Written		General Surgery	
AN29.3	Explain anatomical basis of wry neck	K	KH	N	Lecture	Written		General Surgery	
AN29.4	Describe & demonstrate attachments of 1) inferior belly of omohyoid, 2)scalenus anterior, 3) scalenus medius & 4) levator scapulae	K/S	SH	N	Lecture, Practical	Written/ Viva voce			
<b>Topic: Cranial cavity</b> <span style="float: right;">Number of competencies: (5)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN30.1	Describe the cranial fossae & identify related structures	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN30.2	Describe & identify major foramina with structures passing through them	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN30.3	Describe & identify dural folds & dural venous sinuses	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN30.4	Describe clinical importance of dural venous sinuses	K	KH	Y	Lecture	Written			
AN30.5	Explain effect of pituitary tumours on visual pathway	K	KH	N	Lecture	Written		Ophthalmology	
<b>Topic: Orbit</b>		<b>Number of competencies: (5)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN31.1	Describe & identify extra ocular muscles of eyeball	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN31.2	Describe & demonstrate nerves and vessels in the orbit	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN31.3	Describe anatomical basis of Horner's syndrome	K	KH	N	Lecture	Written		Ophthalmology	
AN31.4	Enumerate components of lacrimal apparatus	K	KH	Y	Lecture	Written			
AN31.5	Explain the anatomical basis of oculomotor, trochlear and abducent nerve palsies along with strabismus	K	KH	Y	Lecture	Written		Ophthalmology	
<b>Topic: Anterior Triangle</b>		<b>Number of competencies: (2)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN32.1	Describe boundaries and subdivisions of anterior triangle	K	KH	Y	Practical, Lecture	Written/ Viva voce			
AN32.2	Describe & demonstrate boundaries and contents of muscular, carotid, digastric and submental triangles	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
<b>Topic: Temporal and Infratemporal regions</b>		<b>Number of competencies: (5)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN33.1	Describe & demonstrate extent, boundaries and contents of temporal and infratemporal fossae	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN33.2	Describe & demonstrate attachments, direction of fibres, nerve supply and actions of muscles of mastication	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN33.3	Describe & demonstrate articulating surface, type & movements of temporomandibular joint	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN33.4	Explain the clinical significance of pterygoid venous plexus	K	KH	Y	Lecture	Written		General Surgery	
AN33.5	Describe the features of dislocation of temporomandibular joint	K	KH	N	Lecture	Written		General Surgery	
<b>Topic: Submandibular region</b> <span style="float: right;">Number of competencies: (2)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN34.1	Describe & demonstrate the morphology, relations and nerve supply of submandibular salivary gland & submandibular ganglion	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN34.2	Describe the basis of formation of submandibular stones	K	KH	N	Lecture	Written		General Surgery	
<b>Topic: Deep structures in the neck</b> <span style="float: right;">Number of competencies: (10)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN35.1	Describe the parts, extent, attachments, modifications of deep cervical fascia	K	KH	Y	Lecture	Written			
AN35.2	Describe & demonstrate location, parts, borders, surfaces, relations & blood supply of thyroid gland	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN35.3	Demonstrate & describe the origin, parts, course & branches subclavian artery	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN35.4	Describe & demonstrate origin, course, relations, tributaries and termination of internal jugular & brachiocephalic veins	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN35.5	Describe and demonstrate extent, drainage & applied anatomy of cervical lymph nodes	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN35.6	Describe and demonstrate the extent, formation, relation & branches of cervical sympathetic chain	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN35.7	Describe the course and branches of IX, X, XI & XII nerve in the neck	K	KH	Y	Lecture	Written			
AN35.8	Describe the anatomically relevant clinical features of Thyroid swellings	K	KH	N	Lecture	Written		General Surgery	
AN35.9	Describe the clinical features of compression of subclavian artery and lower trunk of brachial plexus by cervical rib	K	KH	N	Lecture	Written		General Surgery	
AN35.10	Describe the fascial spaces of neck	K	KH	N	Lecture	Written			
<b>Topic: Mouth, Pharynx &amp; Palate</b>		<b>Number of competencies: (5)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN36.1	Describe the 1) morphology, relations, blood supply and applied anatomy of palatine tonsil 2) composition of soft palate	K	KH	Y	Lecture	Written		ENT	
AN36.2	Describe the components and functions of Waldeyer's lymphatic ring	K	KH	Y	Lecture	Written		ENT	
AN36.3	Describe the boundaries and clinical significance of pyriform fossa	K	KH	N	Lecture	Written		ENT	
AN36.4	Describe the anatomical basis of tonsillitis, tonsillectomy, adenoids and peri-tonsillar abscess	K	KH	N	Lecture	Written		ENT	
AN36.5	Describe the clinical significance of Killian's dehiscence	K	KH	N	Lecture	Written		ENT	
<b>Topic: Cavity of Nose</b>		<b>Number of competencies: (3)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN37.1	Describe & demonstrate features of nasal septum, lateral wall of nose, their blood supply and nerve supply	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		ENT	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN37.2	Describe location and functional anatomy of paranasal sinuses	K	KH	Y	Lecture	Written		ENT	
AN37.3	Describe anatomical basis of sinusitis & maxillary sinus tumours	K	KH	N	Lecture	Written		ENT	
<b>Topic: Larynx</b> <span style="float: right;">Number of competencies: (3)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN38.1	Describe the morphology, identify structure of the wall, nerve supply, blood supply and actions of intrinsic and extrinsic muscles of the larynx	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		ENT	
AN38.2	Describe the anatomical aspects of laryngitis	K	KH	N	Lecture	Written		ENT	
AN38.3	Describe anatomical basis of recurrent laryngeal nerve injury	K	KH	N	Lecture	Written		ENT	
<b>Topic: Tongue</b> <span style="float: right;">Number of competencies: (2)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN39.1	Describe & demonstrate the morphology, nerve supply, embryological basis of nerve supply, blood supply, lymphatic drainage and actions of extrinsic and intrinsic muscles of tongue	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN39.2	Explain the anatomical basis of hypoglossal nerve palsy	K	KH	N	Lecture	Written		ENT	
<b>Topic: Organs of hearing and equilibrium</b> <span style="float: right;">Number of competencies: (5)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN40.1	Describe & identify the parts, blood supply and nerve supply of external ear	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		ENT	
AN40.2	Describe & demonstrate the boundaries, contents, relations and functional anatomy of middle ear and auditory tube	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		ENT	
AN40.3	Describe the features of internal ear	K	KH	N	Lecture	Written		ENT	
AN40.4	Explain anatomical basis of otitis externa and otitis media	K	KH	N	Lecture	Written		ENT	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN40.5	Explain anatomical basis of myringotomy	K	KH	N	Lecture	Written		ENT	
<b>Topic: Eyeball</b>		<b>Number of competencies: (3)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN41.1	Describe & demonstrate parts and layers of eyeball	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		Ophthalmology	
AN41.2	Describe the anatomical aspects of cataract, glaucoma & central retinal artery occlusion	K	KH	N	Lecture	Written		Ophthalmology	
AN41.3	Describe the position, nerve supply and actions of intraocular muscles	K	KH	N	Lecture	Written		Ophthalmology	
<b>Topic: Back Region</b>		<b>Number of competencies: (3)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN42.1	Describe the contents of the vertebral canal	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN42.2	Describe & demonstrate the boundaries and contents of Suboccipital triangle	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN42.3	Describe the position, direction of fibres, relations, nerve supply, actions of semispinalis capitis and splenius capitis	K	KH	N	Lecture	Written			
<b>Topic: Head &amp; neck Joints, Histology, Development, Radiography &amp; Surface marking</b>		<b>Number of competencies: (9)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN43.1	Describe & demonstrate the movements with muscles producing the movements of atlantooccipital joint & atlantoaxial joint	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN43.2	Identify, describe and draw the microanatomy of pituitary gland, thyroid, parathyroid gland, tongue, salivary glands, tonsil, epiglottis, cornea, retina	K/S	SH	Y	Lecture, Practical	Written/ skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN43.3	Identify, describe and draw microanatomy of olfactory epithelium, eyelid, lip, sclero-corneal junction, optic nerve, cochlea- organ of corti, pineal gland	K/S	SH	N	Lecture, Practical	Written/ skill assessment			
AN43.4	Describe the development and developmental basis of congenital anomalies of face, palate, tongue, branchial apparatus, pituitary gland, thyroid gland & eye	K	KH	Y	Lecture	Written/ Viva voce			
AN43.5	Demonstrate- 1) Testing of muscles of facial expression, extraocular muscles, muscles of mastication, 2) Palpation of carotid arteries, facial artery, superficial temporal artery, 3) Location of internal and external jugular veins, 4) Location of hyoid bone, thyroid cartilage and cricoid cartilage with their vertebral levels	K/S	SH	Y	Practical	Viva voce/ skill assessment		General Surgery	
AN43.6	Demonstrate surface projection of- Thyroid gland, Parotid gland and duct, Pterion, Common carotid artery, Internal jugular vein, Subclavian vein, External jugular vein, Facial artery in the face & accessory nerve	K/S	SH	N	Practical	Viva voce/ skill assessment		General Surgery	
AN43.7	Identify the anatomical structures in 1) Plain x-ray skull, 2) AP view and lateral view 3) Plain x-ray cervical spine-AP and lateral view 4) Plain x-ray of paranasal sinuses	K/S	SH	Y	Practical	Viva voce/ skill assessment		Radiodiagnosis	
AN43.8	Describe the anatomical route used for carotid angiogram and vertebral angiogram	K/S	SH	N	Practical	Viva voce/ skill assessment		Radiodiagnosis	
AN43.9	Identify anatomical structures in carotid angiogram and vertebral angiogram	K/S	SH	N	Practical	Viva voce/ skill assessment		Radiodiagnosis	
<b>Topic: Anterior abdominal wall</b> <span style="margin-left: 200px;"><b>Number of competencies: (7)</b></span> <span style="margin-left: 200px;"><b>Number of procedures for certification: (NIL)</b></span>									
AN44.1	Describe & demonstrate the Planes (transpyloric, transtuberular, subcostal, lateral vertical, linea alba, linea semilunaris), regions & Quadrants of abdomen	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN44.2	Describe & identify the Fascia, nerves & blood vessels of anterior abdominal wall	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN44.3	Describe the formation of rectus sheath and its contents	K	KH	Y	Lecture	Written/ Viva voce			
AN44.4	Describe & demonstrate extent, boundaries, contents of Inguinal canal including Hesselbach's triangle.	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN44.5	Explain the anatomical basis of inguinal hernia.	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN44.6	Describe & demonstrate attachments of muscles of anterior abdominal wall	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN44.7	Enumerate common Abdominal incisions	K	KH	N	Lecture	Written		General Surgery	
<b>Topic: Posterior abdominal wall</b>		<b>Number of competencies: (3)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN45.1	Describe Thoracolumbar fascia	K	KH	Y	Lecture	Written			
AN45.2	Describe & demonstrate Lumbar plexus for its root value, formation & branches	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN45.3	Mention the major subgroups of back muscles, nerve supply and action	K	KH	N	Lecture	Written			
<b>Topic: Male external genitalia</b>		<b>Number of competencies: (5)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN46.1	Describe & demonstrate coverings, internal structure, side determination, blood supply, nerve supply, lymphatic drainage & descent of testis with its applied anatomy	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN46.2	Describe parts of Epididymis	K	KH	Y	Lecture, Practical	Written/ Viva voce			
AN46.3	Describe Penis under following headings: (parts, components, blood supply and lymphatic drainage)	K	KH	Y	Lecture, Practical	Written/ Viva voce			
AN46.4	Explain the anatomical basis of Varicocoele	K	KH	N	Lecture	Written		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN46.5	Explain the anatomical basis of Phimosis & Circumcision	K	KH	N	Lecture	Written		General Surgery	
<b>Topic: Abdominal cavity</b>		<b>Number of competencies: (14)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN47.1	Describe & identify boundaries and recesses of Lesser & Greater sac	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN47.2	Name & identify various peritoneal folds & pouches with its explanation	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN47.3	Explain anatomical basis of Ascites & Peritonitis	K	KH	N	Lecture	Written		General Surgery	
AN47.4	Explain anatomical basis of Subphrenic abscess	K	KH	N	Lecture	Written		General Surgery	
AN47.5	Describe & demonstrate major viscera of abdomen under following headings (anatomical position, external and internal features, important peritoneal and other relations, blood supply, nerve supply, lymphatic drainage and applied aspects)	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN47.6	Explain the anatomical basis of Splenic notch, Accessory spleens, Kehr's sign, Different types of vagotomy, Liver biopsy (site of needle puncture), Referred pain in cholecystitis, Obstructive jaundice, Referred pain around umbilicus, Radiating pain of kidney to groin & Lymphatic spread in carcinoma stomach	K	KH	N	Lecture	Written		General Surgery	
AN47.7	Mention the clinical importance of Calot's triangle	K	KH	N	Lecture	Written		General Surgery	
AN47.8	Describe & identify the formation, course relations and tributaries of Portal vein, Inferior vena cava & Renal vein	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN47.9	Describe & identify the origin, course, important relations and branches of Abdominal aorta, Coeliac trunk, Superior mesenteric, Inferior mesenteric & Common iliac artery	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN47.10	Enumerate the sites of portosystemic anastomosis	K	KH	Y	Lecture	Written		General Surgery	
AN47.11	Explain the anatomic basis of hematemesis& caput medusae in portal hypertension	K	KH	Y	Lecture,	Written/ Viva voce		General Surgery	
AN47.12	Describe important nerve plexuses of posterior abdominal wall	K	KH	N	Lecture	Written			
AN47.13	Describe & demonstrate the attachments, openings, nerve supply & action of the thoracoabdominal diaphragm	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN47.14	Describe the abnormal openings of thoracoabdominal diaphragm and diaphragmatic hernia	K	KH	N	Lecture	Written		General Surgery	
<b>Topic: Pelvic wall and viscera</b> <span style="margin-left: 200px;"><b>Number of competencies: (8)</b></span> <span style="margin-left: 200px;"><b>Number of procedures for certification: (NIL)</b></span>									
AN48.1	Describe & identify the muscles of Pelvic diaphragm	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN48.2	Describe & demonstrate the (position, features, important peritoneal and other relations, blood supply, nerve supply, lymphatic drainage and clinical aspects of) important male & female pelvic viscera	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN48.3	Describe & demonstrate the origin, course, important relations and branches of internal iliac artery	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN48.4	Describe the branches of sacral plexus	K	KH	Y	Lecture	Written			
AN48.5	Explain the anatomical basis of suprapubic cystostomy, Urinary obstruction in benign prostatic hypertrophy, Retroverted uterus, Prolapse uterus, Internal and external haemorrhoids, Anal fistula, Vasectomy, Tubal pregnancy & Tubal ligation	K	KH	N	Lecture	Written		General Surgery	
AN48.6	Describe the neurological basis of Automatic bladder	K	KH	N	Lecture	Written		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN48.7	Mention the lobes involved in benign prostatic hypertrophy & prostatic cancer	K	KH	N	Lecture	Written		General Surgery	
AN48.8	Mention the structures palpable during vaginal & rectal examination	K	KH	N	Lecture	Written		Obstetrics & Gynaecology General Surgery	
<b>Topic: Perineum</b>		<b>Number of competencies: (5)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN49.1	Describe & demonstrate the superficial & deep perineal pouch (boundaries and contents)	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		Obstetrics & Gynaecology	
AN49.2	Describe & identify Perineal body	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		Obstetrics & Gynaecology	
AN49.3	Describe & demonstrate Perineal membrane in male & female	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN49.4	Describe & demonstrate boundaries, content & applied anatomy of Ischiorectal fossa	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Surgery	
AN49.5	Explain the anatomical basis of Perineal tear, Episiotomy, Perianal abscess and Anal fissure	K	KH	N	Lecture	Written		Obstetrics & Gynaecology	
<b>Topic: Vertebral column</b>		<b>Number of competencies: (4)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN50.1	Describe the curvatures of the vertebral column	K	KH	Y	Lecture	Written/ Viva voce			
AN50.2	Describe & demonstrate the type, articular ends, ligaments and movements of Intervertebral joints, Sacroiliac joints & Pubic symphysis	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN50.3	Describe lumbar puncture (site, direction of the needle, structures pierced during the lumbar puncture)	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	
AN50.4	Explain the anatomical basis of Scoliosis, Lordosis, Prolapsed disc, Spondylolisthesis & Spina bifida	K	KH	N	Lecture	Written		Orthopedics	
<b>Topic: Sectional Anatomy</b>		<b>Number of competencies: (2)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN51.1	Describe & identify the cross-section at the level of T8, T10 and L1 (transpyloric plane)	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		Radiodiagnosis	
AN51.2	Describe & identify the midsagittal section of male and female pelvis	K	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		Radiodiagnosis	
<b>Topic: Histology &amp; Embryology</b>		<b>Number of competencies: (8)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN52.1	Describe & identify the microanatomical features of Gastro-intestinal system: Oesophagus, Fundus of stomach, Pylorus of stomach, Duodenum, Jejunum, Ileum, Large intestine, Appendix, Liver, Gall bladder, Pancreas & Suprarenal gland	K/S	SH	Y	Lecture, Practical	Written/ skill assessment			
AN52.2	Describe & identify the microanatomical features of: Urinary system: Kidney, Ureter & Urinary bladder Male Reproductive System: Testis, Epididymis, Vas deferens, Prostate & penis Female reproductive system: Ovary, Uterus, Uterine tube, Cervix, Placenta & Umbilical cord	K/S	SH	Y	Lecture, Practical	Written/ skill assessment			
AN52.3	Describe & identify the microanatomical features of Cardiooesophageal junction, Corpus luteum	K/S	SH	N	Lecture, Practical	Written/ skill assessment			
AN52.4	Describe the development of anterior abdominal wall	K	KH	N	Lecture	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN52.5	Describe the development and congenital anomalies of Diaphragm	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN52.6	Describe the development and congenital anomalies of: Foregut, Midgut & Hindgut	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN52.7	Describe the development of Urinary system	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN52.8	Describe the development of male & female reproductive system	K	KH	Y	Lecture	Written/ Viva voce		Obstetrics & Gynaecology	
<b>Topic: Osteology</b> <span style="float: right;">Number of competencies: (4)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN53.1	Identify & hold the bone in the anatomical position, Describe the salient features, articulations & demonstrate the attachments of muscle groups	K/S	SH	Y	Lecture, DOAP session	Viva voce/ skill assessment		General Surgery, Obstetrics & Gynaecology	
AN53.2	Demonstrate the anatomical position of bony pelvis & show boundaries of pelvic inlet, pelvic cavity, pelvic outlet	K/S	SH	Y	Lecture, DOAP session	Viva voce/ skill assessment		Obstetrics & Gynaecology	
AN53.3	Define true pelvis and false pelvis and demonstrate sex determination in male & female bony pelvis	K/S	SH	Y	Lecture, DOAP session	Viva voce/ skill assessment		Obstetrics & Gynaecology	
AN53.4	Explain and demonstrate clinical importance of bones of abdominopelvic region (sacralization of lumbar vertebra, Lumbarization of 1st sacral vertebra, types of bony pelvis & Coccyx)	K/S	SH	N	Lecture, DOAP session	Viva voce/ skill assessment			
<b>Topic: Radiodiagnosis</b> <span style="float: right;">Number of competencies: (3)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN54.1	Describe & identify features of plain X ray abdomen	K/S	SH	Y	Lecture, DOAP session	Viva voce/ skill assessment		Radiodiagnosis	
AN54.2	Describe & identify the special radiographs of abdominopelvic region (contrast X ray Barium swallow, Barium meal, Barium enema, Cholecystography, Intravenous pyelography & Hysterosalpingography)	K/S	SH	Y	Lecture, DOAP session	Viva voce/ skill assessment		Radiodiagnosis	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN54.3	Describe role of ERCP, CT abdomen, MRI, Arteriography in radiodiagnosis of abdomen	K	KH	N	Lecture	Viva voce		Radiodiagnosis	
<b>Topic: Surface marking</b> <span style="float: right;"><b>Number of competencies: (2)</b> <b>Number of procedures for certification: (NIL)</b></span>									
AN55.1	Demonstrate the surface marking of; Regions and planes of abdomen, Superficial inguinal ring, Deep inguinal ring , McBurney's point, Renal Angle & Murphy's point	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Viva voce/ skill assessment		General Surgery	
AN55.2	Demonstrate the surface projections of: Stomach, Liver, Fundus of gall bladder, Spleen, Duodenum, Pancreas, Ileocaecal junction, Kidneys & Root of mesentery	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Viva voce/ skill assessment		General Surgery	
<b>Topic: Meninges &amp; CSF</b> <span style="float: right;"><b>Number of competencies: (2)</b> <b>Number of procedures for certification: (NIL)</b></span>									
AN56.1	Describe & identify various layers of meninges with its extent & modifications	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Medicine	
AN56.2	Describe circulation of CSF with its applied anatomy	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
<b>Topic: Spinal Cord</b> <span style="float: right;"><b>Number of competencies: (5)</b> <b>Number of procedures for certification: (NIL)</b></span>									
AN57.1	Identify external features of spinal cord	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN57.2	Describe extent of spinal cord in child & adult with its clinical implication	K	KH	Y	Lecture	Written/ Viva voce			
AN57.3	Draw & label transverse section of spinal cord at mid-cervical & mid-thoracic level	K	KH	Y	Lecture	Written/ Viva voce			
AN57.4	Enumerate ascending & descending tracts at mid thoracic level of spinal cord	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN57.5	Describe anatomical basis of syringomyelia	K	KH	N	Lecture	Written		General Medicine	Physiology
<b>Topic: Medulla Oblongata</b> <span style="float: right;">Number of competencies: (4)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN58.1	Identify external features of medulla oblongata	K/S	SH	Y	Lecture, DOAP session	Written/ Viva voce/ skill assessment			
AN58.2	Describe transverse section of medulla oblongata at the level of 1) pyramidal decussation, 2) sensory decussation 3) ION	K	KH	Y	Lecture	Written/ Viva voce			
AN58.3	Enumerate cranial nerve nuclei in medulla oblongata with their functional group	K	KH	Y	Lecture	Written/ Viva voce			Physiology
AN58.4	Describe anatomical basis & effects of medial & lateral medullary syndrome	K	KH	N	Lecture	Written		General Medicine	Physiology
<b>Topic: Pons</b> <span style="float: right;">Number of competencies: (3)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN59.1	Identify external features of pons	K/S	SH	Y	Lecture, DOAP session	Written/ Viva voce/ skill assessment			Physiology
AN59.2	Draw & label transverse section of pons at the upper and lower level	K	KH	Y	Lecture	Written/ Viva voce			
AN59.3	Enumerate cranial nerve nuclei in pons with their functional group	K	KH	Y	Lecture	Written/ Viva voce			
<b>Topic: Cerebellum</b> <span style="float: right;">Number of competencies: (3)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN60.1	Describe & demonstrate external & internal features of cerebellum	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN60.2	Describe connections of cerebellar cortex and intracerebellar nuclei	K	KH	Y	Lecture	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN60.3	Describe anatomical basis of cerebellar dysfunction	K	KH	N	Lecture	Written		General Medicine	Physiology
<b>Topic: Midbrain</b> <span style="float: right;">Number of competencies: (3)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN61.1	Identify external & internal features of midbrain	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			
AN61.2	Describe internal features of midbrain at the level of superior & inferior colliculus	K	KH	Y	Lecture	Written/ Viva voce			
AN61.3	Describe anatomical basis & effects of Benedikt's and Weber's syndrome	K	KH	N	Lecture	Written		General Medicine	Physiology
<b>Topic: Cranial nerve nuclei &amp; Cerebral hemispheres</b> <span style="float: right;">Number of competencies: (6)</span> <span style="float: right;">Number of procedures for certification: (NIL)</span>									
AN62.1	Enumerate cranial nerve nuclei with its functional component	K	KH	Y	Lecture	Written/ Viva voce			
AN62.2	Describe & demonstrate surfaces, sulci, gyri, poles, & functional areas of cerebral hemisphere	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Medicine	Physiology
AN62.3	Describe the white matter of cerebrum	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN62.4	Enumerate parts & major connections of basal ganglia & limbic lobe	K	KH	Y	Lecture	Written/ Viva voce			Physiology
AN62.5	Describe boundaries, parts, gross relations, major nuclei and connections of dorsal thalamus, hypothalamus, epithalamus, metathalamus and subthalamus	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN62.6	Describe & identify formation, branches & major areas of distribution of circle of Willis	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Medicine	Physiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Ventricular System</b>		<b>Number of competencies: (2)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN63.1	Describe & demonstrate parts, boundaries & features of IIIrd, IVth & lateral ventricle	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			Physiology
AN63.2	Describe anatomical basis of congenital hydrocephalus	K	KH	N	Lecture	Written		Pediatrics	Physiology
<b>Topic: Histology &amp; Embryology</b>		<b>Number of competencies: (3)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN64.1	Describe & identify the microanatomical features of Spinal cord, Cerebellum & Cerebrum	K/S	SH	Y	Lecture, Practical	Written/ skill assessment			
AN64.2	Describe the development of neural tube, spinal cord, medulla oblongata, pons, midbrain, cerebral hemisphere & cerebellum	K	KH	Y	Lecture	Written/ Viva voce			
AN64.3	Describe various types of open neural tube defects with its embryological basis	K	KH	N	Lecture	Written/ Viva voce		Obstetrics & Gynaecology, Pediatrics	
<b>Topic: Epithelium histology</b>		<b>Number of competencies: (2)</b>			<b>Number of competencies for certification: (01)</b>				
AN65.1	Identify epithelium under the microscope & describe the various types that correlate to its function	K/S	P	Y	Lecture, Practical	Written/ skill assessment	1		
AN65.2	Describe the ultrastructure of epithelium	K	KH	N	Lecture, Practical	Written			
<b>Topic: Connective tissue histology</b>		<b>Number of competencies: (2)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN66.1	Describe & identify various types of connective tissue with functional correlation	K/S	SH	Y	Lecture, Practical	Written/ skill assessment			Physiology
AN66.2	Describe the ultrastructure of connective tissue	K	KH	N	Lecture, Practical	Written		Pathology	
<b>Topic: Muscle histology</b>		<b>Number of competencies: (3)</b>			<b>Number of procedures for certification: (NIL)</b>				



Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN71.1	Identify bone under the microscope; classify various types and describe the structure-function correlation of the same	K/S	SH	Y	Lecture, Practical	Written/ skill assessment		Pathology	
AN71.2	Identify cartilage under the microscope & describe various types and structure- function correlation of the same	K/S	SH	Y	Lecture, Practical	Written/ skill assessment		Pathology	
<b>Topic: Integumentary System</b>		<b>Number of competencies: (1)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN72.1	Identify the skin and its appendages under the microscope and correlate the structure with function	K/S	SH	Y	Lecture, Practical	Written/ skill assessment			
<b>Topic: Chromosomes</b>		<b>Number of competencies: (3)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN73.1	Describe the structure of chromosomes with classification	K	KH	Y	Lecture	Written			
AN73.2	Describe technique of karyotyping with its applications	K	KH	Y	Lecture	Written			
AN73.3	Describe the Lyon's hypothesis	K	KH	Y	Lecture	Written			
<b>Topic: Patterns of Inheritance</b>		<b>Number of competencies: (4)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN74.1	Describe the various modes of inheritance with examples	K	KH	Y	Lecture	Written		General Medicine, Pediatrics	
AN74.2	Draw pedigree charts for the various types of inheritance & give examples of diseases of each mode of inheritance	K	KH	Y	Lecture	Written		General Medicine, Pediatrics	
AN74.3	Describe multifactorial inheritance with examples	K	KH	Y	Lecture	Written		General Medicine	
AN74.4	Describe the genetic basis & clinical features of Achondroplasia, Cystic Fibrosis, Vitamin D resistant rickets, Haemophilia, Duchene's muscular dystrophy & Sickle cell anaemia	K	KH	N	Lecture	Written		General Medicine, Pediatrics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Principle of Genetics, Chromosomal Aberrations &amp; Clinical Genetics</b> <b>Number of competencies: (5)</b> <b>Number of procedures for certification: (NIL)</b>									
AN75.1	Describe the structural and numerical chromosomal aberrations	K	KH	Y	Lecture	Written		Pediatrics	
AN75.2	Explain the terms mosaics and chimeras with example	K	KH	N	Lecture	Written		Pediatrics	
AN75.3	Describe the genetic basis & clinical features of Prader Willi syndrome, Edward syndrome & Patau syndrome	K	KH	N	Lecture	Written		Pediatrics	
AN75.4	Describe genetic basis of variation: polymorphism and mutation	K	KH	Y	Lecture	Written		Pediatrics	
AN75.5	Describe the principles of genetic counselling	K	KH	Y	Lecture	Written		Pediatrics, Obstetrics & Gynaecology	
<b>Topic: Introduction to embryology</b> <b>Number of competencies: (2)</b> <b>Number of procedures for certification: (NIL)</b>									
AN76.1	Describe the stages of human life	K	KH	Y	Lecture	Written			
AN76.2	Explain the terms- phylogeny, ontogeny, trimester, viability	K	KH	Y	Lecture	written			
<b>Topic: Gametogenesis and fertilization</b> <b>Number of competencies: (6)</b> <b>Number of procedures for certification: (NIL)</b>									
AN77.1	Describe the uterine changes occurring during the menstrual cycle	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN77.2	Describe the synchrony between the ovarian and menstrual cycles	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN77.3	Describe spermatogenesis and oogenesis along with diagrams	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN77.4	Describe the stages and consequences of fertilisation	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN77.5	Enumerate and describe the anatomical principles underlying contraception	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN77.6	Describe teratogenic influences; fertility and sterility, surrogate motherhood, social significance of "sex-ratio".	K	KH	N	Lecture	Written		Obstetrics & Gynaecology	
<b>Topic: Second week of development</b>									
				<b>Number of competencies: (5)</b>			<b>Number of procedures for certification: (NIL)</b>		
AN78.1	Describe cleavage and formation of blastocyst	K	KH	Y	Lecture	Written			
AN78.2	Describe the development of trophoblast	K	KH	Y	Lecture	Written			
AN78.3	Describe the process of implantation & common abnormal sites of implantation	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN78.4	Describe the formation of extra-embryonic mesoderm and coelom, bilaminar disc and prochordal plate	K	KH	Y	Lecture	Written			
AN78.5	Describe in brief abortion; decidual reaction, pregnancy test	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
<b>Toic: 3rd to 8th week of development</b>									
				<b>Number of competencies: (6)</b>			<b>Number of procedures for certification: (NIL)</b>		
AN79.1	Describe the formation & fate of the primitive streak	K	KH	Y	Lecture	Written			
AN79.2	Describe formation & fate of notochord	K	KH	Y	Lecture	Written			
AN79.3	Describe the process of neurulation	K	KH	Y	Lecture	Written			
AN79.4	Describe the development of somites and intra-embryonic coelom	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN79.5	Explain embryological basis of congenital malformations, nucleus pulposus, sacrococcygeal teratomas, neural tube defects	K	KH	N	Lecture	Written		Obstetrics & Gynaecology	
AN79.6	Describe the diagnosis of pregnancy in first trimester and role of teratogens, alpha-fetoprotein	K	KH	N	Lecture	Written		Obstetrics & Gynaecology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Fetal membranes</b>		<b>Number of competencies: (7)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN80.1	Describe formation, functions & fate of-chorion: amnion; yolk sac; allantois & decidua	K	KH	Y	Lecture	Written			
AN80.2	Describe formation & structure of umbilical cord	K	KH	Y	Lecture	Written			
AN80.3	Describe formation of placenta, its physiological functions, foetomaternal circulation & placental barrier	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN80.4	Describe embryological basis of twinning in monozygotic & dizygotic twins	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN80.5	Describe role of placental hormones in uterine growth & parturition	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN80.6	Explain embryological basis of estimation of fetal age.	K	KH	N	Lecture	Written		Obstetrics & Gynaecology	
AN80.7	Describe various types of umbilical cord attachments	K	KH	N	Lecture	Written		Obstetrics & Gynaecology	
<b>Topic: Prenatal Diagnosis</b>		<b>Number of competencies: (3)</b>			<b>Number of procedures for certification: (NIL)</b>				
AN81.1	Describe various methods of prenatal diagnosis	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN81.2	Describe indications, process and disadvantages of amniocentesis	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN81.3	Describe indications, process and disadvantages of chorion villus biopsy	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
<b>Topic: Ethics in Anatomy</b>		<b>Number of competencies: (1)</b>			<b>Number of procedures for certification: (NIL)</b>				

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN 82.1	Demonstrate respect and follow the correct procedure when handling cadavers and other biologic tissue	S	SH	Y	Group Activity	NIL		AETCOM	
<p><b>Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.</b>  <b>Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,</b>  <b>Column F: DOAP session – Demonstrate, Observe, Assess, Perform.</b>  <b>Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation</b></p>									
<b>Integration</b>									
<b>Physiology</b>									
PY3.1	Describe the structure and functions of a neuron and neuroglia; Discuss Nerve Growth Factor & other growth factors/cytokines	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY3.7	Describe the different types of muscle fibres and their structure	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY3.13	Describe muscular dystrophy: myopathies	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	Human Anatomy
PY4.1	Describe the structure and functions of digestive system	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY5.1	Describe the functional Anatomy of heart including chambers, sounds; and Pacemaker tissue and conducting system.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY5.6	Describe abnormal ECG, arrhythmias, heart block and myocardial Infarction	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	Human Anatomy
PY9.1	Describe and discuss sex determination; sex differentiation and their abnormalities and outline psychiatry and practical implication of sex determination.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY10.1	Describe and discuss the organization of nervous system	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
PY10.2	Describe and discuss the functions and properties of synapse, reflex, receptors	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY10.3	Describe and discuss somatic sensations & sensory tracts	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY10.4	Describe and discuss motor tracts, mechanism of maintenance of tone, control of body movements, posture and equilibrium & vestibular apparatus	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY10.5	Describe and discuss structure and functions of reticular activating system, autonomic nervous system (ANS)	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY10.6	Describe and discuss Spinal cord, its functions, lesion & sensory disturbances	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY10.7	Describe and discuss functions of cerebral cortex, basal ganglia, thalamus, hypothalamus, cerebellum and limbic system and their abnormalities	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Psychiatry	Human Anatomy
PY10.11	Demonstrate the correct clinical examination of the nervous system: Higher functions, Sensory system, motor system, reflexes, Cranial Nerves in a normal volunteer or simulated environment	S	P	Y	DOAP sessions	Skill assessment / Viva voce / OSCE	1 each (total 5)		Human Anatomy
<b>Biochemistry</b>									
BI6.13	Describe the functions of the kidney, liver, thyroid and adrenal glands	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
BI6.14	Describe the tests that are commonly done in clinical practice to assess the functions of these organs (kidney, liver, thyroid and adrenal glands).	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
BI6.15	Describe the abnormalities of kidney, liver, thyroid and adrenal glands	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
<b>Pathology</b>									

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
PA28.10	Describe the etiology, pathogenesis, pathology, laboratory findings, distinguishing features progression and complications of acute and chronic pyelonephritis and reflux nephropathy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, General Surgery	
PA31.1	Classify and describe the types, etiology, pathogenesis, pathology and hormonal dependency of benign breast disease	K	KH	Y	Lecture, Small group	Written/ Viva voce		Human Anatomy, General Surgery	
PA32.1	Enumerate, classify and describe the etiology, pathogenesis, pathology and iodine dependency of thyroid swellings	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy Physiology, General Medicine, General Surgery	
PA32.9	Describe the etiology, pathogenesis, manifestations, laboratory and morphologic features of adrenal neoplasms	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Physiology, General Medicine, General Surgery	
PA33.1	Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications of osteomyelitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Orthopedics	Microbiology
<b>Forensic Medicine &amp; Toxicology</b>									
FM2.28	Describe and discuss signs of intrauterine death, signs of live birth, viability of foetus, age determination of foetus, DOAP session of ossification centres, Hydrostatic test, Sudden infants death syndrome and Munchausen's syndrome by proxy.	K	KH	Y	Lectures, Small group discussion, Autopsy, DOAP session	Written/Viva voce/ OSCE		Pediatrics, Human Anatomy	
FM3.1	Identification Define and describe Corpus Delicti, establishment of identity of living persons including race, Sex, religion, complexion, stature, age determination using morphology, teeth-eruption, decay, bite marks, bones ossification centres, medico-legal aspects of age.	K	KH	Y	Lectures, Small group discussion, Bedside clinic, DOAP session	Written/ Viva voce/skill assessment		Human Anatomy	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Anesthesiology</b>									
AS4.2	Describe the Anatomy of the airway and its implications for general anaesthesia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	
AS5.2	Describe the correlative Anatomy of the brachial plexus, subarachnoid and epidural spaces	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	
AS5.3	Observe and describe the principles and steps/ techniques involved in peripheral nerve blocks	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Human Anatomy	
AS8.1	Describe the anatomical correlates and physiologic principles of pain	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Human Anatomy Physiology	
<b>ENT</b>									
EN1.1	Describe the Human Anatomy & physiology of ear, nose, throat, head & neck.	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce/Skill assessment		Human Anatomy	
<b>Ophthalmology</b>									
OP2.1	Enumerate the causes, describe and discuss the aetiology, clinical presentations and diagnostic features of common conditions of the lid and adnexa including Hordeolum externum/ internum, blepharitis, preseptal cellulitis, dacryocystitis, hemangioma, dermoid, ptosis, entropion, lid lag, lagophthalmos	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	
OP4.1	Enumerate describe and discuss the types and causes of corneal ulceration	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	
OP6.7	Enumerate and discuss the aetiology, the clinical distinguishing features of various glaucomas associated with shallow and deep anterior chamber. Choose appropriate investigations and treatment for patients with above conditions.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
OP7.1	Describe the surgical anatomy and the metabolism of the lens	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Human Anatomy	
OP8.1	Discuss the aetiology, pathology, clinical features and management of vascular occlusions of the retina	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Pathology	
<b>Dentistry</b>									
DE1.1	Enumerate the parts of the tooth	K	K	N	Lecture, Small group discussion	Viva voce		Human Anatomy	
DE5.1	Enumerate the parts of the tooth and supporting structures	K	K	N	Lecture, Small group discussion	Viva voce		Human Anatomy	
<b>General Medicine</b>									
IM3.1	Define discuss describe and distinguish community acquired pneumonia, nosocomial pneumonia and aspiration pneumonia	K	K	Y	Lecture, Small Group discussion	short note/ Viva voce		Human Anatomy, Pathology, Microbiology	
IM13.9	Demonstrate in a mannequin the correct technique for performing breast exam, rectal examination and cervical examination and pap smear	S	K	Y	Bedside clinic	Skill assessment/ short case		Human Anatomy	General Surgery
IM17.1	Define and classify headache and describe the presenting features, precipitating factors, aggravating and relieving factors of various kinds of headache	K	KH	Y	Lecture, Small group discussion	short note/ Viva voce		Human Anatomy	
IM18.1	Describe the functional and the vascular anatomy of the brain	K	KH	Y	Lecture, Small Group discussion	Written/ Viva voce		Human Anatomy	
IM19.1	Describe the functional anatomy of the locomotor system of the brain	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Human Anatomy, Physiology	
<b>Obstetrics &amp; Gynaecology</b>									

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
OG2.1	Describe and discuss the development and anatomy of the female reproductive tract, relationship to other pelvic organs, applied anatomy as related to Obstetrics and Gynaecology.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment		Human Anatomy	
OG4.1	Describe and discuss the basic embryology of fetus , factors influencing fetal growth and development, anatomy and physiology of placenta, and teratogenesis	K	K	Y	Lecture, Small group discussion	Theory		Human Anatomy	
OG14.1	Enumerate and discuss the diameters of maternal pelvis and types	K	KH	Y	Lecture, Small group discussion, Bedside clinic, DOAP session	Written/ Viva voce/ skill assessment		Human Anatomy	
<b>General Surgery</b>									
SU19.1	Describe the etiology and classification of cleft lip and palate	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
SU19.2	Describe the Principles of reconstruction of cleft lip and palate	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
SU22.1	Describe the Applied anatomy, and physiology of thyroid	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
SU22.5	Describe the applied anatomy of parathyroid.	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
SU23.1	Describe the applied anatomy of adrenal glands	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
SU24.1	Describe the clinical features, principles of investigation, prognosis and management of pancreatitis.	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
SU25.1	Describe applied anatomy appropriate investigations for breast disease	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
SU28.2	Describe the clinical features, investigations and principles of management of congenital anomalies of Genitourinary system.	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
SU28.5	Describe the applied anatomy and physiology of esophagus	K	K	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce		Human Anatomy, Physiology	
SU28.7	Describe the applied anatomy and physiology of stomach.	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
SU28.10	Describe the applied anatomy of liver. Describe the Clinical features, Investigations and principles of management of Liver abscess, hydatid disease, Injuries and Tumors of the liver.	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
SU28.11	Describe the applied anatomy of Spleen. Describe the clinical features, Investigations and principles of management of splenic injuries. Describe the Post-splenectomy sepsis- prophylaxis.	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
SU28.12	Describe the applied anatomy of biliary system. Describe the clinical features, investigations and principles of management of diseases of biliary system.	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
SU28.13	Describe the applied anatomy of small and large intestines	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
SU28.16	Describe applied anatomy including congenital anomalies of the rectum and anal canal	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
SU30.2	Describe the applied anatomy, clinical features, investigations and principles of management of Undescended testis.	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
SU30.3	Describe the applied anatomy, clinical features, investigations and principles of management of Epididymo-orchitis	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
SU30.4	Describe the applied anatomy, clinical features, investigations and principles of management of Varicocele	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
SU30.5	Describe the applied anatomy, clinical features, investigations and principles of management of Hydrocele	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
<b>Orthopaedics</b>									
OR2.1	Describe and discuss the mechanism of Injury, clinical features, investigations and plan management of fracture of clavicle	K/S	KH/SH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE	1	Human Anatomy	
OR2.2	Describe and discuss the mechanism of Injury, clinical features, investigations and plan management of fractures of proximal humerus	K	K/KH/SH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.3	Describe and discuss the mechanism of Injury, clinical features, investigations and plan management of supra condylar fracture of humerus	K	KH/SH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.4	Describe and discuss the mechanism of injury, clinical features, investigations and principles of management of fracture of shaft of humerus and intercondylar fracture humerus with emphasis on neurovascular deficit	K/S	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.5	Describe and discuss the aetiopathogenesis, clinical features, mechanism of injury, investigation & principles of management of fractures of both bones forearm and Galeazzi and Monteggia injury	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
OR2.6	Describe and discuss the aetiopathogenesis, mechanism of injury, clinical features, investigations and principles of management of fractures of distal radius	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.7	Describe and discuss the aetiopathogenesis, mechanism of injury, clinical features, investigations and principles of management of pelvic injuries with emphasis on hemodynamic instability	K	K/KH/SH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.8	Describe and discuss the aetiopathogenesis, mechanism of injury, clinical features, investigations and principles of management of spine injuries with emphasis on mobilisation of the patient	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.9	Describe and discuss the mechanism of injury, Clinical features, investigations and principle of management of acetabular fracture	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.10	Describe and discuss the aetiopathogenesis, mechanism of injury, clinical features, investigations and principles of management of fractures of proximal femur	K/S/A/C	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.11	Describe and discuss the aetiopathogenesis, mechanism of injury, clinical features, investigations and principles of management of (a) Fracture patella (b) Fracture distal femur © Fracture proximal tibia with special focus on neurovascular injury and compartment syndrome	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.12	Describe and discuss the aetiopathogenesis, clinical features, Investigation and principles of management of Fracture shaft of femur in all age groups and the recognition and management of fat embolism as a complication	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.13	Describe and discuss the aetiopathogenesis, clinical features, Investigation and principles of management of: (a) Fracture both bones leg (b) Calcaneus (c) Small bones of foot	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.14	Describe and discuss the aetiopathogenesis, clinical features, Investigation and principles of management of ankle fractures	K/S/C	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Teaching-Learning Methods	Assessment Methods	Number required to certify P	Vertical Integration	Horizontal Integration
OR2.15	Plan and interpret the investigations to diagnose complications of fractures like malunion, non-union, infection, compartmental syndrome	K/S	SH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE	2	Human Anatomy	
OR2.16	Describe and discuss the mechanism of injury, clinical features, investigations and principles of management of open fractures with focus on secondary infection, prevention and management	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR11.1	Describe and discuss the aetiopathogenesis, Clinical features, Investigations and principles of management of peripheral nerve injuries in diseases like foot drop, wrist drop, claw hand, palsies of Radial, Ulnar, Median, Lateral Popliteal and Sciatic Nerves	K	K/H	Y	Lecture, Small Group discussion, case discussion	Written/ Viva voce/ OSCE		Human Anatomy	General Medicine, General surgery
OR12.1	Describe and discuss the Clinical features, Investigations and principles of management of Congenital and acquired malformations and deformities of: a. limbs and spine - Scoliosis and spinal bifida b. Congenital dislocation of Hip, Torticollis, c. congenital talipes equino varus	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ OSCE		Human Anatomy	
<b>Physical Medicine &amp; Rehabilitation</b>									
PM2.1	Describe the causes of disability in the patient with a cerebrovascular accident	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	General Medicine
PM3.1	Describe and discuss the clinical features, types, evaluation, diagnosis and management of cerebral palsy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	Pediatrics
<b>Pediatrics</b>									
PE32.1	Discuss the genetic basis, risk factors, complications, prenatal diagnosis, management and genetic counselling in Down's Syndrome	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	

# **PHYSIOLOGY (CODE: PY)**

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>PHYSIOLOGY</b>									
<b>Topic: General Physiology</b>		<b>Number of competencies: (09)</b>			<b>Number of procedures that require certification : (NIL)</b>				
PY1.1	Describe the structure and functions of a mammalian cell	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY1.2	Describe and discuss the principles of homeostasis	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY1.3	Describe intercellular communication	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY1.4	Describe apoptosis – programmed cell death	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Pathology	
PY1.5	Describe and discuss transport mechanisms across cell membranes	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY1.6	Describe the fluid compartments of the body, its ionic composition & measurements	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY1.7	Describe the concept of pH & Buffer systems in the body	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY1.8	Describe and discuss the molecular basis of resting membrane potential and action potential in excitable tissue	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY1.9	Demonstrate the ability to describe and discuss the methods used to demonstrate the functions of the cells and its products, its communications and their applications in Clinical care and research.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
<b>Topic: Haematology</b>		<b>Number of competencies: (13)</b>			<b>Number of procedures that require certification: (NIL)</b>				

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PY2.1	Describe the composition and functions of blood components	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY2.2	Discuss the origin, forms, variations and functions of plasma proteins	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY2.3	Describe and discuss the synthesis and functions of Haemoglobin and explain its breakdown. Describe variants of haemoglobin	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY2.4	Describe RBC formation (erythropoiesis & its regulation) and its functions	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY2.5	Describe different types of anaemias & Jaundice	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Pathology	Biochemistry
PY2.6	Describe WBC formation (granulopoiesis) and its regulation	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY2.7	Describe the formation of platelets, functions and variations.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY2.8	Describe the physiological basis of hemostasis and, anticoagulants. Describe bleeding & clotting disorders (Hemophilia, purpura)	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Pathology	
PY2.9	Describe different blood groups and discuss the clinical importance of blood grouping, blood banking and transfusion	K	KH	Y	Lecture, Small group discussion, ECE- Visit to blood bank	Written/Viva voce		Pathology	
PY2.10	Define and classify different types of immunity. Describe the development of immunity and its regulation	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY2.11	Estimate Hb, RBC, TLC, RBC indices, DLC, Blood groups, BT/CT	S	SH	Y	DOAP sessions	Practical/OSPE/Viva voce		Pathology	
PY2.12	Describe test for ESR, Osmotic fragility, Hematocrit. Note the findings and interpret the test results etc	K	KH	Y	Demonstration	Written /Viva voce		Pathology	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PY2.13	Describe steps for reticulocyte and platelet count	K	KH	Y	Demonstration sessions	Written /Viva voce		Pathology	
<b>Topic: Nerve and Muscle Physiology</b> <span style="margin-left: 200px;"><b>Number of competencies: (18)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
PY3.1	Describe the structure and functions of a neuron and neuroglia; Discuss Nerve Growth Factor & other growth factors/cytokines	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY3.2	Describe the types, functions & properties of nerve fibers	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY3.3	Describe the degeneration and regeneration in peripheral nerves	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
PY3.4	Describe the structure of neuro-muscular junction and transmission of impulses	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Anaesthesiology	
PY3.5	Discuss the action of neuro-muscular blocking agents	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Anaesthesiology, Pharmacology	
PY3.6	Describe the pathophysiology of Myasthenia gravis	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Pathology	
PY3.7	Describe the different types of muscle fibres and their structure	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY3.8	Describe action potential and its properties in different muscle types (skeletal & smooth)	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY3.9	Describe the molecular basis of muscle contraction in skeletal and in smooth muscles	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY3.10	Describe the mode of muscle contraction (isometric and isotonic)	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY3.11	Explain energy source and muscle metabolism	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PY3.12	Explain the gradation of muscular activity	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
PY3.13	Describe muscular dystrophy: myopathies	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	Human Anatomy
PY3.14	Perform Ergography	S	SH	Y	DOAP sessions	Practical/OSPE/Viva voce			
PY3.15	Demonstrate effect of mild, moderate and severe exercise and record changes in cardiorespiratory parameters	S	SH	Y	DOAP sessions	Practical/OSPE/Viva voce			
PY3.16	Demonstrate Harvard Step test and describe the impact on induced physiologic parameters in a simulated environment	S	SH	Y	DOAP sessions	Practical/OSPE/Viva voce			
PY3.17	Describe Strength-duration curve	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY3.18	Observe with Computer assisted learning (i) amphibian nerve - muscle experiments (ii) amphibian cardiac experiments	S	KH	Y	Demonstration, Computer assisted learning methods	Practical / Viva voce			
<b>Topic: Gastro-intestinal Physiology</b> <span style="margin-left: 150px;"><b>Number of competencies: (10)</b></span> <span style="margin-left: 150px;"><b>Number of procedures that require certification: (NIL)</b></span>									
PY4.1	Describe the structure and functions of digestive system	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY4.2	Describe the composition, mechanism of secretion, functions, and regulation of saliva, gastric, pancreatic, intestinal juices and bile secretion	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY4.3	Describe GIT movements, regulation and functions. Describe defecation reflex. Explain role of dietary fibre.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY4.4	Describe the physiology of digestion and absorption of nutrients	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PY4.5	Describe the source of GIT hormones, their regulation and functions	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY4.6	Describe the Gut-Brain Axis	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY4.7	Describe & discuss the structure and functions of liver and gall bladder	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY4.8	Describe & discuss gastric function tests, pancreatic exocrine function tests & liver function tests	K	KH	Y	Lecture, Small group discussion, Demonstration Esophageal Manometry & endoscopy	Written/Viva voce			Biochemistry
PY4.9	Discuss the physiology aspects of: peptic ulcer, gastro-oesophageal reflux disease, vomiting, diarrhoea, constipation, Adynamic ileus, Hirschsprung's disease	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	Biochemistry
PY4.10	Demonstrate the correct clinical examination of the abdomen in a normal volunteer or simulated environment	S	SH	Y	DOAP session	Skill assessment/ Viva voce/OSCE			
<b>Topic: Cardiovascular Physiology (CVS)</b> <span style="float: right;">Number of competencies: (16)</span> <span style="float: right;">Number of procedures that require certification: (03)</span>									
PY5.1	Describe the functional anatomy of heart including chambers, sounds; and Pacemaker tissue and conducting system.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY5.2	Describe the properties of cardiac muscle including its morphology, electrical, mechanical and metabolic functions	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY5.3	Discuss the events occurring during the cardiac cycle	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY5.4	Describe generation, conduction of cardiac impulse	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY5.5	Describe the physiology of electrocardiogram (E.C.G), its applications and the cardiac axis	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PY5.6	Describe abnormal ECG, arrhythmias, heart block and myocardial Infarction	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	Human Anatomy
PY5.7	Describe and discuss haemodynamics of circulatory system	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY5.8	Describe and discuss local and systemic cardiovascular regulatory mechanisms	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY5.9	Describe the factors affecting heart rate, regulation of cardiac output & blood pressure	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY5.10	Describe & discuss regional circulation including microcirculation, lymphatic circulation, coronary, cerebral, capillary, skin, foetal, pulmonary and splanchnic circulation	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
PY5.11	Describe the patho-physiology of shock, syncope and heart failure	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY5.12	Record blood pressure & pulse at rest and in different grades of exercise and postures in a volunteer or simulated environment	S	SH	Y	DOAP sessions	Practical/OSPE/ Viva voce	1 each x 3		
PY5.13	Record and interpret normal ECG in a volunteer or simulated environment	S	SH	Y	DOAP sessions	Practical/OSPE/ Viva voce		General Medicine	
PY5.14	Observe cardiovascular autonomic function tests in a volunteer or simulated environment	S	SH	N	DOAP sessions	Skill assessment/ Viva voce			
PY5.15	Demonstrate the correct clinical examination of the cardiovascular system in a normal volunteer or simulated environment	S	SH	Y	DOAP sessions	Practical/OSPE/ Viva voce			
PY5.16	Record Arterial pulse tracing using finger plethysmography in a volunteer or simulated environment	S	SH	N	DOAP sessions, Computer assisted learning methods	Practical/OSPE/ Viva voce		General Medicine	

Topic: Respiratory Physiology

Number of competencies: (10)

Number of procedures that require certification: (01)

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PY6.1	Describe the functional anatomy of respiratory tract	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY6.2	Describe the mechanics of normal respiration, pressure changes during ventilation, lung volume and capacities, alveolar surface tension, compliance, airway resistance, ventilation, V/P ratio, diffusion capacity of lungs	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY6.3	Describe and discuss the transport of respiratory gases: Oxygen and Carbon dioxide	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY6.4	Describe and discuss the physiology of high altitude and deep sea diving	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY6.5	Describe and discuss the principles of artificial respiration, oxygen therapy, acclimatization and decompression sickness.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY6.6	Describe and discuss the pathophysiology of dyspnoea, hypoxia, cyanosis asphyxia; drowning, periodic breathing	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY6.7	Describe and discuss lung function tests & their clinical significance	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY6.8	Demonstrate the correct technique to perform & interpret Spirometry	S	SH	Y	DOAP sessions	Skill assessment/ Viva voce		Respiratory Medicine	
PY6.9	Demonstrate the correct clinical examination of the respiratory system in a normal volunteer or simulated environment	S	P	Y	DOAP sessions	Skill assessment/ Viva voce/OSCE	1		
PY6.10	Demonstrate the correct technique to perform measurement of peak expiratory flow rate in a normal volunteer or simulated environment	S	SH	Y	DOAP sessions	Practical/OSPE/ Viva voce			
<b>Topic: Renal Physiology</b>		<b>Number of competencies: (09)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PY7.1	Describe structure and function of kidney	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY7.2	Describe the structure and functions of juxta glomerular apparatus and role of renin-angiotensin system	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PY7.3	Describe the mechanism of urine formation involving processes of filtration, tubular reabsorption & secretion; concentration and diluting mechanism	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY7.4	Describe & discuss the significance & implication of Renal clearance	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY7.5	Describe the renal regulation of fluid and electrolytes & acid-base balance	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY7.6	Describe the innervations of urinary bladder, physiology of micturition and its abnormalities	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY7.7	Describe artificial kidney, dialysis and renal transplantation	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
PY7.8	Describe & discuss Renal Function Tests	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY7.9	Describe cystometry and discuss the normal cystometrogram	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
<b>Topic: Endocrine Physiology</b> <span style="margin-left: 200px;"><b>Number of competencies: (06)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
PY8.1	Describe the physiology of bone and calcium metabolism	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY8.2	Describe the synthesis, secretion, transport, physiological actions, regulation and effect of altered (hypo and hyper) secretion of pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas and hypothalamus	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY8.3	Describe the physiology of Thymus & Pineal Gland	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY8.4	Describe function tests: Thyroid gland; Adrenal cortex, Adrenal medulla and pancreas	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PY8.5	Describe the metabolic and endocrine consequences of obesity & metabolic syndrome, Stress response. Outline the psychiatry component pertaining to metabolic syndrome.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY8.6	Describe & differentiate the mechanism of action of steroid, protein and amine hormones	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
<b>Topic: Reproductive Physiology</b> <span style="margin-left: 150px;"><b>Number of competencies: (12)</b></span> <span style="margin-left: 150px;"><b>Number of procedures that require certification: (NIL)</b></span>									
PY9.1	Describe and discuss sex determination; sex differentiation and their abnormalities and outline psychiatry and practical implication of sex determination.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY9.2	Describe and discuss puberty: onset, progression, stages; early and delayed puberty and outline adolescent clinical and psychological association.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY9.3	Describe male reproductive system: functions of testis and control of spermatogenesis & factors modifying it and outline its association with psychiatric illness	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY9.4	Describe female reproductive system: (a) functions of ovary and its control; (b) menstrual cycle - hormonal, uterine and ovarian changes	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY9.5	Describe and discuss the physiological effects of sex hormones	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY9.6	Enumerate the contraceptive methods for male and female. Discuss their advantages & disadvantages	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Obstetrics & Gynaecology, Community Medicine	
PY9.7	Describe and discuss the effects of removal of gonads on physiological functions	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PY9.8	Describe and discuss the physiology of pregnancy, parturition & lactation and outline the psychology and psychiatry-disorders associated with it.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Obstetrics & Gynaecology	
PY9.9	Interpret a normal semen analysis report including (a) sperm count, (b) sperm morphology and (c) sperm motility, as per WHO guidelines and discuss the results	K	KH	Y	Lecture, Small group discussion	OSPE/Viva voce			
PY9.10	Discuss the physiological basis of various pregnancy tests	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Obstetrics & Gynaecology	
PY9.11	Discuss the hormonal changes and their effects during perimenopause and menopause	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Obstetrics & Gynaecology	
PY9.12	Discuss the common causes of infertility in a couple and role of IVF in managing a case of infertility.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Obstetrics & Gynaecology	
<b>Topic: Neurophysiology</b>									
				<b>Number of competencies: (20)</b>			<b>Number of procedures that require certification: (09)</b>		
PY10.1	Describe and discuss the organization of nervous system	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY10.2	Describe and discuss the functions and properties of synapse, reflex, receptors	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY10.3	Describe and discuss somatic sensations & sensory tracts	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY10.4	Describe and discuss motor tracts, mechanism of maintenance of tone, control of body movements, posture and equilibrium & vestibular apparatus	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY10.5	Describe and discuss structure and functions of reticular activating system, autonomic nervous system (ANS)	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy
PY10.6	Describe and discuss Spinal cord, its functions, lesion & sensory disturbances	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Human Anatomy

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PY10.7	Describe and discuss functions of cerebral cortex, basal ganglia, thalamus, hypothalamus, cerebellum and limbic system and their abnormalities	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Psychiatry	Human Anatomy
PY10.8	Describe and discuss behavioural and EEG characteristics during sleep and mechanism responsible for its production	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Psychiatry	
PY10.9	Describe and discuss the physiological basis of memory, learning and speech	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Psychiatry	
PY10.10	Describe and discuss chemical transmission in the nervous system. (Outline the psychiatry element).	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY10.11	Demonstrate the correct clinical examination of the nervous system: Higher functions, sensory system, motor system, reflexes, cranial nerves in a normal volunteer or simulated environment	S	P	Y	DOAP sessions	Skill assessment/ Viva voce/OSCE	1 each (total 5)		Human Anatomy
PY10.12	Identify normal EEG forms	S	S	Y	Small group teaching	OSPE/Viva voce		Psychiatry	
PY10.13	Describe and discuss perception of smell and taste sensation	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		ENT	
PY10.14	Describe and discuss patho-physiology of altered smell and taste sensation	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		ENT	
PY10.15	Describe and discuss functional anatomy of ear and auditory pathways & physiology of hearing	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		ENT	
PY10.16	Describe and discuss pathophysiology of deafness. Describe hearing tests	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		ENT	
PY10.17	Describe and discuss functional anatomy of eye, physiology of image formation, physiology of vision including colour vision, refractive errors, colour blindness, physiology of pupil and light reflex	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Ophthalmology	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PY10.18	Describe and discuss the physiological basis of lesion in visual pathway	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Ophthalmology	
PY10.19	Describe and discuss auditory & visual evoke potentials	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Ophthalmology	
PY10.20	Demonstrate (i) Testing of visual acuity, colour and field of vision and (ii) hearing (iii) Testing for smell and (iv) taste sensation in volunteer/ simulated environment	S	P	Y	DOAP sessions	Skill assessment/ Viva voce	1 each (total 4)	ENT, Ophthalmology	
<b>Topic: Integrated Physiology</b> <span style="margin-left: 200px;"><b>Number of competencies: (14)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
PY11.1	Describe and discuss mechanism of temperature regulation	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY11.2	Describe and discuss adaptation to altered temperature (heat and cold)	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY11.3	Describe and discuss mechanism of fever, cold injuries and heat stroke	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY11.4	Describe and discuss cardio-respiratory and metabolic adjustments during exercise; physical training effects	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY11.5	Describe and discuss physiological consequences of sedentary lifestyle	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY11.6	Describe physiology of Infancy	K	KH	N	Lecture, Small group discussion	Written/Viva voce		Pediatrics	
PY11.7	Describe and discuss physiology of aging; free radicals and antioxidants	K	KH	N	Lecture, Small group discussion	Written/Viva voce			
PY11.8	Discuss & compare cardio-respiratory changes in exercise (isometric and isotonic) with that in the resting state and under different environmental conditions (heat and cold)	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PY11.9	Interpret growth charts	K	KH	N	Small group teaching	Practical/OSPE/ Viva voce		Pediatrics	
PY11.10	Interpret anthropometric assessment of infants	K	KH	N	Small group teaching	Practical/OSPE/ Viva voce		Pediatrics	
PY11.11	Discuss the concept, criteria for diagnosis of Brain death and its implications	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
PY11.12	Discuss the physiological effects of meditation	K	KH	N	Lecture, Small group discussion	Written/Viva voce			
PY11.13	Obtain history and perform general examination in the volunteer / simulated environment	S	SH	Y	DOAP sessions	Skill assessment/ Viva voce			
PY11.14	Demonstrate Basic Life Support in a simulated environment	S	SH	Y	DOAP sessions	OSCE		General Medicine, Anaesthesiology	

**Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.**  
**Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,**  
**Column F: DOAP session – Demonstrate, Observe, Assess, Perform.**  
**Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation**

## Integration

### Human Anatomy

AN3.1	Classify muscle tissue according to structure & action	K	KH	Y	Lecture	Written/ Viva voce			Physiology
AN5.1	Differentiate between blood vascular and lymphatic system	K	KH	Y	Lecture	Written/ Viva voce			Physiology
AN5.2	Differentiate between pulmonary and systemic circulation	K	KH	Y	Lecture	Written/ Viva voce			Physiology
AN5.6	Describe the concept of anastomoses and collateral circulation with significance of end-arteries	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN5.7	Explain function of meta-arterioles, precapillary sphincters, arterio-venous anastomoses	K	KH	N	Lecture	Written			Physiology
AN5.8	Define thrombosis, infarction & aneurysm	K	KH	N	Lecture	Written		Pathology	Physiology

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN7.2	List components of nervous tissue and their functions	K	KH	Y	Lecture	Written/ Viva voce			Physiology
AN7.3	Describe parts of a neuron and classify them based on number of neurites, size & function	K	KH	Y	Lecture	Written/ Viva voce			Physiology
AN7.5	Describe principles of sensory and motor innervation of muscles	K	KH	N	Lecture	Written		General Medicine	Physiology
AN7.7	Describe various types of synapse	K	KH	N	Lecture	Written			Physiology
AN21.9	Describe & demonstrate mechanics and types of respiration	K/S	SH	Y	Practical, Lecture, Small group dicussion, DOAP session	Written/Viva voce/ skill assessment			Physiology
AN22.2	Describe & demonstrate external and internal features of each chamber of heart	K/S	SH	Y	Practical, Lecture, Small group dicussion, DOAP session	Written/Viva voce/ skill assessment			Physiology
AN22.3	Describe & demonstrate origin, course and branches of coronary arteries	K/S	SH	Y	Practical, Lecture, Small group dicussion, DOAP session	Written/Viva voce/ skill assessment			Physiology
AN22.4	Describe anatomical basis of ischaemic heart disease	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN22.7	Mention the parts, position and arterial supply of the conducting system of heart	K	KH	Y	Lecture	Written		General Medicine	Physiology
AN24.1	Mention the blood supply, lymphatic drainage and nerve supply of pleura, extent of pleura and describe the pleural recesses and their applied anatomy	K	KH	Y	Practical, Lecture	Written/ Viva voce		General Medicine	Physiology
AN24.2	Identify side, external features and relations of structures which form root of lung & bronchial tree and their clinical correlate	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Medicine	Physiology
AN24.3	Describe a bronchopulmonary segment	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN25.3	Describe fetal circulation and changes occurring at birth	K	KH	Y	Lecture	Written		General Medicine	Physiology
AN25.4	Describe embryological basis of: 1) atrial septal defect, 2) ventricular septal defect, 3) Fallot's tetralogy & 4) tracheo-oesophageal fistula	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics	Physiology
AN25.5	Describe developmental basis of congenital anomalies, transposition of great vessels, dextrocardia, patent ductus arteriosus and coarctation of aorta	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics	Physiology
AN25.9	Demonstrate surface marking of lines of pleural reflection, Lung borders and fissures, Trachea, Heart borders, Apex beat & Surface projection of valves of heart	K/S	SH	Y	Practical	Viva voce/ skill assessment		General Medicine, Pediatrics	Physiology
AN56.2	Describe circulation of CSF with its applied anatomy	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN57.4	Enumerate ascending & descending tracts at mid thoracic level of spinal cord	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN57.5	Describe anatomical basis of syringomyelia	K	KH	N	Lecture	Written		General Medicine	Physiology
AN58.3	Enumerate cranial nerve nuclei in medulla oblongata with their functional group	K	KH	Y	Lecture	Written/ Viva voce			Physiology
AN58.4	Describe anatomical basis & effects of medial & lateral medullary syndrome	K	KH	N	Lecture	Written		General Medicine	Physiology
AN59.1	Identify external features of pons	K/S	SH	Y	Lecture, DOAP session	Written/ Viva voce/ skill assessment			Physiology
AN60.3	Describe anatomical basis of cerebellar dysfunction	K	KH	N	Lecture	Written		General Medicine	Physiology
AN61.3	Describe anatomical basis & effects of Benedikt's and Weber's syndromme	K	KH	N	Lecture	Written		General Medicine	Physiology
AN62.2	Describe & demonstrate surfaces, sulci, gyri, poles, & functional areas of cerebral hemisphere	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Medicine	Physiology

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN62.3	Describe the white matter of cerebrum	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN62.4	Enumerate parts & major connections of basal ganglia & limbic lobe	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN62.5	Describe boundaries, parts, gross relations, major nuclei and connections of dorsal thalamus, hypothalamus, epithalamus, metathalamus and subthalamus	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN62.6	Describe & identify formation, branches & major areas of distribution of circle of Willis	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		General Medicine	Physiology
AN63.1	Describe & demonstrate parts, boundaries & features of IIIrd, IVth & lateral ventricle	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment			Physiology
AN63.2	Describe anatomical basis of congenital hydrocephalus	K	KH	N	Lecture	Written		Pediatrics	Physiology
AN66.1	Describe & identify various types of connective tissue with functional correlation	K/S	SH	Y	Lecture, Practical	Written/ skill assessment			Physiology
AN67.2	Classify muscle and describe the structure-function correlation of the same	K	KH	Y	Lecture, Practical	Written			Physiology
AN68.2	Describe the structure-function correlation of neuron	K	KH	Y	Lecture, Practical	Written			Physiology
AN69.2	Describe the various types and structure-function correlation of blood vessel	K	KH	Y	Lecture, Practical	Written			Physiology
<b>Biochemistry</b>									
BI1.1	Describe the molecular and functional organization of a cell and its sub-cellular components.	K	KH	Y	Lecture, Small group discussions	Written assessment and Viva voce			Physiology

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
BI3.7	Describe the common poisons that inhibit crucial enzymes of carbohydrate metabolism (eg; fluoride, arsenate)	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Physiology
BI5.2	Describe and discuss functions of proteins and structure-function relationships in relevant areas eg, hemoglobin and selected hemoglobinopathies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology
BI6.3	Describe the common disorders associated with nucleotide metabolism.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Physiology
BI6.7	Describe the processes involved in maintenance of normal pH, water & electrolyte balance of body fluids and the derangements associated with these.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Physiology
BI6.9	Describe the functions of various minerals in the body, their metabolism and homeostasis.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Physiology
BI6.11	Describe the functions of haem in the body and describe the processes involved in its metabolism and describe porphyrin metabolism.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology
BI6.12	Describe the major types of haemoglobin and its derivatives found in the body and their physiological/ pathological relevance.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology
BI6.13	Describe the functions of the kidney, liver, thyroid and adrenal glands.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
BI6.14	Describe the tests that are commonly done in clinical practice to assess the functions of these organs (kidney, liver, thyroid and adrenal glands).	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
BI6.15	Describe the abnormalities of kidney, liver, thyroid and adrenal glands.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
BI10.4	Describe & discuss innate and adaptive immune responses, self/non-self recognition and the central role of T-helper cells in immune responses.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pathology	Physiology
BI11.4	Perform urine analysis to estimate and determine normal and abnormal constituents	S	P	Y	DOAP session	Skill assessment	1	General Medicine	Physiology

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Pathology</b>									
PA26.3	Define and describe the etiology, types, pathogenesis, stages, morphology and complications and evaluation of Obstructive airway disease (OAD) and bronchiectasis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	Microbiology
PA27.3	Describe the etiology, types, stages pathophysiology pathology and complications of heart failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Physiology	
PA27.8	Interpret abnormalities in cardiac function testing in acute coronary syndromes	S	SH	Y	DOAP session	Skill Assessment		Physiology, General Medicine	
PA27.9	Classify and describe the etiology, types, pathophysiology, pathology, gross and microscopic features, diagnosis and complications of cardiomyopathies	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Physiology	
PA28.5	Define and classify glomerular diseases. Enumerate and describe the etiology, pathogenesis, mechanisms of glomerular injury, pathology, distinguishing features and clinical manifestations of glomerulonephritis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.1	Enumerate, classify and describe the etiology, pathogenesis, pathology and iodine dependency of thyroid swellings	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Physiology, General Medicine, General Surgery	
PA32.2	Describe the etiology, cause, iodine dependency, pathogenesis, manifestations, laboratory and imaging features and course of thyrotoxicosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.3	Describe the etiology, pathogenesis, manifestations, laboratory and imaging features and course of thyrotoxicosis/ hypothyroidism	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.4	Classify and describe the epidemiology, etiology, pathogenesis, pathology, clinical laboratory features, complications and progression of diabetes mellitus	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.5	Describe the etiology, genetics, pathogenesis, manifestations, laboratory and morphologic features of hyperparathyroidism	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PA32.7	Describe the etiology, pathogenesis, manifestations, laboratory, morphologic features, complications of adrenal insufficiency	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.8	Describe the etiology, pathogenesis, manifestations, laboratory, morphologic features, complications of Cushing's syndrome	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.9	Describe the etiology, pathogenesis, manifestations, laboratory and morphologic features of adrenal neoplasms	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Physiology, General Medicine, General Surgery	

#### Pharmacology

PH1.15	Describe mechanism/s of action, types, doses, side effects, indications and contraindications of skeletal muscle relaxants	K	KH	Y	Lecture	Written/ Viva voce		Anesthesiology, Physiology	
PH1.19	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs which act on CNS, (including anxiolytics, sedatives & hypnotics, antipsychotic, antidepressant drugs, anti-manics, opioid agonists and antagonists, drugs used for neurodegenerative disorders, antiepileptics Drugs)	K	KH	Y	Lecture	Written/ Viva voce		Psychiatry, Physiology	
PH1.25	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs acting on blood, like anticoagulants, antiplatelets, fibrinolytics, plasma expanders	K	KH	Y	Lecture	Written/ Viva voce		Physiology, General Medicine	
PH1.26	Describe mechanisms of action, types, doses, side effects, indications and contraindications of the drugs modulating the renin angiotensin and aldosterone system	K	KH	Y	Lecture	Written/ Viva voce		Physiology, General Medicine	
PH1.35	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of drugs used in hematological disorders like: 1. Drugs used in anemias 2. Colony Stimulating factors	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Physiology	Pharmacology

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Forensic Medicine &amp; Toxicology</b>									
FM14.7	Demonstrate & identify that a particular stain is blood and identify the species of its origin.	S	KH	Y	Small group discussion, Lecture	Log book/ skill station/ Viva voce		Pathology, Physiology	
FM14.8	Demonstrate the correct technique to perform and identify ABO & Rh blood group of a person.	S	SH	Y	Small group discussion, DOAP session	Log book/ skill station/ Viva voce		Pathology, Physiology	
<b>Anesthesiology</b>									
AS7.3	Observe and describe the management of an unconscious patient	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Physiology	General Medicine
AS7.4	Observe and describe the basic setup process of a ventilator	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Physiology	General Medicine
AS8.1	Describe the anatomical correlates and physiologic principles of pain	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Human Anatomy, Physiology	
AS8.2	Elicit and determine the level, quality and quantity of pain and its tolerance in patient or surrogate	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Physiology	
<b>Ophtalmology</b>									
OP1.1	Describe the physiology of vision.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology	
<b>General Medicine</b>									
IM1.1	Describe and discuss the epidemiology, pathogenesis clinical evolution and course of common causes of heart disease including: rheumatic/ valvular, ischemic, hypertrophic inflammatory.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM1.2	Describe and discuss the genetic basis of some forms of heart failure	K	KH	N	Lecture, Small group discussion	Written		Pathology, Physiology	
IM1.3	Describe and discuss the aetiology microbiology pathogenies and clinical evolution of rheumatic fever, criteria, degree of rheumatic activity and rheumatic valvular heart disease and its complications including infective endocarditis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology, Microbiology	
IM1.4	Stage heart failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.5	Describe discuss and differentiate the processes involved in R Vs L heart failure, systolic vs diastolic failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.6	Describe and discuss the compensatory mechanisms involved in heart failure including cardiac remodelling and neurohormonal adaptations	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.7	Enumerate, describe and discuss the factors that exacerbate heart failure including ischemia, arrhythmias anemia, thyrotoxicosis, dietary factors drugs etc.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.8	Describe and discuss the pathogenesis and development of common arrhythmias involved in heart failure particularly atrial fibrillation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM2.1	Discuss and describe the epidemiology, antecedents and risk factors for atherosclerosis and ischemic heart disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology Community Medicine	
IM2.2	Discuss the aetiology of risk factors both modifiable and non modifiable of atherosclerosis and IHD	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM2.3	Discuss and describe the lipid cycle and the role of dyslipidemia in the pathogenesis of atherosclerosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	
IM2.4	Discuss and describe the pathogenesis, natural history, evolution and complications of atherosclerosis and IHD	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM5.1	Describe and discuss the physiologic and biochemical basis of hyperbilirubinemia	K	K	Y	Lecture, Small group discussion	Written/Viva voce		Pathology, Physiology	
IM5.2	Describe and discuss the aetiology and pathophysiology of liver injury	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM8.1	Describe and discuss the epidemiology, aetiology and the prevalence of primary and secondary hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM8.2	Describe and discuss the pathophysiology of hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM11.22	Enumerate the causes of hypoglycaemia and describe the counter hormone response and the initial approach and treatment.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM12.1	Describe the epidemiology and pathogenesis of hypothyroidism and hyperthyroidism including the influence of iodine deficiency and autoimmunity in the pathogenesis of thyroid disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM12.3	Describe and discuss the physiology of the hypothalamopituitary - thyroid axis, principles of thyroid function testing and alterations in physiologic function	K	K	Y	Lecture, Small group discussion	short notes		Pathology, Physiology	
IM15.3	Describe and discuss the physiologic effects of acute blood and volume loss	K	K	Y	Lecture, Small group discussions	short note/ Viva voce		Pathology, Physiology	General Surgery
IM18.6	Distinguish the lesion based on upper vs lower motor neuron, side, site and most probable nature of the lesion	K/S	SH	Y	Bedside clinic, DOAP session	Skill Assessment		Physiology	
IM18.7	Describe the clinical features and distinguish, based on clinical examination, the various disorders of speech	K/S	SH	N	Bedside clinic, DOAP session	Skill Assessment		Physiology	
IM18.8	Describe and distinguish, based on the clinical presentation, the types of bladder dysfunction seen in CNS disease	K	KH	Y	Small group discussion, Bedside clinic	Written/ Viva voce		Physiology	
IM19.1	Describe the functional anatomy of the locomotor system of the brain	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Human Anatomy, Physiology	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM22.1	Enumerate the causes of hypercalcemia and distinguish the features of PTH vs non PTH mediated hypercalcemia	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM22.9	Enumerate the causes and describe the clinical and laboratory features of metabolic acidosis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology	
IM22.10	Enumerate the causes of describe the clinical and laboratory features of metabolic alkalosis	K	KH	N	Lecture, small group discussion	Written/ Viva voce		Physiology	
IM22.11	Enumerate the causes and describe the clinical and laboratory features of respiratory acidosis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology	
IM22.12	Enumerate the causes and describe the clinical and laboratory features of respiratory alkalosis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology	
IM22.13	Identify the underlying acid based disorder based on an ABG report and clinical situation	S	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology	
IM23.1	Discuss and describe the methods of nutritional assessment in an adult and calculation of caloric requirements during illnesses	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM23.2	Discuss and describe the causes and consequences of protein caloric malnutrition in the hospital	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM23.3	Discuss and describe the aetiology, causes, clinical manifestations, complications, diagnosis and management of common vitamin deficiencies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM23.4	Enumerate the indications for enteral and parenteral nutrition in critically ill patients	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM24.22	Describe and discuss the aetiopathogenesis, clinical presentation, complications, assessment and management of nutritional disorders in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	

**Obstetrics & Gynaecology**

OG3.1	Describe the physiology of ovulation, menstruation, fertilization, implantation and gametogenesis	K	K	Y	Lecture, seminars	Theory		Physiology	
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Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OG7.1	Describe and discuss the changes in the genital tract, cardiovascular system, respiratory, haematology, renal and gastrointestinal systems in pregnancy	K	KH	Y	Lecture, seminars	Theory		Physiology	

**Pediatrics**

PE7.2	Explain the physiology of lactation	K	KH	Y	Lecture, small group discussion	Written/ Viva voce		Physiology	
PE7.3	Describe the composition and types of breast milk and discuss the differences between cow's milk and human milk	K	KH	Y	Lecture, debate	Written/ Viva voce		Physiology	
PE10.1	Define, describe the etio-pathogenesis, classify including WHO classification, clinical features, complication and management of severe Acute Malnourishment and Moderate Acute Malnutrition	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology Biochemistry	
PE10.2	Outline the clinical approach to a child with SAM and MAM	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	
PE10.3	Assessment of a patient with SAM and MAM, diagnosis, classification and planning management including hospital and community based intervention, rehabilitation and prevention	S	SH	Y	Bed side clinics, Skill Lab	Skill station		Physiology, Biochemistry	
PE11.1	Describe the common etiology, clinical features and management of Obesity in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry, Pathology	
PE11.2	Discuss the risk approach for obesity and discuss the prevention strategies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
PE12.7	Describe the causes, clinical features, diagnosis and management of Deficiency / excess of Vitamin D ( Rickets and Hypervitaminosis D	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Physiology, Pathology	
PE12.8	Identify the clinical features of dietary deficiency of Vitamin D	S	P	Y	Bedside clinics, Skills lab	Document in log book	3	Biochemistry Physiology Pathology	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PE12.9	Assess patients with Vitamin D deficiency, diagnose, classify and plan management	S	SH	Y	Bed side clinics	Document in log book		Biochemistry, Physiology, Pathology	
PE12.13	Discuss the RDA, dietary sources of Vitamin K and their role in health and disease	K	K	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Physiology, Pathology	
PE12.14	Describe the causes, clinical features, diagnosis, management and prevention of Deficiency of Vitamin K	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Physiology, Pathology	
PE23.1	Discuss the Hemodynamic changes, clinical presentation, complications and management of Acyanotic Heart Diseases –VSD, ASD and PDA	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology Pathology	
PE23.2	Discuss the Hemodynamic changes, clinical presentation, complications and management of Cyanotic Heart Diseases – Fallot's Physiology	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology Pathology	
PE23.3	Discuss the etio-pathogenesis, clinical presentation and management of cardiac failure in infant and children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology Pathology	
PE23.4	Discuss the etio-pathogenesis, clinical presentation and management of Acute Rheumatic Fever in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology Pathology	
PE23.5	Discuss the clinical features, complications, diagnosis, management and prevention of Acute Rheumatic Fever	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology Pathology	
PE23.6	Discuss the etio-pathogenesis and clinical features and management of Infective endocarditis in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology, Microbiology	
PE29.1	Discuss the etio-pathogenesis, Clinical features, classification and approach to a child with anaemia	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Pathology, Physiology	
PE29.2	Discuss the etio-pathogenesis, clinical features and management of Iron Deficiency anaemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PE29.3	Discuss the etiopathogenesis, Clinical features and management of VIT B12, Folate deficiency anaemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
PE29.4	Discuss the etio-pathogenesis, clinical features and management of Hemolytic anemia, Thalassemia Major, Sickle cell anaemia, Hereditary spherocytosis, Auto-immune hemolytic anaemia and hemolytic uremic syndrome	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology Physiology	

#### General Surgery

SU1.1	Describe basic concepts of homeostasis, enumerate the metabolic changes in injury and their mediators	K	KH	Y	Lecture, Bed side clinic and Small group discussion	Written/ Viva voce		Physiology, Biochemistry	
SU2.1	Describe Pathophysiology of shock. Types of shock. Principles of resuscitation including fluid replacement and monitoring	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
SU4.1	Elicit, document and present history in a case of Burns and perform physical examination. Describe Pathophysiology of Burns.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology	
SU12.1	Enumerate the causes and consequences of malnutrition in the surgical patient.	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce		Physiology	
SU12.2	Describe and Discuss the methods of estimation and replacement the Fluid and electrolyte requirements in the surgical patient	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce		Physiology	
SU28.5	Describe the applied Anatomy and physiology of esophagus	K	K	Y	Lecture, Small group Discussion, Demonstration	Written/ Viva voce		Human Anatomy, Physiology	

#### Respiratory Medicine

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
CT2.1	Define and classify obstructive airway disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
CT2.2	Describe and discuss the epidemiology risk factors and evolution of obstructive airway disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
CT2.4	Describe and discuss the physiology and pathophysiology of hypoxia and hypercapnea	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
CT2.5	Describe and discuss the genetics of alpha 1 antitrypsin deficiency in emphysema	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
CT2.11	Describe, discuss and interpret pulmonary function tests	S	SH	Y	Bed side clinic, DOAP session	Skill assessment		Physiology, Pathology	

# **BIOCHEMISTRY (CODE: BI)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
<b>BIOCHEMISTRY</b>									
<b>Topic: Basic Biochemistry</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification: (NIL)</b>				
BI1.1	Describe the molecular and functional organization of a cell and its sub-cellular components.	K	KH	Y	Lecture, Small group discussion	Written assessment/ Viva voce			Physiology
<b>Topic: Enzyme</b>		<b>Number of competencies: (07)</b>			<b>Number of procedures that require certification: (NIL)</b>				
BI2.1	Explain fundamental concepts of enzyme, isoenzyme, alloenzyme, coenzyme & co-factors. Enumerate the main classes of IUBMB nomenclature.	K	KH	Y	Lecture, case discussion	Written assessment/ Viva voce			
BI2.2	Observe the estimation of SGOT & SGPT	K	K	Y	Demonstration	Viva voce			
BI2.3	Describe and explain the basic principles of enzyme activity	K	KH	Y	Lecture, case discussion	Written/ Viva voce			
BI2.4	Describe and discuss enzyme inhibitors as poisons and drugs and as therapeutic enzymes	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Pathology, General Medicine	
BI2.5	Describe and discuss the clinical utility of various serum enzymes as markers of pathological conditions.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Pathology, General Medicine	
BI2.6	Discuss use of enzymes in laboratory investigations (Enzyme-based assays)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	
BI2.7	Interpret laboratory results of enzyme activities & describe the clinical utility of various enzymes as markers of pathological conditions.	K	KH	Y	Lecture, Small group discussion, DOAP sessions	Written/ Viva voce		Pathology, General Medicine	
<b>Topic: Chemistry and Metabolism of Carbohydrates</b>		<b>Number of competencies: (10)</b>			<b>Number of procedures that require certification: (NIL)</b>				
BI3.1	Discuss and differentiate monosaccharides, di-saccharides and polysaccharides giving examples of main carbohydrates as energy fuel, structural element and storage in the human body	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
BI3.2	Describe the processes involved in digestion and assimilation of carbohydrates and storage.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
BI3.3	Describe and discuss the digestion and assimilation of carbohydrates from food.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
BI3.4	Define and differentiate the pathways of carbohydrate metabolism, (glycolysis, gluconeogenesis, glycogen metabolism, HMP shunt).	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
BI3.5	Describe and discuss the regulation, functions and integration of carbohydrate along with associated diseases/disorders.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
BI3.6	Describe and discuss the concept of TCA cycle as a amphibolic pathway and its regulation.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			
BI3.7	Describe the common poisons that inhibit crucial enzymes of carbohydrate metabolism (eg; fluoride, arsenate)	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Physiology
BI3.8	Discuss and interpret laboratory results of analytes associated with metabolism of carbohydrates.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Pathology, General Medicine	
BI3.9	Discuss the mechanism and significance of blood glucose regulation in health and disease.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
BI3.10	Interpret the results of blood glucose levels and other laboratory investigations related to disorders of carbohydrate metabolism.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
<b>Topic: Chemistry and Metabolism of Lipids</b>		<b>Number of competencies: (07)</b>			<b>Number of procedures that require certification: (NIL)</b>				
BI4.1	Describe and discuss main classes of lipids (Essential/non-essential fatty acids, cholesterol and hormonal steroids, triglycerides, major phospholipids and sphingolipids) relevant to human system and their major functions.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
BI4.2	Describe the processes involved in digestion and absorption of dietary lipids and also the key features of their metabolism	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
BI4.3	Explain the regulation of lipoprotein metabolism & associated disorders.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.4	Describe the structure and functions of lipoproteins, their functions, interrelations & relations with atherosclerosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.5	Interpret laboratory results of analytes associated with metabolism of lipids	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.6	Describe the therapeutic uses of prostaglandins and inhibitors of eicosanoid synthesis.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.7	Interpret laboratory results of analytes associated with metabolism of lipids.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

**Topic: Chemistry and Metabolism of Proteins**

**Number of competencies: (05)**

**Number of procedures that require certification: (NIL)**

BI5.1	Describe and discuss structural organization of proteins.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI5.2	Describe and discuss functions of proteins and structure-function relationships in relevant areas eg, hemoglobin and selected hemoglobinopathies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology
BI5.3	Describe the digestion and absorption of dietary proteins.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
BI5.4	Describe common disorders associated with protein metabolism.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
BI5.5	Interpret laboratory results of analytes associated with metabolism of proteins.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

**Topic: Metabolism and homeostasis**

**Number of competencies: (15)**

**Number of procedures that require certification: (NIL)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
BI6.1	Discuss the metabolic processes that take place in specific organs in the body in the fed and fasting states.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI6.2	Describe and discuss the metabolic processes in which nucleotides are involved.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI6.3	Describe the common disorders associated with nucleotide metabolism.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Physiology
BI6.4	Discuss the laboratory results of analytes associated with gout & Lesch Nyhan syndrome.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI6.5	Describe the biochemical role of vitamins in the body and explain the manifestations of their deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI6.6	Describe the biochemical processes involved in generation of energy in cells.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI6.7	Describe the processes involved in maintenance of normal pH, water & electrolyte balance of body fluids and the derangements associated with these.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Physiology
BI6.8	Discuss and interpret results of Arterial Blood Gas (ABG) analysis in various disorders.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI6.9	Describe the functions of various minerals in the body, their metabolism and homeostasis.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Physiology
BI6.10	Enumerate and describe the disorders associated with mineral metabolism.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI6.11	Describe the functions of haem in the body and describe the processes involved in its metabolism and describe porphyrin metabolism.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
BI6.12	Describe the major types of haemoglobin and its derivatives found in the body and their physiological/ pathological relevance.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology
BI6.13	Describe the functions of the kidney, liver, thyroid and adrenal glands.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
BI6.14	Describe the tests that are commonly done in clinical practice to assess the functions of these organs (kidney, liver, thyroid and adrenal glands).	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
BI6.15	Describe the abnormalities of kidney, liver, thyroid and adrenal glands.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
<b>Topic: Molecular biology</b> <span style="margin-left: 200px;"><b>Number of competencies: (07)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
BI7.1	Describe the structure and functions of DNA and RNA and outline the cell cycle.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI7.2	Describe the processes involved in replication & repair of DNA and the transcription & translation mechanisms.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI7.3	Describe gene mutations and basic mechanism of regulation of gene expression.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
BI7.4	Describe applications of molecular technologies like recombinant DNA technology, PCR in the diagnosis and treatment of diseases with genetic basis.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics, General Medicine	
BI7.5	Describe the role of xenobiotics in disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI7.6	Describe the anti-oxidant defence systems in the body.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI7.7	Describe the role of oxidative stress in the pathogenesis of conditions such as cancer, complications of diabetes mellitus and atherosclerosis.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
<b>Topic: Nutrition</b>		<b>Number of competencies: (05)</b>			<b>Number of procedures that require certification: (NIL)</b>				
BI8.1	Discuss the importance of various dietary components and explain importance of dietary fibre.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics, Pathology	
BI8.2	Describe the types and causes of protein energy malnutrition and its effects.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics, Pathology	
BI8.3	Provide dietary advice for optimal health in childhood and adult, in disease conditions like diabetes mellitus, coronary artery disease and in pregnancy.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI8.4	Describe the causes (including dietary habits), effects and health risks associated with being overweight/ obesity.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pathology	
BI8.5	Summarize the nutritional importance of commonly used items of food including fruits and vegetables.(macro-molecules & its importance)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, General Medicine, Pediatrics	
<b>Topic: Extracellular Matrix</b>		<b>Number of competencies: (03)</b>			<b>Number of procedures that require certification: (NIL)</b>				
BI9.1	List the functions and components of the extracellular matrix (ECM).	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI9.2	Discuss the involvement of ECM components in health and disease.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI9.3	Describe protein targeting & sorting along with its associated disorders.	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Oncogenesis and immunity</b>		<b>Number of competencies: (05)</b>			<b>Number of procedures that require certification: (NIL)</b>				

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
BI10.1	Describe the cancer initiation, promotion oncogenes & oncogene activation. Also focus on p53 & apoptosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, General Surgery, Pathology	
BI10.2	Describe various biochemical tumor markers and the biochemical basis of cancer therapy.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, General Surgery, Pathology	
BI10.3	Describe the cellular and humoral components of the immune system & describe the types and structure of antibody	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, General Surgery, Pathology	
BI10.4	Describe & discuss innate and adaptive immune responses, self/non-self recognition and the central role of T-helper cells in immune responses.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pathology	Physiology
BI10.5	Describe antigens and concepts involved in vaccine development.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Pediatrics, Microbiology	
<b>Topic: Biochemical Laboratory Tests</b>		<b>Number of competencies: (24)</b>			<b>Number of procedures that require certification: (05)</b>				
BI11.1	Describe commonly used laboratory apparatus and equipments, good safe laboratory practice and waste disposal.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI11.2	Describe the preparation of buffers and estimation of pH.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI11.3	Describe the chemical components of normal urine.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI11.4	Perform urine analysis to estimate and determine normal and abnormal constituents	S	P	Y	DOAP session	Skill assessment	1	General Medicine	Physiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
BI11.5	Describe screening of urine for inborn errors & describe the use of paper chromatography	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI11.6	Describe the principles of colorimetry	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI11.7	Demonstrate the estimation of serum creatinine and creatinine clearance	S	P	Y	Practical	Skills assessment	1		
BI11.8	Demonstrate estimation of serum proteins, albumin and A:G ratio	S	P	Y	Practical	Skills assessment	1		
BI11.9	Demonstrate the estimation of serum total cholesterol and HDL-cholesterol	S	P	Y	Practical	Skills assessment			
BI11.10	Demonstrate the estimation of triglycerides	S	P	Y	Practical	Skills assessment			
BI11.11	Demonstrate estimation of calcium and phosphorous	S	P	Y	Practical	Skills assessment			
BI11.12	Demonstrate the estimation of serum bilirubin	S	P	Y	Practical	Skills assessment			
BI11.13	Demonstrate the estimation of SGOT/ SGPT	S	P	Y	Practical	Skills assessment			
BI11.14	Demonstrate the estimation of alkaline phosphatase	S	P	Y	Practical	Skills assessment			
BI11.15	Describe & discuss the composition of CSF	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
BI11.16	Observe use of commonly used equipments/techniques in biochemistry laboratory including: •pH meter •Paper chromatography of amino acid •Protein electrophoresis •TLC, PAGE •Electrolyte analysis by ISE •ABG analyzer •ELISA •Immunodiffusion •Autoanalyser •Quality control •DNA isolation from blood/ tissue	S	KH	Y	Demonstration	Skill assessment			
BI11.17	Explain the basis and rationale of biochemical tests done in the following conditions: - diabetes mellitus, - dyslipidemia, - myocardial infarction, - renal failure, gout, - proteinuria, - nephrotic syndrome, - edema, - jaundice, - liver diseases, pancreatitis, disorders of acid- base balance, thyroid disorders.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pathology	
BI11.18	Discuss the principles of spectrophotometry.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI11.19	Outline the basic principles involved in the functioning of instruments commonly used in a biochemistry laboratory and their applications.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
BI11.20	Identify abnormal constituents in urine, interpret the findings and correlate these with pathological states.	S	SH	Y	DOAP sessions	Skill assessment	1		

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
BI11.21	Demonstrate estimation of glucose, creatinine, urea and total protein in serum.	S	SH	Y	DOAP sessions	Skill assessment	1		
BI11.22	Calculate albumin: globulin (AG) ratio and creatinine clearance	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI11.23	Calculate energy content of different food Items, identify food items with high and low glycemic index and explain the importance of these in the diet	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI11.24	Enumerate advantages and/or disadvantages of use of unsaturated, saturated and trans fats in food.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

**Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.**  
**Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,**  
**Column F: DOAP session – Demonstrate, Observe, Assess, Perform.**  
**Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation**

## Integration

### Physiology

PY3.11	Explain energy source and muscle metabolism	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY4.2	Describe the composition, mechanism of secretion, functions, and regulation of saliva, gastric, pancreatic, intestinal juices and bile secretion	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY4.4	Describe the physiology of digestion and absorption of nutrients	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY4.7	Describe & discuss the structure and functions of liver and gall bladder	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PY4.8	Describe & discuss gastric function tests, pancreatic exocrine function tests & liver function tests	K	KH	Y	Lecture, Small group discussion, Demonstration Esophageal Manometry & endoscopy	Written/Viva voce			Biochemistry
PY4.9	Discuss the physiology aspects of: peptic ulcer, gastro-oesophageal reflux disease, vomiting, diarrhoea, constipation, Adynamic ileus, Hirschsprung's disease	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	Biochemistry
PY7.8	Describe & discuss Renal Function Tests	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry
PY8.4	Describe function tests: Thyroid gland; Adrenal cortex, Adrenal medulla and pancreas	K	KH	Y	Lecture, Small group discussion	Written/Viva voce			Biochemistry

#### Pathology

PA12.2	Describe the pathogenesis of disorders caused by protein calorie malnutrition and starvation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Pediatrics	
PA14.1	Describe iron metabolism	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PA15.1	Describe the metabolism of Vitamin B12 and the etiology and pathogenesis of B12 deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.1	Define and classify hemolytic anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.2	Describe the pathogenesis and clinical features and hematologic indices of hemolytic anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.3	Describe the pathogenesis, features, hematologic indices and peripheral blood picture of sickle cell anemia and thalassemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.4	Describe the etiology, pathogenesis, hematologic indices and peripheral blood picture of Acquired hemolytic anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PA25.1	Describe bilirubin metabolism, enumerate the etiology and pathogenesis of jaundice, distinguish between direct and indirect hyperbilirubinemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	

#### Dermatology, Venereology & Leprosy

DR17.1	Enumerate and identify the cutaneous findings in Vitamin A deficiency	K/S	SH	Y	Lecture, Small group discussion, Bedside clinic	Skill assessment Viva voce		General Medicine, Pediatrics, Biochemistry	
DR17.2	Enumerate and describe the various skin changes in Vitamin B complex deficiency	K	KH	Y	Lecture	Written/ Viva voce		General Medicine Pediatrics, Biochemistry	
DR17.3	Enumerate and describe the various changes in Vitamin C deficiency	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics, Biochemistry	
DR17.4	Enumerate and describe the various changes in Zinc deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics, Biochemistry	

#### Ophthalmology

OP7.1	Describe the surgical anatomy and the metabolism of the lens	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Human Anatomy	
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#### General Medicine

IM2.3	Discuss and describe the lipid cycle and the role of dyslipidemia in the pathogenesis of atherosclerosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	
IM2.12	Choose and interpret a lipid profile and identify the desirable lipid profile in the clinical context	S	SH	Y	Bed side clinic, DOAP session	Skill assessment		Biochemistry	
IM2.18	Discuss and describe the indications, formulations, doses, side effects and monitoring for drugs used in the management of dyslipidemia	K	KH	Y	Lecture Small group discussion	Written/ Viva voce		Pharmacology, Biochemistry	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
IM11.12	Perform and interpret a capillary blood glucose test	S	P	Y	Bed side clinic, DOAP session	Skill assessment	2	Pathology, Biochemistry	
IM11.13	Perform and interpret a urinary ketone estimation with a dipstick	S	P	Y	Bed side clinic, DOAP session	Skill assessment	2	Pathology, Biochemistry	
IM13.1	Describe the clinical epidemiology and inherited & modifiable risk factors for common malignancies in India	K	K	Y	Lecture, Small group discussion	short note/ Viva voce		Pathology, Biochemistry	
IM23.1	Discuss and describe the methods of nutritional assessment in an adult and calculation of caloric requirements during illnesses	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM23.2	Discuss and describe the causes and consequences of protein caloric malnutrition in the hospital	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM23.3	Discuss and describe the aetiology, causes, clinical manifestations, complications, diagnosis and management of common vitamin deficiencies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM23.4	Enumerate the indications for enteral and parenteral nutrition in critically ill patients	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM24.22	Describe and discuss the aetiopathogenesis, clinical presentation, complications, assessment and management of nutritional disorders in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	

#### Pediatrics

PE9.1	Describe the age related nutritional needs of infants, children and adolescents including micronutrients and vitamins	K	KH	Y	Lecture, Small Group discussion	Written/ Viva voce		Community Medicine, Biochemistry	
PE9.3	Explains the Calorific value of common Indian foods	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE10.1	Define Describe the etio-pathogenesis , Classify including WHO classification , clinical features, complication and management of Severe Acute Malnourishment (SAM) and Moderate Acute Malnutrition (MAM)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PE10.2	Outline the clinical approach to a child with SAM and MAM	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	
PE10.3	Assessment of a patient with SAM and MAM, diagnosis, classification and planning management including hospital and community based intervention, rehabilitation and prevention	S	SH	Y	Bed side clinics, Skill Lab	Skill station		Physiology, Biochemistry	
PE11.1	Describe the common etiology, clinical features and management of Obesity in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry, Pathology	
PE12.1	Discuss the (RDA) , dietary sources of Vitamin A and their role in Health and disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.2	Describe the causes, clinical features, diagnosis and management of Deficiency / excess of Vitamin A	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.3	Identify the clinical features of dietary deficiency / excess of Vitamin A	S	SH	Y	Bed side clinics, Small group discussion	Document in log book		Biochemistry	
PE12.4	Diagnose patients with Vitamin A deficiency, Classify and plan management	S	SH	N	Bed side clinics, Skill Station	Document in log book		Biochemistry	
PE12.5	Discuss the Vitamin A prophylaxis program and their recommendations	K	K	Y	Lecture, Small group Discussion	Written/ Viva voce		Biochemistry	
PE12.6	Discuss the RDA, dietary sources of Vitamin D and their role in Health and disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.7	Describe the causes, clinical features, diagnosis and management of Deficiency / excess of Vitamin D (Rickets and Hypervitaminosis D)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Physiology, Pathology	
PE12.8	Identify the clinical features of dietary deficiency of Vitamin D	S	SH	Y	Bedside clinics, Skills lab	Document in log book		Biochemistry, Physiology, Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PE12.9	Assess patients with Vitamin D deficiency, Diagnose, Classify and plan management	S	SH	Y	Bed side clinics	Document in log book		Biochemistry, Physiology, Pathology	
PE12.11	Discuss the RDA, dietary sources of Vitamin E and their role in Health and disease	K	K	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.12	Describe the causes, clinical features, diagnosis and management of deficiency of Vitamin E	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.13	Discuss the RDA , dietary sources of Vitamin K and their role in Health and disease	K	K	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Physiology, Pathology	
PE12.14	Describe the causes, clinical features, diagnosis , management and prevention of Deficiency of Vitamin K	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Physiology, Pathology	
PE12.15	Discuss the RDA , dietary sources of Vitamin B and their role in Health and disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.16	Describe the causes, clinical features, diagnosis and management of Deficiency of B complex Vitamins	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.17	Identify the clinical features of Vitamin B complex deficiency	S	SH	Y	Bedside clinics, Skills lab	Document in log book		Biochemistry	
PE12.18	Diagnose patients with Vitamin B complex deficiency and plan management	S	SH	Y	Bed side clinics, Skill lab	Document in log book		Biochemistry	
PE12.19	Discuss the RDA, dietary sources of Vitamin C and their role in Health and disease	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.20	Describe the causes, clinical features, diagnosis and management of Deficiency of Vitamin C ( scurvy)	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.21	Identify the clinical features Vitamin C deficiency	S	SH	N	Bed side clinics, Skill lab	Document in log book		Biochemistry	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PE13.1	Discuss the RDA, dietary sources of Iron and their role in health and disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Biochemistry	
PE13.2	Describe the causes, diagnosis and management of Fe deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Biochemistry	
PE13.3	Identify the clinical features of dietary deficiency of Iron and make a diagnosis	S	SH	Y	Bed side clinics, Skill Lab	Document in log book		Pathology, Biochemistry	
PE13.4	Interpret hemogram and Iron Panel	S	SH	Y	Bed side clinic, Small group discussion	Skill Assessment		Pathology, Biochemistry	
PE13.7	Discuss the RDA , dietary sources of Iodine and their role in Health and disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE13.8	Describe the causes, clinical features, diagnosis and management of Deficiency of Iodine	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE13.9	Identify the clinical features of Iodine deficiency disorders	S	SH	N	Lecture, Bed side clinic	Written/ Viva voce		Biochemistry	
PE13.10	Discuss the National Goiter control program and their recommendations	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Community Medicine	
PE13.11	Discuss the RDA, dietary sources of Calcium and its role in Health and disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE13.12	Describe the causes, clinical features, diagnosis and management of Ca Deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE13.13	Discuss the RDA , dietary sources of Magnesium and their role in Health and disease	K	K	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE13.14	Describe the causes, clinical features, diagnosis and management of Magnesium Deficiency	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE19.1	Explain the components of the Universal immunization Program and the sub National Immunization Programs	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PE19.2	Explain the epidemiology of Vaccine preventable diseases	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology	
PE19.3	Vaccine description with regards to Classification of vaccines, Strain used, Dose, route, schedule, Risks benefits and side effects, indications and contraindications	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology	
PE19.4	Define cold chain and discuss the methods of safe storage and handling of vaccines	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology	
PE19.5	Discuss immunization in special situations – HIV positive children, immunodeficiency, preterm, organ transplants, those who received blood and blood products, splenectomised children, Adolescents, travellers	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology	
PE21.11	Perform and interpret the common analytes in a Urine examination	S	SH	Y	Bed side clinic Labs, Skill lab	Skill assessment		Biochemistry, Pathology	
PE29.16	Discuss the Indications for Hemoglobin electrophoresis and interpret report	K	K	N	Small group discussion	Viva voce		Biochemistry	
PE33.6	Perform and interpret Urine Dip Stick for Sugar	S	P	Y	DOAP session	Skill assessment	3	Biochemistry	

#### General Surgery

SU1.1	Describe basic concepts of homeostasis, enumerate the metabolic changes in injury and their mediators.	K	KH	Y	Lecture, Bed side clinic and Small group discussion.	Written/ Viva voce.		Physiology, Biochemistry	
SU1.2	Describe the factors that affect the metabolic response to injury.	K	KH	Y	Lecture, Bed side clinic and Small group discussion.	Written/ Viva voce.		Biochemistry	
SU9.1	Choose appropriate biochemical, microbiological, pathological, imaging investigations and interpret the investigative data in a surgical patient.	K	KH	Y	Lecture, Small group discussion.	Written/ Viva voce		Biochemistry, Microbiology, Pathology	
SU12.3	Discuss the nutritional requirements of surgical patients, the methods of providing nutritional support and their complications.	K	KH	Y	Lecture, Small group discussion, Bedside clinic discussion	Written/ Viva voce		Biochemistry	

# **PHARMACOLOGY (CODE: PH)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>PHARMACOLOGY</b>									
<b>KNOWLEDGE: Topic: Pharmacology</b>		<b>Number of competencies: (64 )</b>			<b>Number of procedures that require certification : (NIL)</b>				
PH1.1	Define and describe the principles of pharmacology and pharmacotherapeutics	K	K	Y	Lecture	Written/ Viva voce			
PH1.2	Describe the basis of Evidence based medicine and Therapeutic drug monitoring	K	KH	Y	Lecture	Written/ Viva voce			
PH1.3	Enumerate and identify drug formulations and drug delivery systems	K/S	SH	Y	Lecture, Practical	Written/ Viva voce			
PH1.4	Describe absorption, distribution, metabolism & excretion of drugs	K	KH	Y	Lecture, Small Group discussion	Written/ Viva voce			
PH1.5	Describe general principles of mechanism of drug action	K	KH	Y	Lecture, Small Group discussion	Written/ Viva voce			
PH1.6	Describe principles of Pharmacovigilance & ADR reporting systems	K	KH	Y	Lecture, Practical	Written/ Viva voce			
PH1.7	Define, identify and describe the management of adverse drug reactions (ADR)	K/S	KH	Y	Lecture, Practical	Written/ Viva voce			
PH1.8	Identify and describe the management of drug interactions	K/S	KH	Y	Lecture, Practical	Written/ Viva voce			
PH1.9	Describe nomenclature of drugs i.e. generic, branded drugs	K/S	SH	Y	Lecture, Practical	Written/ Viva voce			
PH1.10	Describe parts of a correct, complete and legible generic prescription. Identify errors in prescription and correct appropriately	K/S	SH	Y	Lecture, Practical	Written/ Viva voce			
PH1.11	Describe various routes of drug administration, eg., oral, SC, IV, IM, SL	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PH1.12	Calculate the dosage of drugs using appropriate formulae for an individual patient, including children, elderly and patient with renal dysfunction.	K/S	SH	Y	Lecture, practical	Written/ Viva voce		Pediatrics, General Medicine	
PH1.13	Describe mechanism of action, types, doses, side effects, indications and contraindications of adrenergic and anti-adrenergic drugs	K	KH	Y	Lecture, Small Group discussion	Written/ Viva voce			
PH1.14	Describe mechanism of action, types, doses, side effects, indications and contraindications of cholinergic and anticholinergic drugs	K	KH	Y	Lecture, Small Group discussion	Written/ Viva voce			
PH1.15	Describe mechanism/s of action, types, doses, side effects, indications and contraindications of skeletal muscle relaxants	K	KH	Y	Lecture	Written/ Viva voce		Anesthesiology, Physiology	
PH1.16	Describe mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs which act by modulating autacoids, including: anti-histaminics, 5-HT modulating drugs, NSAIDs, drugs for gout, anti-rheumatic drugs, drugs for migraine	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	
PH1.17	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of local anesthetics	K	KH	Y	Lecture	Written/ Viva voce		Anesthesiology	
PH1.18	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of general anaesthetics, and pre-anesthetic medications	K	KH	Y	Lecture	Written/ Viva voce		Anesthesiology	
PH1.19	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs which act on CNS, (including anxiolytics, sedatives & hypnotics, anti-psychotic, anti-depressant drugs, anti-maniacs, opioid agonists and antagonists, drugs used for neurodegenerative disorders, anti-epileptics drugs)	K	KH	Y	Lecture	Written/ Viva voce		Psychiatry, Physiology	
PH1.20	Describe the effects of acute and chronic ethanol intake	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PH1.21	Describe the symptoms and management of methanol and ethanol poisonings	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PH1.22	Describe drugs of abuse (dependence, addiction, stimulants, depressants, psychedelics, drugs used for criminal offences)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	Forensic Medicine
PH1.23	Describe the process and mechanism of drug deaddiction	K/S	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	
PH1.24	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs affecting renal systems including diuretics, antidiuretics- vasopressin and analogues	K	KH	Y	Lecture	Written/ Viva voce			
PH1.25	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs acting on blood, like anticoagulants, antiplatelets, fibrinolytics, plasma expanders	K	KH	Y	Lecture	Written/ Viva voce		Physiology, General Medicine	
PH1.26	Describe mechanisms of action, types, doses, side effects, indications and contraindications of the drugs modulating the renin-angiotensin and aldosterone system	K	KH	Y	Lecture	Written/ Viva voce		Physiology, General Medicine	
PH1.27	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of antihypertensive drugs and drugs used in shock	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	
PH1.28	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in ischemic heart disease (stable, unstable angina and myocardial infarction), peripheral vascular disease	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	
PH1.29	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in congestive heart failure	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	
PH1.30	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the antiarrhythmics	K	KH	N	Lecture	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PH1.31	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in the management of dyslipidemias	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PH1.32	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of drugs used in bronchial asthma and COPD	K	KH	Y	Lecture, Small Group discussion	Written/ Viva voce		Respiratory Medicine	
PH1.33	Describe the mechanism of action, types, doses, side effects, indications and contraindications of the drugs used in cough (antitussives, expectorants/ mucolytics)	K	KH	Y	Lecture, Small Group discussion	Written/ Viva voce		Respiratory Medicine	
PH1.34	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs used as below: 1. Acid-peptic disease and GERD 2. Antiemetics and prokinetics 3. Antidiarrhoeals 4. Laxatives 5. Inflammatory Bowel Disease 6. Irritable Bowel Disorders, biliary and pancreatic diseases	K	KH	Y	Lecture, Small Group discussion	Written/ Viva voce		General Medicine	
PH1.35	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of drugs used in hematological disorders like: 1. Drugs used in anemias 2. Colony Stimulating factors	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Physiology	Pharmacology
PH1.36	Describe the mechanism of action, types, doses, side effects, indications and contraindications of drugs used in endocrine disorders (diabetes mellitus, thyroid disorders and osteoporosis)	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	
PH1.37	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used as sex hormones, their analogues and anterior Pituitary hormones	K	KH	Y	Lecture	Written/ Viva voce			
PH1.38	Describe the mechanism of action, types, doses, side effects, indications and contraindications of corticosteroids	K	KH	Y	Lecture	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PH1.39	Describe mechanism of action, types, doses, side effects, indications and contraindications the drugs used for contraception	K	KH	Y	Lecture	Written/ Viva voce		Obstetrics & Gynaecology	
PH1.40	Describe mechanism of action, types, doses, side effects, indications and contraindications of 1. Drugs used in the treatment of infertility, and 2. Drugs used in erectile dysfunction	K	KH	Y	Lecture	Written/ Viva voce		Obstetrics & Gynaecology	
PH1.41	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of uterine relaxants and stimulants	K	KH	Y	Lecture	Written/ Viva voce		Obstetrics & Gynaecology	
PH1.42	Describe general principles of chemotherapy	K	KH	Y	Lecture	Written/ Viva voce			
PH1.43	Describe and discuss the rational use of antimicrobials including antibiotic stewardship program	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics	Microbiology
PH1.44	Describe the first line antitubercular dugs, their mechanisms of action, side effects and doses.	K	KH	Y	Lecture	Written/ Viva voce		Respiratory Medicine	
PH1.45	Describe the dugs used in MDR and XDR Tuberculosis	K	KH	Y	Lecture	Written/ Viva voce		Respiratory Medicine	Microbiology
PH1.46	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of antileprotic drugs	K	KH	Y	Lecture	Written/ Viva voce		Dermatology, Venereology & Leprosy	Microbiology
PH1.47	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in malaria, KALA-AZAR, amebiasis and intestinal helminthiasis	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Microbiology
PH1.48	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in UTI/ STD and viral diseases including HIV	K	KH	Y	Lecture	Written/Viva voce			Microbiology
PH1.49	Describe mechanism of action, classes, side effects, indications and contraindications of anticancer drugs	K	KH	Y	Lecture	Written/Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PH1.50	Describe mechanisms of action, types, doses, side effects, indications and contraindications of immunomodulators and management of organ transplant rejection	K	KH	Y	Lecture	Written/ Viva voce			
PH1.51	Describe occupational and environmental pesticides, food adulterants, pollutants and insect repellents	K	KH/	Y	Lecture	Written/ Viva voce			
PH1.52	Describe management of common poisoning, insecticides, common sting and bites	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	
PH1.53	Describe heavy metal poisoning and chelating agents	K	KH	N	Lecture	Written/ Viva voce			
PH1.54	Describe vaccines and their uses	K	KH	Y	Lecture	Written/ Viva voce			
PH1.55	Describe and discuss the following National Health Programmes including Immunisation, Tuberculosis, Leprosy, Malaria, HIV, Filaria, Kala Azar, Diarrhoeal diseases, Anaemia & nutritional disorders, Blindness, Non-communicable diseases, cancer and Iodine deficiency	K	KH	Y	Lecture	Written/ Viva voce			Community Medicine
PH1.56	Describe basic aspects of Geriatric and Pediatric pharmacology	K	KH	Y	Lecture	Written/ Viva voce		Pediatrics	
PH1.57	Describe drugs used in skin disorders	K	KH	Y	Lecture	Written/ Viva voce		Dermatology, Venereology & Leprosy	
PH1.58	Describe drugs used in Ocular disorders	K	KH	Y	Lecture	Written/ Viva voce		Ophthalmology	
PH1.59	Describe and discuss the following: Essential medicines, Fixed dose combinations, Over the counter drugs, Herbal medicines	K	KH	Y	Lecture	Written/ Viva voce			
PH1.60	Describe and discuss Pharmacogenomics and Pharmacoeconomics	K	KH	N	Lecture	Written/ Viva voce			
PH1.61	Describe and discuss dietary supplements and nutraceuticals	K	KH	N	Lecture	Written/ Viva voce			





Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PH5.6	Demonstrate ability to educate public & patients about various aspects of drug use including drug dependence and OTC drugs	A/C	SH	Y	Small group discussion	Skill station		Psychiatry	
PH5.7	Demonstrate an understanding of the legal and ethical aspects of prescribing drugs	K	KH	Y	Small group discussion	short note/ Viva voce			Forensic Medicine

**Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.**  
**Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,**  
**Column F: DOAP session – Demonstrate, Observe, Assess, Perform.**  
**Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation**

## Integration

Physiology									
PY3.5	Discuss the action of neuro-muscular blocking agents	K	KH	Y	Lectures, Small group discussion	Written/ Viva voce		Anaesthesiology, Pharmacology	
Microbiology									
MI1.6	Describe the mechanisms of drug resistance, methods of antimicrobial susceptibility testing and monitoring of antimicrobial therapy.	K	K	Y	Lecture , Small group discussion	Written Viva			Pharmacology
MI3.3	Describe the enteric fever pathogens and discuss the evolution of the clinical course, the laboratory diagnosis of the diseases caused by them	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Pathology
MI3.5	Enumerate the causative agents of food poisoning and discuss the pathogenesis, clinical course and laboratory diagnosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology
MI3.6	Describe the etio-pathogenesis of Acid Peptic Disease (APD) and the clinical course. Discuss the diagnosis and management of the causative agent of APD	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Pathology

## Community Medicine

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
CM3.8	Describe the mode of action & application cycle of commonly used insecticides and rodenticides	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
CM19.1	Define and describe the concept of Essential Medicine List (EML)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Pharmacology
CM19.2	Describe roles of essential medicine in primary health care	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Pharmacology
CM19.3	Describe counterfeit medicine and its prevention	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Pharmacology

#### Forensic Medicine & Toxicology

FM4.11	Describe and discuss euthanasia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	Pharmacology
FM4.12	Discuss legal and ethical issues in relation to stem cell research	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	Pharmacology
FM4.17	Describe and discuss ethical Principles: Respect for autonomy, non-maleficence, beneficence & justice	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	Pharmacology
FM4.22	Explain Oath – Hippocrates, Charaka and Sushruta and procedure for administration of Oath	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	Pharmacology
FM4.23	Describe the modified Declaration of Geneva and its relevance	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	Pharmacology
FM4.25	Clinical research & Ethics: Discuss human experimentation including clinical trials	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		AETCOM	Pharmacology
FM4.26	Discuss the constitution and functions of ethical committees	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	Pharmacology
FM4.27	Describe and discuss Ethical Guidelines for Biomedical Research on Human Subjects & Animals	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		AETCOM	Pharmacology
FM8.1	Describe the history of Toxicology	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM8.2	Define the terms Toxicology, Forensic Toxicology, Clinical Toxicology and poison	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
FM8.3	Describe the various types of poisons, Toxicokinetics & Toxicodynamics and diagnosis of poisoning in living and dead	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
FM8.4	Describe the Laws in relations to poisons including NDPS Act, Medico-legal aspects of poisons	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
FM8.5	Describe Medico-legal autopsy in cases of poisoning including preservation and dispatch of viscera for chemical analysis	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce/ OSPE		Pharmacology	
FM8.6	Describe the general symptoms, principles of diagnosis and management of common poisons encountered in India	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce /OSCE		Pharmacology	
FM8.7	Describe simple Bedside clinic tests to detect poison/drug in a patient's body fluids	K	K/KH	Y	Lectures, Small group discussion, Bed side clinic, DOAP session	Written/ Viva voce /OSCE		Pharmacology, General Medicine	
FM8.8	Describe basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination	K	K/KH	Y	Lectures, Small group discussion, Bed side clinic, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM9.1	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Caustics Inorganic – sulphuric, nitric, and hydrochloric acid Organic- Carbolic Acid (phenol), Oxalic and acetylsalicylic acids.	K	K/KH	Y	Lectures, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM9.2	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Phosphorus, Iodine, Barium	K	K/KH	Y	Lectures, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM9.3	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Arsenic, lead, mercury, copper, iron, cadmium and thallium	K	K/KH	Y	Lectures, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM9.4	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Ethanol, methanol, ethylene glycol	K	K/KH	Y	Lectures, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM9.5	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Organophosphates, Carbamates, Organochlorines, Pyrethroids, Paraquat, Aluminium and Zinc phosphide	K	K/KH	Y	Lectures, Small group discussion Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	Pharmacology
FM9.6	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Ammonia, carbon monoxide, hydrogen cyanide & derivatives, methyl isocyanate, tear (riot control) gases	K	K/KH	Y	Lectures, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM10.1	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to: i. Antipyretics – Paracetamol, Salicylates ii. Anti-Infectives (Common antibiotics – an overview) iii. Neuropsychotoxicology Barbiturates, benzodiazepines, phenytoin, lithium, haloperidol, neuroleptics, tricyclics iv. Narcotic Analgesics, Anaesthetics, and Muscle Relaxants v. Cardiovascular Toxicology Cardiotoxic plants – oleander, odollam, aconite, digitalis vi. Gastro-Intestinal and Endocrinal Drugs – Insulin	K	K/KH	Y	Lectures, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	Pharmacology

**Dermatology, Venereology & Leprosy**

DR5.3	Enumerate and describe the pharmacology, administration and adverse reaction of pharmacotherapies for scabies	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Pediatrics	Pharmacology
DR7.3	Describe the pharmacology and action of antifungal (systemic and topical). agents Enumerate side effects of antifungal therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Microbiology ,Pharmacology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
DR8.7	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for common viral illnesses of the skin	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			Pharmacology
DR9.4	Enumerate, describe and identify lepra reactions and supportive measures and therapy of lepra reactions	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine	Pharmacology
DR9.5	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for various classes of leprosy based on National Guidelines	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine	Pharmacology, Community Medicine
DR9.6	Describe the treatment of Leprosy based on WHO guidelines	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine	Pharmacology, Community Medicine
DR9.7	Enumerate and describe the complications of leprosy and its management, including understanding disability and stigma	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine	Pharmacology, Psychiatry
DR10.3	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for syphilis	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine	Pharmacology, Microbiology
DR10.8	Enumerate the indications and describe the pharmacology, indications and adverse reactions of drugs used in the non-syphilitic sexually transmitted diseases (chancroid, donovanosis and LGV)	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine	Pharmacology, Microbiology
DR11.3	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for dermatologic lesions in HIV	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine	Pharmacology, Microbiology
DR14.5	Enumerate the indications and describe the pharmacology indications and adverse reactions of drugs used in the urticaria and angioedema	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			Pharmacology
DR15.3	Enumerate the indications and describe the pharmacology indications and adverse reactions of topical and systemic drugs used in treatment of pyoderma	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Surgery	Microbiology, Pharmacology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Anesthesiology</b>									
AS3.6	Choose and write a prescription for appropriate premedications for patients undergoing surgery	S	SH	Y	DOAP session, Bedside clinic session	Skill station		Pharmacology	
AS4.1	Describe and discuss the pharmacology of drugs used in induction and maintenance of general anaesthesia (including intravenous and inhalation induction agents, opiate and non-opiate analgesics, depolarising and non-depolarising muscle relaxants, anticholinesterases	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Pharmacology	
AS4.3	Observe and describe the principles and the practical aspects of induction and maintenance of anaesthesia	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Pharmacology	
AS5.4	Observe and describe the pharmacology and correct use of commonly used drugs and adjuvant agents in regional anaesthesia	S	KH	Y	Lecture, Small group discussion, DOAP session	Written / Viva voce		Pharmacology	
AS8.3	Describe the pharmacology and use of drugs in the management of pain	K	KH	Y	Lecture, Small group discussion, DOAP session	Written / Viva voce		Pharmacology	
AS8.4	Describe the principles of pain management in palliative care	K	KH	Y	Lecture, Small group discussion, DOAP session	Written / Viva voce		Pharmacology	General Medicine
AS8.5	Describe the principles of pain management in the terminally ill	K	KH	Y	Lecture, Small group discussion, DOAP session	Written / Viva voce		Pharmacology	General Medicine
AS10.4	Define and describe common medical and medication errors in anaesthesia	K	KH	Y	Lecture, Small group discussion, DOAP session	Written / Viva voce		Pharmacology	General Medicine

**Psychiatry**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PS4.4	Describe the treatment of alcohol and substance abuse disorders including behavioural and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PS4.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in alcohol and substance abuse	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PS5.3	Describe the treatment of schizophrenia including behavioural and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS5.5	Enumerate and describe the pharmacologic basis and side effects of drugs used in schizophrenia	K	KH	Y	Lecture Small group discussion	Written/ Viva voce		Pharmacology	
PS6.4	Describe the treatment of depression including behavioural and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS6.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in depression	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS7.4	Describe the treatment of bipolar disorders including behavioural and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS7.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in bipolar disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS8.4	Describe the treatment of anxiety disorders including behavioural and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS8.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in anxiety disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS10.4	Describe the treatment of somatoform disorders including behavioural, psychosocial and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PS10.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in somatoform, dissociative and conversion disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PS11.4	Describe the treatment of <b>personality</b> disorders including behavioural, psychosocial and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS11.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in personality disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS12.4	Describe the treatment of <b>psychosomatic</b> disorders including behavioural, psychosocial and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PS12.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in psychosomatic disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS13.4	Describe the treatment of psychosexual and gender identity disorders including behavioural, psychosocial and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS18.1	Enumerate the indications and describe the pharmacology, dose and side effects of commonly use drugs in psychiatric disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	

**General Medicine**

IM1.24	Describe and discuss the pharmacology of drugs including indications & contraindications in the management of heart failure including diuretics, ACE inhibitors, Beta blockers, aldosterone antagonists and cardiac glycosides	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM1.27	Describe and discuss the role of penicillin prophylaxis in the prevention of rheumatic heart disease	K	KH	Y	Bedside clinic, Small group discussion	Written		Microbiology Pharmacology	
IM1.30	Administer an intramuscular injection with an appropriate explanation to the patient	S	SH	Y	Bedside clinic, Skill assessment	log book documentation of completion		Pharmacology	
IM2.15	Discuss and describe the medications used in patients with an acute coronary syndrome based on the clinical presentation	K	KH	Y	Lecture Small group discussion	Written/ Viva voce		Pharmacology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM2.18	Discuss and describe the indications, formulations, doses, side effects and monitoring for drugs used in the management of dyslipidemia	K	KH	Y	Lecture Small group discussion	Written/ Viva voce		Pharmacology, Biochemistry	
IM2.20	Discuss and describe the assessment and relief of pain in acute coronary syndromes	K	KH	Y	Lecture Small group discussion	Written/ Viva voce		Pharmacology	
IM2.23	Describe and discuss the indications for nitrates, anti platelet agents, gpIIb - IIIa inhibitors, beta blockers, ACE inhibitors etc in the management of coronary syndromes	K	KH	Y	Lecture Small group discussion	Written/ Viva voce		Pharmacology	
IM3.12	Select, describe and prescribe based on the most likely aetiology, an appropriate empirical antimicrobial based on the pharmacology and antimicrobial spectrum	S	SH	Y	Bed side clinic, DOAP session	Skill Assessment/ Written/ Viva voce		Pharmacology, Microbiology	
IM3.13	Select, describe and prescribe based on culture and sensitivity appropriate empirical antimicrobial based on the pharmacology and antimicrobial spectrum	S	SH	Y	Bed side clinic, DOAP session	Skill Assessment/ Written/ Viva voce		Pharmacology, Microbiology	
IM4.22	Describe and discuss the pharmacology, indications, adverse reactions, interactions of antimalarial drugs and basis of resistance	K	KH	Y	Small group, Lecture	Written/ Viva voce		Pharmacology	
IM4.23	Prescribe drugs for malaria based on the species identified, prevalence of drug resistance and National Programs	S	SH	Y	Skill assessment	Skill assessment		Microbiology, Pharmacology	
IM4.26	Counsel the patient on malarial prevention	C	SH	Y	DOAP session	Skill assessment		Microbiology, Pharmacology	
IM5.7	Enumerate and describe the causes and pathophysiology of drug induced liver injury	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Pharmacology	
IM5.16	Describe and discuss the management of hepatitis, cirrhosis, portal hypertension, ascites spontaneous, bacterial peritonitis and hepatic encephalopathy	K	KH	Y	Written, Small group	Skill Assessment/ Written/ Viva voce		Pharmacology	General Surgery
IM6.13	Describe and enumerate the indications and side effects of drugs for bacterial, viral and other types of diarrhea	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology, Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM6.17	Discuss and describe the principles of HAART, the classes of antiretrovirals used, adverse reactions and interactions	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Pharmacology	
IM6.18	Discuss and describe the principles and regimens used in post exposure prophylaxis	K	K	Y	Lecture Small group discussion	Written/ Viva voce		Microbiology, Pharmacology	
IM7.21	Select, prescribe and communicate appropriate medications for relief of joint pain	K/C	SH	Y	DOAP session	Skill assessment/ written		Pharmacology	Orthopedics
IM7.22	Select, prescribe and communicate preventive therapy for crystalline arthropathies	K/C	SH	Y	DOAP session	Skill assessment/ written		Pharmacology	
IM7.23	Select, prescribe and communicate treatment option for systemic rheumatologic conditions	K/C	SH	Y	DOAP session	Skill assessment/ written		Pharmacology	
IM7.24	Describe the basis for biologic and disease modifying therapy in rheumatologic diseases	K	KH	Y	Bed side clinic, Small group discussion	Skill assessment/ written		Pharmacology	
IM8.14	Develop an appropriate treatment plan for essential hypertension	K	KH	Y	Small group discussion	Skill assessment/ Written/ Viva voce		Pharmacology	
IM8.15	Recognise, prioritise and manage hypertensive emergencies	S	SH	Y	DOAP session	Skill assessment/ written		Pharmacology	
IM9.14	Prescribe replacement therapy with iron, B12, folate	S	SH	Y	Bed side clinic, DOAP session	Skill assessment/ written		Pharmacology	
IM9.15	Describe the national programs for anemia prevention	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology, Community Medicine	
IM10.25	Identify and describe the priorities in the management of ARF including diet, volume management, alteration in doses of drugs, monitoring and indications for dialysis	K/C	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM11.16	Discuss and describe the pharmacologic therapies for diabetes their indications, contraindications, adverse reactions and interactions	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		Pharmacology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM11.18	Describe and discuss the pharmacology, indications, adverse reactions and interactions of drugs used in the prevention and treatment of target organ damage and complications of Type II Diabetes including neuropathy, nephropathy, retinopathy, hypertension, dyslipidemia and cardiovascular disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM11.19	Demonstrate and counsel patients on the correct technique to administer insulin	S/C	SH	Y	DOAP session	Skill assessment		Pharmacology	
IM12.13	Describe the pharmacology, indications, adverse reaction, interactions of thyroxine and antithyroid drugs	K	KH	Y	Lecture, Small group discussion	Viva voce/ short note		Pharmacology	General Surgery
IM12.14	Write and communicate to the patient appropriately a prescription for thyroxine based on age, sex, and clinical and biochemical status	S/C	SH	Y	Skill assessment	Skill assessment		Pharmacology	
IM12.15	Describe and discuss the indications of thionamide therapy, radio iodine therapy and General Surgery in the management of thyrotoxicosis	K	KH	Y	Bedside clinic, small group discussion	short note/ Viva voce		Pharmacology	General Surgery
IM13.6	Describe and distinguish the difference between curative and palliative care in patients with cancer	K	K	N	Lecture, Small group discussion	short note/ Viva voce		Pharmacology	
IM13.13	Describe and assess pain and suffering objectively in a patient with cancer	K	KH	Y	Bedside clinic, small group discussion	short note/ Viva voce		Pharmacology	General Surgery
IM13.14	Describe the indications for General Surgery, radiation and chemotherapy for common malignancies	K	KH	Y	Bedside clinic, small group discussion	short note/ Viva voce		Pharmacology	General Surgery
IM13.17	Describe and enumerate the indications, use, side effects of narcotics in pain alleviation in patients with cancer	K	KH	Y	Bedside clinic, small group discussion	short note/ Viva voce		Pharmacology	Anesthesiology
IM14.13	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy for obesity	K	K	Y	Lecture, small group discussion	short note/ Viva voce		Pharmacology	
IM15.14	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy of pressors used in the treatment of Upper GI bleed	K	K	Y	Lecture, Small group discussion	Viva voce/ short note		Pharmacology	General Surgery

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM15.15	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy of acid peptic disease including Helicobacter pylori	K	K	Y	Lecture, small group discussion	short note/ Viva voce		Pharmacology, Microbiology	General Surgery
IM16.13	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy for parasitic causes of diarrhea	K	K	Y	Lecture, small group discussion	short note/ Viva voce		Pharmacology, Microbiology	
IM16.14	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy for bacterial and viral diarrhea	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pharmacology, Microbiology	
IM16.16	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy including immunotherapy	K	K	Y	Lecture, small group discussion	short note/ Viva voce		Pharmacology	
IM17.11	Describe the indications, pharmacology, dose, side effects of abortive therapy in migraine	K	KH	Y	Lecture, Small Group discussion	Written/ Viva voce		Pharmacology	
IM17.12	Describe the indications, pharmacology, dose, side effects of prophylactic therapy in migraine	K	KH	Y	Lecture, Small Group discussion	Written/ Viva voce		Pharmacology	
IM17.13	Describe the pharmacology, dose, adverse reactions and regimens of drugs used in the treatment of bacterial, tubercular and viral meningitis	K	KH	Y	Lecture, Small Group discussion	Written/ Viva voce		Pharmacology	
IM17.14	Counsel patients with migraine on lifestyle changes and need for prophylactic therapy	A/C	SH	N	DOAP session	Skill Assessment		Pharmacology	
IM19.8	Discuss and describe the pharmacology, dose, side effects and interactions used in the drug therapy of Parkinson's syndrome	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM19.9	Enumerate the indications for use of surgery and botulinum toxin in the treatment of movement disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Surgery
IM20.1	Enumerate the poisonous snakes of your area and describe the distinguishing marks of each	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine, Pharmacology	
IM20.7	Enumerate the indications and describe the pharmacology, dose, adverse reactions, hypersensitivity reactions of anti-snake venom	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM20.8	Describe the diagnosis, initial approach, stabilisation and therapy of scorpion envenomation	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM20.9	Describe the diagnosis, initial approach, stabilisation and therapy of bee sting allergy	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM21.1	Describe the initial approach to the stabilisation of the patient who presents with poisoning	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM21.2	Enumerate the common plant poisons seen in your area and describe their toxicology, clinical features, prognosis and specific approach to detoxification	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine, Pharmacology	
IM21.3	Enumerate the common corrosives used in your area and describe their toxicology, clinical features, prognosis and approach to therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine, Pharmacology	
IM21.4	Enumerate the commonly observed drug overdose in your area and describe their toxicology, clinical features, prognosis and approach to therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine, Pharmacology	
IM21.5	Observe and describe the functions and role of a poison center in suspected poisoning	S	KH	Y	DOAP session	document in log book		Forensic Medicine, Pharmacology	
IM21.6	Describe the medico-legal aspects of suspected suicidal or homicidal poisoning and demonstrate the correct procedure to write a medico-legal report on a suspected poisoning	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		Forensic Medicine, Pharmacology	
IM21.7	Counsel family members of a patient with suspected poisoning about the clinical and medico-legal aspects with empathy	A/C	SH	Y	DOAP session	Skill assessment		Forensic Medicine, Pharmacology	
IM22.3	Describe the approach to the management of hypercalcemia	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM25.11	Develop an appropriate empiric treatment plan based on the patient's clinical and immune status pending definitive diagnosis	C	SH	Y	DOAP session	Skill assessment		Microbiology, Pharmacology	

**Pediatrics**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PE13.5	Propose a management plan for Fe Deficiency Anaemia	S	SH	Y	Bed side clinics, Skill lab	Skill Assessment		Pathology, Pharmacology	
PE13.6	Discuss the National Anaemia Control Program and its recommendations	K	K	Y	Lecture, Small group Discussion	Written/ Viva voce		Pharmacology, Community Medicine	
PE14.1	Discuss the risk factors, clinical features, diagnosis and management of Lead Poisoning	K	KH	N	Lecture, Small group Discussion	Written/ Viva voce		Pharmacology	
PE14.3	Discuss the risk factors, clinical features, diagnosis and management of Organo phosphorous poisoning	K	KH	N	Lecture, Small group Discussion	Written/ Viva voce		Pharmacology	General Medicine
PE14.4	Discuss the risk factors, clinical features, diagnosis and management of paracetamol Poisoning	K	KH	N	Lecture, Small group Discussion	Written/ Viva voce		Pharmacology	
PE24.5	Discuss the role of antibiotics, antispasmodics, anti-secretory drugs, probiotics, anti- emetics in acute diarrheal diseases	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology, Microbiology	
PE24.8	Discuss the causes, clinical presentation and management of dysentery in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology, Microbiology	
PE34.3	Discuss the various regimens for management of Tuberculosis as per National Guidelines	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Community Medicine, Pharmacology	Respiratory Medicine
PE34.4	Discuss the preventive strategies adopted and the objectives and outcome of the National Tuberculosis Control Program	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Community Medicine, Pharmacology	Respiratory Medicine

**General Surgery**

SU13.2	Discuss the Principles of immunosuppressive therapy. Enumerate indications, describe surgical principles, management of organ transplantation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Pharmacology	
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**Physical Medicine & Rehabilitation**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PM3.5	Enumerate the indications and describe the therapies for spasticity including medications, serial casts, nerve blocks, botulinum toxin injections	K	KH	Y	Lectures, Small group discussion			Pharmacology	Pediatrics, Orthopedics
PM7.6	Enumerate the indications and describe the pharmacology and side effects of commonly used drugs in neuropathic bladder	K	KH	Y	Lectures, Small group discussion	Written / Viva voce		Pharmacology	General Medicine

#### Respiratory Medicine

CT1.4	Describe the epidemiology, the predisposing factors and microbial and therapeutic factors that determine resistance to drugs	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology, Pharmacology	
CT1.14	Describe and discuss the pharmacology of various antituberculous agents, their indications, contraindications, interactions and adverse reactions	K	KH	Y	Lecture, Small group discussion	short note/ Viva voce		Pharmacology, Microbiology	
CT1.15	Prescribe an appropriate antituberculosis regimen based on the location of disease, smear positivity and negativity and co-morbidities based on current national guidelines including directly observed tuberculosis therapy (DOTS)	K	SH	Y	Bedside clinic, Small group discussion, Lecture	Skill assessment		Pharmacology, Community Medicine	
CT2.16	Discuss and describe therapies for OAD including bronchodilators, leukotriene inhibitors, mast cell stabilisers, theophylline, inhaled and systemic steroids, oxygen and immunotherapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	

#### Orthopaedics

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OR3.1	Describe and discuss the aetiopathogenesis, clinical features, Investigations and principles of management of Bone and Joint infections a) Acute Osteomyelitis b) Subacute osteomyelitis c) Acute Suppurative arthritis d) Septic arthritis & HIV infection e) Spirochaetal infection f) Skeletal Tuberculosis	K/S	K/KH/S H	Y	Lecture, Small group Discussion, Video assisted lecture	Written/ Viva voce/ OSCE	–	Pathology, Microbiology	General surgery

# **PATHOLOGY (CODE: PA)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
<b>PATHOLOGY</b>									
<b>Topic: Introduction to Pathology</b>		<b>Number of competencies: (03)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PA1.1	Describe the role of a pathologist in diagnosis and management of disease	K	K	Y	Departmental orientation	Written/ Viva voce			
PA1.2	Enumerate common definitions and terms used in Pathology	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
PA1.3	Describe the history and evolution of Pathology	K	K	N	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Cell Injury and Adaptation</b>		<b>Number of competencies: (08)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PA2.1	Demonstrate knowledge of the causes, mechanisms, types and effects of cell injury and their clinical significance	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PA2.2	Describe the etiology of cell injury. Distinguish between reversible-irreversible injury: mechanisms; morphology of cell injury	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PA2.3	Intracellular accumulation of fats, proteins, carbohydrates, pigments	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PA2.4	Describe and discuss Cell death- types, mechanisms, necrosis, apoptosis (basic as contrasted with necrosis), autolysis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PA2.5	Describe and discuss pathologic calcifications, gangrene	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PA2.6	Describe and discuss cellular adaptations: atrophy, hypertrophy, hyperplasia, metaplasia, dysplasia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PA2.7	Describe and discuss the mechanisms of cellular aging and apoptosis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			
PA2.8	Identify and describe various forms of cell injuries, their manifestations and consequences in gross and microscopic specimens	S	SH	Y	DOAP session	Skill assessment			
<b>Topic: Amyloidosis</b>		<b>Number of competencies: (02)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PA3.1	Describe the pathogenesis and pathology of amyloidosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PA3.2	Identify and describe amyloidosis in a pathology specimen	S	SH	N	DOAP session	Skill assessment			
<b>Topic: Inflammation</b>		<b>Number of competencies:(04)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PA4.1	Define and describe the general features of acute and chronic inflammation including stimuli, vascular and cellular events	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA4.2	Enumerate and describe the mediators of acute inflammation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA4.3	Define and describe chronic inflammation including causes, types, non-specific and granulomatous; and enumerate examples of each	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PA4.4	Identify and describe acute and chronic inflammation in gross and microscopic specimens	S	SH	Y	DOAP session	Skill assessment			
<b>Topic: Healing and repair</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification:(NIL)</b>				

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PA5.1	Define and describe the process of repair and regeneration including wound healing and its types	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
<b>Topic: Hemodynamic disorders</b> <span style="float: right;">Number of competencies: (07)</span> <span style="float: right;">Number of procedures that require certification :(NIL)</span>									
PA6.1	Define and describe edema, its types, pathogenesis and clinical correlations	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA6.2	Define and describe hyperemia, congestion, hemorrhage	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PA6.3	Define and describe shock, its pathogenesis and its stages	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA6.4	Define and describe normal haemostasis and the etiopathogenesis and consequences of thrombosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PA6.5	Define and describe embolism and its causes and common types	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PA6.6	Define and describe Ischaemia/infarction its types, etiology, morphologic changes and clinical effects	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PA6.7	Identify and describe the gross and microscopic features of infarction in a pathologic specimen	S	SH	Y	DOAP session	Skill Assessment			
<b>Topic: Neoplastic disorders</b> <span style="float: right;">Number of competencies: (05)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
PA7.1	Define and classify neoplasia. Describe the characteristics of neoplasia including gross, microscopy, biologic, behaviour and spread. Differentiate between benign from malignant neoplasms	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PA7.2	Describe the molecular basis of cancer	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			







Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PA15.1	Describe the metabolism of Vitamin B12 and the etiology and pathogenesis of B12 deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA15.2	Describe laboratory investigations of macrocytic anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA15.3	Identify and describe the peripheral blood picture of macrocytic anemia	S	SH	Y	DOAP session	Skill assessment			
PA15.4	Enumerate the differences and describe the etiology and distinguishing features of megaloblastic and non-megaloblastic macrocytic anemia	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
<b>Topic: Hemolytic anemia</b>									
			<b>Number of competencies: (07)</b>			<b>Number of procedures that require certification: (01)</b>			
PA16.1	Define and classify hemolytic anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.2	Describe the pathogenesis and clinical features and hematologic indices of hemolytic anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.3	Describe the pathogenesis, features, hematologic indices and peripheral blood picture of sickle cell anemia and thalassemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.4	Describe the etiology pathogenesis, hematologic indices and peripheral blood picture of Acquired hemolytic anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.5	Describe the peripheral blood picture in different hemolytic anaemias	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA16.6	Prepare a peripheral blood smear and identify hemolytic anaemia from it	S	P	Y	DOAP session	Skill assessment	1		
PA16.7	Discribe the correct technique to perform a cross match	S	SH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Aplastic anemia</b>									
			<b>Number of competencies: (02)</b>			<b>Number of procedures that require certification:(NIL)</b>			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PA 17.1	Enumerate the etiology, pathogenesis and findings in aplastic anemia	K	K	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA17.2	Enumerate the indications and describe the findings in bone marrow aspiration and biopsy	K	K	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
<b>Topic: Leukocyte disorders</b>		<b>Number of competencies: (02)</b>			<b>Number of procedures that require certification:(NIL)</b>				
PA18.1	Enumerate and describe the causes of leucocytosis leucopenia lymphocytosis and leukemoid reactions	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PA 18.2	Describe the etiology, genetics, pathogenesis classification, features, hematologic features of acute and chronic leukemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Lymph node and spleen</b>		<b>Number of competencies: (07)</b>			<b>Number of procedures that require certification:(NIL)</b>				
PA19.1	Enumerate the causes and describe the differentiating features of lymphadenopathy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA19.2	Describe the pathogenesis and pathology of tuberculous lymphadenitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA19.3	Identify and describe the features of tuberculous lymphadenitis in a gross and microscopic specimen	S	SH	Y	DOAP session	Skill assessment			
PA19.4	Describe and discuss the pathogenesis, pathology and the differentiating features of Hodgkin's and non-Hodgkin's lymphoma	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA19.5	Identify and describe the features of Hodgkin's lymphoma in a gross and microscopic specimen	S	SH	Y	DOAP session	Skill assessment		General Surgery	



Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PA22.4	Enumerate blood components and describe their clinical uses	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery, General Medicine	
PA22.5	Enumerate and describe infections transmitted by blood transfusion	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Microbiology
PA22.6	Describe transfusion reactions and enumerate the steps in the investigation of a transfusion reaction	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA22.7	Enumerate the indications and describe the principles and procedure of autologous transfusion	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Clinical Pathology</b>		<b>Number of competencies: (03)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PA23.1	Describe abnormal urinary findings in disease states and identify and describe common urinary abnormalities in a clinical specimen	S	SH	Y	DOAP session	Skill Assessment			
PA23.2	Describe abnormal findings in body fluids in various disease states	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PA23.3	Describe and interpret the abnormalities in a panel containing semen analysis, thyroid function tests, renal function tests or liver function tests	S	SH	Y	DOAP session	Skill Assessment			
<b>Topic: Gastrointestinal tract</b>		<b>Number of competencies: (07)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PA24.1	Describe the etiology, pathogenesis, pathology and clinical features of oral cancers	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Dentistry	
PA24.2	Describe the etiology, pathogenesis, pathology, microbiology, clinical and microscopic features of peptic ulcer disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA24.3	Describe and identify the microscopic features of peptic ulcer	S	SH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PA24.4	Describe and etiology and pathogenesis and pathologic features of carcinoma of the stomach	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA24.5	Describe and etiology and pathogenesis and pathologic features of Tuberculosis of the intestine	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA24.6	Describe and etiology and pathogenesis and pathologic and distinguishing features of Inflammatory bowel disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA24.7	Describe the etiology, pathogenesis, pathology and distinguishing features of carcinoma of the colon	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
<b>Topic: Hepatobiliary system</b> <span style="margin-left: 200px;"><b>Number of competencies: (06)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (01)</b></span>									
PA25.1	Describe bilirubin metabolism, enumerate the etiology and pathogenesis of jaundice, distinguish between direct and indirect hyperbilirubinemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA25.2	Describe the pathophysiology and pathologic changes seen in hepatic failure and their clinical manifestations, complications and consequences	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, General Surgery	
PA25.3	Describe the etiology and pathogenesis of viral and toxic hepatitis: distinguish the causes of hepatitis based on the clinical and laboratory features. Describe the pathology, complications and consequences of hepatitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA25.4	Describe the pathophysiology, pathology and progression of alcoholic liver disease including cirrhosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, General Surgery	
PA25.5	Describe the etiology, pathogenesis and complications of portal hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, General Surgery	
PA25.6	Interpret liver function and viral hepatitis serology panel. Distinguish obstructive from non-obstructive jaundice based on clinical features and liver function tests	S	P	Y	DOAP session	Skill assessment	1	General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
<b>Topic: Respiratory system</b>		<b>Number of competencies: (07)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PA26.1	Define and describe the etiology, types, pathogenesis, stages, morphology and complications of pneumonia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA26.2	Describe the etiology, gross and microscopic appearance and complications of lung abscess	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA26.3	Define and describe the etiology, types, pathogenesis, stages, morphology and complications and evaluation of Obstructive airway disease (OAD) and bronchiectasis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	Microbiology
PA26.4	Define and describe the etiology, types, pathogenesis, stages, morphology microscopic appearance and complications of tuberculosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA26.5	Define and describe the etiology, types, exposure, environmental influence, pathogenesis, stages, morphology, microscopic appearance and complications of Occupational lung disease	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine, Community Medicine	
PA26.6	Define and describe the etiology, types, exposure, genetics environmental influence, pathogenesis, stages, morphology, microscopic appearance,metastases and complications of tumors of the lung and pleura	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA26.7	Define and describe the etiology, types, exposure, genetics environmental influence, pathogenesis, morphology, microscopic appearance and complications of mesothelioma	K	KH	N	Lecture, Small group discussion	Written / Viva voce		General Medicine, Community Medicine	
<b>Topic: Cardiovascular system</b>		<b>Number of competencies: (10)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PA27.1	Distinguish arteriosclerosis from atherosclerosis. Describe the pathogenesis and pathology of various causes and types of arteriosclerosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA27.2	Describe the etiology, dynamics, pathology types and complications of aneurysms including aortic aneurysms	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PA27.3	Describe the etiology, types, stages pathophysiology, pathology and complications of heart failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Physiology	
PA27.4	Describe the etiology, pathophysiology, pathology, gross and microscopic features, criteria and complications of rheumatic fever	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA27.5	Describe the epidemiology, risk factors, etiology, pathophysiology, pathology, presentations, gross and microscopic features, diagnostic tests and complications of ischemic heart disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA27.6	Describe the etiology, pathophysiology, pathology, gross and microscopic features, diagnosis and complications of infective endocarditis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA27.7	Describe the etiology, pathophysiology, pathology, gross and microscopic features, diagnosis and complications of pericarditis and pericardial effusion	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA27.8	Interpret abnormalities in cardiac function testing in acute coronary syndromes	S	SH	Y	DOAP session	Skill Assessment		Physiology, General Medicine	
PA27.9	Classify and describe the etiology, types, pathophysiology, pathology, gross and microscopic features, diagnosis and complications of cardiomyopathies	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Physiology	
PA27.10	Describe the etiology, pathophysiology, pathology features and complications of syphilis on the cardiovascular system	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
<b>Topic: Urinary Tract</b>		<b>Number of competencies: (16)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PA28.1	Describe the normal histology of the kidney	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
PA28.2	Define, classify and distinguish the clinical syndromes and describe the etiology, pathogenesis, pathology, morphology, clinical and laboratory and urinary findings, complications of renal failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PA28.3	Define and describe the etiology, precipitating factors, pathogenesis, pathology, laboratory urinary findings, progression and complications of acute renal failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA28.4	Define and describe the etiology, precipitating factors, pathogenesis, pathology, laboratory urinary findings progression and complications of chronic renal failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA28.5	Define and classify glomerular diseases. Enumerate and describe the etiology, pathogenesis, mechanisms of glomerular injury, pathology, distinguishing features and clinical manifestations of glomerulonephritis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA28.6	Define and describe the etiology, pathogenesis, pathology, laboratory, urinary findings, progression and complications of IgA nephropathy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA28.7	Enumerate and describe the findings in glomerular manifestations of systemic disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA28.8	Enumerate and classify diseases affecting the tubular interstitium	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA28.9	Define and describe the etiology, pathogenesis, pathology, laboratory, urinary findings, progression and complications of acute tubular necrosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA28.10	Describe the etiology, pathogenesis, pathology, laboratory findings, distinguishing features progression and complications of acute and chronic pyelonephritis and reflux nephropathy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, General Surgery	
PA28.11	Define classify and describe the etiology, pathogenesis pathology, laboratory, urinary findings, distinguishing features progression and complications of vascular disease of the kidney	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PA28.12	Define classify and describe the genetics, inheritance, etiology, pathogenesis, pathology, laboratory, urinary findings, distinguishing features, progression and complications of cystic disease of the kidney	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics	
PA28.13	Define classify and describe the etiology, pathogenesis, pathology, laboratory, urinary findings, distinguishing features progression and complications of renal stone disease and obstructive uropathy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA28.14	Classify and describe the etiology, genetics, pathogenesis, pathology, presenting features, progression and spread of renal tumors	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
PA28.15	Describe the etiology, genetics, pathogenesis, pathology, presenting features and progression of thrombotic angiopathies	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA28.16	Describe the etiology, genetics, pathogenesis, pathology, presenting features and progression of urothelial tumors	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
<b>Topic: Male Genital Tract</b>									
		<b>Number of competencies: (05)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PA29.1	Classify testicular tumors and describe the pathogenesis, pathology, presenting and distinguishing features, diagnostic tests, progression and spread of testicular tumors	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA29.2	Describe the pathogenesis, pathology, presenting and distinguishing features, diagnostic tests, progression and spread of carcinoma of the penis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA29.3	Describe the pathogenesis, pathology, hormonal dependency presenting and distinguishing features, urologic findings & diagnostic tests of benign prostatic hyperplasia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA29.4	Describe the pathogenesis, pathology, hormonal dependency presenting and distinguishing features, diagnostic tests, progression and spread of carcinoma of the prostate	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PA29.5	Describe the etiology, pathogenesis, pathology and progression of prostatitis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
<b>Topic: Female Genital Tract</b> <span style="margin-left: 200px;"><b>Number of competencies: (09)</b></span> <span style="margin-left: 100px;"><b>Number of procedures that require certification: (NIL)</b></span>									
PA30.1	Describe the epidemiology, pathogenesis, etiology, pathology, screening, diagnosis and progression of carcinoma of the cervix	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PA30.2	Describe the pathogenesis, etiology, pathology, diagnosis and progression and spread of carcinoma of the endometrium	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PA30.3	Describe the pathogenesis, etiology, pathology, diagnosis and progression and spread of carcinoma of the leiomyomas and leiomyosarcomas	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PA30.4	Classify and describe the etiology, pathogenesis, pathology, morphology, clinical course, spread and complications of ovarian tumors	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PA30.5	Describe the etiology, pathogenesis, pathology, morphology, clinical course, spread and complications of gestational trophoblastic neoplasms	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PA30.6	Describe the etiology and morphologic features of cervicitis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PA30.7	Describe the etiology, hormonal dependence, features and morphology of endometriosis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PA30.8	Describe the etiology and morphologic features of adenomyosis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PA30.9	Describe the etiology, hormonal dependence and morphology of endometrial hyperplasia	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
<b>Topic: Breast</b> <span style="float: right;">Number of competencies: (04)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
PA31.1	Classify and describe the types, etiology, pathogenesis, pathology and hormonal dependency of benign breast disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, General Surgery	
PA31.2	Classify and describe the epidemiology, pathogenesis, classification, morphology, prognostic factors, hormonal dependency, staging and spread of carcinoma of the breast	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA31.3	Describe and identify the morphologic and microscopic features of carcinoma of the breast	S	SH	N	DOAP session	Skill Assessment		General Surgery	
PA31.4	Enumerate and describe the etiology, hormonal dependency and pathogenesis of gynecomastia	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pediatrics, General Medicine	
<b>Topic: Endocrine system</b> <span style="float: right;">Number of competencies: (09)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
PA32.1	Enumerate, classify and describe the etiology, pathogenesis, pathology and iodine dependency of thyroid swellings	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Physiology, General Medicine, General Surgery	
PA32.2	Describe the etiology, cause, iodine dependency, pathogenesis, manifestations, laboratory and imaging features and course of thyrotoxicosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.3	Describe the etiology, pathogenesis, manifestations, laboratory and imaging features and course of thyrotoxicosis/ hypothyroidism	K	KH	Y	Lecture, Small group	Written/ Viva voce		Physiology, General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PA32.4	Classify and describe the epidemiology, etiology, pathogenesis, pathology, clinical laboratory features, complications and progression of diabetes mellitus	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.5	Describe the etiology, genetics, pathogenesis, manifestations, laboratory and morphologic features of hyperparathyroidism	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.6	Describe the etiology, pathogenesis, manifestations, laboratory, morphologic features, complications and metastases of pancreatic cancer	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA32.7	Describe the etiology, pathogenesis, manifestations, laboratory, morphologic features, complications of adrenal insufficiency	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.8	Describe the etiology, pathogenesis, manifestations, laboratory, morphologic features, complications of Cushing's syndrome	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.9	Describe the etiology, pathogenesis, manifestations, laboratory and morphologic features of adrenal neoplasms	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Physiology, General Medicine, General Surgery	
<b>Topic: Bone and soft tissue</b> <span style="margin-left: 200px;"><b>Number of competencies: (05)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
PA33.1	Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications of osteomyelitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Orthopaedics	Microbiology
PA33.2	Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications and metastases of bone tumors	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Orthopaedics	
PA33.3	Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications and metastases of soft tissue tumors	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Orthopaedics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PA33.4	Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications of Paget's disease of the bone	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Orthopaedics	
PA33.5	Classify and describe the etiology, immunology, pathogenesis, manifestations, radiologic and laboratory features, diagnostic criteria and complications of rheumatoid arthritis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
<b>Topic: Skin</b>		<b>Number of competencies: (04)</b>			<b>Number of procedures that require certification:(NIL)</b>				
PA34.1	Describe the risk factors pathogenesis, pathology and natural history of squamous cell carcinoma of the skin	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Dermatology, Venereology & Leprosy	
PA34.2	Describe the risk factors pathogenesis, pathology and natural history of basal cell carcinoma of the skin	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Dermatology, Venereology & Leprosy	
PA34.3	Describe the distinguishing features between a nevus and melanoma. Describe the etiology, pathogenesis, risk factors morphology clinical features and metastases of melanoma	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Dermatology, Venereology & Leprosy	
PA34.4	Identify, distinguish and describe common tumors of the skin	S	SH	N	DOAP session	Skill Assessment		Dermatology, Venereology & Leprosy	
<b>Topic: Central Nervous System</b>		<b>Number of competencies:(03)</b>			<b>Number of procedures that require certification: (01)</b>				
PA35.1	Describe the etiology, types and pathogenesis, differentiating factors, CSF findings in meningitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA35.2	Classify and describe the etiology, genetics, pathogenesis, pathology, presentation sequelae and complications of CNS tumors	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PA35.3	Identify the etiology of meningitis based on given CSF parameters	S	P	Y	DOAP session	Skill Assessment	1	General Medicine	Microbiology

**Topic: Eye**

**Number of competencies: (01)**

**Number of procedures that require certification:(NIL)**

PA36.1	Describe the etiology, genetics, pathogenesis, pathology, presentation, sequelae and complications of retinoblastoma	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Ophthalmology	
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**Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.**

**Column D: K – Knows, KH - Knows How, S - Shows how, P- performs independently,**

**Column F: DOAP session – Demonstrate, Observe, Assess, Perform.**

**Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation**

**Integration**

**Human Anatomy**

AN5.8	Define thrombosis, infarction & aneurysm	K	KH	N	Lecture	Written		Pathology	Physiology
AN66.2	Describe the ultrastructure of connective tissue	K	KH	N	Lecture, Practical	Written		Pathology	
AN70.1	Identify exocrine gland under the microscope & distinguish between serous, mucous and mixed acini	K/S	SH	Y	Lecture, Practical	Written/ skill assessment		Pathology	
AN70.2	Identify the lymphoid tissue under the microscope & describe microanatomy of lymph node, spleen, thymus, tonsil and correlate the structure with function	K/S	SH	Y	Lecture, Practical	Written/ skill assessment		Pathology	
AN71.1	Identify bone under the microscope, Classify various types and describe the structure-function correlation of the same	K/S	SH	Y	Lecture, Practical	Written/ skill assessment		Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
AN71.2	Identify cartilage under the microscope & describe various types and structure- function correlation of the same describe various types and structure-function correlation of the same	K/S	SH	Y	Lecture, Practical	Written/ skill assessment		Pathology	
<b>Physiology</b>									
PY1.4	Describe apoptosis – programmed cell death	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PY2.5	Describe different types of anemia & Jaundice	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	Biochemistry
PY2.8	Describe the physiological basis of hemostasis and anticoagulants. Describe bleeding & clotting disorders (Hemophilia, purpura)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PY2.9	Describe different blood groups and discuss the clinical importance of blood grouping, blood banking and transfusion	K	KH	Y	Lecture, Small group discussion, ECE- Visit to blood bank	Written/ Viva voce		Pathology	
PY2.11	Estimate Hb, RBC, TLC, RBC indices, DLC, Blood groups, BT/CT	S	SH	Y	DOAP sessions	Practical/OSPE/ viva voce		Pathology	
PY2.12	Describe test for ESR, Osmotic fragility, Hematocrit. Note the findings and interpret the test results etc	K	KH	Y	Demonstration	Written/ Viva voce		Pathology	
PY2.13	Describe steps for reticulocyte and platelet count	K	KH	Y	Demonstration sessions	Written/ Viva voce		Pathology	
PY3.6	Describe the pathophysiology of Myasthenia gravis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
<b>Biochemistry</b>									
BI2.4	Describe and discuss enzyme inhibitors as poisons and drugs and as therapeutic enzymes	K	KH	Y	Lecture, small group discussions	Written/ Viva voce		Pathology, General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
BI2.5	Describe and discuss the clinical utility of various serum enzymes as markers of pathological conditions	K	KH	Y	Lecture, small group discussions	Written/ Viva voce		Pathology, General Medicine	
BI2.6	Discuss use of enzymes in laboratory investigations (Enzyme-based assays)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	
BI2.7	Interpret laboratory results of enzyme activities & describe the clinical utility of various enzymes as markers of pathological conditions	K	KH	Y	Lecture, Small group discussion /DOAP sessions	Written/ Viva voce		Pathology, General Medicine	
BI3.8	Discuss and interpret laboratory results of analytes associated with metabolism of carbohydrates.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	
BI5.2	Describe and discuss functions of proteins and structure-function relationships in relevant areas eg, hemoglobin and selected hemoglobinopathies	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Pathology, General Medicine	Physiology
BI6.11	Describe the functions of haem in the body and describe the processes involved in its metabolism and describe porphyrin metabolism	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Pathology, General Medicine	Physiology
BI6.12	Describe the major types of haemoglobin and its derivatives found in the body and their physiological/ pathological relevance	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Pathology, General Medicine	Physiology
BI6.13	Describe the functions of the kidney, liver, thyroid and adrenal glands.	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
BI6.14	Describe the tests that are commonly done in clinical practice to assess the functions of kidney, liver, thyroid and adrenal glands	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
BI6.15	Describe the abnormalities of kidney, liver, thyroid and adrenal glands	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
BI7.7	Describe the role of oxidative stress in the pathogenesis of conditions such as cancer, complications of diabetes mellitus and atherosclerosis	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		General Medicine, Pathology	
BI8.1	Discuss the importance of various dietary components and explain importance of dietary fibre	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		General Medicine, Pediatrics, Pathology	
BI8.2	Describe the types and causes of protein energy malnutrition and its effects	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		General Medicine, Pediatrics, Pathology	
BI8.4	Describe the causes (including dietary habits), effects and health risks associated with being overweight/obesity	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		General Medicine, Pathology	
BI8.5	Summarize the nutritional importance of commonly used items of food including fruits and vegetables (macro-molecules & its importance)	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Community Medicine, General Medicine, Pediatrics	
BI10.1	Describe the cancer initiation, promotion oncogenes & oncogene activation	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Obstetrics & Gynaecology, General Surgery, Pathology	
BI10.2	Describe various biochemical tumor markers and the biochemical basis of cancer therapy	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Obstetrics & Gynaecology, General Surgery, Pathology	
BI10.3	Describe the cellular and humoral components of the immune system & describe the types and structure of antibody	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Obstetrics & Gynaecology, General Surgery, Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
BI10.4	Describe & discuss innate and adaptive immune responses, self/non-self recognition and the central role of T-helper cells in immune responses	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		General Medicine, Pathology	Physiology
BI10.5	Describe antigens and concepts involved in vaccine development	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Pathology, Pediatrics, Microbiology	
BI11.17	Explain the basis and rationale of biochemical tests done in the following conditions: diabetes mellitus, dyslipidemia, myocardial infarction, renal failure, gout, proteinuria, nephrotic syndrome, edema, jaundice, liver diseases, pancreatitis, disorders of acid-base balance, thyroid disorders	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		General Medicine, Pathology	
<b>Microbiology</b>									
MI1.7	Describe the immunological mechanisms in health	K	KH	Y	Lecture	Written/ Viva voce			Pathology
MI1.8	Describe the mechanisms of immunity and response of the host immune system to infections	K	KH	Y	Lecture	Written/ Viva voce		Pediatrics	Pathology
MI2.1	Describe the etiologic agents in rheumatic fever and their diagnosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
MI2.2	Describe the classification etio-pathogenesis, clinical features and discuss the diagnostic modalities of Infective endocarditis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
MI2.3	Identify the microbial agents causing Rheumatic heart disease & infective Endocarditis	S	SH	Y	DOAP session	Skill assessment		General Medicine	Pathology
MI2.4	List the common microbial agents causing anemia. Describe the morphology, mode of infection and discuss the pathogenesis, clinical course, diagnosis and prevention and treatment of the common microbial agents causing Anemia	K	KH	Y	Lecture, Small group discussion	Written/ viva voce		General Medicine	Pathology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
MI2.5	Describe the etio-pathogenesis and discuss the clinical evolution and the laboratory diagnosis of kala azar, malaria, filariasis and other common parasites prevalent in India	K	KH	Y	Lecture, Small group discussion	Written/ viva voce		General Medicine	Pathology
MI2.7	Describe the epidemiology, the etio-pathogenesis, evolution, complications, opportunistic infections, diagnosis, prevention and the principles of management of HIV	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
MI3.1	Enumerate the microbial agents causing diarrhea and dysentery. Describe the epidemiology, morphology, pathogenesis, clinical features, and diagnostic modalities of these agents	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics	Pathology
MI3.3	Describe the enteric fever pathogens and discuss the evolution of the clinical course, the laboratory diagnosis of the diseases caused by them	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Pathology
MI3.4	Identify the different modalities for diagnosis of enteric fever. Choose the appropriate test related to the duration of illness	S	KH	Y	DOAP session	Skill assessment		General Medicine	Pathology
MI3.6	Describe the etio-pathogenesis of Acid Peptic disease (APD) and the clinical course. Discuss the diagnosis and management of the causative agent of APD.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Pathology
MI3.7	Describe the epidemiology, the etio-pathogenesis and discuss the viral markers in the evolution of Viral hepatitis. Discuss the modalities in the diagnosis, and prevention of viral hepatitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
MI3.8	Choose the appropriate laboratory test in the diagnosis of viral hepatitis	K	KH	Y	small group discussion, Case discussion	Written/ Viva voce/ OSPE		General Medicine	Pathology
MI5.1	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of meningitis	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics	Pathology
MI5.2	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of encephalitis.	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics	Pathology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
MI8.2	Describe the etio-pathogenesis of opportunistic infections (OI) and discuss the factors contributing to the occurrence of OI, and the laboratory diagnosis	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Pathology
MI8.3	Describe the role of oncogenic viruses in the evolution of virus associated malignancy	K	KH	Y	Lecture	Written		General Medicine	Pathology
<b>Community Medicine</b>									
CM8.1	Describe and discuss the epidemiological and control measures including the use of essential laboratory tests at the primary care level for communicable diseases	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		General Medicine, Pediatrics	Microbiology, Pathology
<b>Forensic Medicine &amp; Toxicology</b>									
FM2.1	Define, describe and discuss death and its types including somatic/clinical/cellular, molecular and brain-death, Cortical death and Brainstem death	K	KH	Y	Lecture, Small group discussion	Written/viva voce			Pathology
FM2.2	Describe and discuss natural and unnatural deaths	K	KH	Y	Lecture, Small group discussion	Written/viva voce			Pathology
FM2.3	Describe and discuss issues related to sudden natural deaths	K	KH	Y	Lecture, Small group discussion	Written/viva voce			Pathology
FM2.5	Discuss moment of death, modes of death-coma, asphyxia and syncope	K	KH	Y	Lecture, Small group discussion	Written/viva voce			Pathology
FM2.11	Describe and discuss autopsy procedures including post-mortem examination, different types of autopsies, aims and objectives of post-mortem examination	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/viva voce/ OSPE			Pathology
FM2.12	Describe the legal requirements to conduct post-mortem examination and procedures to conduct medico-legal post-mortem examination	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/viva voce/ OSPE			Pathology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
FM2.13	Describe and discuss obscure autopsy	K	KH	Y	Lecture, Small group discussion	Written/viva voce			Pathology
FM3.28	Describe evidences of abortion - living and dead, duties of doctor in cases of abortion, investigations of death due to criminal abortion	K	K/KH	Y	Lecture, Small group discussion	Written/viva voce		Obstetrics & Gynaecology, Pathology	
FM6.1	Describe different types of specimens and tissues to be collected both in the living and dead: body fluids (blood, urine, semen, faeces, saliva), skin, nails, tooth pulp, vaginal smear, viscera, skull, specimen for histo-pathological examination, blood grouping, HLA Typing and DNA Fingerprinting. Describe Locard's Exchange Principle	K	K/KH	Y	Lecture, Small group discussion	Written/viva voce			Pathology
FM14.7	Demonstrate & identify that a particular stain is blood and identify the species of its origin	S	KH	Y	Small group discussion, Lecture	Log book/ skill station/ Viva voce		Forensic Medicine, Physiology	
FM14.8	Demonstrate the correct technique to perform and identify ABO & RH blood group of a person	S	SH	Y	Small group discussion, DOAP session	Log book/ skill station/ Viva voce		Forensic Medicine, Physiology	
<b>Dermatology, Venereology &amp; Leprosy</b>									
DR12.7	Identify and distinguish fixed drug eruptions and Steven Johnson syndrome from other skin lesions	S	SH	Y	Bedside clinic	Skill assessment	1	General Medicine	Pathology, Microbiology
DR14.1	Describe the etiology, pathogenesis and clinical precipitating features and classification of Urticaria and angioedema	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Microbiology, Pathology
DR16.1	Identify and distinguish skin lesions of SLE	S	SH	Y	Bedside clinic discussion	Skill assessment	2	General Medicine	Pathology
DR16.2	Identify and distinguish Raynaud's phenomenon	S	SH	Y	Bedside clinic discussion	Skill assessment	2	General Medicine	Pathology
<b>Anesthesiology</b>									

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
AS9.4	Enumerate blood products and describe the use of blood products in the preoperative period	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Pathology	General Surgery
<b>ENT</b>									
EN1.2	Describe the pathophysiology of common diseases in ENT	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Pathology	
<b>Ophthalmology</b>									
OP7.2	Describe and discuss the aetio-pathogenesis, stages of maturation and complications of cataract	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
OP8.1	Discuss the aetiology, pathology, clinical features and management of vascular occlusions of the retina	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Pathology	
<b>Dentistry</b>									
DE4.1	Discuss the prevalence of oral cancer and enumerate the common types of cancer that can affect tissues of the oral cavity	K	K	N	Lecture, Small group discussion	Viva voce		Pathology	ENT
DE4.2	Discuss the role of etiological factors in the formation of precancerous /cancerous lesions	K	KH	Y	Lecture, Small group discussion	Viva voce		Pathology	ENT
DE4.3	Identify potential pre-cancerous / cancerous lesions	S	SH	N	Observation, Bed side clinics	Skill assessment		Pathology	ENT
DE4.4	Counsel patients to risks of oral cancer with respect to tobacco, smoking, alcohol and other causative factors.	A/C	SH	Y	DOAP session	Document in Log book	2	Pathology	ENT
<b>General Medicine</b>									

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
IM1.1	Describe and discuss the epidemiology, pathogenesis clinical evolution and course of common causes of heart disease including: rheumatic/ valvular, ischemic, hypertrophic inflammatory	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.2	Describe and discuss the genetic basis of some forms of heart failure	K	KH	N	Lecture, Small group discussion	Written		Pathology, Physiology	
IM1.3	Describe and discuss the aetiology, microbiology, pathogenies and clinical evolution of rheumatic fever, criteria, degree of rheumatic activity and rheumatic valvular heart disease and its complications including infective endocarditis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology, Microbiology	
IM1.4	Stage heart failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.5	Describe, discuss and differentiate the processes involved in R vs L heart failure, systolic vs diastolic failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.6	Describe and discuss the compensatory mechanisms involved in heart failure including cardiac remodelling and neurohormonal adaptations	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.7	Enumerate, describe and discuss the factors that exacerbate heart failure including ischemia, arrhythmias, anemia, thyrotoxicosis, dietary factors drugs etc.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.8	Describe and discuss the pathogenesis and development of common arrhythmias involved in heart failure particularly atrial fibrillation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.9	Describe and discuss the clinical presentation and features, diagnosis, recognition and management of acute rheumatic fever	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
IM2.1	Discuss and describe the epidemiology, antecedents and risk factors for atherosclerosis and ischemic heart disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology, Community Medicine	
IM2.2	Discuss the aetiology of risk factors both modifiable and non-modifiable of atherosclerosis and IHD	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM2.4	Discuss and describe the pathogenesis natural history, evolution and complications of atherosclerosis and IHD	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM2.5	Define the various acute coronary syndromes and describe their evolution, natural history and outcomes	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM3.1	Define, discuss, describe and distinguish community acquired pneumonia, nosocomial pneumonia and aspiration pneumonia	K	K	Y	Lecture, Small group discussion	short note/ Viva voce		Human Anatomy, Pathology, Microbiology	
IM3.3	Discuss and describe the pathogenesis, presentation, natural history and complications of pneumonia	K	K	Y	Lecture, Small group discussion	short note/ Viva voce		Pathology, Microbiology	
IM4.5	Describe and discuss the pathophysiology and manifestations of malignant causes of fever including hematologic and lymph node malignancies	K	KH	Y	Lecture, Small group discussion	written		Pathology, Microbiology	
IM4.12	Order and interpret diagnostic tests based on the differential diagnosis including: CBC with differential, peripheral smear, urinary analysis with sediment, Chest X ray, blood and urine cultures, sputum gram stain and cultures, sputum AFB and cultures, CSF analysis, pleural and body fluid analysis, stool routine and culture and QBC	K	SH	Y	Bed side clinic, Skill assessment	Skill assessment		Pathology, Microbiology	
IM4.16	Enumerate the indications and describe the findings in tests of inflammation and specific rheumatologic tests, serologic testing for pathogens including HIV, bone marrow aspiration and biopsy	K	KH	N	Lecture, Small group discussion	written		Pathology	
IM4.17	Observe and assist in the performance of a bone marrow aspiration and biopsy in a simulated environment	S	SH	N	skills lab	log book documentation/ DOAP session		Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
IM5.1	Describe and discuss the physiologic and biochemical basis of hyperbilirubinemia	K	K	Y	Lecture, Small group discussion	Written/Viva voce		Pathology, Physiology	
IM5.2	Describe and discuss the aetiology and pathophysiology of liver injury	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM5.3	Describe and discuss the pathologic changes in various forms of liver disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM5.4	Describe and discuss the epidemiology, microbiology, immunology and clinical evolution of infective (viral) hepatitis	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Microbiology	
IM5.5	Describe and discuss the pathophysiology and clinical evolution of alcoholic liver disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM5.6	Describe and discuss the pathophysiology, clinical evolution and complications of cirrhosis and portal hypertension including ascites, spontaneous bacterial peritonitis, hepatorenal syndrome and hepatic encephalopathy	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM5.7	Enumerate and describe the causes and pathophysiology of drug induced liver injury	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Pharmacology	
IM5.12	Choose and interpret appropriate diagnostic tests including: CBC, bilirubin, function tests, Hepatitis serology and ascitic fluid examination in patient with liver diseases	S	KH	Y	Bedside clinic, DOAP session	Skill assessment		Pathology	
IM5.14	Outline a diagnostic approach to liver disease based on hyperbilirubinemia, liver function changes and hepatitis serology	S	SH	Y	Bedside clinic, Small group discussion	viva voce/ written		Pathology, Microbiology	
IM6.5	Describe and discuss the pathogenesis, evolution and clinical features of common HIV related malignancies	K	KH	Y	Lecture, Small group discussion	short notes/ Viva voce		Pathology, Microbiology	
IM6.6	Describe and discuss the pathogenesis, evolution and clinical features of common HIV related skin and oral lesions	K	KH	Y	Lecture, Small group discussion	short notes/ Viva voce		Pathology, Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
IM6.10	Choose and interpret appropriate diagnostic tests to diagnose and classify the severity of HIV-AIDS including specific tests of HIV, CDC	K	KH	Y	Bed side clinic, DOAP session, Small group discussion	written/ Skill assessment		Pathology, Microbiology	
IM6.19	Enumerate the indications of and discuss about prophylactic drugs used to prevent HIV related opportunistic infections	K/C	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Microbiology	
IM7.1	Describe the pathophysiology of autoimmune disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM7.2	Describe the genetic basis of autoimmune disease	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM7.16	Enumerate the indications for and interpret the results of: CBC, anti CCP (Anti-cyclic citrullinated peptide), RA, ANA, DNA and other tests of autoimmunity	K	SH	Y	Bed side clinic, small group	Skill assessment/ written		Pathology	
IM8.1	Describe and discuss the epidemiology, aetiology and the prevalence of primary and secondary hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM8.2	Describe and discuss the pathophysiology of hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM8.3	Describe and discuss the genetic basis of hypertension	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM8.4	Define and classify hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM8.5	Describe and discuss the differences between primary and secondary hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM8.7	Describe and discuss the clinical manifestations of the various aetiologies of secondary causes of hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM8.8	Describe, discuss and identify target organ damage due to hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
IM9.1	Define, describe and classify anemia based on red blood cell size and reticulocyte count	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM9.2	Describe and discuss the morphological characteristics, aetiology and prevalence of each of the causes of anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM9.6	Generate a differential diagnosis and prioritise based on clinical features that suggest a specific aetiology	S	SH	Y	Bed side clinic, DOAP session, Small group discussion	Skill assessment/ written		Pathology	
IM9.7	Describe the appropriate diagnostic work up based on the presumed aetiology	S	SH	Y	Bed side clinic, DOAP session	Skill assessment/ written		Pathology	
IM9.8	Describe and discuss the meaning and utility of various components of the hemogram	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment		Pathology	
IM9.9	Describe and discuss the various tests for iron deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment		Pathology	
IM9.10	Order and interpret tests for anemia including hemogram, red cell indices, reticulocyte count, iron studies, B12 and folate.	S	SH	Y	Bed side clinic, DOAP session	Skill assessment/ written		Pathology	
IM9.11	Describe, perform and interpret a peripheral smear and stool occult blood	S	SH	P	Bed side clinic, DOAP session	Skill assessment/ written		Pathology	
IM9.12	Describe the indications and interpret the results of a bone marrow aspirations and biopsy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment		Pathology	
IM9.13	Describe, develop a diagnostic plan to determine the aetiology of anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment		Pathology	
IM9.18	Describe the indications for blood transfusion and the appropriate use of blood components	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment		Pathology	
IM10.1	Define, describe and differentiate between acute and chronic renal failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
IM10.2	Classify, describe and differentiate the pathophysiologic causes of acute renal failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.3	Describe the pathophysiology and causes of pre renal ARF, renal and post renal ARF	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.4	Describe the evolution, natural history and treatment of ARF	K	KH	Y	Lecture, small group	Written/ Viva voce		Pathology	
IM10.5	Describe and discuss the aetiology of CRF	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.6	Stage Chronic Kidney Disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.7	Describe and discuss the pathophysiology and clinical findings of uraemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.8	Classify, describe and discuss the significance of proteinuria in CKD	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.9	Describe and discuss the pathophysiology of anemia and hyperparathyroidism in CKD	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.10	Describe and discuss the association between CKD glycemia and hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.11	Describe and discuss the relationship between CAD risk factors and CKD and in dialysis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.16	Enumerate the indications for and interpret the results of: renal function tests, calcium, phosphorus, PTH, urine electrolytes, osmolality, Anion gap	K	KH	Y	DOAP session, Small group discussion	Skill assessment/ Written/ Viva voce		Pathology	
IM10.17	Describe and calculate indices of renal function based on available laboratories including FENa (Fractional Excretion of Sodium) and CrCl (Creatinine Clearance)	S	SH	Y	DOAP session, Small group discussion	Skill assessment/ Written/ Viva voce		Pathology	
IM11.2	Describe and discuss the epidemiology and pathogenesis and risk factors and clinical evolution of type 1 diabetes	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
IM11.3	Describe and discuss the epidemiology and pathogenesis and risk factors, economic impact and clinical evolution of type 2 diabetes	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM11.5	Describe and discuss the pathogenesis and temporal evolution of microvascular and macrovascular complications of diabetes	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM11.11	Order and interpret laboratory tests to diagnose diabetes and its complications including: glucoses, glucose tolerance test, glycosylated hemoglobin, urinary micro albumin, ECG, electrolytes, ABG, ketones, renal function tests and lipid profile	S	SH	Y	Bed side clinic, DOAP session, Small group discussion	Skill assessment		Pathology	
IM11.12	Perform and interpret a capillary blood glucose test	S	P	Y	Bed side clinic, DOAP session, Small group discussion	Skill assessment	2	Pathology, Biochemistry	
IM11.13	Perform and interpret a urinary ketone estimation with a dipstick	S	P	Y	Bed side clinic, DOAP session	Skill assessment	2	Pathology, Biochemistry	
IM11.22	Enumerate the causes of hypoglycaemia and describe the counter hormone response and the initial approach and treatment	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM12.1	Describe the epidemiology and pathogenesis of hypothyroidism and hyperthyroidism including the influence of iodine deficiency and autoimmunity in the pathogenesis of thyroid disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM12.3	Describe and discuss the physiology of the hypothalamo-pituitary - thyroid axis, principles of thyroid function testing and alterations in physiologic function	K	K	Y	Lecture, Small group discussion	short notes		Pathology, Physiology	
IM13.1	Describe the clinical epidemiology and inherited & modifiable risk factors for common malignancies in India	K	K	Y	Lecture, Small group discussion	short note/ Viva voce		Pathology, Biochemistry	
IM13.2	Describe the genetic basis of selected cancers	K	K	N	Lecture, Small group discussion	short note/ Viva voce		Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
IM13.3	Describe the relationship between infection and cancers	K	K	Y	Lecture, Small group discussion	short note/ Viva voce		Pathology, Microbiology	
IM13.4	Describe the natural history, presentation, course, complications and cause of death for common cancers	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology	
IM13.15	Describe the need, tests involved, their utility in the prevention of common malignancies	K	KH	Y	Bedside clinic, small group discussion	short note/ Viva voce		Pathology	
IM14.2	Describe and discuss the aetiology of obesity including modifiable and non-modifiable risk factors and secondary causes	K	K	Y	Lecture, Small group discussion	short note/ Viva voce		Pathology	
IM14.3	Describe and discuss the monogenic forms of obesity	K	K	N	Lecture, Small group discussion	short note/ Viva voce		Pathology	
IM14.4	Describe and discuss the impact of environmental factors including eating habits, food, work, environment and physical activity on the incidence of obesity	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology, Community Medicine	
IM14.5	Describe and discuss the natural history of obesity and its complications	K	K	Y	Lecture, Small group discussion	short note/ Viva voce		Pathology	
IM15.1	Enumerate, describe and discuss the aetiology of upper and lower GI bleeding	K	K	Y	Lecture, Small group discussion	short note/ Viva voce		Pathology	General Surgery
IM15.2	Enumerate, describe and discuss the evaluation and steps involved in stabilizing a patient who presents with acute volume loss and GI bleed	S	SH	Y	DOAP session, Small group discussion, Lecture	Written/ Viva voce/ Skill assessment		Pathology	General Surgery
IM15.3	Describe and discuss the physiologic effects of acute blood and volume loss	K	K	Y	Lecture, Small group discussion	Short note/ viva voce		Pathology, Physiology	General Surgery
IM15.9	Choose and interpret diagnostic tests based on the clinical diagnosis including complete blood count, PT and PTT, stool examination, occult blood, liver function tests, H.pylori test	S	SH	Y	Bedside clinic, DOAP session, Small group discussion	Skill assessment/ Short note/ Viva voce		Pathology	General Surgery

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
IM15.11	Develop document and present a treatment plan that includes fluid resuscitation, blood and blood component transfusion and specific therapy for arresting blood loss	S	KH	Y	Lecture, Small group discussion	Short note/ viva voce		Pathology	General Surgery
IM15.12	Enumerate the indications for whole blood, component and platelet transfusion and describe the clinical features and management of a mismatched transfusion	K	K	Y	Lecture, Small group discussion	Short note/ viva voce		Pathology	General Surgery
IM15.13	Observe cross matching and blood / blood component transfusion	S	SH	Y	Bedside clinic	Short note/ Viva voce/ Skill assessment		Pathology	General Surgery
IM16.4	Elicit and document and present an appropriate history that includes the natural history, dietary history, travel, sexual history and other concomitant illnesses	S	SH	Y	Bedside clinic skills lab	Skill assessment		Microbiology, Pathology	
IM16.8	Choose and interpret diagnostic tests based on the clinical diagnosis including complete blood count, and stool examination	S	SH	Y	Bedside clinic, Skills lab, Small group discussion	Skill assessment/ Short note/ Viva voce		Microbiology, Pathology	
IM16.12	Enumerate and discuss the indications for further investigations including antibodies, colonoscopy, diagnostic imaging and biopsy in the diagnosis of chronic diarrhea	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	General Surgery
IM16.15	Distinguish, based on the clinical presentation, Crohn's disease from ulcerative colitis	S	SH	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology	General Surgery
IM17.7	Enumerate the indications and describe the findings in the CSF in patients with meningitis	K	K	Y	Small group, Bedside clinic	Skill Assessment		Microbiology, Pathology	
IM17.8	Demonstrate in a mannequin or equivalent the correct technique for performing a lumbar puncture	S	SH	Y	DOAP session	Skill assessment		Microbiology, Pathology	
IM17.9	Interpret the CSF findings when presented with various parameters of CSF fluid analysis	S	SH	Y	Small group discussion, Bedside clinic	Skill assessment		Microbiology, Pathology	
IM18.2	Classify cerebrovascular accidents and describe the aetiology, predisposing genetic and risk factors pathogenesis of hemorrhagic and non hemorrhagic stroke	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
IM18.3	Elicit and document and present an appropriate history including onset, progression precipitating and aggravating relieving factors, associated symptoms that help identify the cause of the cerebrovascular accident	S	SH	Y	Bedside clinic	Skill assessment		Pathology	
IM22.1	Enumerate the causes of hypercalcemia and distinguish the features of PTH vs non PTH mediated hypercalcemia	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM22.2	Describe the aetiology, clinical manifestations, diagnosis and clinical approach to primary hyperparathyroidism	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	General Surgery
IM22.4	Enumerate the components and describe the genetic basis of the multiple endocrine neoplasia syndrome	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM25.7	Order and interpret diagnostic tests based on the differential diagnosis including: CBC with differential, blood biochemistry, peripheral smear, urinary analysis with sediment, Chest X ray, blood and urine cultures, sputum gram stain and cultures, sputum AFB and cultures, CSF analysis, pleural and body fluid analysis, stool routine and culture and QBC	K	SH	Y	Bed side clinic, Skill assessment	Skill assessment		Pathology, Microbiology	
<b>Obstetrics &amp; Gynaecology</b>									
OG10.2	Enumerate the indications and describe the appropriate use of blood and blood products, their complications and management	K	KH	Y	Lecture, Small group discussion			Pathology	
<b>Pediatrics</b>									
PE11.1	Describe the common etiology, clinical features and management of obesity in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry, Pathology	
PE11.2	Discuss the risk approach for obesity and discuss the prevention strategies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PE12.7	Describe the causes, clinical features, diagnosis and management of deficiency /excess of Vitamin D ( Rickets and Hypervitaminosis D)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Physiology, Pathology	
PE12.8	Identify the clinical features of dietary deficiency of Vitamin D	S	p	Y	Bedside clinics, Skills lab	Document in log book	3	Biochemistry, Physiology Pathology	
PE12.9	Assess patients with Vitamin D deficiency, diagnose, classify and plan management	S	SH	Y	Bed side clinics	Document in log book		Biochemistry, Physiology, Pathology	
PE12.13	Discuss the RDA , dietary sources of Vitamin K and their role in Health and disease	K	K	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Physiology, Pathology	
PE12.14	Describe the causes, clinical features, diagnosis, management and prevention of Deficiency of Vitamin K	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Physiology, Pathology	
PE13.1	Discuss the RDA, dietary sources of Iron and their role in health and disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Biochemistry	
PE13.2	Describe the causes, diagnosis and management of Fe deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology Biochemistry	
PE13.3	Identify the clinical features of dietary deficiency of Iron and make a diagnosis	S	SH	Y	Bed side clinics, Skill Lab	Document in log book		Pathology, Biochemistry	
PE13.4	Interpret hemogram and Iron Panel	S	P	Y	Bed side clinic, Small group discussion	Skill Assessment	5	Pathology, Biochemistry	
PE13.5	Propose a management plan for Fe Deficiency Anaemia	S	SH	Y	Bed side clinics, Skill lab	Skill Assessment		Pathology, Pharmacology	
PE21.2	Enumerate the etio-pathogenesis, clinical features, complications and management of Acute post streptococcal Glomerular Nephritis in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE21.3	Discuss the approach and referral criteria to a child with Proteinuria	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PE21.5	Enumerate the etio-pathogenesis clinical features, complications and management of Acute Renal Failure in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE21.6	Enumerate the etio-pathogenesis, clinical features, complications and management of Chronic renal Failure in Children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE21.7	Enumerate the etio-pathogenesis clinical features, complications and management of Wilms Tumor	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE21.11	Perform and interpret the common analytes in a Urine examination	S	SH	Y	Bed side clinic Labs, Skill lab	Skill assessment		Biochemistry, Pathology	
PE23.1	Discuss the Hemodynamic changes, clinical presentation, complications and management of Acyanotic Heart Diseases –VSD, ASD and PDA	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
PE23.2	Discuss the Hemodynamic changes, clinical presentation, complications and management of Cyanotic Heart Diseases – Fallot's Physiology	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
PE23.3	Discuss the etio-pathogenesis, clinical presentation and management of cardiac failure in infant and children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
PE23.4	Discuss the etio-pathogenesis, clinical presentation and management of Acute Rheumatic Fever in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
PE23.5	Discuss the clinical features, complications, diagnosis, management and prevention of Acute Rheumatic Fever	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
PE23.6	Discuss the etio-pathogenesis and clinical features and management of Infective endocarditis in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology, Microbiology	
PE24.1	Discuss the etio-pathogenesis, classification, clinical presentation and management of diarrheal diseases in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PE24.2	Discuss the classification and clinical presentation of various types of diarrheal dehydration	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Microbiology	
PE25.1	Discuss the etio-pathogenesis, clinical presentation and management of Malabsorption in children and its causes including celiac disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE26.1	Discuss the etio-pathogenesis, clinical features and management of acute hepatitis in children	K	KH	Y	Lecture, Small group activity	Written/ Viva voce		Pathology, Microbiology	
PE26.2	Discuss the etio-pathogenesis, clinical features and management of Fulminant Hepatic Failure in children	K	KH	Y	Lecture, Small group activity	Written/ Viva voce		Pathology, Microbiology	
PE26.3	Discuss the etio-pathogenesis, clinical features and management of chronic liver diseases in children	K	KH	Y	Lecture, Small group activity	Written/ Viva voce		Pathology, Microbiology	
PE26.4	Discuss the etio-pathogenesis, clinical features and management of Portal Hypertension in children	K	KH	Y	Lecture, Small group activity	Written/ Viva voce		Pathology	
PE26.9	Interpret Liver Function Tests, viral markers, ultra sonogram report	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment		Pathology	
PE29.1	Discuss the etio-pathogenesis, clinical features, classification and approach to a child with anaemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
PE29.2	Discuss the etio-pathogenesis, clinical features and management of Iron Deficiency anaemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
PE29.3	Discuss the etiopathogenesis, clinical features and management of VIT B12, Folate deficiency anaemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
PE29.4	Discuss the etio-pathogenesis, clinical features and management of Hemolytic anemia, Thalassemia Major, Sickle cell anaemia, Hereditary spherocytosis, Auto-immune hemolytic anaemia and hemolytic uremic syndrome	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
PE29.6	Discuss the cause of thrombocytopenia in children: describe the clinical features and management of Idiopathic Thrombocytopenic Purpura (ITP)	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE29.7	Discuss the etiology, classification, pathogenesis and clinical features of Hemophilia in children	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE29.8	Discuss the etiology, clinical presentation and management of Acute Lymphoblastic Leukemia in children	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE29.9	Discuss the etiology, clinical presentation and management of lymphoma in children	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	
<b>General Surgery</b>									
SU2.1	Describe pathophysiology of shock, types of shock, principles of resuscitation including fluid replacement and monitoring	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
SU3.1	Describe the indications and appropriate use of blood and blood products and complications of blood transfusion.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce.		Pathology	
SU5.1	Describe normal wound healing and factors affecting healing.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
SU9.1	Choose appropriate biochemical, microbiological, pathological, imaging investigations and interpret the investigative data in a surgical patient	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Microbiology, Pathology	
SU22.2	Describe the etiopathogenesis of thyroidal swellings	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology,	
<b>Respiratory Medicine</b>									
CT2.1	Define and classify obstructive airway disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
CT2.2	Describe and discuss the epidemiology, risk factors and evolution of obstructive airway disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
CT2.4	Describe and discuss the physiology and pathophysiology of hypoxia and hypercapnia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
CT2.5	Describe and discuss the genetics of alpha 1 antitrypsin deficiency in emphysema	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
CT2.6	Describe the role of the environment in the cause and exacerbation of obstructive airway disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
CT2.7	Describe and discuss allergic and non-allergic precipitants of obstructive airway disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology,	
CT2.11	Describe, discuss and interpret pulmonary function tests	S	SH	Y	Bed side clinic, DOAP session	Skill assessment		Physiology, Pathology	
<b>Orthopaedics</b>									
OR3.1	Describe and discuss the aetiopathogenesis, clinical features, investigations and principles of management of Bone and Joint infections a) Acute Osteomyelitis b) Subacute osteomyelitis c) Acute Suppurative arthritis d) Septic arthritis & HIV infection e) Spirochaetal infection f) Skeletal Tuberculosis	K/S	K/KH/S H	Y	Lecture, Small group discussion, Video assisted lecture	Written/ Viva voce/ OSCE		Pathology, Microbiology	General surgery
OR4.1	Describe and discuss the clinical features, investigation and principles of management of Tuberculosis affecting major joints (Hip, Knee) including cold abscess and caries spine	K	K/KH	Y	Lecture, Small group discussion, Case discussion	Written/ Viva voce/ OSCE		Pathology	General surgery
OR10.1	Describe and discuss the aetiopathogenesis, clinical features, Investigations and principles of management of benign and malignant bone tumours and pathological fractures	K	K/KH	Y	Lecture, Small group discussion, Video assisted interactive lecture	Written/ Viva voce OSCE		Pathology	General surgery, Radiotherapy
<b>Radiotherapy</b>									

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical integration	Horizontal Integration
RT1.3	Enumerate, describe and discuss classification and staging of cancer (AJCC, FIGO etc.)	K	KH	Y	Lecture	Written/ Viva voce		Pathology	General Surgery, General Medicine
RT4.5	Describe and discuss role of radiation in management of common malignancies in India (region specific)	K	KH	Y	Lecture and Bed side clinic	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology
RT4.6	Describe and discuss radiotherapy for benign disease	K	KH	Y	Lecture	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology
RT4.7	Counsel patients regarding acute and late effects of radiation and supportive care	K/A/S	KH	Y	Bed side clinic, Group discussion	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology
RT5.1	Describe and discuss cancer prevention, screening, vaccination, cancer registry	K	K	Y	Group discussion	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology

# **MICROBIOLOGY (CODE: MI)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
<b>MICROBIOLOGY</b>									
<b>Topic: General Microbiology and Immunity</b>		<b>Number of competencies: (11)</b>			<b>Number of procedures that require certification : (01)</b>				
MI1.1	Describe the different causative agents of Infectious diseases+A208, the methods used in their detection, and discuss the role of microbes in health and disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
MI1.2	Perform and identify the different causative agents of Infectious diseases by Gram Stain, ZN stain and stool routine microscopy	S	P	Y	DOAP session	Skill assessment	5		
MI1.3	Describe the epidemiological basis of common infectious diseases	K	KH	Y	Lecture	Written/ Viva voce			Community Medicine
MI1.4	Classify and describe the different methods of sterilization and disinfection. Discuss the application of the different methods in the laboratory, in clinical and surgical practice	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
MI1.5	Choose the most appropriate method of sterilization and disinfection to be used in specific situations in the laboratory, in clinical and surgical practice	K	KH	Y	Small group discussion, Case discussion	Written/Viva voce/ OSPE		General Surgery	
MI1.6	Describe the mechanisms of drug resistance, and the methods of antimicrobial susceptibility testing and monitoring of antimicrobial therapy	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			Pharmacology
MI1.7	Describe the immunological mechanisms in health	K	KH	Y	Lecture	Written/ Viva voce			Pathology
MI1.8	Describe the mechanisms of immunity and response of the host immune system to infections	K	KH	Y	Lecture	Written/ Viva voce		Pediatrics	Pathology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
MI1.9	Discuss the immunological basis of vaccines and describe the Universal Immunisation schedule	K	KH	Y	Lecture	Written/ Viva voce		Paediatrics	
MI1.10	Describe the immunological mechanisms in immunological disorder (hypersensitivity, autoimmune disorders and immunodeficiency states) and discuss the laboratory methods used in detection.	K	KH	Y	Lecture	Written/ Viva voce		Paediatrics	
MI1.11	Describe the immunological mechanisms of transplantation and tumor immunity	K	KH	Y	Lecture	Written/ Viva voce			
<b>Topic: CVS and Blood</b> <span style="margin-left: 200px;"><b>Number of competencies: (7)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
MI2.1	Describe the etiologic agents in rheumatic fever and their diagnosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
MI2.2	Describe the classification etio-pathogenesis, clinical features and discuss the diagnostic modalities of Infective endocarditis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
MI2.3	Identify the microbial agents causing Rheumatic Heart Disease & infective Endocarditis	S	SH	Y	DOAP session	Skill assessment		General Medicine	Pathology
MI2.4	List the common microbial agents causing anemia. Describe the morphology, mode of infection and discuss the pathogenesis, clinical course, diagnosis and prevention and treatment of the common microbial agents causing Anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
MI2.5	Describe the etio-pathogenesis and discuss the clinical evolution and the laboratory diagnosis of kalaazar, malaria, filariasis and other common parasites prevalent in India	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
MI2.6	Identify the causative agent of malaria and filariasis	K/S	SH	Y	DOAP session	Skill assessment		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
MI2.7	Describe the epidemiology, the etio- pathogenesis, evolution complications, opportunistic infections, diagnosis, prevention and the principles of management of HIV	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
<b>Topic: Gastrointestinal and hepatobiliary system</b> <span style="float: right;">Number of competencies: (8)</span> <span style="float: right;">Number of procedures that require certification : (NIL)</span>									
MI3.1	Enumerate the microbial agents causing diarrhea and dysentery. Describe the epidemiology, morphology, pathogenesis, clinical features and diagnostic modalities of these agents	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Paediatrics	Pathology
MI3.2	Identify the common etiologic agents of diarrhea and dysentery	S	SH	Y	DOAP session	Skill assessment		General Medicine, Paediatrics	
MI3.3	Describe the enteric fever pathogens and discuss the evolution of the clinical course and the laboratory diagnosis of the diseases caused by them	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Pathology
MI3.4	Identify the different modalities for diagnosis of enteric fever. Choose the appropriate test related to the duration of illness	S	KH	Y	DOAP session	Skill assessment		General Medicine	Pathology
MI3.5	Enumerate the causative agents of food poisoning and discuss the pathogenesis, clinical course and laboratory diagnosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology
MI3.6	Describe the etio-pathogenesis of Acid peptic disease (APD) and the clinical course. Discuss the diagnosis and management of the causative agent of APD	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Pathology
MI3.7	Describe the epidemiology, the etio-pathogenesis and discuss the viral markers in the evolution of Viral hepatitis. Discuss the modalities in the diagnosis and prevention of viral hepatitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
MI3.8	Choose the appropriate laboratory test in the diagnosis of viral hepatitis with emphasis on viral markers	K	KH	Y	Small group discussion, Case discussion	Written/ Viva voce/ OSPE		General Medicine	Pathology
<b>Topic: Musculoskeletal system skin and soft tissue infections</b> <span style="margin-left: 150px;"><b>Number of competencies: (3)</b></span> <span style="margin-left: 150px;"><b>Number of procedures that require certification : (NIL)</b></span>									
MI4.1	Enumerate the microbial agents causing anaerobic infections. Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of anaerobic infections	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	
MI4.2	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of bone & joint infections	K	KH	Y	Lecture	Written/ Viva voce		Orthopaedics	
MI4.3	Describe the etio-pathogenesis of infections of skin and soft tissue and discuss the clinical course and the laboratory diagnosis	K	KH	Y	Lecture	Written/ Viva voce		Dermatology, Venereology & Leprosy, General Surgery	
<b>Topic: Central Nervous System infections</b> <span style="margin-left: 150px;"><b>Number of competencies: (3)</b></span> <span style="margin-left: 150px;"><b>Number of procedures that require certification : (NIL)</b></span>									
MI5.1	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of meningitis	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics	Pathology
MI5.2	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of encephalitis	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics	Pathology
MI5.3	Identify the microbial agents causing meningitis	S	SH	Y	DOAP session	Skill assessment		General Medicine, Pediatrics	
<b>Topic: Respiratory tract infections</b> <span style="margin-left: 150px;"><b>Number of competencies: (3)</b></span> <span style="margin-left: 150px;"><b>Number of procedures that require certification : (02)</b></span>									
MI6.1	Describe the etio-pathogenesis, laboratory diagnosis and prevention of Infections of upper and lower respiratory tract	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
MI6.2	Identify the common etiologic agents of upper respiratory tract infections (Gram Stain)	S	P	Y	DOAP session	Skill assessment	3	General Medicine	
MI6.3	Identify the common etiologic agents of lower respiratory tract infections (Gram Stain & Acid fast stain)	S	P	Y	DOAP session	Skill assessment	3	General Medicine	
<b>Topic: Genitourinary &amp; Sexually transmitted infections</b> <span style="float: right;">Number of competencies: (3)</span> <span style="float: right;">Number of procedures that require certification : (NIL)</span>									
MI7.1	Describe the etio-pathogenesis and discuss the laboratory diagnosis of infections of genitourinary system	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
MI7.2	Describe the etio-pathogenesis and discuss the laboratory diagnosis of sexually transmitted infections. Recommend preventive measures	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Dermatology, Venereology & Leprosy, Obstetrics & Gynaecology	
MI7.3	Describe the etio-pathogenesis, clinical features, the appropriate method for specimen collection, and discuss the laboratory diagnosis of Urinary tract infections	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
<b>Topic: Zoonotic diseases and miscellaneous</b> <span style="float: right;">Number of competencies: (16)</span> <span style="float: right;">Number of procedures that require certification : (01)</span>									
MI8.1	Enumerate the microbial agents and their vectors causing Zoonotic diseases. Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course, laboratory diagnosis and prevention	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
MI8.2	Describe the etio-pathogenesis of opportunistic infections (OI) and discuss the factors contributing to the occurrence of OI, and the laboratory diagnosis	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Pathology
MI8.3	Describe the role of oncogenic viruses in the evolution of virus associated malignancy	K	KH	Y	Lecture	Written		General Medicine	Pathology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
MI8.4	Describe the etiologic agents of emerging Infectious diseases. Discuss the clinical course and diagnosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Community Medicine	
MI8.5	Define Healthcare Associated Infections (HAI) and enumerate the types. Discuss the factors that contribute to the development of HAI and the methods for prevention	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Community Medicine	
MI8.6	Describe the basics of Infection control	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Community Medicine
MI8.7	Demonstrate Infection control practices and use of Personal Protective Equipments (PPE)	S	P	Y	DOAP session	Skill assessment	3 each in (Hand hygiene & PPE)	General Surgery	Community Medicine
MI8.8	Describe the methods used and significance of assessing the microbial contamination of food, water and air	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
MI8.9	Discuss the appropriate method of collection of samples in the performance of laboratory tests in the detection of microbial agents causing infectious diseases	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
MI8.10	Demonstrate the appropriate method of collection of samples in the performance of laboratory tests in the detection of microbial agents causing Infectious diseases	S	SH	Y	DOAP session	Skill assessment			
MI8.11	Demonstrate respect for patient samples sent to the laboratory for performance of laboratory tests in the detection of microbial agents causing Infectious diseases	A	SH	Y	DOAP session	Skill assessment			
MI8.12	Discuss confidentiality pertaining to patient identity in laboratory results	A	KH	Y	Lecture, Small group discussion	Viva voce			
MI8.13	Choose the appropriate laboratory test in the diagnosis of the infectious disease	K	KH	Y	Small group discussions, Case discussion	Written/ Viva voce/ OSPE			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
MI8.14	Demonstrate confidentiality pertaining to patient identity in laboratory results	A	SH	Y	DOAP session	Skill assessment		AETCOM	
MI8.15	Choose and Interpret the results of the laboratory tests used in diagnosis of the infectious diseases	K/S	SH	Y	Small group discussion, Case discussion	Written/ Viva voce/ OSPE			
MI8.16	Describe the National Health Programs in the prevention of common infectious disease (for information purpose only as taught in CM)	K	K	Y	Lecture	Written/ Viva voce			Community Medicine
	*causative agents of Infectious diseases are inclusive of bacterial, viral, parasites and fungal agents causing various clinical conditions.								
	<b>Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.</b> <b>Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,</b> <b>Column F: DOAP session – Demonstrate, Observe, Assess, Perform.</b> <b>Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation</b>								
<b>Integration</b>									
<b>Biochemistry</b>									
BI10.5	Describe antigens and concepts involved in vaccine development.	K	KH	Y	Lectures, Small group discussion	Written/ Viva voce		Pathology, Pediatrics, Microbiology	
<b>Pathology</b>									
PA7.5	Describe the immunology and the immune response to cancer	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			Microbiology
PA9.1	Describe the principles and mechanisms involved in immunity	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	Microbiology
PA9.2	Describe the mechanism of hypersensitivity reactions	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Microbiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PA9.3	Describe the HLA system and the immune principles involved in transplant and mechanism of transplant rejection	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Microbiology
PA9.6	Define and describe the pathogenesis and pathology of HIV and AIDS	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA10.1	Define and describe the pathogenesis and pathology of malaria	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA10.2	Define and describe the pathogenesis and pathology of cysticercosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA10.3	Define and describe the pathogenesis and pathology of leprosy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA10.4	Define and describe the pathogenesis and pathology of common bacterial, viral, protozoal and helminthic diseases	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA22.5	Enumerate and describe infections transmitted by blood transfusion	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Microbiology
PA26.1	Define and describe the etiology, types, pathogenesis, stages, morphology and complications of pneumonia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA26.2	Describe the etiology, gross and microscopic appearance and complications of lung abscess	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA26.3	Define and describe the etiology, types, pathogenesis, stages, morphology and complications and evaluation of Obstructive Airway Disease (OAD) and bronchiectasis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	Microbiology
PA26.4	Define and describe the etiology, types, pathogenesis, stages, morphology, microscopic appearance and complications of tuberculosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PA27.4	Describe the etiology, pathophysiology, pathology, gross and microscopic features, criteria and complications of rheumatic fever	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA27.6	Describe the etiology, pathophysiology, pathology, gross and microscopic, features diagnosis and complications of infective endocarditis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA27.10	Describe the etiology, pathophysiology, pathology features and complications of syphilis on the cardiovascular system	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA33.1	Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications of osteomyelitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Orthopaedics	Microbiology
PA35.1	Describe the etiology, types and pathogenesis, differentiating factors, CSF findings in meningitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA35.3	Identify the etiology of meningitis based on given CSF parameters	S	P	Y	DOAP session	Skill Assessment	1	General Medicine	Microbiology
<b>Pharmacology</b>									
PH1.43	Describe and discuss the rational use of antimicrobials including antibiotic stewardship program	K	KH	Y	Lecture	Written/ Viva voce		General Medicine Pediatrics	Microbiology
PH1.45	Describe the drugs used in MDR and XDR Tuberculosis	K	KH	Y	Lecture	Written/ Viva voce		Respiratory Medicine	Microbiology
PH1.46	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of antileprotic drugs	K	KH	Y	Lecture	Written/ Viva voce		Dermatology, Venereology & Leprosy	Microbiology
PH1.47	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in malaria, KALA-AZAR, amebiasis and intestinal helminthiasis	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Microbiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PH1.48	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in UTI/ STD and viral diseases including HIV	K	KH	Y	Lecture	Written/Viva voce			Microbiology
<b>Community Medicine</b>									
CM3.3	Describe the aetiology and basis of water borne diseases/ jaundice/hepatitis/ diarrheal diseases	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Microbiology, General Medicine, Pediatrics	
CM3.6	Describe the role of vectors in the causation of diseases. Also discuss National Vector Borne disease Control Program	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
CM3.7	Identify and describe the identifying features and life cycles of vectors of Public Health importance and their control measures	S	SH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		Microbiology	
CM5.7	Describe food hygiene	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Microbiology
CM7.7	Describe and demonstrate the steps in the Investigation of an epidemic of communicable disease and describe the principles of control measures	S	SH	Y	Small group discussion, DOAP sessions	Written/ Skill assessment		General Medicine	Microbiology
CM8.1	Describe and discuss the epidemiological and control measures including the use of essential laboratory tests at the primary care level for communicable diseases	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		General Medicine, Pediatrics	Microbiology, Pathology
CM14.1	Define and classify hospital waste	K	KH	Y	Lecture, Small group discussion, visit to hospital	Written/ Viva voce			Microbiology
CM14.2	Describe various methods of treatment of hospital waste	K	KH	Y	Lecture, Small group discussion, visit to hospital	Written/ Viva voce			Microbiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
CM14.3	Describe laws related to hospital waste management	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Microbiology
<b>Dermatology, Venereology &amp; Leprosy</b>									
DR6.1	Describe the etiology pathogenesis and diagnostic features of pediculosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	Microbiology
DR7.1	Describe the etiology microbiology pathogenesis and clinical presentations and diagnostic features of dermatophytes	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	Microbiology
DR7.2	Identify candida species in fungal scrapings and KOH mount	S	SH	Y	DOAP session	Skill assessment			Microbiology
DR7.3	Describe the pharmacology and action of antifungal (systemic and topical) agents. Enumerate side effects of antifungal therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Microbiology ,Pharmacology
DR8.1	Describe the etiology microbiology pathogenesis and clinical presentations and diagnostic features of common viral infections of the skin	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	Microbiology
DR9.1	Classify, describe the epidemiology, etiology, microbiology, pathogenesis and clinical presentations and diagnostic features of Leprosy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology, Community Medicine
DR10.1	Identify and classify syphilis based on the presentation and clinical manifestations	S	SH	Y	Bedside clinic	Skill assessment		General Medicine	Microbiology
DR10.2	Identify spirochete in a dark ground microscopy	S	SH	Y	DOAP session	Skill assessment			Microbiology
DR10.3	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for syphilis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Microbiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
DR10.6	Describe the etiology, diagnostic and clinical features of non-syphilitic sexually transmitted diseases (chancroid, donovanosis and LGV)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
DR10.7	Identify and differentiate based on the clinical features non-syphilitic sexually transmitted diseases (chancroid, donovanosis and LGV)	S	SH	Y	Bedside clinic	Skill assessment		General Medicine	Microbiology
DR10.8	Enumerate the indications and describe the pharmacology, indications and adverse reactions of drugs used in the non-syphilitic sexually transmitted diseases (chancroid, donovanosis and LGV)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Microbiology
DR11.1	Describe the etiology, pathogenesis and clinical features of the dermatologic manifestations of HIV and its complications including opportunistic infections	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
DR11.2	Identify and distinguish the dermatologic manifestations of HIV its complications, opportunistic infections and adverse reactions	S	SH	Y	Bedside clinic	Skill assessment		General Medicine	Microbiology
DR11.3	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for dermatologic lesions in HIV	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine	Pharmacology Microbiology
DR12.7	Identify and distinguish fixed drug eruptions and Steven Johnson syndrome from other skin lesions	S	SH	Y	Bedside clinic	Skill assessment		General Medicine	Pathology, Microbiology
DR14.1	Describe the etiology, pathogenesis and clinical precipitating features and classification of Urticaria and angioedema	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Microbiology, Pathology
DR15.2	Identify staphylococcus on a gram stain	S	SH	Y	Bedside clinic	Skill assessment			Microbiology
DR15.3	Enumerate the indications and describe the pharmacology, indications and adverse reactions of topical and systemic drugs used in treatment of pyoderma	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	Microbiology, Pharmacology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
<b>Dentistry</b>									
DE1.2	Discuss the role of causative microorganisms in the aetio-pathogenesis of dental caries	K	KH	Y	Lecture, Small group discussion	Viva voce		Microbiology	
DE1.4	Discuss the role of dental caries as a focus of sepsis	K	KH	Y	Lecture, Small group discussion	Viva voce		Microbiology, General Medicine	
<b>General Medicine</b>									
IM1.3	Describe and discuss the aetiology, microbiology, pathogenies and clinical evolution of rheumatic fever, criteria, degree of rheumatic activity and rheumatic valvular heart disease and its complications including infective endocarditis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology, Microbiology	
IM1.9	Describe and discuss the clinical presentation and features, diagnosis, recognition and management of acute rheumatic fever	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
IM1.22	Assist and demonstrate the proper technique in collecting specimen for blood culture	S	SH	Y	DOAP session	Skill assessment		Microbiology	
IM1.27	Describe and discuss the role of penicillin prophylaxis in the prevention of rheumatic heart disease	K	KH	Y	Bedside clinic, Small group discussion	Written		Microbiology, Pharmacology	
IM3.1	Define, discuss, describe and distinguish community acquired pneumonia, nosocomial pneumonia and aspiration pneumonia	K	K	Y	Lecture, Small group discussion	short note/ Viva voce		Human Anatomy, Pathology, Microbiology	
IM3.2	Discuss and describe the aetiology of various kinds of pneumonia and their microbiology depending on the setting and immune status of the host	K	K	Y	Lecture, Small group discussion	short note/ Viva voce		Microbiology	
IM3.3	Discuss and describe the pathogenesis, presentation, natural history and complications of pneumonia	K	KH	Y	Lecture , Small group discussion	short note/ Viva voce		Pathology, Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
IM3.7	Order and interpret diagnostic tests based on the clinical presentation including: CBC, Chest X ray PA view, Mantoux, sputum gram stain, sputum culture and sensitivity, pleural fluid examination and culture, HIV testing and ABG	S	SH	Y	Bed side clinic, DOAP session	Skill assessment		Radiodiagnosis, Microbiology	
IM3.10	Demonstrate the correct technique in a mannequin and interpret results of a blood culture	S	SH	Y	DOAP session	Skill assessment		Microbiology	
IM3.11	Describe and enumerate the indications for further testing including HRCT, Viral cultures, PCR and specialised testing	S	SH	Y	Bed side clinic, DOAP session	Skill assessment		Radiodiagnosis, Microbiology	
IM3.12	Select, describe and prescribe based on the most likely aetiology, an appropriate empirical antimicrobial based on the pharmacology and antimicrobial spectrum	S	SH	Y	Bed side clinic, DOAP session	Skill Assessment/ Written/ Viva voce		Pharmacology, Microbiology	
IM3.13	Select, describe and prescribe based on culture and sensitivity appropriate empirical antimicrobial based on the pharmacology and antimicrobial spectrum.	S	SH	Y	Bed side clinic, DOAP session	Skill assessment/ Written/ Viva voce		Pharmacology, Microbiology	
IM3.14	Perform and interpret a sputum gram stain and AFB	S	P	Y	DOAP session	Skill assessment		Microbiology	
IM3.19	Discuss, describe and enumerate the indications and communicate to patients on pneumococcal and influenza vaccines	S/C	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Microbiology	
IM4.1	Describe and discuss the febrile response and the influence of host immune status, risk factors and co-morbidities on the febrile response	K	K	Y	Lecture, Small group discussion	Written		Microbiology	
IM4.2	Describe and discuss the influence of special populations on the febrile response including: the elderly, immune suppression, malignancy and neutropenia, HIV and travel	K	K	Y	Lecture, Small group discussion	Written		Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
IM4.3	Discuss and describe the common causes, pathophysiology and manifestations of fever in various regions in India including bacterial, parasitic and viral causes (e.g. Dengue, Chikungunya, Typhus)	K	K	Y	Lecture, Small group discussion	Written		Microbiology, Community Medicine	
IM4.4	Describe and discuss the pathophysiology and manifestations of inflammatory causes of fever	K	KH	Y	Lecture, Small group discussion	Written		Microbiology	
IM4.5	Describe and discuss the pathophysiology and manifestations of malignant causes of fever including hematologic and lymph node malignancies	K	KH	Y	Lecture, Small group discussion	Written		Pathology, Microbiology	
IM4.6	Discuss and describe the pathophysiology and manifestations of malaria	K	KH	Y	Lecture, Small group discussion	Written		Microbiology	
IM4.8	Discuss and describe the pathophysiology, aetiology and clinical manifestations of fever of unknown origin (FUO) including in a normal host, neutropenic host, nosocomial host and a host with HIV disease	K	K	Y	Lecture, Small group discussion	Written		Microbiology	
IM4.9	Elicit document and present a medical history that helps delineate the aetiology of fever that includes the evolution and pattern of fever, associated symptoms, immune status, comorbidities, risk factors, exposure through occupation, travel and environment and medication use	S	SH	Y	Bed side clinic, DOAP session	Skill assessment		Microbiology	
IM4.12	Order and interpret diagnostic tests based on the differential diagnosis including: CBC with differential, peripheral smear, urinary analysis with sediment, Chest X ray, blood and urine cultures, sputum gram stain and cultures, sputum AFB and cultures, CSF analysis, pleural and body fluid analysis, stool routine and culture and QBC	K	SH	Y	Bedside clinic, Skill assessment	Skill assessment		Pathology, Microbiology	
IM4.13	Perform and interpret a sputum gram stain	S	SH	Y	DOAP session	Log book documentation		Microbiology	
IM4.14	Perform and interpret a sputum AFB	S	SH	Y	DOAP session	Log book documentation		Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
IM4.15	Perform and interpret a malarial smear	S	SH	Y	DOAP session	Log book documentation/ Skill assessment		Microbiology	
IM4.19	Assist in the collection of blood and wound cultures	S	SH	Y	DOAP session	Log book/ documentation		Microbiology	
IM4.20	Interpret a PPD (Mantoux)	S	SH	Y	DOAP session	Log book/ documentation		Microbiology	
IM4.23	Prescribe drugs for malaria based on the species identified, prevalence of drug resistance and national programs	S	SH	Y	Small group discussion	Skill assessment		Microbiology, Pharmacology	
IM4.26	Counsel the patient on malarial prevention	C	SH	Y	DOAP session	Skill assessment		Microbiology, Pharmacology	
IM5.4	Describe and discuss the epidemiology, microbiology, immunology and clinical evolution of infective (viral) hepatitis	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Microbiology	
IM5.14	Outline a diagnostic approach to liver disease based on hyperbilirubinemia, liver function changes and hepatitis serology	S	SH	Y	Bedside clinic, Small group discussion	Viva voce/ Written		Pathology, Microbiology	
IM5.17	Enumerate the indications precautions and counsel patients on vaccination for hepatitis	K/C	SH	Y	written Small group discussion	Written/ Viva voce		Microbiology	
IM6.1	Describe and discuss the symptoms and signs of acute HIV seroconversion	K	KH	Y	Lecture, Small group discussion	Short notes/ Viva voce		Microbiology	
IM6.2	Define and classify HIV AIDS based on the CDC criteria	K	KH	Y	Lecture, Small group discussion	Short notes/ Viva voce		Microbiology	
IM6.3	Describe and discuss the relationship between CDC count and the risk of opportunistic infections	K	KH	Y	Lecture, Small group discussion	Short notes/ Viva voce		Microbiology	
IM6.4	Describe and discuss the pathogenesis, evolution and clinical features of common HIV related opportunistic infections	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
IM6.10	Choose and interpret appropriate diagnostic tests to diagnose and classify the severity of HIV-AIDS including specific tests of HIV, CDC	K	KH	Y	Bedside clinic, DOAP session, Small group discussion	Written/ Skill assessment		Pathology, Microbiology	
IM6.13	Describe and enumerate the indications and side effects of drugs for bacterial, viral and other types of diarrhea	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology, Microbiology	
IM6.14	Perform and interpret a gram stain of the sputum	S	P	Y	DOAP session	Skill assessment		Microbiology	
IM6.17	Describe and discuss the principles of HAART, the classes of antiretroviral used, adverse reactions and interactions	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Pharmacology	
IM6.18	Describe and discuss the principles and regimens used in post exposure prophylaxis	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Pharmacology	
IM6.19	Enumerate the indications of and discuss about prophylactic drugs used to prevent HIV related opportunistic infections	K/C	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Microbiology	
IM13.3	Describe the relationship between infection and cancers	K	K	Y	Lecture, Small group discussion	Short notes/ Viva voce		Pathology, Microbiology	General Surgery
IM15.15	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy of acid peptic disease including Helicobacter pylori	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology, Microbiology	
IM16.1	Describe and discuss the aetiology of acute and chronic diarrhea including infectious and non-infectious causes	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
IM6.13	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy for bacterial, viral and other types of diarrhea	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology, Microbiology	
IM16.8	Choose and interpret diagnostic tests based on the clinical diagnosis including complete blood count, and stool examination	S	SH	Y	Bedside clinic, Skills lab, Small group discussion	Skill assessment/ Short note/ Viva voce		Microbiology, Pathology	
IM16.9	Identify common parasitic causes of diarrhea under the microscope in a stool specimen	S	SH	Y	DOAP session	Skill assessment		Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
IM16.10	Identify Vibrio cholera in a hanging drop specimen	S	SH	Y	DOAP session	Skill Assessment		Microbiology	
IM16.11	Enumerate the indications for stool cultures and blood cultures in patients with acute diarrhea	K	KH	Y	Lectures, Small group discussion	Written/ Viva voce		Microbiology	
IM16.13	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy for parasitic causes of diarrhea	K	K	Y	Lectures, Small group discussion	Written/ Viva voce		Pharmacology, Microbiology	
IM17.7	Enumerate the indications and describe the findings in the CSF in patients with meningitis	K	K	Y	Small group discussion, Bedside clinic	Skill Assessment		Microbiology, Pathology	
IM17.8	Demonstrate in a mannequin or equivalent the correct technique for performing a lumbar puncture	S	SH	Y	DOAP session	Skill assessment		Microbiology, Pathology	
IM17.9	Interpret the CSF findings when presented with various parameters of CSF fluid analysis	S	SH	Y	Small group discussion, Bedside clinic	Skill assessment		Microbiology, Pathology	
IM25.1	Describe and discuss the response and the influence of host immune status, risk factors and comorbidities on zoonotic disease (eg. Leptospirosis, Rabies) and non febrile infectious disease (eg. Tetanus)	K	K	Y	Lecture, Small group discussion	Written		Microbiology, Community Medicine	
IM25.2	Describe and discuss the common causes pathophysiology and manifestations of these diseases	K	K	Y	Lecture, Small group discussion	Written		Microbiology, Community Medicine	
IM25.3	Describe and discuss the pathophysiology and manifestations of these diseases	K	KH	Y	Lecture, Small group discussion	Written		Microbiology	
IM25.9	Assist in the collection of blood and other specimen cultures	S	SH	Y	DOAP session	Log book documentation		Microbiology	
IM25.11	Develop an appropriate empiric treatment plan based on the patient's clinical and immune status pending definitive diagnosis	C	SH	Y	DOAP session	Skill assessment		Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
<b>Pediatrics</b>									
PE19.1	Explain the components of the Universal immunization Program and the sub National Immunization Programs	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology	
PE19.2	Explain the epidemiology of Vaccine preventable diseases	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology	
PE19.3	Vaccine description with regard to classification of vaccines, strain used, dose, route, schedule, risks, benefits and side effects, indications and contraindications	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology	
PE19.4	Define cold chain and discuss the methods of safe storage and handling of vaccines	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology	
PE19.5	Discuss immunization in special situations – HIV positive children, immunodeficiency, preterm, organ transplants, those who received blood and blood products, splenectomised children, adolescents, travellers	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology	
PE21.1	Enumerate the etio-pathogenesis clinical features, complications and management of Urinary Tract infection in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
PE23.6	Discuss the etio-pathogenesis and clinical features and management of Infective endocarditis in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology, Microbiology	
PE24.1	Discuss the etio-pathogenesis, classification, clinical presentation and management of diarrheal diseases in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Microbiology	
PE24.2	Discuss the classification and clinical presentation of various types of diarrheal dehydration	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Microbiology	
PE24.5	Discuss the role of antibiotics, antispasmodics, anti-secretory drugs, probiotics, anti- emetics in acute diarrheal diseases	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology, Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PE24.6	Discuss the causes, clinical presentation and management of persistent diarrhoea in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
PE24.8	Discuss the causes, clinical presentation and management of dysentery in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology, Microbiology	
PE24.12	Perform and interpret stool examination including Hanging Drop	S	P	N	Bed side clinics, Skills lab	log book	2	Microbiology	
PE26.1	Discuss the etio-pathogenesis, clinical features and management of acute hepatitis in children	K	KH	Y	Lecture, Small group activity	Written/ Viva voce		Pathology, Microbiology	
PE26.2	Discuss the etio-pathogenesis, clinical features and management of Fulminant Hepatic Failure in children	K	KH	Y	Lecture, Small group activity	Written/ Viva voce		Pathology, Microbiology	
PE26.3	Discuss the etio-pathogenesis, clinical features and management of chronic liver diseases in children	K	KH	Y	Lecture, Small group activity	Written/ Viva voce		Pathology, Microbiology	
PE26.12	Discuss the prevention of Hep B infection – Universal precautions and Immunisation	K	KH	Y	Lecture, Small group discussion activity	Written/ Viva voce		Microbiology	
PE30.1	Discuss the etio-pathogenesis, clinical features, complications, management and prevention of meningitis in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
PE30.2	Distinguish bacterial, viral and tuberculous meningitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
PE30.13	Discuss the etio-pathogenesis, clinical features, management and prevention of Poliomyelitis in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
PE30.21	Interpret and explain the findings in a CSF analysis	S	SH	Y	Small group discussion	Log book		Microbiology	Respiratory Medicine
PE34.1	Discuss the epidemiology, clinical features, clinical types, complications of Tuberculosis in Children and Adolescents	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	Respiratory Medicine

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PE34.2	Discuss the various diagnostic tools for childhood tuberculosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	Respiratory Medicine
PE34.3	Discuss the various regimens for management of Tuberculosis as per National Guidelines	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Community Medicine Pharmacology	Respiratory Medicine
PE34.4	Discuss the preventive strategies adopted and the objectives and outcome of the National Tuberculosis Control Program	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Community Medicine Pharmacology	Respiratory Medicine
PE34.6	Identify a BCG scar	S	P	Y	Bed side clinics, Skills lab	Skill Assessment	3	Microbiology	Respiratory Medicine
PE34.7	Interpret a Mantoux test	S	P	Y	Bed side clinics Skills lab	Skill assessment	3	Microbiology	Respiratory Medicine
PE34.9	Interpret blood tests in the context of laboratory evidence for tuberculosis	S	SH	N	Bed side clinics, Small group discussion	Log book		Microbiology	Respiratory Medicine
PE34.10	Discuss the various samples for demonstrating the organism eg Gastric Aspirate, Sputum, CSF, FNAC	K	KH	Y	Bed side clinics, Small group discussion	Written/ Viva voce		Microbiology	Respiratory Medicine
PE34.11	Perform AFB staining	S	P	Y	DOAP session	Log book/journal	3	Microbiology	Respiratory Medicine
PE34.12	Enumerate the indications and Discuss the limitation of methods of culturing M.Tuberculi	K	KH	Y	Small group discussion	Written/ Viva voce		Microbiology	
<b>General Surgery</b>									
SU6.1	Define and describe the aetiology and pathogenesis of surgical infections	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
SU9.1	Choose appropriate biochemical, microbiological, pathological, imaging investigations and interpret the investigative data in a surgical patient	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Microbiology, Pathology	
SU13.1	Describe the immunological basis of organ transplantation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
SU13.2	Discuss the Principles of immunosuppressive therapy.Enumerate Indications, describe surgical principles, management of organ transplantation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Pharmacology	
SU14.1	Describe aseptic techniques, sterilization and disinfection	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
SU15.1	Describe Classification of hospital waste and appropriate methods of disposal	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
SU29.3	Describe the Clinical features, Investigations and principles of management of urinary tract infections	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
<b>Orthopaedics</b>									
OR3.1	Describe and discuss the aetiopathogenesis, clinical features, Investigations and principles of management of Bone and Joint infections a) Acute Osteomyelitis b) Subacute osteomyelitis c) Acute Suppurative arthritis d) Septic arthritis & HIV infection e) Spirochaetal infection f) Skeletal Tuberculosis	K/S	K/KH/SH	Y	Lecture, Small group discussion, Video assisted lecture	Written/ Viva voce/ OSCE		Pathology, Microbiology	
<b>Respiratory Medicine</b>									

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/SH/ P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
CT1.2	Describe and discuss the microbiology of tubercle bacillus, mode of transmission, pathogenesis, clinical evolution and natural history of pulmonary and extra pulmonary forms (including lymph node, bone and CNS).	K	KH	Y	Lecture, Small group discussion	Written		Microbiology	
CT1.3	Discuss and describe the impact of confection with HIV and other co-morbid conditions like diabetes on the natural history of tuberculosis	K	K	Y	Lecture, Small group discussion	Written		Microbiology	
CT1.4	Describe the epidemiology, the predisposing factors and microbial and therapeutic factors that determine resistance to drugs	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology, Pharmacology	
CT1.7	Perform and interpret a PPD (Mantoux) and describe and discuss the indications and pitfalls of the test	S	P	Y	DOAP session	Maintenance of log book		Microbiology	
CT1.10	Perform and interpret an AFB stain	S	P	Y	DOAP session	Skill assessment	1	Microbiology	
CT1.12	Enumerate the indications for tests including: serology, special cultures and polymerase chain reaction and sensitivity testing	K	KH	Y	Small group discussion, Lecture	Short note/ Viva voce		Microbiology	
CT1.13	Describe and discuss the origins, indications, technique of administration, efficacy and complications of the BCG vaccine	K	KH	Y	Lecture, Small group discussion	Short note/ Viva voce		Microbiology	

**FORENSIC MEDICINE INCLUDING TOXICOLOGY (CODE: FM)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>FORENSIC MEDICINE &amp; TOXICOLOGY</b>									
<b>Topic: General Information</b>		<b>Number of competencies: (11)</b>			<b>Number of procedures that require certification: (NIL)</b>				
FM1.1	Demonstrate knowledge of basics of Forensic Medicine like definitions of Forensic medicine, Clinical Forensic Medicine, Forensic Pathology, State Medicine, Legal Medicine and Medical Jurisprudence	K	KH	N	Lecture, Small Group Discussion	Written/ Viva voce			
FM1.2	Describe history of Forensic Medicine	K	KH	N	Lecture, Small Group Discussion	Written/ Viva voce			
FM1.3	Describe legal procedures including Criminal Procedure Code, Indian Penal Code, Indian Evidence Act, Civil and Criminal Cases, Inquest (Police Inquest and Magistrate's Inquest), Cognizable and Non-cognizable offences	K	KH	N	Lecture, Small Group Discussion	Written/ Viva voce			
FM1.4	Describe Courts in India and their powers: Supreme Court, High Court, Sessions court, Magistrate's Court, Labour Court, Family Court, Executive Magistrate Court and Juvenile Justice Board	K	KH	N	Lecture, Small Group Discussion	Written/ Viva voce			
FM1.5	Describe Court procedures including issue of Summons, conduct money, types of witnesses, recording of evidence oath, affirmation, examination in chief, cross examination, re-examination and court questions, recording of evidence & conduct of doctor in witness box	K	KH	N	Lecture, Small Group Discussion, Moot Court	Written/ Viva voce			
FM1.6	Describe Offenses in Court including Perjury; Court strictures vis-a-vis Medical Officer	K	KH	N	Lecture, Small Group Discussion	Written/ Viva voce			
FM1.7	Describe Dying Declaration & Dying Deposition	K	KH	Y	Lecture, Small Group Discussion	Written/ Viva voce			
FM1.8	Describe the latest decisions/notifications/resolutions/circulars/standing orders related to medico-legal practice issued by Courts/Government authorities etc.	K	KH	Y	Lecture, Small Group Discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM1.9	Describe the importance of documentation in medical practice in regard to medicolegal examinations, Medical Certificates and medicolegal reports especially - maintenance of patient case records, discharge summary, prescribed registers to be maintained in Health Centres. - maintenance of medico-legal register like accident register. - documents of issuance of wound certificate - documents of issuance of drunkenness certificate. - documents of issuance of sickness and fitness certificate. - documents for issuance of death certificate. -documents of Medical Certification of Cause of Death - Form Number4 and 4A - documents for estimation of age by physical, dental and radiological examination and issuance of certificate	K	KH	Y	Lecture, Small Group Discussion	Written/ Viva voce		Radiodiagnosis, General Surgery, General Medicine, Pediatrics	
FM1.10	Select appropriate cause of death in a particular scenario by referring ICD 10 code	K	KH	Y	Lecture, Small Group Discussion	Written/ Viva voce			
FM1.11	Write a correct cause of death certificate as per ICD 10 document	S	SH	Y	Lecture, Small Group Discussion	Written/ Viva voce			
<b>Topic: Forensic Pathology</b> <span style="margin-left: 200px;"><b>Number of competencies: (35)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
FM2.1	Define, describe and discuss death and its types including somatic/clinical/cellular, molecular and brain-death, Cortical Death and Brainstem Death	K	KH	Y	Lecture/Small group discussion	Written/ Viva voce		Pathology	
FM2.2	Describe and discuss natural and unnatural deaths	K	KH	Y	Lecture, Small Group Discussion	Written/ Viva voce		Pathology	
FM2.3	Describe and discuss issues related to sudden natural deaths	K	KH	Y	Lecture, Small Group Discussion	Written/ Viva voce		Pathology	
FM2.4	Describe salient features of the Organ Transplantation and The Human Organ Transplant (Amendment) Act 2011 and discuss ethical issues regarding organ donation	K	KH	Y	Lecture/Small group discussion	Written/ Viva voce		AETCOM	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM2.5	Discuss moment of death, modes of death - coma, asphyxia and syncope	K	KH	Y	Lecture, Small Group Discussion	Written/ Viva voce		Psychiatry, Pathology	
FM2.6	Discuss presumption of death and survivorship	K	KH	Y	Lecture, Small Group Discussion	Written/ Viva voce			
FM2.7	Describe and discuss suspended animation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
FM2.8	Describe and discuss postmortem changes including signs of death, cooling of body, post-mortem lividity, rigor mortis, cadaveric spasm, cold stiffening and heat stiffening	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/ Viva voce/ OSPE			
FM2.9	Describe putrefaction, mummification, adipocere and maceration	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/ Viva voce/ OSPE			
FM2.10	Discuss estimation of time since death	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/ Viva voce/ OSPE			
FM2.11	Describe and discuss autopsy procedures including post-mortem examination, different types of autopsies, aims and objectives of post-mortem examination	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/ Viva voce/ OSPE		Pathology	
FM2.12	Describe the legal requirements to conduct post-mortem examination and procedures to conduct medico-legal post-mortem examination	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/ Viva voce/ OSPE		Pathology	
FM2.13	Describe and discuss obscure autopsy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
FM2.14	Describe and discuss examination of clothing, preservation of viscera on post-mortem examination for chemical analysis and other medico-legal purposes, post-mortem artefacts	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/ Viva voce/ OSPE			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM 2.15	Describe special protocols for conduction of medico-legal autopsies in cases of death in custody or following violation of human rights as per National Human Rights Commission Guidelines	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/ Viva voce/ OSPE			
FM2.16	Describe and discuss examination of mutilated bodies or fragments, charred bones and bundle of bones	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce/ OSPE			
FM2.17	Describe and discuss exhumation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
FM2.18	Crime Scene Investigation:- Describe and discuss the objectives of crime scene visit, the duties & responsibilities of doctors on crime scene and the reconstruction of sequence of events after crime scene investigation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
FM2.19	Investigation of anaesthetic, operative deaths: Describe and discuss special protocols for conduction of autopsy and for collection, preservation and dispatch of related material evidences	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Anesthesiology, General Surgery	
FM2.20	Mechanical asphyxia: Define, classify and describe asphyxia and medico-legal interpretation of post-mortem findings in asphyxial deaths	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/ Viva voce/ OSPE			
FM2.21	Mechanical asphyxia: Describe and discuss different types of hanging and strangulation including clinical findings, causes of death, post-mortem findings and medico-legal aspects of death due to hanging and strangulation including examination, preservation and dispatch of ligature material	K	KH	Y	Lecture/Small group discussion, Autopsy DOAP session	Written/ Viva voce/ OSPE			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM2.22	Mechanical asphyxia: Describe and discuss patho-physiology, clinical features, post-mortem findings and medico-legal aspects of traumatic asphyxia, obstruction of nose & mouth, suffocation and sexual asphyxia	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/ Viva voce/ OSPE			
FM2.23	Describe and discuss types, patho-physiology, clinical features, post-mortem findings and medico-legal aspects of drowning, diatom test and, gettler test.	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/ Viva voce/ OSPE			
FM2.24	Thermal deaths: Describe the clinical features, post-mortem finding and medicolegal aspects of injuries due to physical agents like heat (heat-hyper-pyrexia, heat stroke, sun stroke, heat exhaustion/prostration, heat cramps [miner's cramp] or cold (systemic and localized hypothermia, frostbite, trench foot, immersion foot)	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/ Viva voce			
FM2.25	Describe types of injuries, clinical features, patho-physiology, post-mortem findings and medico-legal aspects in cases of burns, scalds, lightning, electrocution and radiations	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/ Viva voce/ OSPE		General Surgery	
FM2.26	Describe and discuss clinical features, post-mortem findings and medico-legal aspects of death due to starvation and neglect	K	KH	Y	Lecture/Small group discussion	Written/ Viva voce			
FM2.27	Define and discuss infanticide, foeticide and stillbirth	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
FM2.28	Describe and discuss signs of intrauterine death, signs of live birth, viability of foetus, age determination of foetus, DOAP session of ossification centres, Hydrostatic test, Sudden Infants Death syndrome and Munchausen's syndrome by proxy	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/Viva voce / OSCE		Pediatrics, Human Anatomy	
FM2.29	Demonstrate respect to the directions of courts, while appearing as witness for recording of evidence under oath or affirmation, examination in chief, cross examination, re-examination and court questions, recording of evidence	A and C	SH	Y	Lecture, Small group discussion, Moot Court, Court visits, Role Play	Role Play during internal assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM2.30	Have knowledge/awareness of latest decisions/notifications/resolutions/circulars/standing orders related to medico-legal practice issued by Courts/Government authorities etc	A	K	Y	Lecture/Small group discussion	Written/ Viva voce			
FM2.31	Demonstrate ability to work in a team for conduction of medico-legal autopsies in cases of death following alleged negligence medical dowry death, death in custody or following violation of human rights as per National Human Rights Commission Guidelines on exhumation	A	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/ Viva voce/ OSPE			
FM2.32	Demonstrate ability to exchange information by verbal, or nonverbal communication to the peers, family members, law enforcing agency and judiciary	A and C	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		AETCOM	
FM2.33	Demonstrate ability to use local resources whenever required like in mass disaster situations	A and C	KH	Y	Lecture/Small group discussion	Written/ Viva voce		Community Medicine	
FM2.34	Demonstrate ability to use local resources whenever required like in mass disaster situations	A and C	KH	Y	Lecture/Small group discussion	Written/ Viva voce		General Medicine, AETCOM	
FM2.35	Demonstrate professionalism while conducting autopsy in medicolegal situations, interpretation of findings and making inference/opinion, collection preservation and dispatch of biological or trace evidences	A and C	KH/SH		Lecture, small group discussions, DOAP session	Written/ Viva voce/ OSPE		AETCOM	
<b>Topic: Clinical Forensic Medicine</b>		<b>Number of competencies:(33)</b>			<b>Number of procedures that require certification:(NIL)</b>				
FM3.1	IDENTIFICATION Define and describe Corpus Delicti, establishment of identity of living persons including race, Sex, religion, complexion, stature, age determination using morphology, teeth-eruption, decay, bite marks, bones-ossification centres, medico-legal aspects of age	K	KH	Y	Lecture, Small group discussion, Bedside clinic, DOAP session	Written/Viva voce/ skill assessment		Human Anatomy	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM3.2	IDENTIFICATION Describe and discuss identification of criminals, unknown persons, dead bodies from the remains-hairs, fibers, teeth, anthropometry, dactylography, foot prints, scars, tattoos, poroscopy and superimposition	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
FM3.3	Mechanical injuries and wounds: Define, describe and classify different types of mechanical injuries, abrasion, bruise, laceration, stab wound, incised wound, chop wound, defense wound, self-inflicted/fabricated wounds and their medico-legal aspects	K	KH	Y	Lecture, Small group discussion Bed side clinic, DOAP session	Written/ Viva voce/ OSCE		General Surgery	
FM3.4	Mechanical injuries and wounds: Define injury, assault & hurt. Describe IPC pertaining to injuries	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
FM3.5	Mechanical injuries and wounds: Describe accidental, suicidal and homicidal injuries. Describe simple, grievous and dangerous injuries. Describe ante-mortem and post-mortem injuries	K	K/KH	Y	Lecture/Small group discussion	Written/ Viva voce			
FM3.6	Mechanical injuries and wounds: Describe healing of injury and fracture of bones with its medico-legal importance	K	K/KH	Y	Lecture/Small group discussion	Written/ Viva voce		General Surgery	
FM3.7	Describe factors influencing infliction of injuries and healing, examination and certification of wounds and wound as a cause of death: Primary and Secondary	K	K/KH	Y	Lecture/Small group discussion	Written/ Viva voce		General Surgery, Orthopaedics	
FM3.8	Mechanical injuries and wounds: Describe and discuss different types of weapons including dangerous weapons and their examination	K	K/KH	Y	Lecture/Small group discussion	Written/ Viva voce		General Surgery, Orthopaedics	
FM3.9	Firearm injuries: Describe different types of firearms including structure and components. Along with description of ammunition propellant charge and mechanism of fire-arms, different types of cartridges and bullets and various terminology in relation of firearm – caliber, range, choking	K	K/KH	Y	Lecture/Small group discussion	Written/ Viva voce		General Surgery, Orthopaedics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM3.10	Firearm injuries: Describe and discuss wound ballistics-different types of firearm injuries, blast injuries and their interpretation, preservation and dispatch of trace evidences in cases of firearm and blast injuries, various tests related to confirmation of use of firearms	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, DOAP session	Written/Viva voce/ OSCE		General Surgery, Orthopaedics	
FM3.11	Regional Injuries: Describe and discuss regional injuries to head (Scalp wounds, fracture skull, intracranial haemorrhages, coup and contrecoup injuries), neck, chest, abdomen, limbs, genital organs, spinal cord and skeleton	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic or autopsy, DOAP session	Written/ Viva voce/ OSCE/OSPE		General Surgery, Orthopaedics	
FM3.12	Regional Injuries Describe and discuss injuries related to fall from height and vehicular injuries – Primary and Secondary impact, Secondary injuries, crush syndrome, railway spine	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic or autopsy, DOAP session	Written/ Viva voce/ OSCE/OSPE		General Surgery, Orthopaedics	
FM3.13	Describe different types of sexual offences. Describe various sections of IPC regarding rape including definition of rape (Section 375 IPC), Punishment for Rape (Section 376 IPC) and recent amendments notified till date	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce/ OSCE/OSPE		Obstetrics & Gynaecology	
FM3.14	SEXUAL OFFENCES Describe and discuss the examination of the victim of an alleged case of rape, and the preparation of report, framing the opinion and preservation and despatch of trace evidences in such cases	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, DOAP session	Written/ Viva voce/ OSCE		Obstetrics & Gynaecology, Psychiatry	
FM3.15	SEXUAL OFFENCES Describe and discuss examination of accused and victim of sodomy, preparation of report, framing of opinion, preservation and despatch of trace evidences in such cases	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, DOAP session	Written/ Viva voce/ OSCE		Obstetrics & Gynaecology, Psychiatry	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM3.16	SEXUAL OFFENCES Describe and discuss adultery and unnatural sexual offences- sodomy, incest, lesbianism, buccal coitus, bestiality, indecent assault and preparation of report, framing the opinion and preservation and despatch of trace evidences in such cases	K	K/KH	Y	Lecture/Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, Psychiatry	
FM3.17	Describe and discuss the sexual perversions fetishism, transvestism, voyeurism, sadism, necrophagia, masochism, exhibitionism, frotteurism, Necrophilia	K	K/KH	Y	Lecture/Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, Psychiatry	
FM3.18	Describe anatomy of male and female genitalia, hymen and its types. Discuss the medico-legal importance of hymen. Define virginity, defloration, legitimacy and its medicolegal importance	K	K/KH	Y	Lecture/Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
FM3.19	Discuss the medicolegal aspects of pregnancy and delivery, signs of pregnancy, precipitate labour superfoetation, superfecundation and signs of recent and remote delivery in living and dead	K	K/KH	Y	Lecture/Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
FM3.20	Discuss disputed paternity and maternity	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
FM3.21	Discuss Pre-conception and Pre Natal Diagnostic Techniques (PC&PNDT) - Prohibition of Sex Selection Act 2003 and Domestic Violence Act 2005	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, AETCOM	
FM3.22	Define and discuss impotence, sterility, frigidity, sexual dysfunction, premature ejaculation. Discuss the causes of impotence and sterility in male and female	K	K/KH	Y	Lecture/Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, General Medicine	
FM3.23	Discuss Sterilization of male and female, artificial insemination, Test Tube Baby, surrogate mother, hormonal replacement therapy with respect to appropriate national and state laws	K	K/KH	Y	Lecture/Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM3.24	Discuss the relative importance of surgical methods of contraception (vasectomy and tubectomy) as methods of contraception in the <b>National</b> Family Planning Programme	K	K/KH	N	Lecture, Small group discussion	Written		Obstetrics & Gynaecology	
FM3.25	Discuss the major results of the <b>National</b> Family Health Survey	K	K/KH	N	Lecture	Written		Obstetrics & Gynaecology	
FM3.26	Discuss the <b>national</b> Guidelines for accreditation, supervision & regulation of ART Clinics in India	K	K/KH	Y	Lecture, Small group discussion	Written		Obstetrics & Gynaecology	
FM3.27	Define, classify and discuss abortion, methods of procuring MTP and criminal abortion and complication of abortion. MTP Act 1971	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, AETCOM	
FM3.28	Describe evidences of abortion - living and dead, duties of doctor in cases of abortion, investigations of death due to criminal abortion	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, Pathology	
FM3.29	Describe and discuss child abuse and battered baby syndrome	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
FM3.30	Describe and discuss issues relating to torture, identification of injuries caused by torture and its sequelae, management of torture survivors	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce			
FM3.31	Torture and Human rights Describe and discuss guidelines and Protocols of <b>National</b> Human Rights Commission regarding torture	K	K/KH	N	Lecture/Small group discussion	Written/ Viva voce			
FM3.32	Demonstrate the professionalism while preparing reports in medicolegal situations, interpretation of findings and making inference/opinion, collection preservation and dispatch of biological or trace evidences	A and C	SH	Y	Lecture, Small group discussion	OSPE/Viva voce		AETCOM	
FM3.33	Should be able to demonstrate the professionalism while dealing with victims of torture and human right violations, sexual assaults- psychological consultation, rehabilitation	A and C	K/KH/S H	Y	Lecture/Small group discussion	Written/ Viva voce		AETCOM	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Medical Jurisprudence (Medical Law and ethics)</b>		<b>Number of competencies: (30)</b>			<b>Number of procedures that require certification : (NIL)</b>				
FM4.1	Describe Medical Ethics and explain its historical emergence	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.2	Describe the Code of Medical Ethics 2002 conduct, Etiquette and Ethics in medical practice and unethical practices & the dichotomy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.3	Describe the functions and role of Medical Council of India and State Medical Councils	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.4	Describe the Indian Medical Register	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.5	Rights/privileges of a medical practitioner, penal erasure, infamous conduct, disciplinary Committee, disciplinary procedures, warning notice and penal erasure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.6	Describe the Laws in Relation to medical practice and the duties of a medical practitioner towards patients and society	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.7	Describe and discuss the ethics related to HIV patients	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.8	Describe the Consumer Protection Act-1986 (Medical Indemnity Insurance, Civil Litigations and Compensations), Workman's Compensation Act & ESI Act	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.9	Describe the medico - legal issues in relation to family violence, violation of human rights, NHRC and doctors	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.10	Describe communication between doctors, public and media	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.11	Describe and discuss euthanasia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM, Pharmacology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM4.12	Discuss legal and ethical issues in relation to stem cell research	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM, Pharmacology	
FM4.13	Describe social aspects of Medico-legal cases with respect to victims of assault, rape, attempted suicide, homicide, domestic violence, dowry- related cases	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.14	Describe & discuss the challenges in managing medico-legal cases including development of skills in relationship management – Human behaviour, communication skills, conflict resolution techniques	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.15	Describe the principles of handling pressure – definition, types, causes, sources and skills for managing the pressure while dealing with medico-legal cases by the doctor	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.16	Describe and discuss Bioethics	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.17	Describe and discuss ethical Principles: Respect for autonomy, non-maleficence, beneficence & justice	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM, Pharmacology	
FM4.18	Describe and discuss medical negligence including civil and criminal negligence, contributory negligence, corporate negligence, vicarious liability, Res Ipsa Loquitor, prevention of medical negligence and defenses in medical negligence litigations	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.19	Define Consent. Describe different types of consent and ingredients of informed consent. Describe the rules of consent and importance of consent in relation to age, emergency situation, mental illness and alcohol intoxication	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.20	Describe therapeutic privilege, Malingering, Therapeutic Misadventure, Professional Secrecy, Human Experimentation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM4.21	Describe Products liability and Medical Indemnity Insurance	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.22	Explain Oath – Hippocrates, Charaka and Sushruta and procedure for administration of Oath.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM, Pharmacology	
FM4.23	Describe the modified Declaration of Geneva and its relevance	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM, Pharmacology	
FM4.24	Enumerate rights, privileges and duties of a Registered Medical Practitioner. Discuss doctor- patient relationship: professional secrecy and privileged communication	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.25	Clinical research & Ethics Discuss human experimentation including clinical trials	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		AETCOM, Pharmacology	
FM4.26	Discuss the constitution and functions of ethical committees	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM, Pharmacology	
FM4.27	Describe and discuss Ethical Guidelines for Biomedical Research on Human Subjects & Animals	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		AETCOM, Pharmacology	
FM4.28	Demonstrate respect to laws relating to medical practice and Ethical code of conduct prescribed by Medical Council of India and rules and regulations prescribed by it from time to time	A and C	SH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.29	Demonstrate ability to communicate appropriately with media, public and doctors	A and C	KH/SH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
FM4.30	Demonstrate ability to conduct research in pursuance to guidelines or research ethics	A and C	KH/SH	Y	Lecture, Small group discussion	Written/ Viva voce		AETCOM	
<b>Topic: Forensic Psychiatry</b>		<b>Number of competencies: (06)</b>			<b>Number of procedures that require certification: (NIL)</b>				
FM5.1	Classify common mental illnesses including post-traumatic stress disorder (PTSD)	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM5.2	Define, classify and describe delusions, hallucinations, illusion, lucid interval and obsessions with exemplification	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	
FM5.3	Describe Civil and criminal responsibilities of a mentally ill person	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	
FM5.4	Differentiate between true insanity from feigned insanity	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	
FM5.5	Describe & discuss Delirium tremens	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry, General Medicine	
FM5.6	Describe the Indian Mental Health Act, 1987 with special reference to admission, care and discharge of a mentally ill person	K	K/KH	N	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	
<b>Topic: Forensic Laboratory investigation in medical legal practice</b>		<b>Number of competencies: (03)</b>			<b>Number of procedures that require certification: (NIL)</b>				
FM6.1	Describe different types of specimen and tissues to be collected both in the living and dead: Body fluids (blood, urine, semen, faeces saliva), Skin, Nails, tooth pulp, vaginal smear, viscera, skull, specimen for histo-pathological examination, blood grouping, HLA Typing and DNA Fingerprinting. Describe Locard's Exchange Principle	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
FM6.2	Describe the methods of sample collection, preservation, labelling, dispatch, and interpretation of reports	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce			
FM6.3	Demonstrate professionalism while sending the biological or trace evidences to Forensic Science laboratory, specifying the required tests to be carried out, objectives of preservation of evidences sent for examination, personal discussions on interpretation of findings	A and C	KH/SH	Y	Lecture, Small group discussions, DOAP sessions	Viva voce / OSPE			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Emerging technologies in Forensic Medicine</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification:(NIL)</b>				
FM7.1	Enumerate the indications and describe the principles and appropriate use for: - DNA profiling Facial reconstruction - Polygraph (Lie Detector) - Narcoanalysis, - Brain Mapping, - Digital autopsy, - Virtual Autopsy, - Imaging technologies	K	K/KH	N	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Toxicology: General Toxicology</b>		<b>Number of competencies: (10)</b>			<b>Number of procedures that require certification: (NIL)</b>				
FM8.1	Describe the history of Toxicology	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
FM8.2	Define the terms Toxicology, Forensic Toxicology, Clinical Toxicology and poison	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
FM8.3	Describe the various types of poisons, Toxicokinetics, and Toxicodynamics and diagnosis of poisoning in living and dead	K	K/KH	Y	Lecture, Small group discussion	Written/viva voce		Pharmacology	
FM8.4	Describe the Laws in relations to poisons including NDPS Act, Medico-legal aspects of poisons	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
FM8.5	Describe Medico-legal autopsy in cases of poisoning including preservation and dispatch of viscera for chemical analysis	K	K/KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/ Viva voce/ OSPE		Pharmacology	
FM8.6	Describe the general symptoms, principles of diagnosis and management of common poisons encountered in India	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, DOAP session	Written/ Viva voce/ OSCE		Pharmacology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM8.7	Describe simple Bedside clinic tests to detect poison/drug in a patient's body fluids	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM8.8	Describe basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM8.9	Describe the procedure of intimation of suspicious cases or actual cases of foul play to the police, maintenance of records, preservation and despatch of relevant samples for laboratory analysis.	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce			
FM8.10	Describe the general principles of Analytical Toxicology and give a brief description of analytical methods available for toxicological analysis: Chromatography – Thin Layer Chromatography, Gas Chromatography, Liquid Chromatography and Atomic Absorption Spectroscopy	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Toxicology : Chemical Toxicology</b> <span style="margin-left: 200px;"><b>Number of competencies: (06)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
FM9.1	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to: Caustics Inorganic – sulphuric, nitric, and hydrochloric acids; Organic-Carbolic Acid (phenol), Oxalic and acetylsalicylic acids	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM9.2	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Phosphorus, Iodine, Barium	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM9.3	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Arsenic, lead, mercury, copper, iron, cadmium and thallium	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM9.4	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Ethanol, methanol, ethylene glycol	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM9.5	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Organophosphates, Carbamates, Organochlorines, Pyrethroids, Paraquat, Aluminium and Zinc phosphide	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM9.6	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Ammonia, carbon monoxide, hydrogen cyanide & derivatives, methyl isocyanate, tear (riot control) gases	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
<b>Topic: Toxicology : Pharmaceutical Toxicology</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification : (NIL)</b>				

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM10.1	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to: i. Antipyretics – Paracetamol, Salicylates ii. Anti-Infectives (Common antibiotics – an overview) iii. Neuropsychotoxicology Barbiturates, benzodiazepins phenytoin, lithium, haloperidol, neuroleptics, tricyclics iv. Narcotic Analgesics, Anaesthetics, and Muscle Relaxants v. Cardiovascular Toxicology Cardiotoxic plants – oleander, odollam, aconite, digitalis vi. Gastro-Intestinal and Endocrinal Drugs – Insulin	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
<b>Topic: Toxicology : Biotoxicology</b> <span style="margin-left: 200px;"><b>Number of competencies: (01)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
FM11.1	Describe features and management of Snake bite, scorpion sting, bee and wasp sting and spider bite	K	K/KH	Y	Lecture, Small group discussion, Autopsy	Written/ Viva voce		General Medicine	
<b>Topic: Toxicology : Sociomedical Toxicology</b> <span style="margin-left: 200px;"><b>Number of competencies: (01)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
FM12.1	Describe features and management of abuse/poisoning with following camicals: Tobacco, cannabis, amphetamines, cocaine, hallucinogens, designer drugs & solvent	K	K/KH	Y	Lecture, Small group discussion, Autopsy	Written/ Viva voce		General Medicine	
<b>Topic: Toxicology : Environmental Toxicology</b> <span style="margin-left: 200px;"><b>Number of competencies: (02)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
FM13.1	Describe toxic pollution of environment, its medico-legal aspects & toxic hazards of occupation and industry	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
FM13.2	Describe medico-legal aspects of poisoning in Workman's Compensation Act	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Skills in Forensic Medicine &amp; Toxicology</b>									
				<b>Number of competencies: (22)</b>			<b>Number of procedures that require certification: (NIL)</b>		
FM14.1	Examine and prepare Medico-legal report of an injured person with different etiologies in a simulated/ supervised environment	S	SH/P	Y	Bedside clinic (ward/casualty), Small group discussion	Log book/ Skill station/ Viva voce / OSCE			
FM14.2	Demonstrate the correct technique of clinical examination in a suspected case of poisoning & prepare medico-legal report in a simulated/ supervised environment	S	SH	Y	Bedside clinic (ward/casualty), Small Group discussion	Log book/ Skill station/ Viva voce / OSCE		General Medicine	
FM14.3	Assist and demonstrate the proper technique in collecting, preserving and dispatch of the exhibits in a suspected case of poisoning, along with clinical examination	S	SH	Y	Bedside clinic, Small Group discussion, DOAP session	Skill lab/ Viva voce		General Medicine	
FM14.4	Conduct and prepare report of estimation of age of a person for medico-legal and other purposes & prepare medico-legal report in a simulated/ supervised environment	S	KH	Y	Small group discussion, Demonstration	Log book/ Skill station/ Viva voce / OSCE			
FM14.5	Conduct & prepare post-mortem examination report of varied etiologies (at least 15) in a simulated/ supervised environment	S	KH	Y	Small group discussion, Autopsy, DOAP session	Log book/ Skill station/ Viva voce / OSCE			
FM14.6	Demonstrate and interpret medico-legal aspects from examination of hair (human & animal) fibre, semen & other biological fluids	S	KH	Y	Small group discussion, Lecture	Log book/ Skill station/ Viva voce / OSCE			
FM14.7	Demonstrate & identify that a particular stain is blood and identify the species of its origin	S	KH	Y	Small group discussion, Lecture	Log book/Skill station/Viva voce		Pathology, Physiology	
FM14.8	Demonstrate the correct technique to perform and identify ABO & RH blood group of a person	S	SH	Y	Small group discussion, DOAP session	Log book/Skill station/Viva voce		Pathology, Physiology	
FM14.9	Demonstrate examination of & present an opinion after examination of skeletal remains in a simulated/ supervised environment	S	SH	Y	Small group discussion, DOAP session	Log book/Skill station/Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM14.10	Demonstrate ability to identify & prepare medicolegal inference from specimens obtained from various types of injuries e.g. contusion, abrasion, laceration, firearm wounds, burns, head injury and fracture of bone	S	KH	Y	Small group discussion, DOAP session	Log book/Skill station/ Viva voce/ OSPE			
FM14.11	To identify & describe weapons of medicolegal importance which are commonly used e.g. lathi, knife, kripa, axe, gandasa, gupta, farsha, dagger, bhalla, razor & stick. Able to prepare report of the weapons brought by police and to give opinion regarding injuries present on the person as described in injury report/ PM report so as to connect weapon with the injuries. (Prepare injury report/ PM report must be provided to connect the weapon with the injuries)	S	KH	Y	Small group discussion, DOAP session	Log book/Skill station/ Viva voce/ OSPE			
FM14.12	Describe the contents and structure of bullet and cartridges used & to provide medico-legal interpretation from these	S	KH	Y	Small group discussion, DOAP session	Log book/ Skill station/ Viva voce			
FM14.13	To estimate the age of foetus by post-mortem examination	S	KH	Y	Small group discussion, DOAP session	Theory/ Clinical assessment/ Viva voce			
FM14.14	To examine & prepare report of an alleged accused in rape/unnatural sexual offence in a simulated/ supervised environment	S	KH	Y	Small group discussion, DOAP session	Log book/ Skill station/ Viva voce / OSCE			
FM14.15	To examine & prepare medico-legal report of a victim of sexual offence/unnatural sexual offence in a simulated/ supervised environment	S	KH	Y	Small group discussion, DOAP session	Log book/ Skill station/ Viva voce / OSCE			
FM14.16	To examine & prepare medico-legal report of drunk person in a simulated/ supervised environment	S	KH	Y	Small group discussion, Bed side clinic, DOAP session	Log book/ Skill station/ Viva voce / OSCE			
FM14.17	To identify & draw medico-legal inference from common poisons e.g. dhatura, castor, cannabis, opium, aconite copper sulphate, pesticides compounds, marking nut, oleander, Nux vomica, abrus seeds, Snakes, capsicum, calotropis, lead compounds & tobacco.	S	KH	Y	Small group discussion, DOAP session	Log book/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM14.18	To examine & prepare medico-legal report of a person in police, judicial custody or referred by Court of Law and violation of human rights as requirement of NHRC, who has been brought for medical examination	S	KH	Y	Small group discussion, DOAP session	Log book/ Skill station/ Viva voce / OSCE			
FM14.19	To identify & prepare medico-legal inference from histo-pathological slides of Myocardial Infarction, pneumonitis, tuberculosis, brain infarct, liver cirrhosis, brain haemorrhage, bone fracture, Pulmonary oedema, brain oedema, soot particles, diatoms & wound healing	S	KH	Y	Small group discussion, DOAP session	Log book/ Skill station/ Viva voce			
FM14.20	To record and certify dying declaration in a simulated/ supervised environment	S	KH	Y	Small group discussion, Role Play, Bed side clinic DOAP session	Log book/ Skill station/ Viva voce /OSCE			
FM14.21	To collect, preserve, seal and dispatch exhibits for DNA-Finger printing using various formats of different laboratories.	S	KH	Y	Small group discussion, Lecture	Log book/ Skill station/Viva voce			
FM14.22	To give expert medical/ medico-legal evidence in Court of law	S	KH	Y	Small group discussion, Lecture, DOAP session, role play, Court Visits	Log book/ Viva voce/OSCE			
<p><b>Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.</b>  <b>Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,</b>  <b>Column F: DOAP session – Demonstrate, Observe, Assess, Perform.</b>  <b>Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation</b></p>									
<b>Integration</b>									
<b>Human Anatomy</b>									
AN14.3	Describe the importance of ossification of lower end of femur & upper end of tibia	K	KH	Y	Lecture	Viva voce/Practicals		Forensic Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Pharmacology</b>									
PH1.22	Describe drugs of abuse (dependence, addiction, stimulants, depressants, psychedelics, drugs used for criminal offences)	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Psychiatry	Forensic Medicine
PH5.7	Demonstrate an understanding of the legal and ethical aspects of prescribing drugs	K	KH	Y	Small group discussion	short note/Viva voce			Forensic Medicine
<b>Radiodiagnosis</b>									
RD1.13	Describe the components of the PC & PNDT act and its medicolegal implications	K	KH	Y	Lecture, Small group discussion			Obstetrics & Gynaecology, Forensic Medicine	
<b>Psychiatry</b>									
PS19.3	Describe and discuss the basic legal and ethical issues in psychiatry	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine AETCOM	
<b>General Medicine</b>									
IM20.1	Enumerate the poisonous snakes of your area and describe the distinguishing marks of each	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine, Pharmacology	
IM20.2	Describe, demonstrate in a volunteer or a mannequin and educate (to other health care workers / patients) the correct initial management of patient with a snake bite in the field	S	SH	Y	DOAP session	Skill assessment/ Written/ Viva voce		Forensic Medicine	
IM20.3	Describe the initial approach to the stabilisation of the patient who presents with snake bite	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine	
IM20.4	Elicit and document and present an appropriate history, the circumstance, time, kind of snake, evolution of symptoms in a patient with snake bite	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Forensic Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM21.2	Enumerate the common plant poisons seen in your area and describe their toxicology, clinical features, prognosis and specific approach to detoxification	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine, Pharmacology	
IM21.3	Enumerate the common corrosives used in your area and describe their toxicology, clinical features, prognosis and approach to therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine, Pharmacology	
IM21.4	Enumerate the commonly observed drug overdose in your area and describe their toxicology, clinical features, prognosis and approach to therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine, Pharmacology	
IM21.5	Observe and describe the functions and role of a poison center in suspected poisoning	S	KH	Y	DOAP session	document in log book		Forensic Medicine, Pharmacology	
IM21.6	Describe the medico legal aspects of suspected suicidal or homicidal poisoning and demonstrate the correct procedure to write a medico legal report on a suspected poisoning	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		Forensic Medicine, Pharmacology	
IM21.7	Counsel family members of a patient with suspected poisoning about the clinical and medico legal aspects with empathy	A/C	SH	Y	DOAP session	Skill assessment		Forensic Medicine, Pharmacology	
IM21.8	Enumerate the indications for psychiatric consultation and describe the precautions to be taken in a patient with suspected suicidal ideation / gesture	K	KH	Y	DOAP session	Skill assessment		Forensic Medicine, Psychiatry	
<b>Obstetrics &amp; Gynaecology</b>									
OG1.3	Define and Discuss still birth and abortion	K	KH	Y	Lecture, Small group discussions	Short notes		Forensic Medicine	
OG9.2	Describe the steps and observe/ assist in the performance of an MTP evacuation	S	SH	Y	DOAP session, Bedside clinic	Viva voce		Forensic Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OG20.1	Enumerate the indications and describe and discuss the legal aspects, indications, methods for first and second trimester MTP; complications and management of complications of medical termination of pregnancy	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Forensic Medicine	
OG20.2	In a simulated environment administer informed consent to a person wishing to undergo medical termination of pregnancy	S/A/C	SH	Y	DOAP session	Skill assessment		Forensic Medicine	
OG20.3	Discuss Pre-conception and Pre Natal Diagnostic Techniques (PC& PNDT) Act 1994 & its amendments	K	K/KH	Y	Lecture, Small group discussions	Written/ Viva voce		Forensic Medicine	
<b>General Surgery</b>									
SU8.1	Describe the principles of Ethics as it pertains to surgery	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ skill assessment		Forensic Medicine, AETCOM	
SU8.2	Demonstrate Professionalism and empathy to the patient undergoing surgery	A/C	SH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		Forensic Medicine, AETCOM	
SU8.3	Discuss Medico legal issues in surgical practice	A/C	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ skill assessment		Forensic Medicine, AETCOM	

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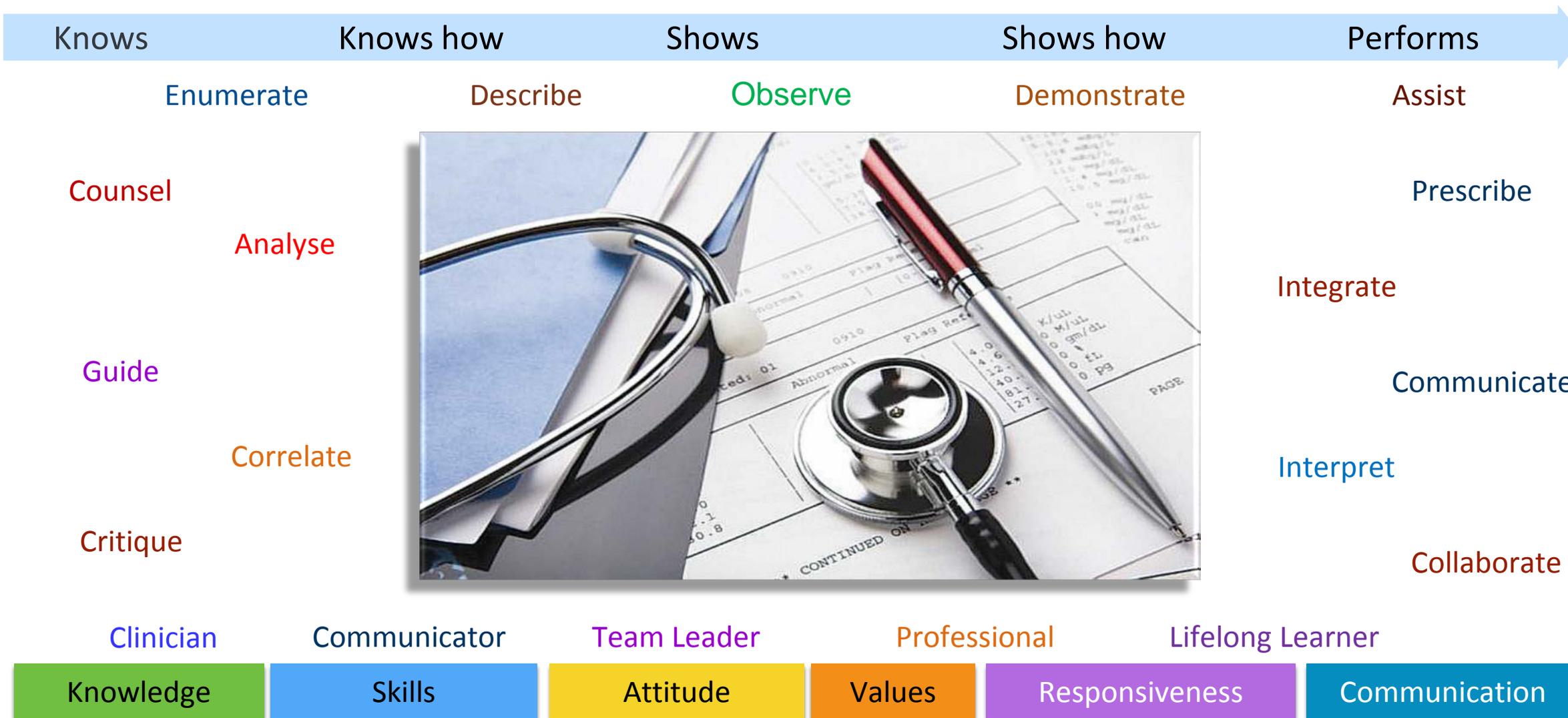
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# MEDICAL COUNCIL OF INDIA

## COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR THE INDIAN MEDICAL GRADUATE



**COMPETENCY BASED UNDERGRADUATE CURRICULUM  
FOR THE  
INDIAN MEDICAL GRADUATE**

**2018**



**Medical Council of India  
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## भारतीय आयुर्विज्ञान परिषद के अधिक्रमण में शासी बोर्ड

### BOARD OF GOVERNORS IN SUPERSESSION OF MEDICAL COUNCIL OF INDIA

#### FOREWORD

The Medical Council of India, aware of its responsibilities in creation of trained health manpower, has been engaged for the past few years in updating the medical curriculum for undergraduates and postgraduates to be in consonance with the changing health needs of the country. The task of updating and reorganization of the postgraduate curriculum in nearly 50 broad specialty disciplines to the competency pattern was accomplished by the Academic Cell of the Council with the help of subject experts and members of its Reconciliation Board and have been uploaded on the Council Website for use of the medical fraternity.

The Council visualized that the Indian Medical Graduate, at the end of the undergraduate training program, should be able to recognize "health for all" as a national goal and should be able to fulfill his/her societal obligations towards the realization of this goal. To fulfill the mandate of the undergraduate medical curriculum which is to produce a clinician, who understands and is able to provide preventive, promotive, curative, palliative and holistic care to his patients, the curriculum must enunciate clearly the competencies the student must be imparted and must have learnt, with clearly defined teaching-learning strategies and effective methods of assessment. The student should be trained to effectively communicate with patients and their relatives in a manner respectful of the patient's preferences, values, beliefs, confidentiality and privacy and to this purpose, a book on Attitude, Ethics & Communication was prepared by the Medical Council of India; the teaching faculty of medical colleges have been receiving training on this module since 2015.

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-2-

Competency based Medical Education provides an effective outcome-based strategy where various domains of teaching including teaching learning methods and assessment form the framework of competencies. Keeping this objective as the core ingredient, the Medical Council of India with the help of panel of experts drawn from across the country, laid the basic framework for the revised undergraduate medical curriculum. Over the past four years, a group of highly committed medical professionals working as Members of the MCI Reconciliation Board developed this information into a document incorporating appropriate teaching-learning strategies, tools and techniques of teaching, and modes of assessment which have culminated in the current competency based undergraduate curriculum. We understand that maximum efforts were made to encourage integrated teaching between traditional subject areas using a problem-based learning approach starting with clinical or community cases and exploring the relevance of various preclinical disciplines in both the understanding and resolution of the problem. All efforts have been made to de-emphasize compartmentalisation of disciplines so as to achieve both horizontal and vertical integration in different phases. We are proud of their work accomplishment and congratulate them in the onerous task accomplished.

It gives us great satisfaction to state that the '**competency based undergraduate curriculum**' that has been prepared by the Medical Council of India would definitely serve the cause of medical education and in creating a competent Indian Medical Graduate to serve the community.

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# **COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR THE INDIAN MEDICAL GRADUATE**

## **Preamble**

The new Graduate Medical Education Regulations attempts to stand on the shoulder of the contributions and the efforts of resource persons, teachers and students (past and present). It intends to take the learner to provide health care to the evolving needs of the nation and the world.

More than twenty years have passed since the existing Regulations on Graduate Medical Education, 1997 was notified, necessitating a relook at all aspects of the various components in the existing regulations and adapt them to the changing demography, socio-economic context, perceptions, values and expectations of stakeholders. Emerging health care issues particularly in the context of emerging diseases, impact of advances in science and technology and shorter distances on diseases and their management also need consideration. The strong and forward looking fundamentals enshrined in the Regulations on Graduate Medical Education, 1997 has made this job easier. A comparison between the 1997 Regulations and proposed Graduate Medical Education Regulations, 2018 will reveal that the 2018 Regulations have evolved from several key principles enshrined in the 1997 Regulations.

The thrust in the new regulations is continuation and evolution of thought in medical education making it more learner-centric, patient-centric, gender-sensitive, outcome -oriented and environment appropriate. The result is an outcome driven curriculum which conforms to global trends. Emphasis is made on alignment and integration of subjects both horizontally and vertically while respecting the strengths and necessity of subject-based instruction and assessment. This has necessitated a deviation from using “broad competencies”; instead, the reports have written end of phase subject (sub) competencies. These “sub-competencies” can be mapped to the global competencies in the Graduate Medical Education Regulations.

A significant attempt has been made in the outcome driven undergraduate curriculum to provide the orientation and the skills necessary for life-long learning to enable proper care of the patient. In particular, the curriculum provides for early clinical exposure, electives and longitudinal care. Skill acquisition is an indispensable component of the learning process in medicine. The curriculum reinforces this aspect by necessitating certification of certain essential skills. The experts and the writing group have factored in patient availability, access, consent, number of students in a class etc. in suggesting skill acquisition and assessment methods; use of skills labs, simulated and guided environments are encouraged. In the pre-internship years,- the highest level of skill acquisition is a show how (SH) in a simulated or guided environment; few skills require independent performance and certification - these are marked with P (for performance). Opportunity to 'perform' these skills will be available during internship.

The importance of ethical values, responsiveness to the needs of the patient and acquisition of communication skills is underscored by providing dedicated curriculum time in the form of a longitudinal program based on Attitude, Ethics and Communication (AETCOM) competencies. Great emphasis has been placed on collaborative and inter-disciplinary teamwork, professionalism, altruism and respect in professional relationships with due sensitivity to differences in thought, social and economic position and gender.

In addition to the above, an attempt has been made to allow students from diverse educational streams and backgrounds to transition appropriately through a Foundation Course. Dedicated time has been allotted for self directed learning and co-curricular activities.

Formative and internal assessments have been streamlined to achieve the objectives of the curriculum. Minor tweaks to the summative assessment have been made to reflect evolving thought and regulatory requirements. Curricular governance and support have been strengthened, increasing the involvement of Curriculum Committee and Medical Education Departments/Units.

The curriculum document in conjunction with the new Graduate Medical Education Regulations (GMR), when notified, must be seen as a "living document" that should evolve as stakeholder requirements and aspirations change. We hope that the current GMR does just that. The Medical Council of India is

grateful to all the teachers, subject experts, process experts, patients, students and trainees who have contributed through invaluable inputs, intellectual feedbacks and valuable time spent to make this possible. This document would not have been possible without the dedicated and unstinting intellectual, mental and time-consuming efforts of the members of the Reconciliation Board of the Council and the Academic Cell of MCI.

## How to use the Manual

This Manual is intended for curriculum planners in an institution to design learning and assessment experiences for the MBBS student. Contents created by subject experts have been curated to provide guidance for the curriculum planners, leaders and teachers in medical schools. They must be used with reference to and in the context of the Regulations.

### Section 1

#### Competencies for the Indian Medical Graduate

**Section 1** - provides the global competencies extracted from the Graduate Medical Education Regulations, 2018. The global competencies identified as defining the roles of the **Indian Medical Graduate** are the broad competencies that the learner has to aspire to achieve; teachers and curriculum planners must ensure that the learning experiences are aligned to this Manual.

#### Extract from the Graduate Medical Education Regulations, 2018

##### 2. Objectives of the Indian Graduate Medical Training Programme

The undergraduate medical education program is designed with a goal to create an “Indian Medical Graduate” (IMG) possessing requisite knowledge, skills, attitudes, values and responsiveness, so that she or he may function appropriately and effectively as a physician of first contact of the community while being globally relevant. **To achieve this, the following national and institutional goals for** the learner of the Indian Medical Graduate training program are hereby prescribed:-

## 2.1. **National Goals**

At the end of undergraduate program, the Indian Medical Graduate should be able to:

- (a) recognize “health for all” as a national goal and health right of all citizens and by undergoing training for medical profession fulfill his/her social obligations towards realization of this goal.
- (b) learn every aspect of National policies on health and devote herself/himself to its practical implementation.
- (c) achieve competence in practice of holistic medicine, encompassing promotive, preventive, curative and rehabilitative aspects of common diseases.
- (d) develop scientific temper, acquire educational experience for proficiency in profession and promote healthy living.
- (e) become exemplary citizen by observance of medical ethics and fulfilling social and professional obligations, so as to respond to national aspirations.

## 2.2. **Institutional Goals**

In consonance with the national goals, each medical institution should evolve institutional goals to define the kind of trained manpower (or professionals) they intend to produce. The Indian Medical Graduates coming out of a medical institute should:

- (a) be competent in diagnosis and management of common health problems of the individual and the community, commensurate with his/her position as a member of the health team at the primary, secondary or tertiary levels, using his/her clinical skills based on history, physical examination and relevant investigations.
- (b) be competent to practice preventive, promotive, curative and rehabilitative medicine in respect to the commonly encountered health problems.
- (c) appreciate rationale for different therapeutic modalities, be familiar with the administration of the "essential drugs" and their common side effects.
- (d) be able to appreciate the socio-psychological, cultural, economic and environmental factors affecting health and develop humane attitude towards the patients in discharging one's professional responsibilities.

- (e) possess the attitude for continued self learning and to seek further expertise or to pursue research in any chosen area of medicine, action research and documentation skills.
- (f) be familiar with the basic factors which are essential for the implementation of the National Health Programs including practical aspects of the following:
  - (i) Family Welfare and Maternal and Child Health (MCH);
  - (ii) Sanitation and water supply;
  - (iii) Prevention and control of communicable and non-communicable diseases;
  - (iv) Immunization;
  - (v) Health Education;
  - (vi) Indian Public Health Standards (IPHS) at various level of service delivery;
  - (vii) Bio-medical waste disposal; and
  - (viii) Organizational and or institutional arrangements.
- (g) acquire basic management skills in the area of human resources, materials and resource management related to health care delivery, General and hospital management, principal inventory skills and counseling.
- (h) be able to identify community health problems and learn to work to resolve these by designing, instituting corrective steps and evaluating outcome of such measures.
- (i) be able to work as a leading partner in health care teams and acquire proficiency in communication skills.
- (j) be competent to work in a variety of health care settings.
- (k) have personal characteristics and attitudes required for professional life including personal integrity, sense of responsibility and dependability and ability to relate to or show concern for other individuals.

All efforts must be made to equip the medical graduate to acquire the skills as detailed in Table 11 Certifiable procedural skills – A Comprehensive list of skills recommended as desirable for Bachelor of Medicine and Bachelor of Surgery (MBBS) – Indian Medical Graduate, as given in the Graduate Medical Education Regulations, 2018

### **2.3. Goals for the Learner**

In order to fulfil this goal, the Indian Medical Graduate must be able to function in the following roles appropriately and effectively:-

2.3.1. Clinician who understands and provides preventive, promotive, curative, palliative and holistic care with compassion.

2.3.2. Leader and member of the health care team and system with capabilities to collect, analyze, synthesize and communicate health data appropriately.

2.3.3. Communicator with patients, families, colleagues and community.

2.3.4. Lifelong learner committed to continuous improvement of skills and knowledge.

2.3.5. Professional, who is committed to excellence, is ethical, responsive and accountable to patients, community and profession.

### **3. Competency Based Training Programme of the Indian Medical Graduate**

Competency based learning would include designing and implementing medical education curriculum that focuses on the desired and observable ability in real life situations. In order to effectively fulfil the roles as listed in clause 2, the Indian Medical Graduate would have obtained the following set of competencies at the time of graduation:

#### **3.1. *Clinician, who understands and provides preventive, promotive, curative, palliative and holistic care with compassion***

3.1.1 Demonstrate knowledge of normal human structure, function and development from a molecular, cellular, biologic, clinical, behavioral and social perspective.

3.1.2. Demonstrate knowledge of abnormal human structure, function and development from a molecular, cellular, biological, clinical, behavioural and social perspective.

3.1.3 Demonstrate knowledge of medico-legal, societal, ethical and humanitarian principles that influence health care.

- 3.1.4 Demonstrate knowledge of national and regional health care policies including the National Health Mission that incorporates National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM), frameworks, economics and systems that influence health promotion, health care delivery, disease prevention, effectiveness, responsiveness, quality and patient safety.
- 3.1.5. Demonstrate ability to elicit and record from the patient, and other relevant sources including relatives and caregivers, a history that is complete and relevant to disease identification, disease prevention and health promotion.
- 3.1.6. Demonstrate ability to elicit and record from the patient, and other relevant sources including relatives and caregivers, a history that is contextual to gender, age, vulnerability, social and economic status, patient preferences, beliefs and values.
- 3.1.7 Demonstrate ability to perform a physical examination that is complete and relevant to disease identification, disease prevention and health promotion.
- 3.1.8 Demonstrate ability to perform a physical examination that is contextual to gender, social and economic status, patient preferences and values.
- 3.1.9 Demonstrate effective clinical problem solving, judgment and ability to interpret and integrate available data in order to address patient problems, generate differential diagnoses and develop individualized management plans that include preventive, promotive and therapeutic goals.
- 3.1.10 Maintain accurate, clear and appropriate record of the patient in conformation with legal and administrative frameworks.
- 3.1.11 Demonstrate ability to choose the appropriate diagnostic tests and interpret these tests based on scientific validity, cost effectiveness and clinical context.
- 3.1.12 Demonstrate ability to prescribe and safely administer appropriate therapies including nutritional interventions, pharmacotherapy and interventions based on the principles of rational drug therapy, scientific validity, evidence and cost that conform to established national and regional health programmes and policies for the following:
  - i) Disease prevention,
  - ii) Health promotion and cure,
  - iii) Pain and distress alleviation, and
  - iv) Rehabilitation and palliation.

- 3.1.13 Demonstrate ability to provide a continuum of care at the primary and/or secondary level that addresses chronicity, mental and physical disability.
- 3.1.14 Demonstrate ability to appropriately identify and refer patients who may require specialized or advanced tertiary care.
- 3.1.15 Demonstrate familiarity with basic, clinical and translational research as it applies to the care of the patient.

**3.2. *Leader and member of the health care team and system***

- 3.2.1 Work effectively and appropriately with colleagues in an inter-professional health care team respecting diversity of roles, responsibilities and competencies of other professionals.
- 3.2.2 Recognize and function effectively, responsibly and appropriately as a health care team leader in primary and secondary health care settings.
- 3.2.3 Educate and motivate other members of the team and work in a collaborative and collegial fashion that will help maximize the health care delivery potential of the team.
- 3.2.4 Access and utilize components of the health care system and health delivery in a manner that is appropriate, cost effective, fair and in compliance with the national health care priorities and policies, as well as be able to collect, analyze and utilize health data.
- 3.2.5 Participate appropriately and effectively in measures that will advance quality of health care and patient safety within the health care system.
- 3.2.6 Recognize and advocate health promotion, disease prevention and health care quality improvement through prevention and early recognition: in a) life style diseases and b) cancer, in collaboration with other members of the health care team.

**3.3. *Communicator with patients, families, colleagues and community***

- 3.3.1 Demonstrate ability to communicate adequately, sensitively, effectively and respectfully with patients in a language that the patient understands and in a manner that will improve patient satisfaction and health care outcomes.
- 3.3.2 Demonstrate ability to establish professional relationships with patients and families that are positive, understanding, humane, ethical, empathetic, and trustworthy.
- 3.3.3 Demonstrate ability to communicate with patients in a manner respectful of patient's preferences, values, prior experience, beliefs, confidentiality and privacy.

3.3.4 Demonstrate ability to communicate with patients, colleagues and families in a manner that encourages participation and shared decision-making.

**3.4. Lifelong learner committed to continuous improvement of skills and knowledge**

3.4.1. Demonstrate ability to perform an objective self-assessment of knowledge and skills, continue learning, refine existing skills and acquire new skills.

3.4.2. Demonstrate ability to apply newly gained knowledge or skills to the care of the patient.

3.4.3. Demonstrate ability to introspect and utilize experiences, to enhance personal and professional growth and learning.

3.4.4. Demonstrate ability to search (including through electronic means), and critically reevaluate the medical literature and apply the information in the care of the patient.

3.4.5. Be able to identify and select an appropriate career pathway that is professionally rewarding and personally fulfilling.

**3.5. *Professional who is committed to excellence, is ethical, responsive and accountable to patients, community and the profession***

3.5.1. Practice selflessness, integrity, responsibility, accountability and respect.

3.5.2. Respect and maintain professional boundaries between patients, colleagues and society.

3.5.3. Demonstrate ability to recognize and manage ethical and professional conflicts.

3.5.4. Abide by prescribed ethical and legal codes of conduct and practice.

3.5.5. Demonstrate a commitment to the growth of the medical profession as a whole.

## Section 2

### Subject-wise outcomes

Section 2 contains subject-wise outcomes so called “sub-competencies” that must be achieved at the end of instruction in that subject. These are organised in tables and have two parts. The core subject outcomes are in first part. The second part in the same document (titled Integration) contains outcomes/competencies in other subjects which have been identified by experts in those subjects as requiring alignment or integration with the core subject.

Outcomes (competencies) in each subject are grouped according to topics number-wise. It is important to review the individual outcomes (competencies) in the light of the topic outcomes as a whole. For each competency outlined - the learning domains (Knowledge, Skill, Attitude, Communication) are identified. The expected level of achievement in that subject is identified as – [knows (K), knows how (KH), shows how (SH), perform (P)]. As a rule, ‘perform’ indicates independent performance without supervision and is required rarely in the pre-internship period. The outcome is a core (Y - must achieve) or a non-core (N - desirable) outcome. Suggested learning and assessment methods (these are suggestions) and explanation of the terms used are given under the section “definitions used in this document”. The suggested number of times a skill must be performed independently for certification in the learner’s log book is also given. Last two columns indicate subjects within the same phase and other phases with which the topic can be taught - together - aligned (temporal coordination), shared, correlated or nested.

The number of topics and competencies in each subject are given below:

## **Topics & outcomes in Pre-clinical & Para-clinical subjects**

<b>Sr. No.</b>	<b>Subjects</b>	<b>Number of topics</b>	<b>Number of outcomes</b>
1.	<b>Human Anatomy</b>	82	409
2.	<b>Physiology</b>	11	137
3.	<b>Biochemistry</b>	11	89
4.	<b>Pharmacology</b>	05	85
5.	<b>Pathology</b>	36	182
6.	<b>Microbiology</b>	08	54
7.	<b>Forensic Medicine &amp; Toxicology</b>	14	162
	<b>Total</b>	<b>167</b>	<b>1118</b>

## **Topics & outcomes in Medicine and Allied subjects**

<b>Sr. No.</b>	<b>Subjects</b>	<b>Number of topics</b>	<b>Number of outcomes</b>
<b>1.</b>	<b>Community Medicine</b>	20	107
<b>2.</b>	<b>General Medicine</b>	26	506
<b>3.</b>	<b>Respiratory Medicine</b>	02	47
<b>4.</b>	<b>Pediatrics</b>	35	406
<b>5.</b>	<b>Psychiatry</b>	19	117
<b>6.</b>	<b>Dermatology, Venereology &amp; Leprosy</b>	18	73
<b>7.</b>	<b>Physical Medicine &amp; Rehabilitation</b>	09	43
	<b>Total</b>	<b>129</b>	<b>1299</b>

## **Topics & outcomes in Surgery and Allied subjects**

<b>Sr. No.</b>	<b>Subjects</b>	<b>Number of topics</b>	<b>Number of outcomes</b>
<b>1.</b>	<b>General Surgery</b>	30	133
<b>2.</b>	<b>Ophthalmology</b>	09	60
<b>3.</b>	<b>Otorhinolaryngology</b>	04	76
<b>4.</b>	<b>Obstetrics &amp; Gynaecology</b>	38	126
<b>5.</b>	<b>Orthopedics</b>	14	39
<b>6.</b>	<b>Anesthesiology</b>	10	46
<b>7.</b>	<b>Radiodiagnosis</b>	01	13
<b>8.</b>	<b>Radiotherapy</b>	05	16
<b>9.</b>	<b>Dentistry</b>	05	23
	<b>Total</b>	<b>116</b>	<b>532</b>

## **Section 3**

### **Sample topics used for alignment & integration**

Section 3 contains a sample selection of topics that run across the phases which can be used for alignment and integration. These are suggestions and institutions can select their own set of topics which can run across phases.

It is important to design the curriculum with a view to ensure with several broad outcomes in mind: a) achievement of the broad competencies by the learner at the end of the MBBS program, b) retain the subject - wise character of learning and assessment and ensure that phase-wise subject outcomes are met and assessed, c) teaching topics that are similar together thereby reducing redundancy and allowing the learner to integrate the concept as the most important step in integration (alignment or temporal coordination) (see document on integration), and d) align learning and assessment experiences to the outcome and the level of achievement specified.

## **Understanding the competencies table**

## Understanding the competencies table

A	B	C	D	E	F	G	H	I	J
No.	Competencies	Domain	K/KH/SH/P	Core	Suggested Teaching Learning Method	Suggested Assessment method	No. required to certify (P)	Vertical Integration	Horizontal Integration
<b>Physiology</b>									
<b>Summary</b>									
Name of Topic: <b>General Physiology</b>									
Number of Competencies: <b>(08)</b>									
PY1.1	Describe the structure and functions of a	K	KH	Y	Lectures, Small group discussion	Written/Viva			Biochemistry
IM15.4	Elicit <i>document</i> and present a medical history that helps delineate the	S	SH	Y	Bed Side clinic, DOAP	Skill assessment		Community Medicine	

Description of competency

Unique number of the competency. First two alphabets represent the subject (see list); number following alphabet reflects topic number, following period is a running number.

Identifies the domain or domains addressed  
 K - Knowledge  
 S - Skill  
 A - Attitude  
 C - Communication

Identifies the level of competency required based on the Miller's pyramid  
 K - Knows  
 KH - Knows How  
 S - Skill  
 SH - Show How  
 P - Perform independently

Identifies if the competency is core or desirable.  
 Y indicates Core;  
 N-non-core

Identifies the suggested learning method.  
 DOAP - Demonstrate (by Student) Observe, Assist Perform)

Identifies the suggested assessment method  
 Skill assessment - Clinics, Skills lab, Practicals etc.

no of times a skill needs to be done independently to be certified for independent performance;  
 Rarely used in UG

Subject (s) in other phases with which the competency can be vertically integrated to increase relevance or improve basic understanding

Subject (s) in the same phase with which the competency can be horizontally integrated or aligned to allow a more wholesome understanding

**\*Numbers given are for illustrative purposes only and should not be compared with the same in curriculum documents**

## **Deriving learning objectives from competencies**

## Deriving learning objectives from competencies

K	Knows	A knowledge attribute – Usually enumerates or describes
KH	Knows how	A higher level of knowledge – is able to discuss or analyse
S	Shows	A skill attribute: is able to identify or demonstrate the steps
SH	Shows how	A skill attribute: is able to interpret / demonstrate a complex procedure requiring thought, knowledge and behaviour
P	Performs (under supervision or independently)	Mastery for the level of competence - When done independently under supervision a pre-specified number of times - certification or capacity to perform independently results

**Competency:** An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

PA42.3*	Identify the etiology of meningitis based on given CSF parameters	K/S	SH	Y
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PA42.1*	At the end of the session the <b>phase II student</b> must be able to enumerate the most common causes of meningitis correctly
PA42.2*	At the end of the session the <b>phase II student</b> must be able to enumerate the components of CSF analysis correctly
PA42.3*	At the end of the session the <b>phase II student</b> must be able to <b>describe</b> the CSF features for a given etiology of meningitis <b>accurately</b>
PA42.4*	At the end of the session the <b>phase II student</b> must be able to identify the aetiology of meningitis correctly from a <b>given set of CSF parameters</b>

Audience - who will do the behavior

Behavior - What should the learner be able to do?

Condition - Under what conditions should the learner be able to do it?

Degree – How well must it be done

**Objective:** Statement of what a learner should be able to do at the end of a specific learning experience

**\*Numbers given are for illustrative purposes only and should not be compared with the same in curriculum documents**

## **Deriving learning methods from competencies**

## Deriving learning methods from competencies

**Competency:** An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

PA42.3*	Identify the etiology of meningitis based on given CSF parameters	K/S	SH	Y
---------	---	-----	----	---

**Objective:** Statement of what a learner should be able to do at the end of a specific learning experience

PA42.1*	At the end of the session the <b>Phase II student</b> must be able to enumerate the most common causes of meningitis <b>correctly</b>	Lecture → small group discussion
PA42.2*	At the end of the session the <b>Phase II student</b> must be able to enumerate the components of a CSF analysis <b>correctly</b>	Related objectives can be combined into one teaching session
PA42.3*	At the end of the session the <b>Phase II student</b> must be able to <b>describe</b> the CSF features for a given etiologic of meningitis <b>accurately</b>	
PA42.4*	At the end of the session the <b>Phase II student</b> must the able to identify the aetiology of meningitis correctly from a <b>given set of CSF parameters</b>	small group discussion, practical session

\*Numbers given are for illustrative purposes only and should not be compared with the same in curriculum documents

## **Deriving assessment methods from competencies**

## Deriving assessment methods from competencies-1

**Competency:** An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

PA42.3*	Identify the etiology of meningitis based on given CSF parameters	K/S	SH	Y
---------	---	-----	----	---

**Objective:** Statement of what a learner should be able to do at the end of a specific learning experience

PA42.1*	At the end of the session the <del>Phase I</del> <b>Phase II student</b> must be able to enumerate the most common causes of meningitis correctly	Short note or part of structured essay: Enumerate 5 causes of meningitis based on their prevalence in India
PA42.2*	At the end of the session the <b>Phase II student</b> must be able to enumerate the components of a CSF analysis correctly	Short note or part of structured essay: Enumerate the components tested in a CSF analysis
PA42.3*	At the end of the session the <b>Phase II student</b> must be able to <b>describe</b> the CSF features for a given aetiology of meningitis <b>accurately</b>	Short note or part of structured essay: Describe the CSF findings that are characteristic of tuberculous meningitis
PA42.4*	At the end of the session the <b>Phase II student</b> must be able to identify the aetiology of meningitis correctly from a <b>given set of CSF parameters</b>	Short note / part of the structured essay/ Skill station/ Viva voce Review the CSF findings in the following patient and identify (write or vocalise) the most likely etiology

\* Numbers given are for illustrative purposes only and should not be compared with numbers in the curriculum document

## Deriving assessment methods from competencies-2

**Competency:** An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

MI2.4*	List the common microbial agents causing anemia. Describe the morphology, mode of infection and discuss the pathogenesis, clinical course, diagnosis and prevention and treatment of the common microbial agents causing Anemia.	K	KH	Y	Didactic Small group discussion	Written/ Viva voce	Medicine	Pathology
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↓  
**Objective:** Statement of what a learner should be able to do at the end of a specific learning experience

MI2.1*	Enumerate the common microbial agents causing anaemia
MI2.2*	Describe the morphology of agent (1,2 etc)
MI2.3*	Describe the mode of infection of agent in humans
MI2.4*	Discuss the pathogenesis of anemia caused by agent
MI2.5*	Describe the clinical course of infection by agent
MI2.6*	Enumerate the diagnostic tests to identify the aetiology of agent as a cause of anemia
MI2.7*	Discuss the methods to prevent infection by agent
MI2.8*	Describe the treatment of infection by agent

↑  
Integrate concept - not necessarily teachers  
Plan session with teachers of both subjects -teachers from both subjects usually not needed. Ensure redundancy and duplication by reviewing both subjects

↔  
Horizontally aligned and integrated with pathology

↕  
Vertically integrated with General Medicine

↓  
Integrate concept - not necessarily teachers Plan session with teachers from both phases. Make a decision on how much of the information needs to be brought down to this phase to make it relevant. Consider how a competency can ascend over phases: for eg. - can be at a KH -( know how) in phase II but becomes SH in phase III. For vertical integration with clinical subjects, use of a case to link the concept (a well written paper, case is sufficient). Using teachers from both phases is rarely required

# The concept of integration

## Concept of integration used in the Manual

*Integration is a learning experience that allows the learner to perceive relationships from blocks of knowledge and develop a unified view of its basis and its application.* The GMR 2018 applies these principles to the extent that will retain the strengths of silo - based education and assessment while providing experiences that will allow learners to integrate concepts.

Keeping this in mind, the Regulations recommend temporal coordination as described by Harden (called alignment in this document) as the major method to be followed allowing similar topics in different subjects to be thought separately but during the same time frame (Figure 1a ).

In a small proportion - not to exceed 20% of the total curriculum an attempt can be made to Share (Figure 1b) topics or Correlate (Figure 1c) topics by using an integration session. The integration session most preferred will be a case based discussion in an appropriate format ensuring that elements in the same phase (horizontal) and from other phases are addressed. Care must be taken to ensure that achievement phase - based objectives are given primacy - the integrative elements from other phases are used only to provide adequate recall and understand the clinical application of concepts. It must be emphasized that integration does not necessarily require multiple teachers in each class. Experts from each phase and subject may be involved in the lesson planning but not it in its delivery unless deemed necessary.

As much as possible the necessary correlates from other phases must also be introduced while discussing a topic in a given subject - Nesting (Figure 1d) (Harden). Topics that cannot be aligned and integrated must be provided adequate time in the curriculum throughout the year.

Assessment will continue to be subject based. However, efforts must be made to ensure that phase appropriate correlates are tested to determine if the learner has internalized and integrated the concept and its application.

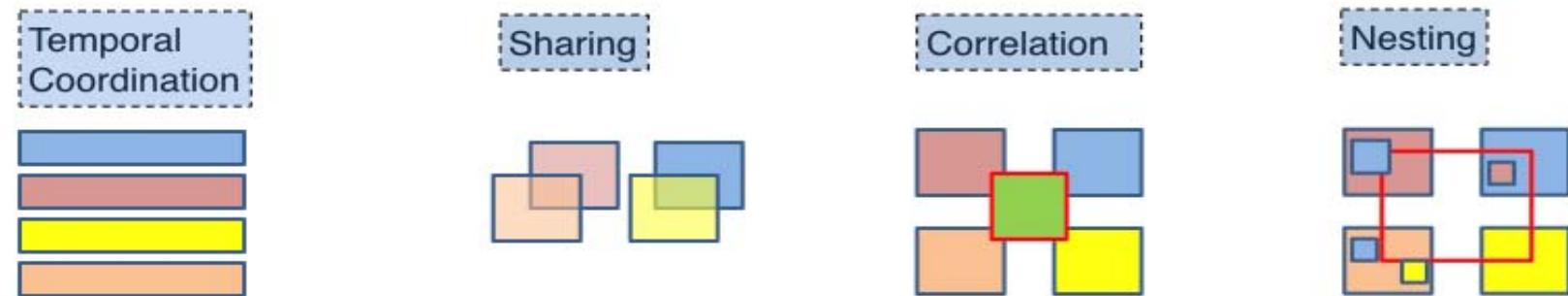


Figure 1 : Integration concepts framed in the GMR. Coloured boxes represent subjects. 1 a. Temporal coordination: The timetable is adjusted so that topics within the subjects or disciplines which are related, are scheduled at the same time. b. Sharing: Two disciplines may agree to plan and jointly implement a teaching program c. Correlation: the emphasis remains on disciplines or subjects with subject-based courses taking up most of the curriculum time. Within this framework, an integrated teaching session or course is introduced in addition to the subject-based teaching (green box with red border) d. Nesting: the teacher targets, within a subject-based course, skills relating to other subjects. Adapted from Harden R Med Edu 2000. 34; 551

## Definitions used in the Manual

**1. Goal:** A projected state of affairs that a person or system plans to achieve.

In other words: Where do you want to go? or What do you want to become?

**2. Competency:** The habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and community being served.

In other words: What should you have? or What should have changed?

**3. Objective:** Statement of what a learner should be able to do at the end of a specific learning experience.

In other words: What the Indian Medical Graduate should know, do, or behave.

### Action Verbs used in this manual

Knowledge	Skill	Attitude/communicate
Enumerate	Identify	Counsel
List	Demonstrate	Inform
Describe	Perform under supervision	Demonstrate understanding of
Discuss	Perform independently	
Differentiate	Document	
Define	Present	
Classify	Record	
Choose	Interpret	
Elicit		
Report		

**Note:**

1. Specified essential competencies only will be required to be performed independently at the end of the final year MBBS.
2. The word 'perform' or 'do' is used ONLY if the task has to be done on patients or in laboratory practical in the pre/para- clinical phases.
3. Most tasks that require performance during undergraduate years will be performed under supervision.
4. If a certification to perform independently has been done, then the number of times the task has to be performed under supervision will be indicated in the last column.

## Explanation of terms used in this manual

Lecture	Any instructional large group method including traditional lecture and interactive lecture
Small group discussion	Any instructional method involving small groups of students in an appropriate learning context
DOAP (Demonstration- Observation - Assistance - Performance)	A practical session that allows the student to observe a demonstration, assist the performer, perform in a simulated environment, perform under supervision or perform independently
Skill assessment	A session that assesses the skill of the student including those in the practical laboratory, skills lab, skills station that uses mannequins/ paper case/simulated patients/real patients as the context demands
Core	A competency that is necessary in order to complete the requirements of the subject (traditional must know)
Non-Core	A competency that is optional in order to complete the requirements of the subject (traditional nice (good) to know/ desirable to know)
National Guidelines	Health programs as relevant to the competency that are part of the National Health Program

### Domains of learning

K	Knowledge
S	Skill
A	Attitude
C	Communication

### Levels of competency

K	Knows	A knowledge attribute - Usually enumerates or describes
KH	Knows how	A higher level of knowledge - is able to discuss or analyze
S	Shows	A skill attribute: is able to identify or demonstrate the steps
SH	Shows how	A skill attribute: is able to interpret/ demonstrate a complex procedure requiring thought, knowledge and behavior
P	Performs (under supervision or independently)	Mastery for the level of competence - When done independently under supervision a pre-specified number of times - certification or capacity to perform independently results

**Note:**

In the table of competency - the highest level of competency acquired is specified and implies that the lower levels have been acquired already. Therefore, when a student is able to SH - Show how - an informed consent is obtained - it is presumed that the preceding steps - the knowledge, the analytical skills, the skill of communicating have all been obtained.

It may also be noted that attainment of the highest level of competency may be obtained through steps spread over several subjects or phases and not necessarily in the subject or the phase in which the competency has been identified.

## **Volume II**

# **Competency based Undergraduate Curriculum in Medicine and Allied subjects**

**COMMUNITY MEDICINE (CODE: CM)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>COMMUNITY MEDICINE</b>									
<b>Topic: Concept of Health and Disease</b>		<b>Number of competencies: (10)</b>			<b>Number of procedures that require certification:(NIL)</b>				
CM1.1	Define and describe the concept of Public Health	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
CM1.2	Define health; describe the concept of holistic health including concept of spiritual health and the relativeness & determinants of health	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
CM1.3	Describe the characteristics of agent, host and environmental factors in health and disease and the multi factorial etiology of disease	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
CM1.4	Describe and discuss the natural history of disease	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
CM1.5	Describe the application of interventions at various levels of prevention	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
CM1.6	Describe and discuss the concepts, the principles of Health promotion and Education, IEC and Behavioral change communication (BCC)	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
CM1.7	Enumerate and describe health indicators	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
CM1.8	Describe the Demographic profile of India and discuss its impact on health	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
CM1.9	Demonstrate the role of effective Communication skills in health in a simulated environment	S	SH	Y	DOAP sessions	Skill Assessment		AETCOM	
CM1.10	Demonstrate the important aspects of the doctor patient relationship in a simulated environment	S	SH	Y	DOAP sessions	Skill Assessment		AETCOM	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Relationship of social and behavioural to health and disease</b> <b>Number of competencies: (5)</b> <b>Number of procedures that require certification: (NIL)</b>									
CM2.1	Describe the steps and perform clinico socio-cultural and demographic assessment of the individual, family and community	S	SH	Y	Lecture, Small group discussion, DOAP session	Written / Viva voce/ Skill assessment			
CM2.2	Describe the socio-cultural factors, family (types), its role in health and disease & demonstrate in a simulated environment the correct assessment of socio-economic status	S	SH	Y	Lecture, Small group discussion, DOAP session	Written / Viva voce/ Skill assessment			
CM2.3	Describe and demonstrate in a simulated environment the assessment of barriers to good health and health seeking behavior	S	SH	Y	Lecture, Small group discussion, DOAP session	Written / Viva voce/ Skill assessment			
CM2.4	Describe social psychology, community behaviour and community relationship and their impact on health and disease	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
CM2.5	Describe poverty and social security measures and its relationship to health and disease	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
<b>Topic: Environmental Health Problems</b> <b>Number of competencies: (8)</b> <b>Number of procedures that require certification: (NIL)</b>									
CM3.1	Describe the health hazards of air, water, noise, radiation and pollution	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine, ENT	
CM3.2	Describe concepts of safe and wholesome water, sanitary sources of water, water purification processes, water quality standards, concepts of water conservation and rainwater harvesting	K	KH	Y	Lecture, Small group discussion, DOAP session	Written / Viva voce			
CM3.3	Describe the aetiology and basis of water borne diseases /jaundice/hepatitis/ diarrheal diseases	K	KH	Y	Lecture, Small group discussion, DOAP session	Written / Viva voce		Microbiology, General Medicine, Pediatrics	
CM3.4	Describe the concept of solid waste, human excreta and sewage disposal	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
CM3.5	Describe the standards of housing and the effect of housing on health	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
CM3.6	Describe the role of vectors in the causation of diseases. Also discuss National Vector Borne disease Control Program	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Microbiology	
CM3.7	Identify and describe the identifying features and life cycles of vectors of Public Health importance and their control measures	S	SH	Y	Lecture, Small group discussion, DOAP session	Written / Viva voce/ Skill assessment		Microbiology	
CM3.8	Describe the mode of action, application cycle of commonly used insecticides and rodenticides	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Pharmacology	
<b>Topic: Principles of health promotion and education</b>		<b>Number of competencies: (3)</b>			<b>Number of procedures that require certification: (NIL)</b>				
CM4.1	Describe various methods of health education with their advantages and limitations	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
CM4.2	Describe the methods of organizing health promotion and education and counselling activities at individual family and community settings	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
CM4.3	Demonstrate and describe the steps in evaluation of health promotion and education program	S	SH	Y	Small group session, DOAP session	Written / Viva voce/ Skill assessment			
<b>Topic: Nutrition</b>		<b>Number of competencies: (08)</b>			<b>Number of procedures that require certification: (NIL)</b>				
CM5.1	Describe the common sources of various nutrients and special nutritional requirements according to age, sex, activity, physiological conditions	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine, Pediatrics	
CM5.2	Describe and demonstrate the correct method of performing a nutritional assessment of individuals, families and the community by using the appropriate method	S	SH	Y	DOAP sessions	Skill Assessment		General Medicine, Pediatrics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
CM5.3	Define and describe common nutrition related health disorders (including macro-PEM, Micro-iron, Zn, iodine, Vit. A), their control and management	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine, Pediatrics	
CM5.4	Plan and recommend a suitable diet for the individuals and families based on local availability of foods and economic status, etc in a simulated environment	S	SH	Y	DOAP sessions	Skill Assessment		General Medicine, Pediatrics	
CM5.5	Describe the methods of nutritional surveillance, principles of nutritional education and rehabilitation in the context of socio-cultural factors.	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine, Pediatrics	
CM5.6	Enumerate and discuss the National Nutrition Policy, important national nutritional Programs including the Integrated Child Development Services Scheme (ICDS) etc	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Pediatrics	
CM5.7	Describe food hygiene	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			Microbiology
CM5.8	Describe and discuss the importance and methods of food fortification and effects of additives and adulteration	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Pediatrics	
<b>Topic: Basic statistics and its applications</b> <span style="margin-left: 150px;"><b>Number of competencies: (04)</b></span> <span style="margin-left: 150px;"><b>Number of procedures that require certification: (NIL)</b></span>									
CM6.1	Formulate a research question for a study	K	KH	Y	Small group discussion, Lecture, DOAP sessions	Written / Viva voce/ Skill assessment		General Medicine, Pediatrics	
CM6.2	Describe and discuss the principles and demonstrate the methods of collection, classification, analysis, interpretation and presentation of statistical data	S	SH	Y	Small group, Lecture, DOAP sessions	Written / Viva voce/ Skill assessment		General Medicine, Pediatrics	
CM6.3	Describe, discuss and demonstrate the application of elementary statistical methods including test of significance in various study designs	S	SH	Y	Small group discussion, Lecture, DOAP sessions	Written / Viva voce/ Skill assessment		General Medicine, Pediatrics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
CM6.4	Enumerate, discuss and demonstrate Common sampling techniques, simple statistical methods, frequency distribution, measures of central tendency and dispersion	S	SH	Y	Small group discussion, Lecture, DOAP sessions	Written / Viva voce/ Skill assessment		General Medicine, Pediatrics	
<b>Topic: Epidemiology</b> <span style="margin-left: 200px;"><b>Number of competencies: (09)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
CM7.1	Define Epidemiology and describe and enumerate the principles, concepts and uses	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		General Medicine	
CM7.2	Enumerate, describe and discuss the modes of transmission and measures for prevention and control of communicable and non-communicable diseases	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		General Medicine	
CM7.3	Enumerate, describe and discuss the sources of epidemiological data	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		General Medicine	
CM7.4	Define, calculate and interpret morbidity and mortality indicators based on given set of data	S	SH	Y	Small group, DOAP sessions	Written/ Skill assessment		General Medicine	
CM7.5	Enumerate, define, describe and discuss epidemiological study designs	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		General Medicine	
CM7.6	Enumerate and evaluate the need of screening tests	S	SH	Y	Small group discussion, DOAP sessions	Written/ Skill assessment		General Medicine	
CM7.7	Describe and demonstrate the steps in the Investigation of an epidemic of communicable disease and describe the principles of control measures	S	SH	Y	Small group discussion, DOAP sessions	Written/ Skill assessment		General Medicine	Microbiology
CM7.8	Describe the principles of association, causation and biases in epidemiological studies	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		General Medicine	
CM7.9	Describe and demonstrate the application of computers in epidemiology	S	KH	Y	Small group discussion, DOAP sessions	Written			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Epidemiology of communicable and non- communicable diseases</b> <span style="float: right;">Number of competencies:(7)      Number of procedures that require certification:(NIL)</span>									
CM8.1	Describe and discuss the epidemiological and control measures including the use of essential laboratory tests at the primary care level for communicable diseases	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		General Medicine, Pediatrics	Microbiology, Pathology
CM8.2	Describe and discuss the epidemiological and control measures including the use of essential laboratory tests at the primary care level for Non Communicable diseases (diabetes, Hypertension, Stroke, obesity and cancer etc.)	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		General Medicine	
CM8.3	Enumerate and describe disease specific <b>National Health Programs</b> including their prevention and treatment of a case	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		General Medicine, Pediatrics	
CM8.4	Describe the principles and enumerate the measures to control a disease epidemic	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		General Medicine, Pediatrics	
CM8.5	Describe and discuss the principles of planning, implementing and evaluating control measures for disease at community level bearing in mind the public health importance of the disease	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		General Medicine, Pediatrics	
CM8.6	Educate and train health workers in disease surveillance, control & treatment and health education	S	SH	Y	DOAP sessions	Skill assessment			
CM8.7	Describe the principles of management of information systems	K	KH	Y	Small group discussion, Lecture	Written / Viva voce			
<b>Topic: Demography and vital statistics</b> <span style="float: right;">Number of competencies: (07)      Number of procedures that require certification: (NIL)</span>									
CM9.1	Define and describe the principles of Demography, Demographic cycle, Vital statistics	K	KH	Y	Small group discussion, Lecture	Written / Viva voce			
CM9.2	Define, calculate and interpret demographic indices including birth rate, death rate, fertility rates	S	SH	Y	Lecture, Small group discussion, DOAP sessions	Skill assessment		Obstetrics & Gynaecology, Pediatrics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
CM9.3	Enumerate and describe the causes of declining sex ratio and its social and health implications	K	KH	Y	Small group discussion, Lecture	Written / Viva voce			
CM9.4	Enumerate and describe the causes and consequences of population explosion and population dynamics of India.	K	KH	Y	Small group discussion, Lecture	Written / Viva voce			
CM9.5	Describe the methods of population control	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		Obstetrics & Gynaecology	
CM9.6	Describe the <b>National Population</b> Policy	K	KH	Y	Small group discussion, Lecture	Written / Viva voce			
CM9.7	Enumerate the sources of vital statistics including census, SRS, NFHS, NSSO etc	K	KH	Y	Small group discussion, Lecture	Written / Viva voce			
<b>Topic: Reproductive maternal and child health</b>		<b>Number of competencies:(09)</b>			<b>Number of procedures that require certification: (NIL)</b>				
CM10.1	Describe the current status of Reproductive, maternal, newborn and Child Health	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		Obstetrics & Gynaecology, Pediatrics	
CM10.2	Enumerate and describe the methods of screening high risk groups and common health problems	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		Pediatrics, Obstetrics & Gynaecology	
CM10.3	Describe local customs and practices during pregnancy, childbirth, lactation and child feeding practices	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		Pediatrics, Obstetrics & Gynaecology	
CM10.4	Describe the reproductive, maternal, newborn & child health (RMCH); child survival and safe motherhood interventions	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		Obstetrics & Gynaecology, Pediatrics	
CM10.5	Describe Universal Immunization Program; Integrated Management of Neonatal and Childhood Illness (IMNCI) and other existing Programs.	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		Pediatrics	
CM10.6	Enumerate and describe various family planning methods, their advantages and shortcomings	K	KH	Y	Small group discussion, Lecture	Written / Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
CM10.7	Enumerate and describe the basis and principles of the Family Welfare Program including the organization, technical and operational aspects	K	KH	Y	Small group discussion, Lecture	Written / Viva voce			
CM10.8	Describe the physiology, clinical management and principles of adolescent health including ARSH	K	KH	Y	Small group discussion, Lecture	Written / Viva voce			
CM10.9	Describe and discuss gender issues and women empowerment	K	KH	Y	Small group discussion, Lecture	Written / Viva voce			
<b>Topic: Occupational Health</b> <span style="float: right;">Number of competencies: (05)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
CM11.1	Enumerate and describe the presenting features of patients with occupational illness including agriculture	K	KH	Y	Small group discussion, Lecture	Written / Viva voce			
CM11.2	Describe the role, benefits and functioning of the employees state insurance scheme	K	KH	Y	Small group discussion, Lecture	Written / Viva voce			
CM11.3	Enumerate and describe specific occupational health hazards, their risk factors and preventive measures	K	KH	Y	Small group discussion, Lecture	Written / Viva voce			
CM11.4	Describe the principles of ergonomics in health preservation	K	KH	Y	Small group discussion, Lecture	Written / Viva voce			
CM11.5	Describe occupational disorders of health professionals and their prevention & management	K	KH	Y	Small group discussion, Lecture	Written / Viva voce			
<b>Topic: Geriatric services</b> <span style="float: right;">Number of competencies: (04)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
CM12.1	Define and describe the concept of Geriatric services	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine	
CM12.2	Describe health problems of aged population	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine	
CM12.3	Describe the prevention of health problems of aged population	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
CM12.4	Describe National program for elderly	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine	
<b>Topic: Disaster Management</b> <span style="float: right;">Number of competencies: (04)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
CM13.1	Define and describe the concept of Disaster management	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Surgery, General Medicine	
CM13.2	Describe disaster management cycle	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Surgery, General Medicine	
CM13.3	Describe man made disasters in the world and in India	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Surgery, General Medicine	
CM13.4	Describe the details of the National Disaster management Authority	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Surgery, General Medicine	
<b>Topic: Hospital waste management</b> <span style="float: right;">Number of competencies: (03)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
CM14.1	Define and classify hospital waste	K	KH	Y	Lecture, Small group discussion, visit to hospital	Written / Viva voce			Microbiology
CM14.2	Describe various methods of treatment of hospital waste	K	KH	Y	Lecture, Small group discussion, visit to hospital	Written / Viva voce			Microbiology
CM14.3	Describe laws related to hospital waste management	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			Microbiology
<b>Topic: Mental Health</b> <span style="float: right;">Number of competencies: (03)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
CM15.1	Define and describe the concept of mental Health	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Psychiatry	
CM15.2	Describe warning signals of mental health disorder	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Psychiatry	
CM15.3	Describe National Mental Health program	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Psychiatry	



Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Essential Medicine</b>		<b>Number of competencies: (3)</b>			<b>Number of procedures that require certification: (NIL)</b>				
CM19.1	Define and describe the concept of Essential Medicine List (EML)	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			Pharmacology
CM19.2	Describe roles of essential medicine in primary health care	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			Pharmacology
CM19.3	Describe counterfeit medicine and its prevention	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			Pharmacology
<b>Topic: Recent advances in Community Medicine</b>		<b>Number of competencies: (04)</b>			<b>Number of procedures that require certification: (NIL)</b>				
CM20.1	List important public health events of last five years	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
CM20.2	Describe various issues during outbreaks and their prevention	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
CM 20.3	Describe any event important to Health of the Community	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
CM 20.4	Demonstrate awareness about laws pertaining to practice of medicine such as Clinical establishment Act and Human Organ Transplantation Act and its implications	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			
<b>Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.</b> <b>Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,</b> <b>Column F: DOAP session – Demonstrate, Observe, Assess, Perform.</b> <b>Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation</b>									
<b>Intergration</b>									
<b>Physiology</b>									
PY9.6	Enumerate the contraceptive methods for male and female. Discuss their advantages & disadvantages	K	KH	Y	Lectures, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, Community Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Biochemistry</b>									
BI8.5	Summarize the nutritional importance of commonly used items of food including fruits and vegetables.(macro-molecules & its importance)	K	KH	Y	Lectures, Small group discussions	Written/ Viva voce		Community Medicine, General Medicine, Pediatrics	
<b>Pathology</b>									
PA12.1	Enumerate and describe the pathogenesis of disorders caused by air pollution, tobacco and alcohol	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			Community Medicine
PA26.5	Define and describe the etiology, types, exposure, environmental influence, pathogenesis, stages, morphology, microscopic appearance and complications of Occupational lung disease	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine, Community Medicine	
PA26.7	Define and describe the etiology, types, exposure, genetics environmental influence, pathogenesis, morphology, microscopic appearance and complications of mesothelioma	K	KH	N	Lecture, Small group discussion	Written / Viva voce		General Medicine, Community Medicine	
<b>Microbiology</b>									
MI1.3	Describe the epidemiological basis of common infectious diseases	K	KH	Y	Lecture	Written/ Viva voce			Community Medicine
MI8.4	Describe the etiologic agents of emerging Infectious diseases. Discuss the clinical course and diagnosis	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine, Community Medicine	Community Medicine
MI8.5	Define Healthcare Associated Infections (HAI) and enumerate the types. Discuss the factors that contribute to the development of HAI and the methods for prevention	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Community Medicine	
MI8.6	Describe the basics of Infection control	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
MI8.7	Demonstrate Infection control practices and use of Personal Protective Equipments (PPE)	S	P	Y	DOAP session	Skill assessment	3 each in (Hand hygiene & PPE)	General Surgery	Community Medicine
MI8.16	Describe the <b>National</b> Health Programs in the prevention of common infectious disease (for information purpose only as taught in CM)	K	K	Y	Lecture	Written / Viva voce			
<b>Pharmacology</b>									
PH1.55	Describe and discuss the following <b>National</b> Health programmes including Immunisation, Tuberculosis, Leprosy, Malaria, HIV, Filariasis, Kala Azar, Diarrhoeal diseases, Anaemia & nutritional disorders, Blindness, Non-communicable diseases, Cancer and Iodine deficiency	K	KH	Y	Lecture	Written / Viva voce			Community Medicine
<b>Forensic Medicine &amp; Toxicology</b>									
FM2.33	Demonstrate ability to use <b>local resources</b> whenever required like in mass disaster situations	A & C	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Community Medicine	
<b>Dermatology, Venereology &amp; Leprosy</b>									
DR9.1	Classify, describe the epidemiology, etiology, microbiology pathogenesis and clinical presentations and diagnostic features of Leprosy	K	KH	Y	Lecture, Small group discussions	Written / Viva voce		General Medicine	Microbiology, Community Medicine
DR9.5	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for various classes of leprosy based on <b>national guidelines</b>	K	KH	Y	Lecture, Small group discussions	Written / Viva voce		General Medicine	Pharmacology, Community Medicine
DR9.6	Describe the treatment of Leprosy based on the WHO guidelines	K	KH	Y	Lecture, Small group discussions	Written / Viva voce		General Medicine	Pharmacology, Community Medicine
<b>Ophthalmology</b>									
OP9.4	Enumerate, describe and discuss the causes of avoidable blindness and the <b>National Programs for</b> Control of Blindness (including vision 2020)	K	KH	Y	Lecture, Small group discussions	Written / Viva voce			Community Medicine

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Psychiatry</b>									
PS19.1	Describe the relevance, role and status of community psychiatry	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine	
PS19.2	Describe the objectives strategies and contents of the of the National Mental Health Programme	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine	
PS19.4	Enumerate and describe the salient features of the prevalent mental health laws in India	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine	
PS19.5	Describe the concept and principles of preventive psychiatry and mental health promotion (positive mental health); and community education	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine	
<b>General Medicine</b>									
IM2.1	Discuss and describe the epidemiology, antecedents and risk factors for atherosclerosis and ischemic heart disease	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Pathology, Physiology, Community Medicine	
IM4.3	Discuss and describe the common causes, pathophysiology and manifestations of fever in various regions in India including bacterial, parasitic and viral causes (e.g. Dengue, Chikungunya, Typhus)	K	K	Y	Lecture, Small group discussion	Written		Microbiology, Community Medicine	
IM9.15	Describe the national programs for anemia prevention	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Pharmacology, Community Medicine	
IM12.12	Describe and discuss the iodisation programs of the government of India	K	KH	Y	Lecture, Bedside clinic	short note		Community Medicine	
IM14.4	Describe and discuss the impact of environmental factors including eating habits, food, work, environment and physical activity on the incidence of obesity	K	K	Y	Lectures, Small group discussions	short note/ Viva voce		Pathology, Community Medicine	
IM24.18	Describe the impact of the demographic changes in ageing on the population	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM25.1	Describe and discuss the response and the influence of host immune status, risk factors and comorbidities on zoonotic diseases (e.g. Leptospirosis, Rabies) and non-febrile infectious disease (e.g. Tetanus)	K	K	Y	Lecture, Small group discussion	Written		Microbiology, Community Medicine	
IM25.2	Discuss and describe the common causes, pathophysiology and manifestations of these diseases	K	K	Y	Lecture, Small group discussion	Written		Microbiology, Community Medicine	
IM25.4	Elicit document and present a medical history that helps delineate the aetiology of these diseases that includes the evolution and pattern of symptoms, risk factors, exposure through occupation and travel	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Community Medicine	
IM25.13	Counsel the patient and family on prevention of various infections due to environmental issues	C	SH	Y	DOAP session	Skill assessment		Community Medicine, General Medicine	

**Obstetrics & Gynaecology**

OG1.1	Define and discuss birth rate, maternal mortality and morbidity	K	KH	Y	Lecture, Small group discussions	Short notes		Community Medicine	
OG1.2	Define and discuss perinatal mortality and morbidity including perinatal and neonatal mortality and morbidity audit	K	KH	Y	Lecture, Small group discussions	Short notes		Community Medicine	Pediatrics
OG8.1	Enumerate describe and discuss the objectives of antenatal care, assessment of period of gestation; screening for high-risk factors	K	KH	Y	Small group discussions, Bedside clinics, Lecture	Written / Viva voce/ Skill assessment		Community Medicine	
OG19.2	Counsel in a simulated environment, contraception and puerperal sterilisation	S/A/C	SH	Y	DOAP session	Skill assessment		Community Medicine	
OG21.1	Describe and discuss the temporary and permanent methods of contraception, indications, technique and complications; selection of patients, side effects and failure rate including OC, male contraception, emergency contraception and IUCD	K	KH	Y	Lecture, Small group discussions, Bedside clinics	Written / Viva voce/ Skill assessment		Community Medicine	
OG33.3	Describe and demonstrate the screening for cervical cancer in a simulated environment	K/S	SH	Y	DOAP session	Skill assessment		Community Medicine	

**Pediatrics**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PE3.5	Discuss the role of the child developmental unit in management of developmental delay	K	K	N	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
PE3.7	Visit a Child Developmental unit and observe its functioning	S	KH	Y	Lecture, Small group discussion	Log book Entry		Community Medicine	
PE8.1	Define the term Complementary Feeding	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
PE8.2	Discuss the principles the initiation, attributes , frequency, techniques and hygiene related to complementary feeding including	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine	
PE8.3	Enumerate the common complimentary foods	K	K	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine	
PE8.4	Elicit history on the Complementary Feeding habits	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment		Community Medicine	
PE8.5	Counsel and educate mothers on the best practices in Complimentary Feeding	A/C	SH	Y	DOAP session	Document in Log Book		Community Medicine	
PE9.1	Describe the age related nutritional needs of infants, children and adolescents including micronutrients and vitamins	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine, Biochemistry	
PE9.2	Describe the tools and methods for Assessment and classification of Nutritional status of infants, children and adolescents	K	KH	Y	Lecture, Small group discussion,	Written / Viva voce		Community Medicine	
PE9.4	Elicit, Document and present an appropriate nutritional history and perform a dietary recall	S	SH	Y	Bedside clinic, Skill Lab	Skill Assessment		Community Medicine	
PE9.5	Calculate the age related Calorie requirement in Health and Disease and identify gap	S	SH	Y	Bedside clinics, Small group discussion	Skill assessment		Community Medicine	
PE9.6	Assess and classify the nutrition status of infants, children and adolescents and recognize deviations	S	SH	Y	Bedside clinic, Small group discussion	Skill Assessment		Community Medicine	
PE9.7	Plan an appropriate diet in Health and disease	S	SH	N	Bedside clinic, Small group discussion	Document in logbook		Community Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PE10.4	Identify children with under nutrition as per IMNCI criteria and plan referral	S	SH	Y	DOAP session	Document in log book		Community Medicine	
PE17.1	State the vision and outline the goals, strategies and plan of action of NHM and other important national programs pertaining to maternal and child health including RMNCH A+, RBSK, RKSK, JSSK mission Indradhanush and ICDS	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
PE17.2	Analyse the outcomes and appraise the monitoring and evaluation of NHM	K	KH	Y	Debate	Written/ Viva voce		Community Medicine	
PE18.1	List and explain the components, plans, outcomes of Reproductive child health (RCH) program and appraise the monitoring and evaluation	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine	Obstetrics & Gynaecology
PE18.2	Explain preventive interventions for Child survival and safe motherhood	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	Obstetrics & Gynaecology
PE18.3	Conduct Antenatal examination of women independently and apply at-risk approach in antenatal care	S	SH	Y	Bedside clinics	Skill station		Community Medicine	Obstetrics & Gynaecology
PE18.4	Provide intra-natal care and conduct a normal Delivery in a simulated environment	S	SH	Y	DOAP session, Skills lab	Document in Log Book		Community Medicine	Obstetrics & Gynaecology
PE18.6	Perform Postnatal assessment of newborn and mother, provide advice on breast feeding, weaning and on family planning	S	SH	Y	Bedside clinics, Skill Lab	Skill Assessment		Community Medicine	Obstetrics & Gynaecology
PE18.8	Observe the implementation of the program by Visiting the Rural Health Centre	S	KH	Y	Bedside clinics, Skill Lab	Document in log book		Community Medicine	Obstetrics & Gynaecology
PE19.1	Explain the components of the Universal immunization Program and the sub National Immunization Programs	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology	
PE19.2	Explain the epidemiology of Vaccine preventable diseases	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology	
PE19.3	Vaccine description with regard to classification of vaccines, strain used, dose, route, schedule, risks, benefits and side effects, indications and contraindications	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology	
PE19.4	Define cold chain and discuss the methods of safe storage and handling of vaccines	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine, Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PE19.5	Discuss immunization in special situations – HIV positive children, immunodeficiency, preterm , organ transplants, those who received blood and blood products, splenectomised children, Adolescents, travellers	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine, Microbiology	
PE19.8	Demonstrate willingness to participate in the National and sub national immunisation days	A	SH	Y	Lecture, Small group discussion	Document in Log Book		Community Medicine	
PE19.12	Observe the Administration the UIP vaccines	S	SH	Y	DOAP session	Document in Log Book		Community Medicine	
PE29.5	Discuss the National anaemia Control program	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine	
PE34.3	Discuss the various regimens for management of Tuberculosis as per National Guidelines	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Community Medicine, Pharmacology	Respiratory Medicine
PE34.4	Discuss the preventive strategies adopted and the objectives and outcome of the National Tuberculosis Control Program	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Community Medicine, Pharmacology	Respiratory Medicine
<b>General Surgery</b>									
SU7.1	Describe the Planning and conduct of Surgical audit	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine	
SU7.2	Describe the principles and steps of clinical research in surgery	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine	
<b>Respiratory Medicine</b>									
CT1.1	Describe and discuss the epidemiology of tuberculosis and its impact on the work, life and economy of India	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine	
CT1.4	Describe the epidemiology, the predisposing factors and microbial and therapeutic factors that determine resistance to drugs	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine, Microbiology, Pharmacology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
CT1.15	Prescribe an appropriate antituberculosis regimen based on the location of disease, smear positivity and negativity and co-morbidities based on current national guidelines including directly observed tuberculosis therapy (DOTS)	K	SH	Y	Bedside clinic, Small group discussion, Lecture	Skill assessment		Pharmacology, Community Medicine	
CT1.16	Describe the appropriate precautions, screening, testing and indications for chemoprophylaxis for contacts and exposed health care workers	K	KH	Y	Bedside clinic, Small group discussion	Written		Community Medicine	
CT1.18	Educate health care workers on national programs of Tuberculosis and administering and monitoring the DOTS program	C	SH	Y	DOAP session	Skill assessment		Community Medicine	
CT2.24	Recognise the impact of OAD on patient's quality of life, well being, work and family	A	KH	Y	Small group discussion, Bedside clinic	Observation by faculty		Community Medicine	
CT2.25	Discuss and describe the impact of OAD on the society and workplace	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine	
CT2.26	Discuss and describe preventive measures to reduce OAD in workplaces	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Community Medicine	
CT2.27	Demonstrate an understanding of patient's inability to change working, living and environmental factors that influence progression of airway disease	A	KH	Y	Small group discussion, Bedside clinic	Observation by faculty		Community Medicine	

**GENERAL MEDICINE (CODE: IM)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
<b>GENERAL MEDICINE</b>									
<b>Topic: Heart Failure</b>		<b>Number of competencies: (30)</b>			<b>Number of procedures that require certification : (01)</b>				
IM1.1	Describe and discuss the epidemiology, pathogenesis clinical evolution and course of common causes of heart disease including: rheumatic/ valvular, ischemic, hypertrophic inflammatory	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.2	Describe and discuss the genetic basis of some forms of heart failure	K	KH	N	Lecture, Small group discussion	Written		Pathology, Physiology	
IM1.3	Describe and discuss the aetiology microbiology pathogenies and clinical evolution of rheumatic fever, criteria, degree of rheumatic activity and rheumatic valvular heart disease and its complications including infective endocarditis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology, Microbiology	
IM1.4	Stage heart failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.5	Describe ,discuss and differentiate the processes involved in R Vs L heart failure, systolic vs diastolic failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.6	Describe and discuss the compensatory mechanisms involved in heart failure including cardiac remodelling and neurohormonal adaptations	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.7	Enumerate, describe and discuss the factors that exacerbate heart failure including ischemia, arrhythmias, anemia, thyrotoxicosis, dietary factors drugs etc.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.8	Describe and discuss the pathogenesis and development of common arrhythmias involved in heart failure particularly atrial fibrillation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM1.9	Describe and discuss the clinical presentation and features, diagnosis, recognition and management of acute rheumatic fever	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM1.10	Elicit document and present an appropriate history that will establish the diagnosis, cause and severity of heart failure including: presenting complaints, precipitating and exacerbating factors, risk factors exercise tolerance, changes in sleep patterns, features suggestive of infective endocarditis	S	SH	Y	Bedside clinic	Skill assessment			
IM1.11	Perform and demonstrate a systematic examination based on the history that will help establish the diagnosis and estimate its severity including: measurement of pulse, blood pressure and respiratory rate, jugular venous forms and pulses, peripheral pulses, conjunctiva and fundus, lung, cardiac examination including palpation and auscultation with identification of heart sounds and murmurs, abdominal distension and splenic palpation	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM1.12	Demonstrate peripheral pulse, volume, character, quality and variation in various causes of heart failure	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM1.13	Measure the blood pressure accurately, recognise and discuss alterations in blood pressure in valvular heart disease and other causes of heart failure and cardiac tamponade	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM1.14	Demonstrate and measure jugular venous distension	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM1.15	Identify and describe the timing, pitch quality conduction and significance of precordial murmurs and their variations	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM1.16	Generate a differential diagnosis based on the clinical presentation and prioritise it based on the most likely diagnosis	K	KH	Y	Bedside clinic, Small group discussion	Skill assessment			
IM1.17	Order and interpret diagnostic testing based on the clinical diagnosis including 12 lead ECG, Chest radiograph, blood cultures	K	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM1.18	Perform and interpret a 12 lead ECG	S	P	Y	Bedside clinic, DOAP session	Skill assessment	3		
IM1.19	Enumerate the indications for and describe the findings of heart failure with the following conditions including: 2D echocardiography, brain natriuretic peptide, exercise testing, nuclear medicine testing and coronary angiogram	S	KH	N	Lecture, Small group discussion, Bedside clinic	Skill assessment		Radiodiagnosis	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM1.20	Determine the severity of valvular heart disease based on the clinical and laboratory and imaging features and determine the level of intervention required including surgery	C	SH	Y	Small group discussion, Lecture, Bedside clinic	Written/ Skill assessment			
IM1.21	Describe and discuss and identify the clinical features of acute and subacute endocarditis, echocardiographic findings, blood culture and sensitivity and therapy	K	KH/SH	Y	Bedside clinic, Small group discussion, Lecture	Skill assessment			
IM1.22	Assist and demonstrate the proper technique in collecting specimen for blood culture	S	SH	Y	DOAP session	Skill assessment		Microbiology	
IM1.23	Describe, prescribe and communicate non pharmacologic management of heart failure including sodium restriction, physical activity and limitations	S/C	SH	Y	Lecture, Small group discussion	Skill assessment			
IM1.24	Describe and discuss the pharmacology of drugs including indications, contraindications in the management of heart failure including diuretics, ACE inhibitors, Beta blockers, aldosterone antagonists and cardiac glycosides	K	KH	Y	Lecture, Small group discussion	Viva voce/written		Pharmacology	
IM1.25	Enumerate the indications for valvuloplasty, valvotomy, coronary revascularization and cardiac transplantation	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Viva voce/written			
IM1.26	Develop document and present a management plan for patients with heart failure based on type of failure, underlying aetiology	S	SH	Y	Bedside clinic, Skill assessment, Small group discussion	Bedside clinic/ Skill assessment/written			
IM1.27	Describe and discuss the role of penicillin prophylaxis in the prevention of rheumatic heart disease	K	KH	Y	Bedside clinic, Small group discussion	Written		Microbiology, Pharmacology	
IM1.28	Enumerate the causes of adult presentations of congenital heart disease and describe the distinguishing features between cyanotic and acyanotic heart disease	K	KH	Y	Bedside clinic, Small group discussion	Bedside clinic/ Skill assessment/written			
IM1.29	Elicit document and present an appropriate history, demonstrate correctly general examination, relevant clinical findings and formulate document and present a management plan for an adult patient presenting with a common form of congenital heart disease	K	KH	Y	Bedside clinic, Small group discussion	Skill assessment/ written			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration	
IM1.30	Administer an intramuscular injection with an appropriate explanation to the patient	S	SH	Y	Bedside clinic, Skill assessment	Log book documentation of completion		Pharmacology		
<b>Topic: Acute Myocardial Infarction/ IHD</b>										
					<b>Number of competencies: (24)</b>			<b>Number of procedures that require certification : (02)</b>		
IM2.1	Discuss and describe the epidemiology, antecedents and risk factors for atherosclerosis and ischemic heart disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology, Community Medicine		
IM2.2	Discuss the aetiology of risk factors both modifiable and non modifiable of atherosclerosis and IHD	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology		
IM2.3	Discuss and describe the lipid cycle and the role of dyslipidemia in the pathogenesis of atherosclerosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry		
IM2.4	Discuss and describe the pathogenesis natural history, evolution and complications of atherosclerosis and IHD	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology		
IM2.5	Define the various acute coronary syndromes and describe their evolution, natural history and outcomes	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology		
IM2.6	Elicit document and present an appropriate history that includes onset evolution, presentation risk factors, family history, comorbid conditions, complications, medication, history of atherosclerosis, IHD and coronary syndromes	S	SH	Y	Bedside clinic, DOAP session	Skill assessment				
IM2.7	Perform, demonstrate and document a physical examination including a vascular and cardiac examination that is appropriate for the clinical presentation	S	SH	Y	Bedside clinic, DOAP session	Skill assessment				
IM2.8	Generate document and present a differential diagnosis based on the clinical presentation and prioritise based on "cannot miss", most likely diagnosis and severity	S	SH	Y	Bedside clinic, DOAP session	Skill assessment				
IM2.9	Distinguish and differentiate between stable and unstable angina and AMI based on the clinical presentation	S	SH	Y	Bedside clinic, DOAP session	Skill assessment				
IM2.10	Order, perform and interpret an ECG	S	P	Y	Bedside clinic, DOAP session	Skill assessment	3			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM2.11	Order and interpret a Chest X-ray and markers of acute myocardial infarction	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM2.12	Choose and interpret a lipid profile and identify the desirable lipid profile in the clinical context	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Biochemistry	
IM2.13	Discuss and enumerate the indications for and findings on echocardiogram, stress testing and coronary angiogram	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM2.14	Discuss and describe the indications for admission to a coronary care unit and supportive therapy for a patient with acute coronary syndrome	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM2.15	Discuss and describe the medications used in patients with an acute coronary syndrome based on the clinical presentation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM2.16	Discuss and describe the indications for acute thrombolysis, PTCA and CABG	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM2.17	Discuss and describe the indications and methods of cardiac rehabilitation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM2.18	Discuss and describe the indications, formulations, doses, side effects and monitoring for drugs used in the management of dyslipidemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology, Biochemistry	
IM2.19	Discuss and describe the pathogenesis, recognition and management of complications of acute coronary syndromes including arrhythmias, shock, LV dysfunction, papillary muscle rupture and pericarditis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM2.20	Discuss and describe the assessment and relief of pain in acute coronary syndromes	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM2.21	Observe and participate in a controlled environment an ACLS program	S	KH	N	DOAP session	NA			
IM2.22	Perform and demonstrate in a mannequin BLS	S	P	Y	DOAP session	Skill assessment	1		

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM2.23	Describe and discuss the indications for nitrates, anti platelet agents, gpIIb IIIa inhibitors, beta blockers, ACE inhibitors etc in the management of coronary syndromes	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM2.24	Counsel and communicate to patients with empathy lifestyle changes in atherosclerosis / post coronary syndromes	C/A	SH	Y	DOAP session	Skill assessment		AETCOM	
<b>Topic: Pneumonia</b>		<b>Number of competencies: (19)</b>			<b>Number of procedures that require certification: (NIL)</b>				
IM3.1	Define, discuss, describe and distinguish community acquired pneumonia, nosocomial pneumonia and aspiration pneumonia	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Human Anatomy, Pathology, Microbiology	
IM3.2	Discuss and describe the aetiologies of various kinds of pneumonia and their microbiology depending on the setting and immune status of the host	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Microbiology	
IM3.3	Discuss and describe the pathogenesis, presentation, natural history and complications of pneumonia	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology, Microbiology	
IM3.4	Elicit document and present an appropriate history including the evolution, risk factors including immune status and occupational risk	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM3.5	Perform, document and demonstrate a physical examination including general examination and appropriate examination of the lungs that establishes the diagnosis, complications and severity of disease	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM3.6	Generate document and present a differential diagnosis based on the clinical features, and prioritise the diagnosis based on the presentation	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM3.7	Order and interpret diagnostic tests based on the clinical presentation including: CBC, Chest X ray PA view, Mantoux, sputum gram stain, sputum culture and sensitivity, pleural fluid examination and culture, HIV testing and ABG	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Radiodiagnosis, Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM3.8	Demonstrate in a mannequin and interpret results of an arterial blood gas examination	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM3.9	Demonstrate in a mannequin and interpret results of a pleural fluid aspiration	S	SH	Y	DOAP session	Skill assessment			
IM3.10	Demonstrate the correct technique in a mannequin and interpret results of a blood culture	S	SH	Y	DOAP session	Skill assessment		Microbiology	
IM3.11	Describe and enumerate the indications for further testing including HRCT, Viral cultures, PCR and specialised testing	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Radiodiagnosis, Microbiology	
IM3.12	Select, describe and prescribe based on the most likely aetiology, an appropriate empirical antimicrobial based on the pharmacology and antimicrobial spectrum	S	SH	Y	Bed side clinic, DOAP session	Skill Assessment/ Written/ Viva voce		Pharmacology, Microbiology	
IM3.13	Select, describe and prescribe based on culture and sensitivity appropriate empirical antimicrobial based on the pharmacology and antimicrobial spectrum.	S	SH	Y	Bedside clinic, DOAP session	Skill assessment/ Written/ Viva voce		Pharmacology, Microbiology	
IM3.14	Perform and interpret a sputum gram stain and AFB	S	P	Y	DOAP session	Skill assessment		Microbiology	
IM3.15	Describe and enumerate the indications for hospitalisation in patients with pneumonia	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce			
IM3.16	Describe and enumerate the indications for isolation and barrier nursing in patients with pneumonia	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce			
IM3.17	Describe and discuss the supportive therapy in patients with pneumonia including oxygen use and indications for ventilation	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce			
IM3.18	Communicate and counsel patient on family on the diagnosis and therapy of pneumonia	C/A	SH	Y	DOAP session	Skill assessment			
IM3.19	Discuss, describe, enumerate the indications and communicate to patients on pneumococcal and influenza vaccines	S/C	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Microbiology	

**Topic: Fever and febrile syndromes**

**Number of competencies: (26)**

**Number of procedures that require certification : (NIL)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM4.1	Describe and discuss the febrile response and the influence of host immune status, risk factors and comorbidities on the febrile response	K	K	Y	Lecture, Small group discussion	Written		Microbiology	
IM4.2	Describe and discuss the influence of special populations on the febrile response including: the elderly, immune suppression, malignancy and neutropenia, HIV and travel	K	K	Y	Lecture, Small group discussion	Written		Microbiology	
IM4.3	Discuss and describe the common causes, pathophysiology and manifestations of fever in various regions in India including bacterial, parasitic and viral causes (e.g.Dengue, Chikungunya, Typhus)	K	K	Y	Lecture, Small group discussion	Written		Microbiology, Community Medicine	
IM4.4	Describe and discuss the pathophysiology and manifestations of inflammatory causes of fever	K	KH	Y	Lecture, Small group discussion	Written		Microbiology	
IM4.5	Describe and discuss the pathophysiology and manifestations of malignant causes of fever including hematologic and lymph node malignancies	K	KH	Y	Lecture, Small group discussion	Written		Pathology, Microbiology	
IM4.6	Discuss and describe the pathophysiology and manifestations of malaria	K	KH	Y	Lecture, Small group discussion	Written		Microbiology	
IM4.7	Discuss and describe the pathophysiology and manifestations of the sepsis syndrome	K	K	Y	Lecture, Small group discussion	Written			
IM4.8	Discuss and describe the pathophysiology, aetiology and clinical manifestations of fever of unknown origin (FUO) including in a normal host, neutropenic host, nosocomial host and a host with HIV disease	K	K	Y	Lecture, Small group discussion	Written		Microbiology	
IM4.9	Elicit document and present a medical history that helps delineate the aetiology of fever that includes the evolution and pattern of fever, associated symptoms, immune status, comorbidities, risk factors, exposure through occupation, travel and environment and medication use	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM4.10	Perform a systematic examination that establishes the diagnosis and severity of presentation that includes: general skin mucosal and lymph node examination, chest and abdominal examination (including examination of the liver and spleen)	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM4.11	Generate a differential diagnosis and prioritise based on clinical features that help distinguish between infective, inflammatory, malignant and rheumatologic causes	K	SH	Y	Bedside clinic, DOAP session	Written/ Viva voce			
IM4.12	Order and interpret diagnostic tests based on the differential diagnosis including: CBC with differential, peripheral smear, urinary analysis with sediment, Chest X ray, blood and urine cultures, sputum gram stain and cultures, sputum AFB and cultures, CSF analysis, pleural and body fluid analysis, stool routine and culture and QBC	K	SH	Y	Bedside clinic, Skill assessment	Skill assessment		Pathology, Microbiology	
IM4.13	Perform and interpret a sputum gram stain	S	SH	Y	DOAP session	Log book/ documentation		Microbiology	
IM4.14	Perform and interpret a sputum AFB	S	SH	Y	DOAP session	Log book/ documentation		Microbiology	
IM4.15	Perform and interpret a malarial smear	S	SH	Y	DOAP session	Log book/ documentation/ Skill assessment		Microbiology	
IM4.16	Enumerate the indications and describe the findings in tests of inflammation and specific rheumatologic tests, serologic testing for pathogens including HIV, bone marrow aspiration and biopsy	K	KH	N	Lecture, Small group discussion	Written		Pathology	
IM4.17	Observe and assist in the performance of a bone marrow aspiration and biopsy in a simulated environment	S	SH	N	Skills lab	Log book/ documentation/ DOAP session		Pathology	
IM4.18	Enumerate the indications for use of imaging in the diagnosis of febrile syndromes	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			
IM4.19	Assist in the collection of blood and wound cultures	S	SH	Y	DOAP session	Log book/ documentation		Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM4.20	Interpret a PPD (Mantoux)	S	SH	Y	DOAP session	Log book/ documentation		Microbiology	
IM4.21	Develop and present an appropriate diagnostic plan based on the clinical presentation, most likely diagnosis in a prioritised and cost effective manner	K	KH	Y	Bedside clinic, Skill assessment	Skill assessment			
IM4.22	Describe and discuss the pharmacology, indications, adverse reactions, interactions of antimalarial drugs and basis of resistance	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM4.23	Prescribe drugs for malaria based on the species identified, prevalence of drug resistance and national programs	S	SH	Y	Small group discussion	Skill assessment		Microbiology, Pharmacology	
IM4.24	Develop an appropriate empiric treatment plan based on the patient's clinical and immune status pending definitive diagnosis	C	SH	Y	DOAP session	Skill assessment			
IM4.25	Communicate to the patient and family the diagnosis and treatment	C	SH	Y	DOAP session	Skill assessment		AETCOM	
IM4.26	Counsel the patient on malarial prevention	C	SH	Y	DOAP session	Skill assessment		Microbiology, Pharmacology	
<b>Topic: Liver disease</b>		<b>Number of competencies: (18)</b>			<b>Number of procedures that require certification : (NIL)</b>				
IM5.1	Describe and discuss the physiologic and biochemical basis of hyperbilirubinemia	K	K	Y	Lecture, Small group discussion	Written/Viva voce		Pathology, Physiology	
IM5.2	Describe and discuss the aetiology and pathophysiology of liver injury	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM5.3	Describe and discuss the pathologic changes in various forms of liver disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM5.4	Describe and discuss the epidemiology, microbiology, immunology and clinical evolution of infective (viral) hepatitis	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Microbiology	
IM5.5	Describe and discuss the pathophysiology and clinical evolution of alcoholic liver disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM5.6	Describe and discuss the pathophysiology, clinical evolution and complications of cirrhosis and portal hypertension including ascites, spontaneous bacterial peritonitis, hepatorenal syndrome and hepatic encephalopathy	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM5.7	Enumerate and describe the causes and pathophysiology of drug induced liver injury	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Pharmacology	
IM5.8	Describe and discuss the pathophysiology, clinical evolution and complications cholelithiasis and cholecystitis	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
IM5.9	Elicit document and present a medical history that helps delineate the aetiology of the current presentation and includes clinical presentation, risk factors, drug use, sexual history, vaccination history and family history	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM5.10	Perform a systematic examination that establishes the diagnosis and severity that includes nutritional status, mental status, jaundice, abdominal distension ascites, features of portosystemic hypertension and hepatic encephalopathy	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM5.11	Generate a differential diagnosis and prioritise based on clinical features that suggest a specific aetiology for the presenting symptom	K	KH	Y	Bedside clinic, DOAP session	Skill assessment/ Viva voce			
IM5.12	Choose and interpret appropriate diagnostic tests including: CBC, bilirubin, function tests, Hepatitis serology and ascitic fluid examination in patient with liver diseases.	S	KH	Y	Bedside clinic, DOAP session	Skill assessment		Pathology	
IM5.13	Enumerate the indications for ultrasound and other imaging studies including MRCP and ERCP and describe the findings in liver disease	K	K	Y	Bedside clinic, Small group discussion	Viva voce/ Written		Radiodiagnosis	General Surgery
IM5.14	Outline a diagnostic approach to liver disease based on hyperbilirubinemia, liver function changes and hepatitis serology	S	SH	Y	Bedside clinic, Small group discussion	Viva voce/ Written		Pathology, Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM5.15	Assist in the performance and interpret the findings of an ascitic fluid analysis	S	KH	Y	DOAP session	documentation in log book			
IM5.16	Describe and discuss the management of hepatitis, cirrhosis, portal hypertension, ascites spontaneous, bacterial peritonitis and hepatic encephalopathy	K	KH	Y	Written, Small group discussion	Skill assessment/ Written/ Viva voce		Pharmacology	General Surgery
IM5.17	Enumerate the indications, precautions and counsel patients on vaccination for hepatitis	K/C	SH	Y	Written, Small group discussion	Written/ Viva voce		Microbiology	
IM5.18	Enumerate the indications for hepatic transplantation	K	K	Y	Written, Small group discussion	Written/ Viva voce			General Surgery
<b>Topic: HIV</b> <span style="margin-left: 200px;"><b>Number of competencies: (23)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
IM6.1	Describe and discuss the symptoms and signs of acute HIV seroconversion	K	KH	Y	Lecture, Small group discussion	Short note/ Viva voce		Microbiology	
IM6.2	Define and classify HIV AIDS based on the CDC criteria	K	KH	Y	Lecture, Small group discussion	Short notes/ Viva voce		Microbiology	
IM6.3	Describe and discuss the relationship between CDC count and the risk of opportunistic infections	K	KH	Y	Lecture, Small group discussion	Short notes/ Viva voce		Microbiology	
IM6.4	Describe and discuss the pathogenesis, evolution and clinical features of common HIV related opportunistic infections	K	KH	Y	Lecture, Small group discussion	Short notes/ Viva voce		Microbiology	
IM6.5	Describe and discuss the pathogenesis, evolution and clinical features of common HIV related malignancies	K	KH	Y	Lecture, Small group discussion	Short notes/ Viva voce		Pathology, Microbiology	
IM6.6	Describe and discuss the pathogenesis, evolution and clinical features of common HIV related skin and oral lesions	K	KH	Y	Lecture, Small group discussion	Short notes/ Viva voce		Pathology, Microbiology	
IM6.7	Elicit document and present a medical history that helps delineate the aetiology of the current presentation and includes risk factors for HIV, mode of infection, other sexually transmitted diseases, risks for opportunistic infections and nutritional status	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM6.8	Generate a differential diagnosis and prioritise based on clinical features that suggest a specific aetiology for the presenting symptom	S	SH	Y	Bedside clinic, DOAP session, Small group discussion	Skill assessment			
IM6.9	Choose and interpret appropriate diagnostic tests to diagnose and classify the severity of HIV-AIDS including specific tests of HIV, CDC	K	KH	Y	Bedside clinic, DOAP session, Small group discussion	Written/ Skill assessment		Pathology, Microbiology	
IM6.10	Choose and interpret appropriate diagnostic tests to diagnose opportunistic infections including CBC, sputum examination and cultures, blood cultures, stool analysis, CSF analysis and Chest radiographs	S	KH	Y	Bedside clinic, DOAP session, Small group discussion	Written/ Skill assessment			
IM6.11	Enumerate the indications and describe the findings for CT of the chest and brain and MRI	K	K	N	Small group discussion, Lecture, Bedside clinic	Written/ Viva voce		Radiodiagnosis	
IM6.12	Enumerate the indications for and interpret the results of: pulse oximetry, ABG, Chest Radiograph	K	KH	Y	Bedside clinic, DOAP session, Small group discussion	Written/ Skill assessment			
IM6.13	Describe and enumerate the indications and side effects of drugs for bacterial, viral and other types of diarrhea	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology, Microbiology	
IM6.14	Perform and interpret AFB sputum	S	P	Y	DOAP session	Skill assessment		Microbiology	
IM6.15	Demonstrate in a model the correct technique to perform a lumbar puncture	S	SH	Y	Simulation	Skill assessment		Microbiology	
IM6.16	Discuss and describe the principles of HAART, the classes of antiretrovirals used, adverse reactions and interactions	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Pharmacology	
IM6.17	Discuss and describe the principles and regimens used in post exposure prophylaxis	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Pharmacology	
IM6.18	Enumerate the indications and discuss prophylactic drugs used to prevent HIV related opportunistic infections	K/C	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM6.19	Counsel patients on prevention of HIV transmission	C	SH	Y	DOAP session	Skills assessment		AETCOM	
IM6.20	Communicate diagnosis, treatment plan and subsequent follow up plan to patients	C	SH	Y	DOAP session	Skills assessment		AETCOM	
IM6.21	Communicate with patients on the importance of medication adherence	C	SH	Y	DOAP session	Skills assessment		AETCOM	
IM6.22	Demonstrate understanding of ethical and legal issues regarding patient confidentiality and disclosure in patients with HIV	K/A	SH	Y	DOAP session, Small group discussion	Viva voce/ Written/ Skill Assessment		AETCOM	
IM6.23	Demonstrate a non-judgemental attitude to patients with HIV and to their lifestyles	A	SH	Y	Small group discussion	observation by teacher		AETCOM	
<b>Topic: Rheumatologic problems</b>		<b>Number of competencies: (27)</b>			<b>Number of procedures that require certification: (NIL)</b>				
IM7.1	Describe the pathophysiology of autoimmune disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM7.2	Describe the genetic basis of autoimmune disease	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM7.3	Classify cause of joint pain based on the pathophysiology	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM7.4	Develop a systematic clinical approach to joint pain based on the pathophysiology	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
IM7.5	Describe and discriminate acute, subacute and chronic causes of joint pain	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
IM7.6	Discriminate, describe and discuss arthralgia from arthritis and mechanical from inflammatory causes of joint pain	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
IM7.7	Discriminate, describe and discuss distinguishing articular from periarticular complaints	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
IM7.8	Determine the potential causes of joint pain based on the presenting features of joint involvement	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM7.9	Describe the common signs and symptoms of articular and periarticular diseases	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
IM7.10	Describe the systemic manifestations of rheumatologic disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM7.11	Elicit document and present a medical history that will differentiate the aetiologies of disease	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM7.12	Perform a systematic examination of all joints, muscle and skin that will establish the diagnosis and severity of disease	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			Orthopedics
IM7.13	Generate a differential diagnosis and prioritise based on clinical features that suggest a specific aetiology	K/S	KH	Y	Bedside clinic, Small group discussion	Skill assessment/ Written			
IM7.14	Describe the appropriate diagnostic work up based on the presumed aetiology	K	KH	Y	Bedside clinic, Small group discussion	Skill assessment/ Written			
IM7.15	Enumerate the indications for and interpret the results of : CBC, anti-CCP, RA, ANA, DNA and other tests of autoimmunity	K	SH	Y	Bedside clinic, Small group discussion	Skill assessment/ Written		Pathology	
IM7.16	Enumerate the indications for arthrocentesis	K	K	Y	Small group discussion, Lecture	Written/ Viva voce			Orthopedics
IM7.17	Enumerate the indications and interpret plain radiographs of joints	K	SH	Y	Bedside clinic, Small group discussion	Skill assessment/ Written		Radiodiagnosis	Orthopedics
IM7.18	Communicate diagnosis, treatment plan and subsequent follow up plan to patients	C	SH	Y	DOAP session	Skill assessment/ Written			
IM7.19	Develop an appropriate treatment plan for patients with rheumatologic diseases	K	KH	Y	Bedside clinic, Small group discussion	Skill assessment/ Written			
IM7.20	Select, prescribe and communicate appropriate medications for relief of joint pain	K/C	SH	Y	DOAP session	Skill assessment/ Written		Pharmacology	Orthopedics
IM7.21	Select, prescribe and communicate preventive therapy for crystalline arthropathies	K/C	SH	Y	DOAP session	Skill assessment/ Written		Pharmacology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM7.22	Select, prescribe and communicate treatment option for systemic rheumatologic conditions	K/C	SH	Y	DOAP session	Skill assessment/ Written		Pharmacology	
IM7.23	Describe the basis for biologic and disease modifying therapy in rheumatologic diseases	K	KH	Y	Bedside clinic, Small group discussion	Skill assessment/ Written		Pharmacology	
IM7.24	Communicate and incorporate patient preferences in the choice of therapy	C/A	SH	Y	DOAP session	Skill assessment		AETCOM	
IM7.25	Develop and communicate appropriate follow up and monitoring plans for patients with rheumatologic conditions	C	SH	Y	DOAP session	Skill assessment			
IM7.26	Demonstrate an understanding of the impact of rheumatologic conditions on quality of life, well being, work and family	A	SH	Y	DOAP session	Skill assessment			
IM7.27	Determine the need for specialist consultation	K	K	Y	Small group discussion, Lecture	Viva voce			
<b>Topic: Hypertension</b>		<b>Number of competencies: (20)</b>			<b>Number of procedures that require certification: (NIL)</b>				
IM8.1	Describe and discuss the epidemiology, aetiology and the prevalence of primary and secondary hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM8.2	Describe and discuss the pathophysiology of hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM8.3	Describe and discuss the genetic basis of hypertension	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM8.4	Define and classify hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM8.5	Describe and discuss the differences between primary and secondary hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM8.6	Define, describe and discuss and recognise hypertensive urgency and emergency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM8.7	Describe and discuss the clinical manifestations of the various aetiologies of secondary causes of hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM8.8	Describe, discuss and identify target organ damage due to hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM8.9	Elicit document and present a medical history that includes: duration and levels, symptoms, comorbidities, lifestyle, risk factors, family history, psychosocial and environmental factors, dietary assessment, previous and concomitant therapy	K	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM8.10	Perform a systematic examination that includes : an accurate measurement of blood pressure, fundus examination, examination of vasculature and heart	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM8.11	Generate a differential diagnosis and prioritise based on clinical features that suggest a specific aetiology	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM8.12	Describe the appropriate diagnostic work up based on the presumed aetiology	K	KH	Y	Small group discussion	Skill assessment/ Written/ Viva voce			
IM8.13	Enumerate the indications for and interpret the results of : CBC, Urine routine, BUN, Cr, Electrolytes, Uric acid, ECG	K	KH	Y	Small group discussion	Skill assessment/ Written/ Viva voce			
IM8.14	Develop an appropriate treatment plan for essential hypertension	K	KH	Y	Small group discussion	Written/ Viva voce		Pharmacology	
IM8.15	Recognise, prioritise and manage hypertensive emergencies	S	SH	Y	DOAP session	Skill assessment/ Written		Pharmacology	
IM8.16	Develop and communicate to the patient lifestyle modification including weight reduction, moderation of alcohol intake, physical activity and sodium intake	C	SH	Y	DOAP session	Skill assessment			
IM8.17	Perform and interpret a 12 lead ECG	S	P	Y	DOAP session	documentation in log book/ skills station			
IM8.18	Incorporate patient preferences in the management of HTN	A/C	SH	Y	DOAP session	Skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM8.19	Demonstrate understanding of the impact of Hypertension on quality of life, well being, work and family	A	SH	Y	Bedside clinic, DOAP session	observation by faculty			
IM8.20	Determine the need for specialist consultation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Anemia</b>		<b>Number of competencies: (21)</b>			<b>Number of procedures that require certification : (NIL)</b>				
IM9.1	Define, describe and classify anemia based on red blood cell size and reticulocyte count	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM9.2	Describe and discuss the morphological characteristics, aetiology and prevalence of each of the causes of anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM9.3	Elicit document and present a medical history that includes symptoms, risk factors including GI bleeding, prior history, medications, menstrual history, and family history	S	SH	Y	Bed side clinic, DOAP session	Skill assessment			
IM9.4	Perform a systematic examination that includes : general examination for pallor, oral examination, DOAP session of hyper dynamic circulation, lymph node and splenic examination	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM9.5	Generate a differential diagnosis and prioritise based on clinical features that suggest a specific aetiology	S	SH	Y	Bedside clinic, DOAP session	Skill assessment/ Written		Pathology	
IM9.6	Describe the appropriate diagnostic work up based on the presumed aetiology	S	SH	Y	Bedside clinic, DOAP session	Skill assessment/ Written		Pathology	
IM9.7	Describe and discuss the meaning and utility of various components of the hemogram	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment		Pathology	
IM9.8	Describe and discuss the various tests for iron deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment		Pathology	
IM9.9	Order and interpret tests for anemia including hemogram, red cell indices, reticulocyte count, iron studies, B12 and folate	S	SH	Y	Bedside clinic, DOAP session	Skill assessment/ Written		Pathology	
IM9.10	Describe, perform and interpret a peripheral smear and stool occult blood	S	SH	P	Bedside clinic, DOAP session	Skill assessment/ Written		Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM9.11	Describe the indications and interpret the results of a bone marrow aspirations and biopsy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment		Pathology	
IM9.12	Describe, develop a diagnostic plan to determine the aetiology of anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment		Pathology	
IM9.13	Prescribe replacement therapy with iron, B12, folate	S	SH	Y	Bedside clinic, DOAP session	Skill assessment/ Written		Pharmacology	
IM9.14	Describe the national programs for anemia prevention	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology, Community Medicine	
IM9.15	Communicate the diagnosis and the treatment appropriately to patients	C	SH	Y	DOAP session	Skill assessment			
IM9.16	Incorporate patient preferences in the management of anemia	C	SH	Y	DOAP session	Skill assessment			
IM9.17	Describe the indications for blood transfusion and the appropriate use of blood components	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment		Pathology	
IM9.18	Describe the precautions required necessary when performing a blood transfusion	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment			
IM9.19	Assist in a blood transfusion	S	SH	Y	Bedside clinic	document in log book			
IM9.20	Communicate and counsel patients with methods to prevent nutritional anemia	C	SH	Y	DOAP session	Skill assessment			
IM9.21	Determine the need for specialist consultation	K	KH	Y	Lecture, Small group discussion	Written			
<b>Topic: Acute Kidney Injury and Chronic renal failure</b>		<b>Number of competencies: (31)</b>			<b>Number of procedures that require certification: (NIL)</b>				
IM10.1	Define, describe and differentiate between acute and chronic renal failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.2	Classify, describe and differentiate the pathophysiologic causes of acute renal failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM10.3	Describe the pathophysiology and causes of pre renal ARF, renal and post renal ARF	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.4	Describe the evolution, natural history and treatment of ARF	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.5	Describe and discuss the aetiology of CRF	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.6	Stage Chronic Kidney Disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.7	Describe and discuss the pathophysiology and clinical findings of uraemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.8	Classify, describe and discuss the significance of proteinuria in CKD	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.9	Describe and discuss the pathophysiology of anemia and hyperparathyroidism in CKD	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.10	Describe and discuss the association between CKD glycemia and hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.11	Describe and discuss the relationship between CAD risk factors and CKD and in dialysis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM10.12	Elicit document and present a medical history that will differentiate the aetiologies of disease, distinguish acute and chronic disease, identify predisposing conditions, nephrotoxic drugs and systemic causes	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM10.13	Perform a systematic examination that establishes the diagnosis and severity including determination of volume status, presence of edema and heart failure, features of uraemia and associated systemic disease	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM10.14	Generate a differential diagnosis and prioritise based on clinical features that suggest a specific aetiology	K	KH	Y	DOAP session, Small group discussion	Skill assessment/ Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM10.15	Describe the appropriate diagnostic work up based on the presumed aetiology	K	SH	Y	DOAP session, Small group discussion	Skill assessment/ Written/ Viva voce			
IM10.16	Enumerate the indications for and interpret the results of : renal function tests, calcium, phosphorus, PTH, urine electrolytes, osmolality, Anion gap	K	KH	Y	DOAP session, Small group discussion	Skill assessment/ Written/ Viva voce		Pathology	
IM10.17	Describe and calculate indices of renal function based on available laboratories including FENa (Fractional Excretion of Sodium) and CrCl (Creatinine Clearance)	S	SH	Y	DOAP session, Small group discussion	Skill assessment/ Written/ Viva voce		Pathology	
IM10.18	Identify the ECG findings in hyperkalemia	S	SH	Y	DOAP session, Small group discussion	Skill assessment/ Written/ Viva voce			
IM10.19	Enumerate the indications and describe the findings in renal ultrasound	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Radiodiagnosis	
IM10.20	Describe and discuss the indications to perform arterial blood gas analysis: interpret the data	S	P	Y	DOAP session	documentation in log book			
IM10.21	Describe and discuss the indications for and insert a peripheral intravenous catheter	S	P	Y	DOAP session, Bedside clinic	documentation in logbook			
IM10.22	Describe and discuss the indications, demonstrate in a model and assist in the insertion of a central venous or a dialysis catheter	S	SH	N	DOAP session	Skill assessment with model			
IM10.23	Communicate diagnosis treatment plan and subsequent follow up plan to patients	C	SH	Y	DOAP session	Skill assessment			
IM10.24	Counsel patients on a renal diet	K	SH	Y	DOAP session	Skill assessment			
IM10.25	Identify and describe the priorities in the management of ARF including diet, volume management, alteration in doses of drugs, monitoring and indications for dialysis	K/C	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM10.26	Describe and discuss supportive therapy in CKD including diet, anti hypertensives, glycemc therapy, dyslipidemia, anemia, hyperkalemia, hyperphosphatemia and secondary hyperparathyroidism	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM10.27	Describe and discuss the indications for renal dialysis	C/A	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM10.28	Describe and discuss the indications for renal replacement therapy	C	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM10.29	Describe discuss and communicate the ethical and legal issues involved in renal replacement therapy	C/A	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM10.30	Recognise the impact of CKD on patient's quality of life well being work and family	A	K	Y	Lecture, Small group discussion, Bedside clinic	observation by faculty			
IM10.31	Incorporate patient preferences in to the care of CKD	A/C	KH	Y	Lecture, Small group discussion, Bedside clinic	observation by faculty			
<b>Topic: Diabetes Mellitus</b>		<b>Number of competencies: (24)</b>			<b>Number of procedures that require certification : (02)</b>				
IM11.1	Define and classify diabetes	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM11.2	Describe and discuss the epidemiology and pathogenesis and risk factors and clinical evolution of type 1 diabetes	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM11.3	Describe and discuss the epidemiology and pathogenesis and risk factors economic impact and clinical evolution of type 2 diabetes	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM11.4	Describe and discuss the genetic background and the influence of the environment on diabetes	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			
IM11.5	Describe and discuss the pathogenesis and temporal evolution of microvascular and macrovascular complications of diabetes	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM11.6	Describe and discuss the pathogenesis and precipitating factors, recognition and management of diabetic emergencies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM11.7	Elicit document and present a medical history that will differentiate the aetiologies of diabetes including risk factors, precipitating factors, lifestyle, nutritional history, family history, medication history, co-morbidities and target organ disease	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM11.8	Perform a systematic examination that establishes the diagnosis and severity that includes skin, peripheral pulses, blood pressure measurement, fundus examination, detailed examination of the foot (pulses, nervous and deformities and injuries)	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM11.9	Describe and recognise the clinical features of patients who present with a diabetic emergency	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce			
IM11.10	Generate a differential diagnosis and prioritise based on clinical features that suggest a specific aetiology	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce			
IM11.11	Order and interpret laboratory tests to diagnose diabetes and its complications including: glucoses, glucose tolerance test, glycosylated hemoglobin, urinary micro albumin, ECG, electrolytes, ABG, ketones, renal function tests and lipid profile	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Pathology	
IM11.12	Perform and interpret a capillary blood glucose test	S	P	Y	Bedside clinic, DOAP session	Skill assessment	2	Pathology, Biochemistry	
IM11.13	Perform and interpret a urinary ketone estimation with a dipstick	S	P	Y	Bedside clinic, DOAP session	Skill assessment	2	Pathology, Biochemistry	
IM11.14	Recognise the presentation of hypoglycaemia and outline the principles on its therapy	K	KH	Y	Small Group discussion, Lecture	Written/ Viva voce			
IM11.15	Recognise the presentation of diabetic emergencies and outline the principles of therapy	K	KH	Y	Small Group discussion, Lecture	Written/ Viva voce			
IM11.16	Discuss and describe the pharmacologic therapies for diabetes their indications, contraindications, adverse reactions and interactions	K	KH	Y	Small Group discussion, Lecture	Written/ Viva voce		Pharmacology	
IM11.17	Outline a therapeutic approach to therapy of T2Diabetes based on presentation, severity and complications in a cost effective manner	K	KH	Y	Small Group discussion, Lecture	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM11.18	Describe and discuss the pharmacology, indications, adverse reactions and interactions of drugs used in the prevention and treatment of target organ damage and complications of Type II Diabetes including neuropathy, nephropathy, retinopathy, hypertension, dyslipidemia and cardiovascular disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM11.19	Demonstrate and counsel patients on the correct technique to administer insulin	S/C	SH	Y	DOAP session	Skill assessment		Pharmacology	
IM11.20	Demonstrate to and counsel patients on the correct technique of self monitoring of blood glucoses	S/C	SH	Y	DOAP session	Skill assessment			
IM11.21	Recognise the importance of patient preference while selecting therapy for diabetes	A	KH	Y	DOAP session	faculty observation			
IM11.22	Enumerate the causes of hypoglycaemia and describe the counter hormone response and the initial approach and treatment	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM11.23	Describe the precipitating causes, pathophysiology, recognition, clinical features, diagnosis, stabilisation and management of diabetic ketoacidosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM11.24	Describe the precipitating causes, pathophysiology, recognition, clinical features, diagnosis, stabilisation and management of Hyperosmolar non ketotic state	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Thyroid dysfunction</b>		<b>Number of competencies: (15)</b>			<b>Number of procedures that require certification : (NIL)</b>				
IM12.1	Describe the epidemiology and pathogenesis of hypothyroidism and hyperthyroidism including the influence of iodine deficiency and autoimmunity in the pathogenesis of thyroid disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM12.2	Describe and discuss the genetic basis of some forms of thyroid dysfunction	K	K	N	Lecture, Small group discussion	Written/ Viva voce			
IM12.3	Describe and discuss the physiology of the hypothalamopituitary - thyroid axis, principles of thyroid function testing and alterations in physiologic function	K	K	Y	Lecture, Small group discussion	Short notes		Pathology, Physiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM12.4	Describe and discuss the principles of radio iodine uptake in the diagnosis of thyroid disorders	K	KH	Y	Lecture, Small group discussion	Short notes/ Viva voce			
IM12.5	Elicit document and present an appropriate history that will establish the diagnosis cause of thyroid dysfunction and its severity	S	SH	Y	Bedside clinic	Skill assessment/ Short case			
IM12.6	Perform and demonstrate a systematic examination based on the history that will help establish the diagnosis and severity including systemic signs of thyrotoxicosis and hypothyroidism, palpation of the pulse for rate and rhythm abnormalities, neck palpation of the thyroid and lymph nodes and cardiovascular findings	S	SH	Y	Bed side clinic, DOAP session	Skill assessment			General Surgery
IM12.7	Demonstrate the correct technique to palpate the thyroid	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Surgery
IM12.8	Generate a differential diagnosis based on the clinical presentation and prioritise it based on the most likely diagnosis	K	KH	Y	Bedside clinic, small group discussion	Short case			General Surgery
IM12.9	Order and interpret diagnostic testing based on the clinical diagnosis including CBC, thyroid function tests and ECG and radio iodine uptake and scan	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Surgery
IM12.10	Identify atrial fibrillation, pericardial effusion and bradycardia on ECG	S	SH	Y	Bedside clinic, lab	Skill assessment			General Surgery
IM12.11	Interpret thyroid function tests in hypo and hyperthyroidism	S	SH	Y	Bedside clinic, lab	Skill assessment			General Surgery
IM12.12	Describe and discuss the iodisation programs of the government of India	K	KH	Y	Lecture, Bedside clinic	Short note		Community Medicine	
IM12.13	Describe the pharmacology, indications, adverse reaction, interactions of thyroxine and antithyroid drugs	K	KH	Y	Lecture, Small group discussion	Viva voce/ Short note		Pharmacology	General Surgery
IM12.14	Write and communicate to the patient appropriately a prescription for thyroxine based on age, sex, and clinical and biochemical status	S/C	SH	Y	Skill assessment	Skill assessment		Pharmacology	
IM12.15	Describe and discuss the indications of thionamide therapy, radio iodine therapy and surgery in the management of thyrotoxicosis	K	KH	Y	Bedside clinic, Small group discussion	Short note/ Viva voce		Pharmacology	General Surgery

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Common malignancies</b>		<b>Number of competencies: (19)</b>			<b>Number of procedures that require certification : (NIL)</b>				
IM13.1	Describe the clinical epidemiology and inherited & modifiable risk factors for common malignancies in India	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology, Biochemistry	
IM13.2	Describe the genetic basis of selected cancers	K	K	N	Lecture, Small group discussion	Short note/ Viva voce		Pathology	
IM13.3	Describe the relationship between infection and cancers	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology, Microbiology	
IM13.4	Describe the natural history, presentation, course, complications and cause of death for common cancers	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology	
IM13.5	Describe the common issues encountered in patients at the end of life and principles of management	K	K	N	Lecture, Small group discussion	Short note/ Viva voce			
IM13.6	Describe and distinguish the difference between curative and palliative care in patients with cancer	K	K	N	Lecture, Small group discussion	Short note/ Viva voce		Pharmacology	
IM13.7	Elicit document and present a history that will help establish the aetiology of cancer and includes the appropriate risk factors, duration and evolution	S	K	Y	Bedside clinic	Skill assessment/ Short case			General Surgery
IM13.8	Perform and demonstrate a physical examination that includes an appropriate general and local examination that excludes the diagnosis, extent spread and complications of cancer	S	SH	Y	Bedside clinic	Skill assessment/ short case			General Surgery
IM13.9	Demonstrate in a mannequin the correct technique for performing breast exam, rectal examination and cervical examination and pap smear	S	K	Y	Bedside clinic	Skill assessment/ Short case		Human Anatomy	General Surgery
IM13.10	Generate a differential diagnosis based on the presenting symptoms and clinical features and prioritise based on the most likely diagnosis	S	K	Y	Bedside clinic	Skill assessment/ Short case			General Surgery
IM13.11	Order and interpret diagnostic testing based on the clinical diagnosis including CBC and stool occult blood and prostate specific antigen	S	K	Y	Bedside clinic	Skill assessment/ Short case			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM13.12	Describe the indications and interpret the results of Chest X Ray, mammogram, skin and tissue biopsies and tumor markers used in common cancers	K	KH	Y	Bedside clinic, Small group discussion	Short note/ Viva voce		Radiodiagnosis	
IM13.13	Describe and assess pain and suffering objectively in a patient with cancer	K	KH	Y	Bedside clinic, Small group discussion	Short note/ Viva voce		Pharmacology	General Surgery
IM13.14	Describe the indications for surgery, radiation and chemotherapy for common malignancies	K	KH	Y	Bedside clinic, Small group discussion	Short note/ Viva voce		Pharmacology	General Surgery
IM13.15	Describe the need, tests involved, their utility in the prevention of common malignancies	K	KH	Y	Bedside clinic, Small group discussion	Short note/ Viva voce		Pathology	
IM13.16	Demonstrate an understanding and needs and preferences of patients when choosing curative and palliative therapy	A/C	KH	Y	Bedside clinic, small group discussion	Short note/ Viva voce		AETCOM	
IM13.17	Describe and enumerate the indications, use, side effects of narcotics in pain alleviation in patients with cancer	K	KH	Y	Bedside clinic, Small group discussion	Short note/ Viva voce		Pharmacology	Anesthesiology
IM13.18	Describe and discuss the ethical and the medico legal issues involved in end of life care	K	KH	Y	Bedside clinic, Small group discussion	Short note/ Viva voce		AETCOM	
IM13.19	Describe the therapies used in alleviating suffering in patients at the end of life	K	KH	Y	Bedside clinic, Small group discussion	Short note/ Viva voce		AETCOM	
<b>Topic: Obesity</b>		<b>Number of competencies: (15)</b>				<b>Number of procedures that require certification: ( NIL)</b>			
IM14.1	Define and measure obesity as it relates to the Indian population	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce			
IM14.2	Describe and discuss the aetiology of obesity including modifiable and non-modifiable risk factors and secondary causes	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology	
IM14.3	Describe and discuss the monogenic forms of obesity	K	K	N	Lecture, Small group discussion	Short note/ Viva voce		Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM14.4	Describe and discuss the impact of environmental factors including eating habits, food, work, environment and physical activity on the incidence of obesity	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology, Community Medicine	
IM14.5	Describe and discuss the natural history of obesity and its complications	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology	
IM14.6	Elicit and document and present an appropriate history that includes the natural history, dietary history, modifiable risk factors, family history, clues for secondary causes and motivation to lose weight	S	SH	Y	Bedside clinic, Skills lab	Skill assessment			
IM14.7	Perform, document and demonstrate a physical examination based on the history that includes general examination, measurement of abdominal obesity, signs of secondary causes and comorbidities	S	SH	Y	Bedside clinic, Skills lab	Skill assessment			
IM14.8	Generate a differential diagnosis based on the presenting symptoms and clinical features and prioritise based on the most likely diagnosis	S	SH	Y	Bedside clinic, Skills lab	Skill assessment/ Short note/ Viva voce			
IM14.9	Order and interpret diagnostic tests based on the clinical diagnosis including blood glucose, lipids, thyroid function tests etc.	S	SH	Y	Bedside clinic, Skills lab, Small group discussion	Skill assessment/ Short note/ Viva voce			
IM14.10	Describe the indications and interpret the results of tests for secondary causes of obesity	K	KH	Y	Bedside clinic, Skills lab, Small group discussion	Skill assessment/ Short note/ Viva voce			
IM14.11	Communicate and counsel patient on behavioural, dietary and lifestyle modifications	C	SH	Y	Bedside clinic, Skills lab	Skill assessment			
IM14.12	Demonstrate an understanding of patient's inability to adhere to lifestyle instructions and counsel them in a non - judgemental way	A/C	SH	Y	Bedside clinic, Skills lab	Skill assessment			
IM14.13	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy for obesity	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pharmacology	
IM14.14	Describe and enumerate the indications and side effects of bariatric surgery	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce			General Surgery

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM14.15	Describe and enumerate and educate patients, health care workers and the public on measures to prevent obesity and promote a healthy lifestyle	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce			
<b>Topic: GI bleeding</b> <span style="margin-left: 200px;"><b>Number of competencies: (18)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
IM15.1	Enumerate, describe and discuss the aetiology of upper and lower GI bleeding	K	KH	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology	General Surgery
IM15.2	Enumerate, describe and discuss the evaluation and steps involved in stabilizing a patient who presents with acute volume loss and GI bleed	S	SH	Y	DOAP session, Small group discussion, Lecture	Written/ Viva voce/ Skill assessment		Pathology	General Surgery
IM15.3	Describe and discuss the physiologic effects of acute blood and volume loss	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology, Physiology	General Surgery
IM15.4	Elicit and document and present an appropriate history that identifies the route of bleeding, quantity, grade, volume loss, duration, etiology, comorbid illnesses and risk factors	S	SH	Y	Bedside clinic	Skill assessment			General Surgery
IM15.5	Perform, demonstrate and document a physical examination based on the history that includes general examination, volume assessment and appropriate abdominal examination	S	SH	Y	Bedside clinic, Skills lab	Skill assessment			General Surgery
IM15.6	Distinguish between upper and lower gastrointestinal bleeding based on the clinical features	S	KH	Y	Lecture, Small group discussion	Short note/ Viva voce			General Surgery
IM15.7	Demonstrate the correct technique to perform an anal and rectal examination in a mannequin or equivalent	S	SH	Y	DOAP session	Skill assessment			General Surgery
IM15.8	Generate a differential diagnosis based on the presenting symptoms and clinical features and prioritise based on the most likely diagnosis	S	SH	Y	Bedside clinic, Skills lab	Skill assessment/ Short note/ Viva voce			General Surgery
IM15.9	Choose and interpret diagnostic tests based on the clinical diagnosis including complete blood count, PT and PTT, stool examination, occult blood, liver function tests, H.pylori test.	S	SH	Y	Bedside clinic, DOAP session, Small group discussion	Skill assessment/ Short note/ Viva voce		Pathology	General Surgery

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM15.10	Enumerate the indications for endoscopy, colonoscopy and other imaging procedures in the investigation of Upper GI bleeding	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Surgery
IM15.11	Develop, document and present a treatment plan that includes fluid resuscitation, blood and blood component transfusion, and specific therapy for arresting blood loss	S	KH	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology	General Surgery
IM15.12	Enumerate the indications for whole blood, component and platelet transfusion and describe the clinical features and management of a mismatched transfusion	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology	General Surgery
IM15.13	Observe cross matching and blood / blood component transfusion	S	SH	Y	Bedside clinic	Short note/ Viva voce/ Skill assessment		Pathology	General Surgery
IM15.14	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy of pressors used in the treatment of Upper GI bleed	K	K	Y	Lecture, Small group discussion	Short note/Viva voce		Pharmacology	General Surgery
IM15.15	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy of acid peptic disease including Helicobacter pylori	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pharmacology, Microbiology	General Surgery
IM15.16	Enumerate the indications for endoscopic interventions and Surgery	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce			General Surgery
IM15.17	Determine appropriate level of specialist consultation	S	K	Y	Small group discussion				General Surgery
IM15.18	Counsel the family and patient in an empathetic non-judgmental manner on the diagnosis and therapeutic options	S	SH	Y	DOAP session	Skill assessment			General Surgery
<b>Topic: Diarrheal disorder</b>		<b>Number of competencies: (17)</b>			<b>Number of procedures that require certification : (NIL)</b>				
IM16.1	Describe and discuss the aetiology of acute and chronic diarrhea including infectious and non infectious causes	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Microbiology	
IM16.2	Describe and discuss the acute systemic consequences of diarrhea including its impact on fluid balance	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM16.3	Describe and discuss the chronic effects of diarrhea including malabsorption	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce			
IM16.4	Elicit and document and present an appropriate history that includes the natural history, dietary history, travel , sexual history and other concomitant illnesses	S	SH	Y	Bedside clinic, Skills lab	Skill assessment		Microbiology, Pathology	
IM16.5	Perform, document and demonstrate a physical examination based on the history that includes general examination, including an appropriate abdominal examination	S	SH	Y	Bedside clinic, Skills lab	Skill assessment			
IM16.6	Distinguish between diarrhea and dysentery based on clinical features	S	KH	Y	Lecture, Small group discussion	Short note/ Viva voce			
IM16.7	Generate a differential diagnosis based on the presenting symptoms and clinical features and prioritise based on the most likely diagnosis	S	SH	Y	Bedside clinic, Skills lab	Skill assessment/ short note/ Viva voce			
IM16.8	Choose and interpret diagnostic tests based on the clinical diagnosis including complete blood count, and stool examination	S	SH	Y	Bedside clinic, Skills lab, Small group discussion	Skill assessment/ Short note/ Viva voce		Microbiology, Pathology	
IM16.9	Identify common parasitic causes of diarrhea under the microscope in a stool specimen	S	SH	Y	DOAP session	Skill assessment		Microbiology	
IM16.10	Identify vibrio cholera in a hanging drop specimen	S	SH	Y	DOAP session	Skill Assessment		Microbiology	
IM16.11	Enumerate the indications for stool cultures and blood cultures in patients with acute diarrhea	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
IM16.12	Enumerate and discuss the indications for further investigations including antibodies, colonoscopy, diagnostic imaging and biopsy in the diagnosis of chronic diarrhea	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	General Surgery
IM16.13	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy for parasitic causes of diarrhea	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pharmacology, Microbiology	
IM16.14	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy for bacterial and viral diarrhea	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pharmacology, Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM16.15	Distinguish based on the clinical presentation Crohn's disease from Ulcerative Colitis	S	SH	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology	General Surgery
IM16.16	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy including immunotherapy	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pharmacology	
IM16.17	Describe and enumerate the indications for surgery in inflammatory bowel disease	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce			General Surgery
<b>Topic: Headache</b> <span style="margin-left: 200px;"><b>Number of competencies: (14)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
IM17.1	Define and classify headache and describe the presenting features, precipitating factors, aggravating and relieving factors of various kinds of headache	K	KH	Y	Lecture, Small group discussion	Short note/ Viva voce		Human Anatomy	
IM17.2	Elicit and document and present an appropriate history including aura, precipitating aggravating and relieving factors, associated symptoms that help identify the cause of headaches	S	SH	Y	Bedside clinic, Small group discussion	Bedside clinic/ Skill assessment			
IM17.3	Classify migraine and describe the distinguishing features between classical and non classical forms of migraine	K	KH	Y	Bedside clinic, Small group discussion	Bedside clinic/ Skill assessment			
IM17.4	Perform and demonstrate a general neurologic examination and a focused examination for signs of intracranial tension including neck signs of meningitis	S	SH	Y	Bedside clinic, Small group discussion	Bedside clinic/ Skill assessment			
IM17.5	Generate document and present a differential diagnosis based on the clinical features, and prioritise the diagnosis based on the presentation	S	SH	Y	Bedside clinic, Small group discussion	Bedside clinic/ skill assessment			
IM17.6	Choose and interpret diagnostic testing based on the clinical diagnosis including imaging	S	SH	Y	Lecture, Small group discussion, Bedside clinic	Skill Assessment			
IM17.7	Enumerate the indications and describe the findings in the CSF in patients with meningitis	K	K	Y	Small group discussion, Bedside clinic	Skill Assessment		Microbiology, Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM17.8	Demonstrate in a mannequin or equivalent the correct technique for performing a lumbar puncture	S	SH	Y	DOAP session	Skill assessment		Microbiology, Pathology	
IM17.9	Interpret the CSF findings when presented with various parameters of CSF fluid analysis	S	SH	Y	Small group discussion, Bedside clinic	Skill assessment		Microbiology, Pathology	
IM17.10	Enumerate the indications for emergency care admission and immediate supportive care in patients with headache	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
IM17.11	Describe the indications, pharmacology, dose, side effects of abortive therapy in migraine	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM17.12	Describe the indications, pharmacology, dose, side effects of prophylactic therapy in migraine	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM17.13	Describe the pharmacology, dose, adverse reactions and regimens of drugs used in the treatment of bacterial, tubercular and viral meningitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM17.14	Counsel patients with migraine and tension headache on lifestyle changes and need for prophylactic therapy	A/C	SH	N	DOAP session	Skill Assessment		Pharmacology	Psychiatry
<b>Topic: Cerebrovascular accident</b>		<b>Number of competencies: (17)</b>			<b>Number of procedures that require certification : (NIL)</b>				
IM18.1	Describe the functional and the vascular anatomy of the brain	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	
IM18.2	Classify cerebrovascular accidents and describe the aetiology, predisposing genetic and risk factors pathogenesis of hemorrhagic and non hemorrhagic stroke	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
IM18.3	Elicit and document and present an appropriate history including onset, progression, precipitating and aggravating relieving factors, associated symptoms that help identify the cause of the cerebrovascular accident	S	SH	Y	Bedside clinic	Skill assessment		Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM18.4	Identify the nature of the cerebrovascular accident based on the temporal evolution and resolution of the illness	K	KH	Y	Bedside clinic, Small group discussion	Skill Assessment			
IM18.5	Perform, demonstrate & document physical examination that includes general and a detailed neurologic examination as appropriate, based on the history	S	SH	Y	Bedside clinic, DOAP session	Skill Assessment			
IM18.6	Distinguish the lesion based on upper vs lower motor neuron, side, site and most probable nature of the lesion	K/S	SH	Y	Bedside clinic, DOAP session	Skill Assessment		Physiology	
IM18.7	Describe the clinical features and distinguish, based on clinical examination, the various disorders of speech	K/S	SH	N	Bedside clinic, DOAP session	Skill Assessment		Physiology	
IM18.8	Describe and distinguish, based on the clinical presentation, the types of bladder dysfunction seen in CNS disease	K	KH	Y	Small group discussion, Bedside clinic	Written/ Viva voce		Physiology	
IM18.9	Choose and interpret the appropriate diagnostic and imaging test that will delineate the anatomy and underlying cause of the lesion	S	KH	Y	Bedside clinic, DOAP session, Small group discussion	Written/ Viva voce/ Skill assessment		Radiodiagnosis	
IM18.10	Choose and interpret the appropriate diagnostic testing in young patients with a cerebrovascular accident (CVA)	S	SH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM18.11	Describe the initial supportive management of a patient presenting with a cerebrovascular accident (CVA)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM18.12	Enumerate the indications for and describe acute therapy of non hemorrhagic stroke including the use of thrombolytic agents	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM18.13	Enumerate the indications for and describe the role of anti platelet agents in non hemorrhagic stroke	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM18.14	Describe the initial management of a hemorrhagic stroke	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM18.15	Enumerate the indications for surgery in a hemorrhagic stroke	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			General Surgery

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM18.16	Enumerate the indications describe and observe the multidisciplinary rehabilitation of patients with a CVA	S	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Physical Medicine & Rehabilitation
IM18.17	Counsel patient and family about the diagnosis and therapy in an empathetic manner	A/C	SH	Y	DOAP session	Skill assessment			
<b>Topic: Movement disorders</b>									
					<b>Number of competencies: (09 )</b>		<b>Number of procedures that require certification : (NIL)</b>		
IM19.1	Describe the functional anatomy of the locomotor system of the brain	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Physiology	
IM19.2	Classify movement disorders of the brain based on distribution, rhythm, repetition, exacerbating and relieving factors	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM19.3	Elicit and document and present an appropriate history including onset, progression precipitating and aggravating relieving factors, associated symptoms that help identify the cause of the movement disorders	S	SH	Y	Bedside clinic	Skill assessment			
IM19.4	Perform, demonstrate and document a physical examination that includes a general examination and a detailed neurologic examination using standard movement rating scales	S	SH	Y	Bedside clinic	Skill assessment			
IM19.5	Generate document and present a differential diagnosis and prioritise based on the history and physical examination	S	SH	Y	Bedside clinic	Skill assessment			
IM19.6	Make a clinical diagnosis regarding on the anatomical location, nature and cause of the lesion based on the clinical presentation and findings	S	SH	Y	Bedside clinic	Skill assessment			
IM19.7	Choose and interpret diagnostic and imaging tests in the diagnosis of movement disorders	S	SH	Y	Bedside clinic, Small group session	Skill assessment/ Written/ Viva voce		Radiodiagnosis	
IM19.8	Discuss and describe the pharmacology, dose, side effects and interactions used in the drug therapy of Parkinson's syndrome	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM19.9	Enumerate the indications for use of surgery and botulinum toxin in the treatment of movement disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Surgery

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Envenomation</b>		<b>Number of competencies: (09)</b>			<b>Number of procedures that require certification : (NIL)</b>				
IM20.1	Enumerate the local poisonous snakes and describe the distinguishing marks of each	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine, Pharmacology	
IM20.2	Describe, demonstrate in a volunteer or a mannequin and educate (to other health care workers / patients) the correct initial management of patient with a snake bite in the field	S	SH	Y	DOAP session	Skill assessment/ Written/ Viva voce		Forensic Medicine	
IM20.3	Describe the initial approach to the stabilisation of the patient who presents with snake bite	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine	
IM20.4	Elicit and document and present an appropriate history, the circumstance, time, kind of snake, evolution of symptoms in a patient with snake bite	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Forensic Medicine	
IM20.5	Perform a systematic examination, document and present a physical examination that includes general examination, local examination, appropriate cardiac and neurologic examination	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM20.6	Choose and interpret the appropriate diagnostic testing in patients with snake bites	S	SH	Y	Small group discussion	Written/ Viva voce			
IM20.7	Enumerate the indications and describe the pharmacology, dose, adverse reactions, hypersensitivity reactions of anti snake venom	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM20.8	Describe the diagnosis, initial approach stabilisation and therapy of scorpion envenomation	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM20.9	Describe the diagnosis initial approach stabilisation and therapy of bee sting allergy	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
<b>Topic: Poisoning</b>		<b>Number of competencies: (08)</b>			<b>Number of procedures that require certification : (NIL)</b>				
IM21.1	Describe the initial approach to the stabilisation of the patient who presents with poisoning	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM21.2	Enumerate the common plant poisons seen in your area and describe their toxicology, clinical features, prognosis and specific approach to detoxification	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine, Pharmacology	
IM21.3	Enumerate the common corrosives used in your area and describe their toxicology, clinical features, prognosis and approach to therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine, Pharmacology	
IM21.4	Enumerate the commonly observed drug overdose in your area and describe their toxicology, clinical features, prognosis and approach to therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine, Pharmacology	
IM21.5	Observe and describe the functions and role of a poison center in suspected poisoning	S	KH	Y	DOAP session	document in log book		Forensic Medicine, Pharmacology	
IM21.6	Describe the medico legal aspects of suspected suicidal or homicidal poisoning and demonstrate the correct procedure to write a medico legal report on a suspected poisoning	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		Forensic Medicine, Pharmacology	
IM21.7	Counsel family members of a patient with suspected poisoning about the clinical and medico legal aspects with empathy	A/C	SH	Y	DOAP session	Skill assessment		Forensic Medicine, Pharmacology	
IM21.8	Enumerate the indications for psychiatric consultation and describe the precautions to be taken in a patient with suspected suicidal ideation / gesture	K	KH	Y	DOAP session	Skill assessment		Forensic Medicine, Psychiatry	
<b>Topic: Mineral, Fluid Electrolyte and Acid base Disorder</b>									
				<b>Number of competencies: (13)</b>			<b>Number of procedures that require certification : (NIL)</b>		
IM22.1	Enumerate the causes of hypercalcemia and distinguish the features of PTH vs non PTH mediated hypercalcemia	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
IM22.2	Describe the aetiology, clinical manifestations, diagnosis and clinical approach to primary hyperparathyroidism	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	General Surgery
IM22.3	Describe the approach to the management of hypercalcemia	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
IM22.4	Enumerate the components and describe the genetic basis of the multiple endocrine neoplasia syndrome	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM22.5	Enumerate the causes and describe the clinical features and the correct approach to the diagnosis and management of the patient with hyponatremia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM22.6	Enumerate the causes and describe the clinical and laboratory features and the correct approach to the diagnosis and management of the patient with hyponatremia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM22.7	Enumerate the causes and describe the clinical and laboratory features and the correct approach to the diagnosis and management of the patient with hypokalemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM22.8	Enumerate the causes and describe the clinical and laboratory features and the correct approach to the diagnosis and management of the patient with hyperkalemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM22.9	Enumerate the causes and describe the clinical and laboratory features of metabolic acidosis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology	
IM22.10	Enumerate the causes of describe the clinical and laboratory features of metabolic alkalosis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology	
IM22.11	Enumerate the causes and describe the clinical and laboratory features of respiratory acidosis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology	
IM22.12	Enumerate the causes and describe the clinical and laboratory features of respiratory alkalosis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology	
IM22.13	Identify the underlying acid based disorder based on an ABG report and clinical situation	S	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology	
<b>Topic: Nutritional and Vitamin Deficiencies</b>									
			<b>Number of competencies: (05)</b>			<b>Number of procedures that require certification: (NIL)</b>			
IM23.1	Discuss and describe the methods of nutritional assessment in an adult and calculation of caloric requirements during illnesses	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM23.2	Discuss and describe the causes and consequences of protein caloric malnutrition in the hospital	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM23.3	Discuss and describe the aetiology, causes, clinical manifestations, complications, diagnosis and management of common vitamin deficiencies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM23.4	Enumerate the indications for enteral and parenteral nutrition in critically ill patients	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM23.5	Counsel and communicate to patients in a simulated environment with illness on an appropriate balanced diet	S	SH	Y	DOAP session	Skill assessment			
<b>Topic: Geriatrics</b>		<b>Number of competencies: (22)</b>			<b>Number of procedures that require certification : (NIL)</b>				
IM24.1	Describe and discuss the epidemiology, pathogenesis, clinical evolution, presentation and course of common diseases in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM24.2	Perform multidimensional geriatric assessment that includes medical, psycho-social and functional components	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Psychiatry	
IM24.3	Describe and discuss the aetiopathogenesis, clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of acute confusional states	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM24.4	Describe and discuss the aetiopathogenesis, clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of vascular events in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM24.5	Describe and discuss the aetiopathogenesis, clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of depression in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
IM24.6	Describe and discuss the aetiopathogenesis causes, clinical presentation, difference in discussion presentation identification, functional changes, acute care, stabilization, management and rehabilitation of dementia in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			AETCOM

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM24.7	Describe and discuss the aetiopathogenesis,clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of personality changes in the elderly	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
IM24.8	Describe and discuss the aetiopathogenesis,clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of osteoporosis in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM24.9	Describe and discuss the aetiopathogenesis,clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of CVA in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM24.10	Describe and discuss the aetiopathogenesis,clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of COPD in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Respiratory Medicine
IM24.11	Describe and discuss the aetiopathogenesis,clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of the elderly undergoing surgery	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Anesthesiology, General Surgery
IM24.12	Describe and discuss the aetiopathogenesis,clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of degenerative joint disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
IM24.13	Describe and discuss the aetiopathogenesis,clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of falls in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics, Physical Medicine & Rehabilitation
IM24.14	Describe and discuss the aetiopathogenesis,clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of common fractures in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
IM24.15	Describe and discuss the aetiopathogenesis,clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of vision and visual loss in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Ophthalmology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM24.16	Describe and discuss the principles of physical and social rehabilitation, functional assessment, role of physiotherapy and occupational therapy in the management of disability in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics, Physical Medicine & Rehabilitation
IM24.17	Describe and discuss the aetiopathogenesis, clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of hearing loss in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			ENT
IM24.18	Describe the impact of the demographic changes in ageing on the population	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
IM24.19	Enumerate and describe the social problems in the elderly including isolation, abuse, change in family structure and their impact on health.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
IM24.20	Enumerate and describe social interventions in the care of elderly including domiciliary discussion services, rehabilitation facilities, old age homes and state interventions	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
IM24.21	Enumerate and describe ethical issues in the care of the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			AETCOM
IM24.22	Describe and discuss the aetiopathogenesis, clinical presentation, complications, assessment and management of nutritional disorders in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	
<b>Topic: Miscellaneous Infections</b>		<b>Number of competencies: (13)</b>			<b>Number of procedures that require certification : (NIL)</b>				
IM25.1	Describe and discuss the response and the influence of host immune status, risk factors and comorbidities on zoonotic diseases (e.g. Leptospirosis, Rabies) and non-febrile infectious disease (e.g. Tetanus)	K	K	Y	Lecture, Small group discussion	Written		Microbiology, Community Medicine	
IM25.2	Discuss and describe the common causes, pathophysiology and manifestations of these diseases	K	K	Y	Lecture, Small group discussion	Written		Microbiology, Community Medicine	
IM25.3	Describe and discuss the pathophysiology and manifestations of these diseases	K	KH	Y	Lecture, Small group discussion	Written		Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM25.4	Elicit document and present a medical history that helps delineate the aetiology of these diseases that includes the evolution and pattern of symptoms, risk factors, exposure through occupation and travel	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Community Medicine	
IM25.5	Perform a systematic examination that establishes the diagnosis and severity of presentation that includes: general skin, mucosal and lymph node examination, chest and abdominal examination (including examination of the liver and spleen)	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM25.6	Generate a differential diagnosis and prioritise based on clinical features that help distinguish between infective, inflammatory, malignant and rheumatologic causes	K	SH	Y	Bedside clinic, DOAP session	Written/ Viva voce			
IM25.7	Order and interpret diagnostic tests based on the differential diagnosis including: CBC with differential, blood biochemistry, peripheral smear, urinary analysis with sediment, Chest X ray, blood and urine cultures, sputum gram stain and cultures, sputum AFB and cultures, CSF analysis, pleural and body fluid analysis, stool routine and culture and QBC	K	SH	Y	Bedside clinic, Skill assessment	Skill assessment		Pathology, Microbiology	
IM25.8	Enumerate the indications for use of newer techniques in the diagnosis of these infections	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			
IM25.9	Assist in the collection of blood and other specimen cultures	S	SH	Y	DOAP session	Log book documentation		Microbiology	
IM25.10	Develop and present an appropriate diagnostic plan based on the clinical presentation, most likely diagnosis in a prioritised and cost effective manner	K	KH	Y	Bedside clinic, Skill assessment	Skill assessment			
IM25.11	Develop an appropriate empiric treatment plan based on the patient's clinical and immune status pending definitive diagnosis	C	SH	Y	DOAP session	Skill assessment		Microbiology, Pharmacology	
IM25.12	Communicate to the patient and family the diagnosis and treatment of identified infection	C	SH	Y	DOAP session	Skill assessment		AETCOM	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM25.13	Counsel the patient and family on prevention of various infections due to environmental issues	C	SH	Y	DOAP session	Skill assessment		Community Medicine, General Medicine	
<b>Topic: The role of the physician in the community</b> <span style="float: right;">Number of competencies: (49)</span> <span style="float: right;">Number of procedures that require certification : (NIL)</span>									
IM26.1	Enumerate and describe professional qualities and roles of a physician	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.2	Describe and discuss the commitment to lifelong learning as an important part of physician growth	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.3	Describe and discuss the role of non maleficence as a guiding principle in patient care	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.4	Describe and discuss the role of autonomy and shared responsibility as a guiding principle in patient care	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.5	Describe and discuss the role of beneficence of a guiding principle in patient care	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.6	Describe and discuss the role of a physician in health care system	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.7	Describe and discuss the role of justice as a guiding principle in patient care	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.8	Identify discuss medicolegal, socioeconomic and ethical issues as it pertains to organ donation	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.9	Identify, discuss and defend medicolegal, sociocultural, economic and ethical issues as it pertains to rights, equity and justice in access to health care	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.10	Identify, discuss and defend medicolegal, socio-cultural and ethical issues as it pertains to confidentiality in patient care	K	KH	Y	Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM26.11	Identify, discuss and defend medicolegal, socio-cultural and ethical issues as it pertains to patient autonomy, patient rights and shared responsibility in health care	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.12	Identify, discuss and defend medicolegal, socio-cultural and ethical issues as it pertains to decision making in health care including advanced directives and surrogate decision making	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.13	Identify, discuss and defend medicolegal, socio-cultural and ethical issues as it pertains to decision making in emergency care including situations where patients do not have the capability or capacity to give consent	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.14	Identify, discuss and defend medicolegal, socio-cultural and ethical issues as it pertains to research in human subjects	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.15	Identify, discuss and defend, medicolegal, socio-cultural and ethical issues as they pertain to consent for surgical procedures	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.16	Identify, discuss and defend medicolegal, socio-cultural, professional and ethical issues as it pertains to the physician patient relationship (including fiduciary duty)	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.17	Identify, discuss physician's role and responsibility to society and the community that she/ he serves	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.18	Identify, discuss and defend medicolegal, socio-cultural, professional and ethical issues in physician- industry relationships	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.19	Demonstrate ability to work in a team of peers and superiors	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM26.20	Demonstrate ability to communicate to patients in a patient, respectful, non threatening, non judgemental and empathetic manner	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM26.21	Demonstrate respect to patient privacy	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM26.22	Demonstrate ability to maintain confidentiality in patient care	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
IM26.23	Demonstrate a commitment to continued learning	S	SH	Y	Small group discussion	Skill assessment/ Viva voce			
IM26.24	Demonstrate respect in relationship with patients, fellow team members, superiors and other health care workers	S	SH	Y	Bedside clinic, DOAP session	Skill assessment/ Viva voce			
IM26.25	Demonstrate responsibility and work ethics while working in the health care team	S	SH	Y	Bedside clinic, DOAP session	Skill assessment/ Viva voce			
IM26.26	Demonstrate ability to maintain required documentation in health care (including correct use of medical records)	S	SH	Y	Small group discussion	Skill assessment/ Viva voce			
IM26.27	Demonstrate personal grooming that is adequate and appropriate for health care responsibilities	S	SH	Y	Small group discussion	Skill assessment			
IM26.28	Demonstrate adequate knowledge and use of information technology that permits appropriate patient care and continued learning	S	SH	Y	Small group discussion	Skill assessment/ Viva voce			
IM26.29	Communicate diagnostic and therapeutic options to patient and family in a simulated environment	S	SH	Y	Bedside clinic, DOAP session	Skill assessment/ Viva voce			
IM26.30	Communicate care options to patient and family with a terminal illness in a simulated environment	S	SH	Y	Bedside clinic, DOAP session	Skill assessment/ Viva voce			
IM26.31	Demonstrate awareness of limitations and seeks help and consultations appropriately	S	SH	Y	Bedside clinic, DOAP session	Skill assessment/ Viva voce			
IM26.32	Demonstrate appropriate respect to colleagues in the profession	S	SH	N	Small group discussion	Skill assessment/ Viva voce			
IM26.33	Demonstrate an understanding of the implications and the appropriate procedures and response to be followed in the event of medical errors	S	SH	N	Small group discussion	Skill assessment/ Viva voce			
IM26.34	Identify conflicts of interest in patient care and professional relationships and describe the correct response to these conflicts	S	SH	Y	Small group discussion	Skill assessment/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM26.35	Demonstrate empathy in patient encounters	S	SH	Y	Bedside clinic, DOAP session	Skill assessment/ Viva voce			
IM26.36	Demonstrate ability to balance personal and professional priorities	S	SH	N	Small group discussion	Skill assessment/ Viva voce			
IM26.37	Demonstrate ability to manage time appropriately	S	SH	Y	Small group discussion	Skill assessment/ Viva voce			
IM26.38	Demonstrate ability to form and function in appropriate professional networks	S	SH	N	Small group discussion	Skill assessment/ Viva voce			
IM26.39	Demonstrate ability to pursue and seek career advancement	S	SH	N	Small group discussion	Skill assessment/ Viva voce			
IM26.40	Demonstrate ability to follow risk management and medical error reduction practices where appropriate	S	SH	N	Small group discussion	Skill assessment/ Viva voce			
IM26.41	Demonstrate ability to work in a mentoring relationship with junior colleagues	S	SH	N	Small group discussion	Skill assessment/ Viva voce			
IM26.42	Demonstrate commitment to learning and scholarship	S	SH	N	Small group discussion	Skill assessment/ Viva voce			
IM26.43	Identify, discuss and defend medicolegal, sociocultural, economic and ethical issues as they pertain to in vitro fertilisation donor insemination and surrogate motherhood	K	KH	N	Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
IM26.44	Identify, discuss and defend medicolegal, socio-cultural professional and ethical issues pertaining to medical negligence	K	KH	N	Small group discussion	Written/ Viva voce			
IM26.45	Identify, discuss and defend medicolegal, socio-cultural professional and ethical issues pertaining to malpractice	K	KH	N	Small group discussion	Written/ Viva voce			
IM26.46	Identify, discuss and defend medicolegal, socio-cultural professional and ethical issues in dealing with impaired physicians	K	KH	N	Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
IM26.47	Identify, discuss and defend medicolegal, socio-cultural and ethical issues as they pertain to refusal of care including do not resuscitate and withdrawal of life support	K	KH	Y	Small group discussion	Written/ Viva voce			
IM26.48	Demonstrate altruism	S	SH	Y	Small group discussion	Written/ Viva voce			
IM26.49	Administer informed consent and appropriately address patient queries to a patient being enrolled in a research protocol in a simulated environment	S	SH	Y	Bedside clinic, DOAP session	Written/ Viva voce			
<b>Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.</b> <b>Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,</b> <b>Column F: DOAP session – Demonstrate, Observe, Assess, Perform.</b> <b>Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation</b>									

## Integration

### Human Anatomy

AN5.6	Describe the concept of anastomoses and collateral circulation with significance of end-arteries	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN7.5	Describe principles of sensory and motor innervation of muscles	K	KH	N	Lecture	Written		General Medicine	Physiology
AN7.6	Describe concept of loss of innervation of a muscle with its applied anatomy	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	
AN20.8	Identify & demonstrate palpation of femoral, popliteal, post tibial, anti tibial & dorsalis pedis blood vessels in a simulated environment	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Viva voce/ Skill assessment		General Medicine	
AN20.9	Identify & demonstrate Palpation of vessels (femoral, popliteal, dorsalis pedis, post tibial), Mid inguinal point, Surface projection of: femoral nerve, Saphenous opening, Sciatic, tibial, common peroneal & deep peroneal nerve, great and small saphenous veins	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Viva voce/ Skill assessment		General Medicine, General Surgery	
AN22.4	Describe anatomical basis of ischaemic heart disease	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN22.7	Mention the parts, position and arterial supply of the conducting system of heart	K	KH	Y	Lecture	Written		General Medicine	Physiology
AN24.1	Mention the blood supply, lymphatic drainage and nerve supply of pleura, extent of pleura and describe the pleural recesses and their applied anatomy	K	KH	Y	Practical, Lecture	Written/ Viva voce		General Medicine	Physiology
AN24.2	Identify side, external features and relations of structures which form root of lung & bronchial tree and their clinical correlate	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Medicine	Physiology
AN24.3	Describe a bronchopulmonary segment	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN25.3	Describe fetal circulation and changes occurring at birth	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN25.4	Describe embryological basis of: 1) atrial septal defect, 2)ventricular septal defect, 3) Fallot's tetralogy & 4) tracheo-oesophageal fistula	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics	Physiology
AN25.5	Describe developmental basis of congenital anomalies, transposition of great vessels, dextrocardia, patent ductus arteriosus and coarctation of aorta	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics	Physiology
AN25.7	Identify structures seen on a plain x-ray chest (PA view)	K/S	SH	Y	Practical, DOAP session	Written/ Viva voce		Radiodiagnosis, General Medicine	
AN25.8	Identify and describe in brief a barium swallow	K/S	SH	N	Practical, DOAP session	Written/ Viva voce		Radiodiagnosis, General Medicine	
AN25.9	Demonstrate surface marking of lines of pleural reflection, Lung borders and fissures, Trachea, Heart borders, Apex beat & Surface projection of valves of heart	K/S	SH	Y	Practical	Viva voce/ Skill assessment		General Medicine, Pediatrics	Physiology
AN28.7	Explain the anatomical basis of facial nerve palsy	K	KH	Y	Lecture	Written		General Medicine	
AN50.3	Describe lumbar puncture (site, direction of the needle, structures pierced during the lumbar puncture)	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN56.1	Describe & identify various layers of meninges with its extent & modifications	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Medicine	
AN56.2	Describe circulation of CSF with its applied anatomy	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN57.4	Enumerate ascending & descending tracts at mid thoracic level of spinal cord	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN57.5	Describe anatomical basis of syringomyelia	K	KH	N	Lecture	Written		General Medicine	Physiology
AN58.4	Describe anatomical basis & effects of medial & lateral medullary syndrome	K	KH	N	Lecture	Written		General Medicine	Physiology
AN60.3	Describe anatomical basis of cerebellar dysfunction	K	KH	N	Lecture	Written		General Medicine	Physiology
AN61.3	Describe anatomical basis & effects of Benedict's and Weber's syndrome	K	KH	N	Lecture	Written		General Medicine	Physiology
AN62.2	Describe & demonstrate surfaces, sulci, gyri, poles, & functional areas of cerebral hemisphere	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Medicine	Physiology
AN62.3	Describe the white matter of cerebrum	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN62.5	Describe boundaries, parts, gross relations, major nuclei and connections of dorsal thalamus, hypothalamus, epithalamus, metathalamus and subthalamus	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Physiology
AN62.6	Describe & identify formation, branches & major areas of distribution of circle of Willis	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Medicine	Physiology
AN74.1	Describe the various modes of inheritance with examples	K	KH	Y	Lecture	Written		General Medicine, Pediatrics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN74.2	Draw pedigree charts for the various types of inheritance & give examples of diseases of each mode of inheritance	K	KH	Y	Lecture	Written		General Medicine, Pediatrics	
AN74.3	Describe multifactorial inheritance with examples	K	KH	Y	Lecture	Written		General Medicine	
AN74.4	Describe the genetic basis & clinical features of Achondroplasia, Cystic Fibrosis, Vitamin D resistant rickets, Hemophilia, Duchene's muscular dystrophy & Sickle cell anaemia	K	KH	N	Lecture	Written		General Medicine, Pediatrics	
<b>Physiology</b>									
PY3.12	Explain the gradation of muscular activity	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PY3.13	Describe muscular dystrophy: myopathies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Human Anatomy
PY4.9	Discuss the physiology aspects of: peptic ulcer, gastro-oesophageal reflux disease, vomiting, diarrhoea, constipation, Adynamic ileus, Hirschsprung's disease	S	SH	Y	Lecture, Small group discussion	Practical/ Viva voce		General Medicine	Biochemistry
PY5.5	Describe the physiology of electrocardiogram (E.C.G), its applications and the cardiac axis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PY5.6	Describe abnormal ECG, arrhythmias, heart block and myocardial Infarction	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Human Anatomy
PY5.10	Describe & discuss regional circulation including microcirculation, lymphatic circulation, coronary, cerebral, capillary, skin, foetal, pulmonary and splanchnic circulation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PY5.13	Record and interpret normal ECG in a volunteer or simulated environment	S	SH	Y	DOAP sessions	Practical/OSPE/Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PY5.16	Record Arterial pulse tracing using finger plethysmography in a volunteer or simulated environment	S	SH	N	DOAP sessions, Computer assisted learning methods	Practical/OSPE/Viva voce		General Medicine	
PY7.7	Describe artificial kidney, dialysis and renal transplantation	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
PY11.14	Demonstrate Basic Life Support in a simulated environment	S	SH	Y	DOAP sessions	OSCE		General Medicine Anaesthesiology	
<b>Biochemistry</b>									
BI2.4	Describe and discuss enzyme inhibitors as poisons and drugs, therapeutic enzymes and the clinical utility of various serum enzymes as markers of pathological conditions	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	
BI2.5	Describe and discuss the clinical utility of various serum enzymes as markers of pathological conditions	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	
BI2.6	Discuss use of enzymes in laboratory investigations (Enzyme-based assays)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	
BI2.7	Interpret laboratory results of enzyme activities & describe the clinical utility of various enzymes as markers of pathological conditions	K	KH	Y	Lecture, Small group discussion, DOAP sessions	Written/ Viva voce		Pathology, General Medicine	
BI3.4	Define and differentiate the pathways of carbohydrate metabolism (glycolysis, gluconeogenesis, glycogen metabolism, HMP shunt)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI3.5	Describe and discuss the regulation, functions and integration of carbohydrate along with associated diseases/disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI3.8	Discuss and interpret laboratory results of analytes associated with metabolism of carbohydrates	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	
BI3.9	Discuss the mechanism and significance of blood glucose regulation in health and disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
BI3.10	Interpret the results of blood glucose levels and other laboratory investigations related to disorders of carbohydrate metabolism	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.1	Describe and discuss main classes of lipids (Essential/non-essential fatty acids, cholesterol and hormonal steroids, triglycerides, major phospholipids and sphingolipids) relevant to human system and their major functions	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.2	Describe the processes involved in digestion and absorption of dietary lipids and also the key features of their metabolism	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.3	Explain the regulation of lipoprotein metabolism & associated disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.4	Describe the structure and functions of lipoproteins, their functions, interrelations & relations with atherosclerosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.5	Interpret laboratory results of analytes associated with metabolism of lipids	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.6	Describe the therapeutic uses of prostaglandins and inhibitors of eicosanoid synthesis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI4.7	Interpret laboratory results of analytes associated with metabolism of lipids	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI5.2	Describe and discuss functions of proteins and structure-function relationships in relevant areas e.g., hemoglobin and selected hemoglobinopathies	K	KH	Y	Lecture, Small group discussion	Viva voce/ Skill assessment		Pathology, General Medicine	Physiology
BI5.5	Interpret laboratory results of analytes associated with metabolism of proteins	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI6.1	Discuss the metabolic processes that take place in specific organs in the body in the fed and fasting states	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI6.4	Discuss the laboratory results of analytes associated with gout & Lesch Nyhan syndrome	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
BI6.5	Describe the biochemical role of vitamins in the body and explain the manifestations of their deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI6.7	Describe the processes involved in maintenance of normal pH, water & electrolyte balance of body fluids and the derangements associated with these	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Physiology
BI6.8	Discuss and interpret results of Arterial Blood Gas (ABG) analysis in various disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI6.9	Describe the functions of various minerals in the body, their metabolism and homeostasis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Physiology
BI6.10	Enumerate and describe the disorders associated with mineral metabolism	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI6.11	Describe the functions of haem in the body and describe the processes involved in its metabolism and describe porphyrin metabolism	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology
BI6.12	Describe the major types of haemoglobin and its derivatives found in the body and their physiological/ pathological relevance	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology
BI6.13	Describe the functions of the kidney, liver, thyroid and adrenal glands	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
BI6.14	Describe the tests that are commonly done in clinical practice to assess the functions of these organs (kidney, liver, thyroid and adrenal glands)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
BI6.15	Describe the abnormalities of kidney, liver, thyroid and adrenal glands.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, General Medicine	Physiology, Human Anatomy
BI7.4	Describe applications of recombinant DNA technology, PCR in the diagnosis and treatment of diseases with genetic basis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics, General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
BI7.7	Describe the role of oxidative stress in the pathogenesis of conditions such as cancer, complications of diabetes mellitus and atherosclerosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pathology	
BI8.1	Discuss the importance of various dietary components and explain importance of dietary fibre	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics, Pathology	
BI8.2	Describe the types and causes of protein energy malnutrition and its effects	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics, Pathology	
BI8.3	Provide dietary advice for optimal health in childhood and adult, in disease conditions like diabetes mellitus, coronary artery disease and in pregnancy.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI8.4	Describe the causes (including dietary habits), effects and health risks associated with being overweight/ obesity	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pathology	
BI8.5	Summarize the nutritional importance of commonly used items of food including fruits and vegetables (macro-molecules & its importance)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, General Medicine, Pediatrics	
BI9.2	Discuss the involvement of ECM components in health and disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI10.4	Describe & discuss innate and adaptive immune responses, self/non-self recognition and the central role of T-helper cells in immune responses	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pathology	Physiology
BI11.4	Perform urine analysis to estimate and determine normal and abnormal constituents	S	P	Y	Lecture, Small group discussion	Skill assessment	1	General Medicine	Physiology
BI11.5	Describe screening of urine for inborn errors & describe the use of paper chromatography	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
BI11.17	Explain the basis and rationale of biochemical tests done in the following conditions: - diabetes mellitus, - dyslipidemia, - myocardial infarction, - renal failure, gout, - proteinuria, - nephrotic syndrome, - edema, - jaundice, - liver diseases, pancreatitis, disorders of acid- base balance, thyroid disorders.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine Pathology	
BI11.22	Calculate albumin: globulin (AG) ratio and creatinine clearance	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI11.23	Calculate energy content of different food Items, identify food items with high and low glycemic index and explain the importance of these in the diet	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
BI11.24	Enumerate advantages and/or disadvantages of use of unsaturated, saturated and trans fats in food.	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
BI1.26	Calculate albumin: globulin (AG) ratio and creatinine clearance	S	SH	Y	Lecture, Small group discussion	Skill assessment		General Medicine	
BI1.27	Calculate energy content of different food Items, identify food items with high and low glycemic index and explain the importance of these in the diet	S	SH	N	Lecture, Small group discussion	Skill assessment		General Medicine	
BI1.28	Enumerate advantages and/or disadvantages of use of unsaturated, saturated and trans fats in food	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
<b>Pathology</b>									
PA6.1	Define and describe edema its types pathogenesis and clinical correlations	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA9.4	Define autoimmunity. Enumerate autoimmune disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PA9.5	Define and describe the pathogenesis of systemic lupus erythematosus	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA9.6	Define and describe the pathogenesis and pathology of HIV and AIDS	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA9.7	Define and describe the pathogenesis of other common autoimmune diseases	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA10.1	Define and describe the pathogenesis and pathology of malaria	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA10.2	Define and describe the pathogenesis and pathology of cysticercosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA10.3	Define and describe the pathogenesis and pathology of leprosy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA10.4	Define and describe the pathogenesis and pathology of common bacterial, viral, protozoal and helminthic diseases	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA12.3	Describe the pathogenesis of obesity and its consequences	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA13.1	Describe hematopoiesis and extramedullary hematopoiesis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA13.2	Describe the role of anticoagulants in hematology	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA13.3	Define and classify anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA13.4	Enumerate and describe the investigation of anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA13.5	Perform, Identify and describe the peripheral blood picture in anemia	S	SH	Y	DOAP session	Skill assessment		General Medicine	
PA14.2	Describe the etiology, investigations and differential diagnosis of microcytic hypochromic anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PA14.3	Identify and describe the peripheral smear in microcytic anemia	S	SH	Y	DOAP session	Skill assessment		General Medicine	
PA15.1	Describe the metabolism of Vitamin B12 and the etiology and pathogenesis of B12 deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA15.2	Describe the laboratory investigations of macrocytic anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA15.4	Enumerate the differences and describe the etiology and distinguishing features of megaloblastic and non-megaloblastic macrocytic anemia	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA16.1	Define and classify hemolytic anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.2	Describe the pathogenesis and clinical features and hematologic indices of hemolytic anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.3	Describe the pathogenesis, features, hematologic indices and peripheral blood picture of sickle cell anemia and thalassemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.4	Describe the etiology pathogenesis, hematologic indices and peripheral blood picture of Acquired hemolytic anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA16.5	Describe indices and peripheral blood smear	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA 17.1	Enumerate the etiology, pathogenesis and findings in aplastic anemia	K	K	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA17.2	Enumerate the indications and describe the findings in bone marrow aspiration and biopsy	K	K	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA19.6	Enumerate and differentiate the causes of splenomegaly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery, General Medicine	
PA21.3	Differentiate platelet from clotting disorders based on the clinical and hematologic features	S	SH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PA21.4	Define and describe disseminated intravascular coagulation, its laboratory findings and diagnosis of disseminated intravascular coagulation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA21.5	Define and describe disseminated intravascular coagulation its laboratory findings and diagnosis of Vitamin K deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA22.4	Enumerate blood components and describe their clinical uses	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery, General Medicine	
PA22.6	Describe transfusion reactions and enumerate the steps in the investigation of a transfusion reaction	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA24.2	Describe the etiology, pathogenesis, pathology, microbiology, clinical and microscopic features of peptic ulcer disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA24.3	Describe and identify the microscopic features of peptic ulcer	S	SH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA25.1	Describe bilirubin metabolism, enumerate the etiology and pathogenesis of jaundice, distinguish between direct and indirect hyperbilirubinemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, General Medicine	
PA25.2	Describe the pathophysiology and pathologic changes seen in hepatic failure and their clinical manifestations, complications and consequences	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, General Surgery	
PA25.3	Describe the etiology and pathogenesis of viral and toxic hepatitis: distinguish the causes of hepatitis based on the clinical and laboratory features. Describe the pathology, complications and consequences of hepatitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA25.4	Describe the pathophysiology, pathology and progression of alcoholic liver disease including cirrhosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, General Surgery	
PA25.5	Describe the etiology, pathogenesis and complications of portal hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PA25.6	Interpret a liver function and viral hepatitis serology panel. Distinguish obstructive from non obstructive jaundice based on clinical features and liver function tests	S	P	Y	DOAP session	Skill assessment	1	General Medicine	
PA26.1	Define and describe the etiology, types, pathogenesis, stages, morphology and complications of pneumonia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA26.2	Describe the etiology, gross and microscopic appearance and complications of lung abscess	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA26.3	Define and describe the etiology, types, pathogenesis, stages, morphology and complications and evaluation of Obstructive airway disease (OAD) and bronchiectasis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	Microbiology
PA26.4	Define and describe the etiology, types, pathogenesis, stages, morphology microscopic appearance and complications of tuberculosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA26.5	Define and describe the etiology, types, exposure, environmental influence, pathogenesis, stages, morphology, microscopic appearance and complications of Occupational lung disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Community Medicine	
PA26.6	Define and describe the etiology, types, exposure, genetics environmental influence, pathogenesis, stages, morphology, microscopic appearance,metastases and complications of tumors of the lung and pleura	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA26.7	Define and describe the etiology, types, exposure, genetics environmental influence, pathogenesis, morphology, microscopic appearance and complications of mesothelioma	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Community Medicine	
PA27.1	Distinguish arteriosclerosis from atherosclerosis. Describe the pathogenesis and pathology of various causes and types of arteriosclerosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA27.2	Describe the etiology, dynamics, pathology types and complications of aneurysms including aortic aneurysms	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PA27.3	Describe the etiology, types, stages pathophysiology pathology and complications of heart failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Physiology	
PA27.4	Describe the etiology, pathophysiology, pathology, gross and microscopic, features, criteria and complications of rheumatic fever	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA27.5	Describe the epidemiology, risk factors, etiology, pathophysiology, pathology, presentations, gross and microscopic, features, diagnostic tests and complications of ischemic heart disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA27.6	Describe the etiology, pathophysiology, pathology, gross and microscopic, features diagnosis and complications of infective endocarditis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA27.7	Describe the etiology, pathophysiology, pathology, gross and microscopic, features diagnosis and complications of pericarditis and pericardial effusion	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA27.8	Interpret abnormalities in cardiac function testing in acute coronary syndromes	S	SH	Y	DOAP session	Skill Assessment		Physiology, General Medicine	
PA27.9	Classify and describe the etiology, types, pathophysiology, pathology, gross and microscopic features, diagnosis and complications of cardiomyopathies	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Physiology	
PA27.10	Describe the etiology, pathophysiology, pathology features and complications of syphilis on the cardiovascular system	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
PA28.3	Define and describe the etiology, precipitating factors, pathogenesis, pathology, laboratory urinary findings, progression and complications of acute renal failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA28.4	Define and describe the etiology, precipitating factors, pathogenesis, pathology, laboratory urinary findings progression and complications of chronic renal failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PA28.5	Define and classify glomerular diseases. Enumerate and describe the etiology, pathogenesis, mechanisms of glomerular injury, pathology, distinguishing features and clinical manifestations of glomerulonephritis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA28.6	Define and describe the etiology, pathogenesis, pathology, laboratory, urinary findings, progression and complications of IgA nephropathy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA28.7	Enumerate and describe the findings in glomerular manifestations of systemic disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA28.8	Enumerate and classify diseases affecting the tubular interstitium	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA28.9	Define and describe the etiology, pathogenesis, pathology, laboratory, urinary findings, progression and complications of acute tubular necrosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA28.11	Define classify and describe the etiology, pathogenesis pathology, laboratory, urinary findings, distinguishing features, progression and complications of vascular disease of the kidney	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA28.12	Define classify and describe the genetics, inheritance etiology, pathogenesis, pathology, laboratory, urinary findings, distinguishing features, progression and complications of cystic disease of the kidney	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics	
PA28.15	Describe the etiology, genetics, pathogenesis, pathology, presenting features and progression of thrombotic angiopathies	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA31.4	Enumerate and describe the etiology, hormonal dependency and pathogenesis of gynecomastia	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pediatrics, General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PA32.1	Enumerate, classify and describe the etiology, pathogenesis, pathology and iodine dependency of thyroid swellings	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Physiology, General Medicine, General Surgery	
PA32.2	Describe the etiology, cause, iodine dependency, pathogenesis, manifestations, laboratory and imaging features and course of thyrotoxicosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.3	Describe the etiology, pathogenesis, manifestations, laboratory and imaging features and course of thyrotoxicosis/ hypothyroidism	K	KH	Y	Lecture, Small group	Written/ Viva voce		Physiology, General Medicine	
PA32.4	Classify and describe the epidemiology, etiology, pathogenesis, pathology, clinical laboratory features, complications and progression of diabetes mellitus	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.5	Describe the etiology, genetics, pathogenesis, manifestations, laboratory and morphologic features of hyperparathyroidism	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.7	Describe the etiology, pathogenesis, manifestations, laboratory, morphologic features, complications of adrenal insufficiency	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.8	Describe the etiology, pathogenesis, manifestations, laboratory, morphologic features, complications of Cushing's syndrome	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PA32.9	Describe the etiology, pathogenesis, manifestations, laboratory and morphologic features of adrenal neoplasms	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Physiology, General Medicine, General Surgery	
PA33.5	Classify and describe the etiology, immunology, pathogenesis, manifestations, radiologic and laboratory features, diagnostic criteria and complications of rheumatoid arthritis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PA35.1	Describe the etiology, types and pathogenesis, differentiating factors, CSF findings in meningitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PA35.3	Identify the etiology of meningitis based on given CSF parameters	S	P	Y	DOAP session	Skill Assessment	1	General Medicine	Microbiology
<b>Microbiology</b>									
MI2.1	Describe the etiologic agents in rheumatic fever and their diagnosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
MI2.2	Describe the classification, etio-pathogenesis, clinical features and discuss the diagnostic modalities of Infective endocarditis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
MI2.3	Identify the microbial agents causing Rheumatic heart disease & infective Endocarditis	S	SH	Y	DOAP session	Skill assessment		General Medicine	Pathology
MI2.4	List the common microbial agents causing anemia. Describe the morphology, mode of infection and discuss the pathogenesis, clinical course, diagnosis and prevention and treatment of the common microbial agents causing Anemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
MI2.5	Describe the etio-pathogenesis and discuss the clinical evolution and the laboratory diagnosis of kala-azar, malaria, filariasis and other common parasites prevalent in India	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
MI2.6	Identify the causative agent of malaria and filariasis	K/S	SH	Y	DOAP session	Skill assessment		General Medicine	
MI2.7	Describe the epidemiology, the etio- pathogenesis evolution complications, opportunistic infections, diagnosis prevention and the principles of management of HIV	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
MI3.1	Enumerate the microbial agents causing diarrhea and dysentery. Describe the epidemiology, morphology, pathogenesis, clinical features, and diagnostic modalities of these agents	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Paediatrics	Pathology
MI3.2	Identify the common etiologic agents of diarrhea and dysentery	S	SH	Y	DOAP session	Skill assessment		General Medicine, Paediatrics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
MI3.3	Describe the enteric fever pathogens and discuss the evolution of the clinical course, the laboratory diagnosis of the diseases caused by them	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Pathology
MI3.4	Identify the different modalities for diagnosis of enteric fever. Choose the appropriate test related to the duration of illness	S	KH	Y	DOAP session	Skill assessment		General Medicine	Pathology
MI3.5	Enumerate the causative agents of food poisoning and discuss the pathogenesis, clinical course and laboratory diagnosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology
MI3.6	Describe the etio-pathogenesis of Acid peptic disease (APD) and the clinical course. Discuss the diagnosis and management of the causative agent of APD	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Pathology
MI3.7	Describe the epidemiology, the etio- pathogenesis and discuss the viral markers in the evolution of Viral hepatitis. Discuss the modalities in the diagnosis, and prevention of viral hepatitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
MI3.8	Choose the appropriate laboratory test in the diagnosis of viral hepatitis	K	KH	Y	Small group discussion, Case discussion	Written/ Viva voce/ OSPE		General Medicine	Pathology
MI4.1	Enumerate the microbial agents causing anaerobic infections. Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of anaerobic infections	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	
MI5.1	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of meningitis	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Paediatrics	Pathology
MI5.2	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of encephalitis	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Paediatrics	Pathology
MI5.3	Identify the microbial agents causing meningitis	S	SH	Y	DOAP session	Skill assessment		General Medicine, Paediatrics	
MI6.1	Describe the etio-pathogenesis, laboratory diagnosis and prevention of Infections of upper and lower respiratory tract	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
MI6.2	Identify the common etiologic agents of upper respiratory tract infections (Gram Stain)	S	P	Y	DOAP session	Skill assessment	3	General Medicine	
MI6.3	Identify the common etiologic agents of lower respiratory tract infections (Gram Stain & Acid fast stain).	S	P	Y	DOAP session	Skill assessment	3	General Medicine	
MI7.3	Describe the etio-pathogenesis, clinical features, the appropriate method for specimen collection, and discuss the laboratory diagnosis of Urinary tract infections	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
MI8.1	Enumerate the microbial agents and their vectors causing Zoonotic diseases. Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course, laboratory diagnosis and prevention	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
MI8.2	Describe the etio-pathogenesis of opportunistic infections (OI) and discuss the factors contributing to the occurrence of OI, and the laboratory diagnosis	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Pathology
MI8.3	Describe the role of oncogenic viruses in the evolution of virus associated malignancy	K	KH	Y	Lecture	Written		General Medicine	Pathology
MI8.4	Describe the etiologic agents of emerging Infectious diseases. Discuss the clinical course and diagnosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Community Medicine	
MI8.5	Define Healthcare Associated Infections (HAI) and enumerate it types. Discuss the factors that contribute to the development of HAI and the methods for prevention	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Community Medicine	
<b>Pharmacology</b>									
PH1.12	Calculate the dosage of drugs using appropriate formulae for an individual patient, including children, elderly and patient with renal dysfunction	K/S	SH	Y	Lecture, practical	Written/ Viva voce		Pediatrics, General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PH1.16	Describe mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs which act by modulating autacoids, including: Anti-histaminics, 5-HT modulating drugs, NSAIDs, Drugs for gout, Anti-rheumatic drugs, drugs for migraine	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	
PH1.21	Describe the symptoms and management of methanol and ethanol poisonings	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
PH1.25	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs acting on blood, like anticoagulants, antiplatelets, fibrinolytics, plasma expanders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PH1.26	Describe mechanisms of action, types, doses, side effects, indications and contraindications of the drugs modulating the renin angiotensin and aldosterone system	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, General Medicine	
PH1.27	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of Antihypertensive drugs and drugs used in shock	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PH1.28	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in ischemic heart disease (stable, unstable angina and myocardial infarction), peripheral vascular disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
PH1.29	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in congestive heart failure	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pathology
PH1.30	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used as Antiarrhythmics	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PH1.31	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in the management of dyslipidemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PH1.34	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs used as below: 1. Acid-peptic disease and GERD 2. Antiemetics and prokinetics 3. Antidiarrhoeals 4. Laxatives 5. Inflammatory Bowel Disease 6. Irritable Bowel Disorders, biliary and pancreatic diseases	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PH1.35	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of drugs used in hematological disorders like: 1. Drugs used in anemias 2. Colony Stimulating factors	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Physiology	Pharmacology
PH1.36	Describe the mechanism of action, types, doses, side effects, indications and contraindications of drugs used in endocrine disorders (diabetes mellitus, thyroid disorders and osteoporosis)	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Pathology, Pharmacology
PH1.43	Describe and discuss the rational use of antimicrobials including antibiotic stewardship program	K	KH	Y	Lecture	Written/ Viva voce		General Medicine Pediatrics	Microbiology, Pharmacology
PH1.47	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of the drugs used in malaria, KALA-AZAR, amebiasis and intestinal helminthiasis	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	Microbiology
PH1.52	Describe management of common poisoning, insecticides, common sting and bites	K	KH	Y	Lecture	Written/ Viva voce		General Medicine	
PH2.4	Demonstrate the correct method of calculation of drug dosage in patients including those used in special situations	S	SH	Y	DOAP sessions	Skills assessment		Pediatrics, Pharmacology	
PH3.1	Write a rational, correct and legible generic prescription for a given condition and communicate the same to the patient	S/C	P	Y	Skill station	Skill station	5	General Medicine	
PH3.3	Perform a critical evaluation of the drug promotional literature	S	P	Y	Skill Lab	Maintenance of log book/ Skill station	3	General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PH3.5	To prepare and explain a list of P-drugs for a given case/condition	S	P	Y	Skill station	Maintenance of log book	3	General Medicine	
PH5.1	Communicate with the patient with empathy and ethics on all aspects of drug use	A/C	SH	Y	Small group discussion	Skill station		General Medicine	
PH5.4	Explain to the patient the relationship between cost of treatment and patient compliance	A/C	SH	Y	Small group discussion	Short note/ Viva voce		General Medicine	
<b>Community Medicine</b>									
CM3.1	Describe the health hazards of air, water, noise, radiation and pollution	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, ENT	
CM3.3	Describe the aetiology and basis of water borne diseases/jaundice/hepatitis/ diarrheal diseases	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Microbiology, General Medicine, Pediatrics	
CM5.1	Describe the common sources of various nutrients and special nutritional requirements according to age, sex, activity, physiological conditions	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics	
CM5.2	Describe and demonstrate the correct method of performing a nutritional assessment of individuals, families and the community by using the appropriate method	S	SH	Y	DOAP sessions	Skill Assessment		General Medicine, Pediatrics	
CM5.3	Define and describe common nutrition related health disorders (including macro-PEM, Micro-iron, Zn, iodine, Vit. A), their control and management	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics	
CM5.4	Plan and recommend a suitable diet for the individuals and families based on local availability of foods and economic status, etc in a simulated environment	S	SH	Y	DOAP sessions	Skill Assessment		General Medicine, Pediatrics	
CM5.5	Describe the methods of nutritional surveillance, principles of nutritional education and rehabilitation in the context of socio-cultural factors	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine, Pediatrics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
CM6.1	Formulate a research question for a study	K	KH	Y	Small group discussion, Lecture, DOAP sessions	Written/ Viva voce/ Skill Assessment		General Medicine, Pediatrics	
CM6.2	Describe and discuss the principles and demonstrate the methods of collection, classification, analysis, interpretation and presentation of statistical data	S	SH	Y	Small group discussion, Lecture, DOAP sessions	Written/ Viva voce/ Skill Assessment		General Medicine, Pediatrics	
CM6.3	Describe, discuss and demonstrate the application of elementary statistical methods including test of significance in various study designs	S	SH	Y	Small group discussion, Lecture, DOAP sessions	Written/ Viva voce/ Skill Assessment		General Medicine, Pediatrics	
CM6.4	Enumerate, discuss and demonstrate common sampling techniques, simple statistical methods, frequency distribution, measures of central tendency and dispersion	S	SH	Y	Small group discussion, Lecture, DOAP sessions	Written/ Viva voce/ Skill Assessment		General Medicine, Pediatrics	
CM7.1	Define Epidemiology and describe and enumerate the principles, concepts and uses	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		General Medicine	
CM7.2	Enumerate, describe and discuss the modes of transmission and measures for prevention and control of communicable and non-communicable diseases	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		General Medicine	
CM7.3	Enumerate, describe and discuss the sources of epidemiological data	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		General Medicine	
CM7.4	Define, calculate and interpret morbidity and mortality indicators based on given set of data	S	SH	Y	Small group discussion, DOAP sessions	Written/ Skill assessment		General Medicine	
CM7.5	Enumerate, define, describe and discuss epidemiological study designs.	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		General Medicine	
CM7.6	Enumerate and evaluate the need of screening tests	S	SH	Y	Small group discussion, DOAP sessions	Written/ Skill assessment		General Medicine	
CM7.7	Describe and demonstrate the steps in the Investigation of an epidemic of communicable disease and describe the principles of control measures.	S	SH	Y	Small group discussion, DOAP sessions	Written/ Skill assessment		General Medicine	Microbiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
CM7.8	Describe the principles of association, causation and biases in epidemiological studies	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		General Medicine	
CM8.1	Describe and discuss the epidemiological and control measures including the use of essential laboratory tests at the primary care level for communicable diseases	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		General Medicine, Pediatrics	Microbiology Pathology
CM8.2	Describe and discuss the epidemiological and control measures including the use of essential laboratory tests at the primary care level for Non Communicable diseases (diabetes, Hypertension, Stroke, obesity and cancer etc.)	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		General Medicine	
CM8.3	Enumerate and describe disease-specific National Health Programs including their prevention and treatment of a case	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		General Medicine, Pediatrics	
CM8.4	Describe the principles and enumerate the measures to control a disease epidemic	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		General Medicine, Pediatrics	
CM8.5	Describe and discuss the principles of planning, implementing and evaluating control measures for disease at community level bearing in mind the public health importance of the disease	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		General Medicine, Pediatrics	
CM12.1	Define and describe the concept of Geriatric services	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
CM12.2	Describe health problems of aged population	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
CM12.3	Describe the prevention of health problems of aged population	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
CM12.4	Describe National program for elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
CM13.1	Define and describe the concept of Disaster management	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery, General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
CM13.2	Describe disaster management cycle	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery, General Medicine	
CM13.3	Describe man made disasters in the world and in India	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Surgery, General Medicine	
CM13.4	Describe the details of the National Disaster management Authority	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Surgery, General Medicine	
<b>Forensic Medicine &amp; Toxicology</b>									
FM1.9	Describe the importance of documentation in medical practice in regard to medicolegal examinations, Medical Certificates and medicolegal reports especially – maintenance of patient case records, discharge summary, prescribed registers to be maintained in Health Centres. -- maintenance of medico-legal register like accident register. - documents of issuance of wound certificate - documents of issuance of drunkenness certificate. - documents of issuance of sickness and fitness certificate. - documents for issuance of death certificate. - documents of Medical Certification of Cause of Death - Form Number 4 and 4A - documents for estimation of age by physical, dental and radiological examination and issuance of certificate	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Radiodiagnosis, General Surgery, General Medicine, Pediatrics	
FM2.34	Demonstrate ability to use <b>local resources</b> whenever required like in mass disaster situations	A & C	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine, AETCOM	
FM3.22	Define and discuss impotence, sterility, frigidity, sexual dysfunction, premature ejaculation. Discuss the causes of impotence and sterility in male and female	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, General Medicine	
FM5.5	Describe & discuss Delirium tremens	K	K/KH	Y	Lecture, Small group discussion	Written/Viva voce		Psychiatry, General Medicine	
FM8.6	Describe the general symptoms, principles of diagnosis and management of common poisons encountered in India.	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, DOAP session	Written/Viva voce/OSCE		Pharmacology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
FM8.7	Describe simple Bedside clinic tests to detect poison/drug in a patient's body fluids	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, DOAP session	Written/Viva voce/OSCE		Pharmacology, General Medicine	
FM8.8	Describe basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM9.1	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to: Caustics Inorganic – sulphuric, nitric, and hydrochloric acids Organic-Carbolic Acid (phenol), Oxalic and acetylsalicylic acids .	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM9.2	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Phosphorus, Iodine, Barium	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM9.3	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Arsenic, lead, mercury, copper, iron, cadmium and thallium	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM9.4	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Ethanol, methanol, ethylene glycol	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM9.5	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Organophosphates, Carbamates, Organochlorines, Pyrethroids, Paraquat, Aluminium and Zinc phosphide	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
FM9.6	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to Ammonia, carbon monoxide, hydrogen cyanide & derivatives, methyl isocyanate, tear (riot control) gases	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM10.1	Describe General Principles and basic methodologies in treatment of poisoning: decontamination, supportive therapy, antidote therapy, procedures of enhanced elimination with regard to: i. Antipyretics – Paracetamol, Salicylates ii. Anti-Infectives (Common antibiotics – an overview) iii. Neuropsychotoxicology Barbiturates, benzodiazepines, phenytoin, lithium, haloperidol, neuroleptics, tricyclics iv. Narcotic Analgesics, Anaesthetics, and Muscle Relaxants v. Cardiovascular Toxicology Cardiotoxic plants – oleander, odollam, aconite, digitalis vi. Gastro-Intestinal and Endocrinal Drugs – Insulin	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pharmacology, General Medicine	
FM11.1	Describe features and management of Snake bite, scorpion sting, bee and wasp sting and spider bite	K	K/KH	Y	Lecture, Small group discussion, Autopsy	Written/Viva voce		General Medicine	
FM12.1	Describe features and management of abuse/poisoning with following camicals: Tobacco, cannabis, amphetamines, cocaine, hallucinogens, designer drugs& solvent	K	K/KH	Y	Lecture, Small group discussion, Autopsy	Written/Viva voce		General Medicine	
FM13.1	Describe toxic pollution of environment, its medico-legal aspects & toxic hazards of occupation and industry	K	K/KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
FM14.2	Demonstrate the correct technique of clinical examination in a suspected case of poisoning & prepare medico-legal report in a simulated/ supervised environment	S	SH	Y	Bedside clinic (ward/casualty), Small group discussion	Logbook Skill station/Viva voce/ OSCE		General Medicine	
FM14.3	Assist and demonstrate the proper technique in collecting, preserving and dispatch of the exhibits in a suspected case of poisoning, along with clinical examination .	S	SH	Y	Bedside clinic, Small group discussion/DOAP session	Skill lab/Viva voce		General Medicine	

**Dermatology, Venereology & Leprosy**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
DR9.1	Classify, describe the epidemiology, etiology, microbiology pathogenesis and clinical presentations and diagnostic features of Leprosy	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		General Medicine	Microbiology, Community Medicine
DR9.2	Demonstrate (and classify based on) the clinical features of leprosy including an appropriate neurologic examination	S	SH	Y	Lecture, Small group discussion	Bedside clinic session/ Skill assessment		General Medicine	
DR9.4	Enumerate, describe and identify lepra reactions and supportive measures and therapy of lepra reactions	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		General Medicine	Pharmacology
DR9.5	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for various classes of leprosy based on national guidelines	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		General Medicine	Pharmacology, Community Medicine
DR9.6	Describe the treatment of Leprosy based on the WHO guidelines	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		General Medicine	Pharmacology, Community Medicine
DR9.7	Enumerate and describe the complications of leprosy and its management, including understanding disability and stigma.	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine	Pharmacology, Psychiatry
DR10.1	Identify and classify syphilis based on the presentation and clinical manifestations	S	SH	Y	Bedside clinic	Skill assessment		General Medicine	Microbiology
DR10.3	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for syphilis	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		General Medicine	Pharmacology, Microbiology
DR10.4	Describe the prevention of congenital syphilis	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		General Medicine	
DR10.5	Counsel in a non-judgemental and empathetic manner patients on prevention of sexually transmitted diseases	C	SH	Y	Lecture, Small group discussion	Skill assessment		General Medicine	
DR10.6	Describe the etiology, diagnostic and clinical features of non-syphilitic sexually transmitted diseases (chancroid, donovanosis and LGV)	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		General Medicine	Microbiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
DR10.7	Identify and differentiate based on the clinical features non-syphilitic sexually transmitted diseases (chancroid, donovanosis and LGV)	S	SH	Y	Lecture, Small group discussion	Skill assessment		General Medicine	Microbiology
DR10.8	Enumerate the indications and describe the pharmacology, indications and adverse reactions of drugs used in the non-syphilitic sexually transmitted diseases (chancroid, donovanosis and LGV)	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		General Medicine	Pharmacology, Microbiology
DR10.9	Describe the syndromic approach to ulcerative sexually transmitted disease	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		General Medicine	
DR10.10	Describe the etiology, diagnostic and clinical features and management of gonococcal and non gonococcal urethritis	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		General Medicine	
DR11.1	Describe the etiology, pathogenesis and clinical features of the dermatologic manifestations of HIV and its complications including opportunistic infections	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		General Medicine	Microbiology
DR11.2	Identify and distinguish the dermatologic manifestations of HIV its complications, opportunistic infections and adverse reactions	S	SH	Y	Lecture, Small group discussion	Skill assessment		General Medicine	Microbiology
DR11.3	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for dermatologic lesions in HIV	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine	Pharmacology, Microbiology
DR12.7	Identify and distinguish fixed drug eruptions and Steven Johnson syndrome from other skin lesions	S	SH	Y	Lecture, Small group discussion	Skill assessment		General Medicine	Pathology, Microbiology
DR16.1	Identify and distinguish skin lesions of SLE	S	SH	Y	Lecture, Small group discussion	Skill assessment		General Medicine	Pathology
DR16.2	Identify and distinguish Raynaud's phenomenon	S	SH	Y	Lecture, Small group discussion	Skill assessment		General Medicine	Pathology
DR17.1	Enumerate and identify the cutaneous findings in vitamin A deficiency	K/S	SH	Y	Lecture, Small group discussion	Skill assessment/ Viva voce		General Medicine, Pediatrics, Biochemistry	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
DR17.2	Enumerate and describe the various skin changes in Vitamin B complex deficiency	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine, Pediatrics, Biochemistry	
DR17.3	Enumerate and describe the various changes in Vitamin C deficiency	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine, Pediatrics, Biochemistry	
DR17.4	Enumerate and describe the various changes in Zinc deficiency	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine, Pediatrics, Biochemistry	
DR18.1	Enumerate the cutaneous features of Type 2 diabetes	K	K	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
DR18.2	Enumerate the cutaneous features of hypo- & hyperthyroidism	K	K	Y	Lecture, Small group discussion	Written/Viva voce		General Medicine	
<b>Anesthesiology</b>									
AS2.1	Enumerate the indications, describe the steps and demonstrate in a simulated environment basic life support in adults children and neonates	S	SH	N	DOAP session	Skill assessment		General Medicine, Pediatrics	
AS2.2	Enumerate the indications, describe the steps and demonstrate in a simulated environment advanced life support in adults and children	S	SH	N	DOAP session	Skill assessment		General Medicine	
AS3.1	Describe the principles of preoperative evaluation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Surgery, General Medicine
AS3.2	Elicit, present and document an appropriate history including medication history in a patient undergoing Surgery as it pertains to a preoperative anaesthetic evaluation	S	SH	Y	DOAP session, Bedside clinic	Skill station			General Surgery, General Medicine
AS3.3	Demonstrate and document an appropriate clinical examination in a patient undergoing General Surgery	S	SH	Y	DOAP session, Bedside clinic	Skill station			General Surgery, General Medicine

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
AS3.4	Choose and interpret appropriate testing for patients undergoing Surgery	S	SH	Y	DOAP session, Bedside clinic	Skill station			General Surgery, General Medicine
AS3.5	Determine the readiness for General Surgery in a patient based on the preoperative evaluation	S	SH	Y	DOAP session, Bedside clinic	Skill station			General Surgery, General Medicine
AS7.2	Enumerate and describe the criteria for admission and discharge of a patient to an ICU	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			General Medicine
AS7.3	Observe and describe the management of an unconscious patient	S	KH	Y	Lecture, Small group discussion DOAP session	Written/ Viva voce		Physiology	General Medicine
AS7.4	Observe and describe the basic setup process of a ventilator	S	KH	Y	Lecture, Small group discussion DOAP session	Written/ Viva voce		Physiology	General Medicine
AS7.5	Observe and describe the principles of monitoring in an ICU	S	KH	Y	Lecture, Small group discussion DOAP session	Written/ Viva voce			General Medicine
AS8.4	Describe the principles of pain management in palliative care	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Pharmacology	General Medicine
AS8.5	Describe the principles of pain management in the terminally ill	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Pharmacology	General Medicine
AS10.4	Define and describe common medical and medication errors in anaesthesia	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Pharmacology	General Medicine
<b>Otorhinolaryngology (ENT)</b>									
EN4.53	Describe the Clinical features, Investigations and principles of management of HIV manifestations of the ENT	K	KH	N	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Ophthalmology</b>									
OP5.2	Define, enumerate and describe the aetiology, associated systemic conditions, clinical features, complications, indications for referral and management of scleritis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
OP6.3	Enumerate systemic conditions that can present as iridocyclitis and describe their ocular manifestations	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
OP9.3	Describe the role of refractive error correction in a patient with headache and enumerate the indications for referral	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
<b>Dentistry</b>									
DE1.4	Discuss the role of dental caries as a focus of sepsis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, General Medicine	
<b>Psychiatry</b>									
PS3.7	Enumerate and describe common organic psychiatric disorders, magnitude, etiology and clinical features	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PS3.8	Enumerate and describe the essential investigations in patients with organic psychiatric disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PS4.1	Describe the magnitude and etiology of alcohol and substance use disorders	K	KH	Y	Lecture, Small group discussion	Lecture/ Small group discussion			General Medicine
PS4.2	Elicit, describe and document clinical features of alcohol and substance use disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Medicine
PS4.3	Enumerate and describe the indications and interpret laboratory and other tests used in alcohol and substance abuse disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Medicine
PS4.4	Describe the treatment of alcohol and substance abuse disorders including behavioural and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PS4.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in alcohol and substance abuse	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PS10.1	Enumerate and describe the magnitude and etiology of somatoform, dissociative and conversion disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PS10.2	Enumerate, elicit, describe and document clinical features in patients with somatoform, dissociative and conversion disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Medicine
PS10.3	Enumerate and describe the indications and interpret laboratory and other tests used in somatoform, dissociative and conversion disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Medicine
PS10.4	Describe the treatment of somatoform disorders including behavioural, psychosocial and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PS10.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in somatoform, dissociative and conversion disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PS12.1	Enumerate and describe the magnitude and etiology of psychosomatic disorders	K	KH	Y	Lecture Small group discussion	Written/ Viva voce			General Medicine
PS12.2	Enumerate, elicit, describe and document clinical features in patients with magnitude and etiology of psychosomatic disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Medicine
PS12.3	Enumerate and describe the indications and interpret laboratory and other tests of psychosomatic disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Medicine
PS12.4	Describe the treatment of psychosomatic disorders including behavioural, psychosocial and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PS16.1	Enumerate and describe common psychiatric disorders in the elderly including dementia, depression and psychosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PS16.2	Describe the aetiology and magnitude of psychiatric illness in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PS16.3	Describe the therapy of psychiatric illness in elderly including psychosocial and behavioural therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PS16.4	Demonstrate family education in a patient with psychiatric disorders occurring in the elderly in a simulated environment	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Medicine
<b>Obstetrics &amp; Gynaecology</b>									
OG12.1	Define, classify and describe the etiology and pathophysiology, early detection, investigations; principles of management of hypertensive disorders of pregnancy and eclampsia, complications of eclampsia	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Medicine
OG12.2	Define, Classify and describe the etiology, pathophysiology, diagnosis, investigations, adverse effects on the mother and foetus and the management during pregnancy and labor, and complications of anemia in pregnancy	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Medicine
OG12.3	Define, Classify and describe the etiology, pathophysiology, diagnosis, investigations, criteria, adverse effects on the mother and foetus and the management during pregnancy and labor, and complications of diabetes in pregnancy	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Medicine
OG12.4	Define, classify and describe the etiology, pathophysiology, diagnosis, investigations, criteria, adverse effects on the mother and foetus and the management during pregnancy and labor, and complications of heart diseases in pregnancy	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Medicine
OG12.5	Describe the clinical features, detection, effect of pregnancy on the disease and impact of the disease on pregnancy complications and management in pregnancy of urinary tract infections	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Medicine
OG12.6	Describe the clinical features, detection, effect of pregnancy on the disease and impact of the disease on pregnancy complications and management in pregnancy of liver disease	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Medicine
OG12.7	Describe and discuss Screening, risk factors, management of mother and newborn with HIV	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Medicine
<b>Pediatrics</b>									

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE14.3	Discuss the risk factors, clinical features, diagnosis and management of Organophosphorous poisoning	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PE32.3	Interpret normal Karyotype and recognize Trisomy 21	S	SH	Y	Bedside clinics, Skills lab	Log book			General Medicine
PE32.9	Discuss the referral criteria and multidisciplinary approach to management of Turner Syndrome	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			General Medicine, Obstetrics & Gynecology
<b>General Surgery</b>									
SU22.6	Describe and discuss the clinical features of hypo- & hyperparathyroidism and the principles of their management	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
SU23.2	Describe the etiology, clinical features and principles of management of disorders of adrenal gland	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
<b>Orthopaedics</b>									
OR5.1	Describe and discuss the aetiopathogenesis, clinical features, Investigations and principles of management of various inflammatory disorder of joints	K	K/KH	Y	Lecture, Small group Discussion, Bedside clinic	Written/ Viva voce OSCE			General Medicine
OR11.1	Describe and discuss the aetiopathogenesis, Clinical features, Investigations and principles of management of peripheral nerve injuries in diseases like foot drop, wrist drop, claw hand, palsies of Radial, Ulnar, Median, Lateral Popliteal and Sciatic Nerves	K	K/H	Y	Lecture Small Group discussion, case discussion	Written/ Viva voce OSCE		Human Anatomy	General Medicine, General surgery
<b>Physical Medicine &amp; Rehabilitation</b>									
PM1.2	Define and describe disability, its cause, and magnitude, identification and prevention of disability	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine Orthopedics
PM1.3	Define and describe the methods to identify and prevent disability	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine Orthopedics

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PM1.4	Enumerate the rights and entitlements of differently abled persons	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine Orthopedics
PM2.1	Describe the causes of disability in the patient with a cerebrovascular accident	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	General Medicine
PM2.2	Describe and discuss the treatment of rigidity and spasticity	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PM2.3	Describe and discuss the principles of early mobilizations, mobility aids and splints	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PM2.4	Describe and discuss the impact of comorbidities on the rehabilitation of the patient with cerebrovascular accident	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PM4.1	Describe the common patterns, clinical features, investigations, diagnosis and treatment of common causes of arthritis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine Orthopedics
PM4.5	Demonstrate correct assessment of muscle strength and range of movements	S	SH	Y	DOAP session, Bedside clinic	Skill assessment			General Medicine Orthopedics
PM6.1	Perform and demonstrate a clinical examination of sensory and motor deficits of peripheral nerve	S	SH	Y	Bedside clinic	Skill assessment			General Medicine
PM6.2	Enumerate the indications and describe the principles of nerve conduction velocity and EMG	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PM7.4	Assess bowel and bladder function and identify common patterns of bladder dysfunction	S	KH	Y	Small group discussion	Written/ Viva voce			General Medicine Orthopedics
PM7.6	Enumerate the indications and describe the pharmacology and side effects of commonly used drugs in neuropathic bladder	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PM7.7	Enumerate and describe common life threatening complications following SCI like Deep vein Thrombosis, Aspiration Pneumonia, Autonomic dysreflexia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine Orthopedics

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/ N	Suggested Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PM8.1	Describe the clinical features, evaluation, diagnosis and management of disability following traumatic brain injury	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine Orthopedics General Surgery
PM8.2	Describe and discuss cognitive dysfunction like deficits in attention, memory and communication	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PM8.3	Describe and discuss common behavior and mood changes following TBI	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PM8.4	Describe metabolic co-morbidities like SIADH, diabetes mellitus, insipidus and endocrine dysfunction following TBI	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PM8.5	Describe the Vocational opportunities and community based rehabilitation following TBI	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PM 9.1	Describe rehabilitative aspects as they pertain to the elderly including patients with dementia, depression, incontinence immobility and nutritional needs	K	KH	Y	Lecture, Small group	Written Viva voce			General Medicine Psychiatry
<b>Radiotherapy</b>									
RT1.3	Enumerate, describe and discuss classification and staging of cancer (AJCC, FIGO etc.)	K	KH	Y	Lecture	Written/ Viva voce		Pathology	General Surgery General Medicine

**RESPIRATORY MEDICINE (CODE: CT)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>RESPIRATORY MEDICINE</b>									
<b>Topic: Tuberculosis</b>		<b>Number of competencies: (19)</b>			<b>Number of procedures that require certification : (01)</b>				
CT1.1	Describe and discuss the epidemiology of tuberculosis and its impact on the work, life and economy of India	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
CT1.2	Describe and discuss the microbiology of tubercle bacillus, mode of transmission, pathogenesis, clinical evolution and natural history of pulmonary and extra pulmonary forms (including lymph node, bone and CNS)	K	KH	Y	Lecture, Small group discussion	written		Microbiology	
CT1.3	Discuss and describe the impact of co-infection with HIV and other co-morbid conditions. Like diabetes on the natural history of tuberculosis	K	K	Y	Lecture, Small group discussion	written		Microbiology	
CT1.4	Describe the epidemiology, the predisposing factors and microbial and therapeutic factors that determine resistance to drugs	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology, Pharmacology	
CT1.5	Elicit, document and present an appropriate medical history that includes risk factor, contacts, symptoms including cough and fever CNS and other manifestations	S	SH	Y	Bed side clinic, DOAP session	Skill assessment			
CT1.6	Demonstrate and perform a systematic examination that establishes the diagnosis based on the clinical presentation that includes a) general examination, b) examination of the chest and lung including loss of volume, mediastinal shift, percussion and auscultation (including DOAP session of lung sounds and added sounds) c) examination of the lymphatic system and d) relevant CNS examination	S	SH	Y	Bed side clinic, DOAP session	Skill assessment			
CT1.7	Perform and interpret a PPD (mantoux) and describe and discuss the indications and pitfalls of the test	S	P	Y	DOAP session	Maintenance of log book		Microbiology	
CT1.8	Generate a differential diagnosis based on the clinical history and evolution of the disease that prioritises the most likely diagnosis	K	K	Y	Bedside clinic, Small group discussion	Bedside clinic/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
CT1.9	Order and interpret diagnostic tests based on the clinical presentation including: CBC, Chest X ray PA view, Mantoux, sputum culture and sensitivity, pleural fluid examination and culture, HIV testing	K	K	Y	Bedside clinic, DOAP session	Skill assessment			
CT1.10	Perform and interpret an AFB stain	S	P	Y	DOAP session	Skill assessment	1	Microbiology	
CT1.11	Assist in the performance, outline the correct tests that require to be performed and interpret the results of a pleural fluid aspiration	S	SH	Y	Skill assessment	Skill assessment			
CT1.12	Enumerate the indications for tests including: serology, special cultures and polymerase chain reaction and sensitivity testing	K	KH	Y	Small group discussion, Lecture	Short note/ Viva voce		Microbiology	
CT1.13	Describe and discuss the origin, indications, technique of administration, efficacy and complications of the BCG vaccine	K	KH	Y	Lecture, Small group discussion	Short note/ Viva voce		Microbiology	
CT1.14	Describe and discuss the pharmacology of various anti-tuberculous agents, their indications, contraindications, interactions and adverse reactions	K	KH	Y	Lecture, Small group discussion	Short note/ Viva voce		Pharmacology, Microbiology	
CT1.15	Prescribe an appropriate antituberculosis regimen based on the location of disease, smear positivity and negativity and co-morbidities based on current national guidelines including directly observed tuberculosis therapy (DOTS)	K	SH	Y	Bedside clinic, Small group discussion, Lecture	Skill assessment		Pharmacology, Community Medicine	
CT1.16	Describe the appropriate precautions, screening, testing and indications for chemoprophylaxis for contacts and exposed health care workers	K	KH	Y	Bedside clinic, Small group discussion	Written		Community Medicine	
CT1.17	Define criteria for the cure of Tuberculosis; describe and recognise the features of drug resistant tuberculosis, prevention and therapeutic regimens	S	P	Y	Lecture, Small group discussion	Written			
CT1.18	Educate health care workers on National Program of Tuberculosis and administering and monitoring the DOTS program	C	SH	Y	DOAP session	Skill assessment		Community Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
CT1.19	Communicate with patients and family in an empathetic manner about the diagnosis, therapy	S	P	Y	DOAP session	Skill assessment		AETCOM	
<b>Topic: Obstructive airway disease</b> <span style="margin-left: 200px;"><b>Number of competencies: (28)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (01)</b></span>									
CT2.1	Define and classify obstructive airway disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
CT2.2	Describe and discuss the epidemiology, risk factors and evolution of obstructive airway disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology , Pathology	
CT2.3	Enumerate and describe the causes of acute episodes in patients with obstructive airway disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
CT2.4	Describe and discuss the physiology and pathophysiology of hypoxia and hypercapnea	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
CT2.5	Describe and discuss the genetics of alpha 1 antitrypsin deficiency in emphysema	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
CT2.6	Describe the role of the environment in the cause and exacerbation of obstructive airway disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
CT2.7	Describe and discuss allergic and non-allergic precipitants of obstructive airway disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
CT2.8	Elicit document and present a medical history that will differentiate the aetiologies of obstructive airway disease, severity and precipitants	S	SH	Y	Bed side clinic, DOAP session	Skill assessment			
CT2.9	Perform a systematic examination that establishes the diagnosis and severity that includes measurement of respiratory rate, level of respiratory distress, effort tolerance, breath sounds, added sounds, identification of signs of consolidation pleural effusion and pneumothorax	S	SH	Y	Bed side clinic, DOAP session	Skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
CT2.10	Generate a differential diagnosis and prioritise based on clinical features that suggest a specific aetiology	S	SH	Y	Bed side clinic, DOAP session	Skill assessment/ Written			
CT2.11	Describe, discuss and interpret pulmonary function tests	S	SH	Y	Bed side clinic, DOAP session	Skill assessment		Physiology, Pathology	
CT2.12	Perform and interpret peak expiratory flow rate	S	P	Y	Bedside clinic, DOAP session	documentation in log book/ Skill assessment	3		
CT2.13	Describe the appropriate diagnostic work up based on the presumed aetiology	S	SH	Y	Bedside clinic, Small group discussion	Written/ Skill assessment			
CT2.14	Enumerate the indications for and interpret the results of : pulse oximetry, ABG, Chest Radiograph	K	SH	Y	Bedside clinics, Small group discussion, DOAP session	Written/ Skill assessment			
CT2.15	Generate a differential diagnosis and prioritise based on clinical features that suggest a specific aetiology	K	SH	Y	Bedside clinics, Small group discussion, DOAP session	Written/ Skill assessment			
CT2.16	Discuss and describe therapies for OAD including bronchodilators, leukotriene inhibitors, mast cell stabilisers, theophylline, inhaled and systemic steroids, oxygen and immunotherapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
CT2.17	Describe and discuss the indications for vaccinations in OAD	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
CT2.18	Develop a therapeutic plan including use of bronchodilators and inhaled corticosteroids	K	SH	Y	Bedside clinics, Small group discussion, DOAP session	Written/ Skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
CT2.19	Develop a management plan for acute exacerbations including bronchodilators, systemic steroids, antimicrobial therapy	K	SH	Y	Bedside clinics, Small group discussion, DOAP session	Written/ Skill assessment			
CT2.20	Describe and discuss the principles and use of oxygen therapy in the hospital and at home	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
CT2.21	Describe discuss and counsel patients appropriately on smoking cessation	K/C	SH	Y	DOAP session	Skill assessment		AETCOM	
CT2.22	Demonstrate and counsel patient on the correct use of inhalers	S/C	SH	Y	DOAP session	Skill assessment			
CT2.23	Communicate diagnosis treatment plan and subsequent follow up plan to patients	K/C	SH	Y	DOAP session	Skill assessment			
CT2.24	Recognise the impact of OAD on patient's quality of life, well being, work and family	A	KH	Y	Small group discussion, Bedside clinics	Observation by faculty		Community Medicine	
CT2.25	Discuss and describe the impact of OAD on the society and workplace	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
CT2.26	Discuss and describe preventive measures to reduce OAD in workplaces	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
CT2.27	Demonstrate an understanding of patient's inability to change working, living and environmental factors that influence progression of airway disease	A	KH	Y	Small group discussion, Bedside clinics	Observation by faculty		Community Medicine	
CT2.28	Demonstrate an understanding for the difficulties faced by patients during smoking cessation	A	KH	Y	Small group discussion, Bedside clinics	Observation by faculty			
<p><b>Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.</b>  <b>Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,</b>  <b>Column F: DOAP session – Demonstrate, Observe, Assess, Perform.</b>  <b>Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation</b></p>									

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Integration</b>									
<b>Physiology</b>									
PY6.8	Demonstrate the correct technique to perform & interpret Spirometry	S	SH	Y	DOAP sessions	Skill assessment/ Viva voce		Respiratory Medicine	
<b>Pharmacology</b>									
PH1.32	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of drugs used in bronchial asthma and COPD	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Respiratory Medicine	
PH1.33	Describe the mechanism of action, types, doses, side effects, indications and contraindications of the drugs used in cough (antitussives, expectorants/ mucolytics)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Respiratory Medicine	
PH1.44	Describe the first line antitubercular drugs, their mechanisms of action, side effects and doses.	K	KH	Y	Lecture	Written/ Viva voce		Respiratory Medicine	
PH1.45	Describe the drugs used in MDR and XDR Tuberculosis	K	KH	Y	Lecture	Written/ Viva voce		Respiratory Medicine	Microbiology
<b>General Medicine</b>									
IM24.10	Describe and discuss the aetiopathogenesis, clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of COPD in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Respiratory Medicine
<b>Pediatrics</b>									
PE28.19	Describe the etio-pathogenesis, clinical features, diagnosis, management and prevention of asthma in children	S	SH	Y	Bedside clinics, Small group discussion, Lecture	Skill Assessment/ Written/ Viva voce		Respiratory Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PE28.20	Counsel the child with asthma on the correct use of inhalers in a simulated environment	S	P	Y	Bedside clinics, Small group discussion, Lecture	Skills Assessment/ Written/ Viva voce	3	Respiratory Medicine	
PE34.1	Discuss the epidemiology, clinical features, clinical types, complications of Tuberculosis in Children and Adolescents	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	Respiratory Medicine
PE34.2	Discuss the various diagnostic tools for childhood tuberculosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	Respiratory Medicine
PE34.3	Discuss the various regimens for management of Tuberculosis as per National Guidelines	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Community Medicine, Pharmacology	Respiratory Medicine
PE34.4	Discuss the preventive strategies adopted and the objectives and outcome of the National Tuberculosis Control Program	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Community Medicine, Pharmacology	Respiratory Medicine
PE34.5	Able to elicit, document and present history of contact with tuberculosis in every patient encounter	S	SH	Y	Bedside clinics, Skill lab	Skill Assessment			Respiratory Medicine
PE34.6	Identify a BCG scar	S	P	Y	Bed side clinics, Skills lab	Skill Assessment	3	Microbiology	Respiratory Medicine
PE34.7	Interpret a Mantoux test	S	P	Y	Bed side clinics Skills lab	Skill assessment	3	Microbiology	Respiratory Medicine
PE34.8	Interpret a Chest Radiograph	S	SH	Y	Bedside clinics Skills lab	Skill assessment		Radiodiagnosis	Respiratory Medicine
PE34.9	Interpret blood tests in the context of laboratory evidence for tuberculosis	S	SH	N	Bed side clinics, Small group discussion	Log book		Microbiolgy	Respiratory Medicine
PE34.10	Discuss the various samples for demonstraing the organism eg Gastric Aspirate, Sputum , CSF, FNAC	K	KH	Y	Bed side clinics, Small group discussion	Written/ Viva voce		Microbiolgy	Respiratory Medicine
PE34.11	Perform AFB staining	S	P	Y	DOAP session	Log book/Journal	3	Microbiology	Respiratory Medicine
PE34.12	Enumerate the indications and discuss the limitations of methods of culturing M.Tuberculi	K	KH	Y	Small group discussion	Written/ Viva voce		Microbiology	Respiratory Medicine

**PEDIATRICS (CODE: PE)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
<b>PEDIATRICS</b>									
<b>Topic: Normal Growth and Development</b>		<b>Number of competencies : (07)</b>			<b>Number of procedures that require certification: (02)</b>				
PE1.1	Define the terminologies Growth and development and discuss the factors affecting normal growth and development	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE1.2	Discuss and describe the patterns of growth in infants, children and adolescents	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE1.3	Discuss and describe the methods of assessment of growth including use of WHO and Indian national standards. Enumerate the parameters used for assessment of physical growth in infants, children and adolescents	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE1.4	Perform Anthropometric measurements, document in growth charts and interpret	S	P	Y	Small group discussion	Document in Log book	3		
PE1.5	Define development and discuss the normal developmental mile stones with respect to motor, behaviour, social, adaptive and language	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE1.6	Discuss the methods of assessment of development	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE1.7	Perform Developmental assessment and interpret	S	P	N	Bedside clinics, Skills Lab	Document in Log book	3		
<b>Topic: Common problems related to Growth</b>		<b>Number of competencies:(06)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PE2.1	Discuss the etio-pathogenesis, clinical features and management of a child who fails to thrive	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE2.2	Assessment of a child with failing to thrive including eliciting an appropriate history and examination	S	SH	Y	Bedside clinics	Skills Station			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE2.3	Counselling a parent with failing to thrive child	A/C	SH	Y	OSPE	Document in Log book		AETCOM	
PE2.4	Discuss the etio-pathogenesis, clinical features and management of a child with short stature	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE2.5	Assessment of a child with short stature: Elicit history, perform examination, document and present	S	SH	Y	Bedside clinics, Skill lab	Skill Assessment			
PE2.6	Enumerate the referral criteria for growth related problems	K	K	Y	Small group discussion	Written/ Viva voce			
<b>Topic: Common problems related to Development -1 (Developmental delay , Cerebral palsy)</b> <b>Number of competencies:(08)      Number of procedures that require certification: (NIL)</b>									
PE3.1	Define, enumerate and discuss the causes of developmental delay and disability including intellectual disability in children	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
PE3.2	Discuss the approach to a child with developmental delay	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
PE3.3	Assessment of a child with developmental delay - Elicit document and present history	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment			
PE3.4	Counsel a parent of a child with developmental delay	S	SH	Y	DOAP session	Document in Log Book			
PE3.5	Discuss the role of the child developmental unit in management of developmental delay	K	K	N	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
PE3.6	Discuss the referral criteria for children with developmental delay	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
PE3.7	Visit a Child Developmental Unit and observe its functioning	S	KH	Y	Lecture, Small group discussion	Log book Entry		Community Medicine	
PE3.8	Discuss the etio-pathogenesis, clinical presentation and multi-disciplinary approach in the management of Cerebral palsy	K	KH	Y	Lecture, Small group, Bedside clinics	Written/ Viva voce			Physical Medicine & Rehabilitation

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Common problems related to Development-2 (Scholastic backwardness, Learning Disabilities , Autism , ADHD)</b> <b>Number of competencies: (06)</b> <span style="float: right;"><b>Number of procedures that require certification: (NIL)</b></span>									
PE4.1	Discuss the causes and approach to a child with scholastic backwardness	K	K	N	Lecture, Small group discussion	Written			
PE4.2	Discuss the etiology, clinical features, diagnosis and management of a child with Learning Disabilities	K	K	N	Lecture, Small group discussion	Written			
PE4.3	Discuss the etiology, clinical features, diagnosis and management of a child with Attention Deficit Hyperactivity Disorder (ADHD)	K	K	N	Lecture, Small group discussion	Written			
PE4.4	Discuss the etiology, clinical features, diagnosis and management of a child with Autism	K	K	N	Lecture, Small group discussion	Written			
PE4.5	Discuss the role of Child Guidance clinic in children with Developmental problems	K	K	N	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	
PE4.6	Visit to the Child Guidance Clinic	S	KH	N	Lecture, Small group discussion	Document in Log Book			
<b>Topic: Common problems related to behavior</b> <span style="float: right;"><b>Number of procedures that require certification: (NIL)</b></span> <b>Number of competencies: ( 11)</b>									
PE5.1	Describe the clinical features, diagnosis and management of thumb sucking	K	K	N	Lecture, Small group discussion	Written			
PE5.2	Describe the clinical features, diagnosis and management of Feeding problems	K	K	N	Lecture, Small group discussion	Written			
PE5.3	Describe the clinical features, diagnosis and management of nail biting	K	K	N	Lecture, Small group discussion	Written/ Viva voce			
PE5.4	Describe the clinical features, diagnosis and management of Breath Holding spells	K	K	N	Lecture, Small group discussion	Written/ Viva voce			Psychiatry

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE5.5	Describe the clinical features, diagnosis and management of temper tantrums	K	K	N	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE5.6	Describe the clinical features, diagnosis and management of Pica	K	K	N	Lecture, Small group discussion	Written/ Viva voce			
PE5.7	Describe the clinical features, diagnosis and management of Fussy infant	K	K	N	Lecture, Small group discussion	Written			Psychiatry
PE5.8	Discuss the etiology, clinical features and management of Enuresis	K	K	N	Lecture, Small group discussion	Written/ Viva voce			
PE5.9	Discuss the etiology, clinical features and management of Encopresis	K	K	N	Lecture, Small group discussion	Written/ Viva voce			
PE5.10	Discuss the role of child guidance clinic in children with behavioural problems and the referral criteria	K	K	N	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE5.11	Visit to Child Guidance Clinic and observe functioning	K	KH	N	Lecture, Small group discussion	Document in Log Book			

**Topic: Adolescent Health & common problems related to Adolescent Health    Number of competencies: (13)                      Number of procedures that require certification: (NIL)**

PE6.1	Define Adolescence and stages of adolescence	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
PE6.2	Describe the physical, physiological and psychological changes during adolescence (Puberty)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE6.3	Discuss the general health problems during adolescence	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE6.4	Describe adolescent sexuality and common problems related to it	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE6.5	Explain the Adolescent Nutrition and common nutritional problems	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Psychiatry

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE6.6	Discuss the common Adolescent eating disorders (Anorexia Nervosa, Bulimia)	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE6.7	Describe the common mental health problems during adolescence	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE6.8	Respecting patient privacy and maintaining confidentiality while dealing with adolescence	A	SH	Y	Bedside clinics	Document in log book			AETCOM
PE6.9	Perform routine Adolescent Health check up including eliciting history, performing examination including SMR (Sexual Maturity Rating), growth assessments (using Growth charts) and systemic exam including thyroid and Breast exam and the HEADSS screening	S	SH	Y	Bedside clinics	Skills station			
PE6.10	Discuss the objectives and functions of AFHS (Adolescent Friendly Health Services) and the referral criteria	K	K	N	Lecture, Small group discussion	Written/ Viva voce			
PE6.11	Visit to the Adolescent Clinic	S	KH	Y	DOAP session	Document in Log Book			
PE6.12	Enumerate the importance of obesity and other NCD in adolescents	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
PE6.13	Enumerate the prevalence and the importance of recognition of sexual drug abuse in adolescents and children	K	K	N	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
<p><b>Topic: To promote and support optimal Breast feeding for Infants      Number of competencies: (11)      Number of procedures that require certification: (01)</b></p>									
PE7.1	Awareness on the cultural beliefs and practices of breast feeding	K	K	N	Lecture, Small group discussion	Viva			Obstetrics & Gynaecology
PE7.2	Explain the physiology of lactation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE7.3	Describe the composition and types of breast milk and discuss the differences between cow's milk and Human milk	K	KH	Y	Lecture, debate	Written/ Viva voce		Physiology	
PE7.4	Discuss the advantages of breast milk	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE7.5	Observe the correct technique of breast feeding and distinguish right from wrong techniques	S	P	Y	Bedside clinics, Skills lab	Skill Assessment	3		
PE7.6	Enumerate the baby friendly hospital initiatives	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE7.7	Perform breast examination and identify common problems during lactation such as retracted nipples, cracked nipples, breast engorgement, breast abscess	S	SH	Y	Bedside clinics, Skill Lab	Skill Assessment			Obstetrics & Gynaecology, AETCOM
PE7.8	Educate mothers on ante natal breast care and prepare mothers for lactation	A/C	SH	Y	DOAP session	Document in Log Book			AETCOM
PE7.9	Educate and counsel mothers for best practices in Breast feeding	A/C	SH	Y	DOAP session	Document in Log Book			Obstetrics & Gynaecology, AETCOM
PE7.10	Respects patient privacy	A	SH	Y	DOAP session	Document in Log Book			AETCOM
PE7.11	Participate in Breast Feeding Week Celebration	A	SH	Y	DOAP session	Document in Log Book			
<b>Topic: Complementary Feeding</b> <span style="margin-left: 200px;"><b>Number of competencies : (05)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
PE8.1	Define the term Complementary Feeding	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE8.2	Discuss the principles, the initiation, attributes, frequency, techniques and hygiene related to Complementary Feeding including IYCF	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
PE8.3	Enumerate the common complimentary foods	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
PE8.4	Elicit history on the Complementary Feeding habits	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment		Community Medicine	
PE8.5	Counsel and educate mothers on the best practices in Complimentary Feeding	A/C	SH	Y	DOAP session	Document in Log Book		Community Medicine	

**Topic: Normal nutrition, assessment and monitoring**

**Numbcompetencies : (07)**

**Number of procedures that require certification: (NIL)**

PE9.1	Describe the age related nutritional needs of infants, children and adolescents including micronutrients and vitamins	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Biochemistry	
PE9.2	Describe the tools and methods for assessment and classification of nutritional status of infants, children and adolescents	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
PE9.3	Explains the Calorific value of common Indian foods	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE9.4	Elicit document and present an appropriate nutritional history and perform a dietary recall	S	SH	Y	Bedside clinic, Skills lab	Skill Assessment		Community Medicine	
PE9.5	Calculate the age related calorie requirement in Health and Disease and identify gap	S	SH	Y	Bedside clinics, Small group discussion	Skill assessment		Community Medicine	
PE9.6	Assess and classify the nutrition status of infants, children and adolescents and recognize deviations	S	SH	Y	Bedside clinic, Small group discussion	Skill Assessment		Community Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE9.7	Plan an appropriate diet in health and disease	S	SH	N	Bedside clinic, Small group discussion	Document in logbook		Community Medicine	
<b>Topic: Provide nutritional support , assessment and monitoring for common nutritional problems</b> <b>Number of competencies: (06)</b> <b>Number of procedures that require certification: (NIL)</b>									
PE10.1	Define and describe the etio-pathogenesis, classify including WHO classification, clinical features, complication and management of Severe Acute Malnourishment (SAM) and Moderate Acute Malnutrition (MAM)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	
PE10.2	Outline the clinical approach to a child with SAM and MAM	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	
PE10.3	Assessment of a patient with SAM and MAM, diagnosis, classification and planning management including hospital and community based intervention, rehabilitation and prevention	S	SH	Y	Bedside clinics, Skills lab	Skill station		Physiology, Biochemistry	
PE10.4	Identify children with under nutrition as per IMNCI criteria and plan referral	S	SH	Y	DOAP session	Document in log book		Community Medicine	
PE10.5	Counsel parents of children with SAM and MAM	S	SH	Y	Bedside clinic, Skills Station	Document in Log book		AETCOM	
PE10.6	Enumerate the role of locally prepared therapeutic diets and ready to use therapeutic diets	K	K	N	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Obesity in children</b> <b>Number of competencies: (06)</b> <b>Number of procedures that require certification: (01)</b>									
PE11.1	Describe the common etiology, clinical features and management of obesity in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry, Pathology	



Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE12.6	Discuss the RDA, dietary sources of Vitamin D and their role in health and disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.7	Describe the causes, clinical features, diagnosis and management of Deficiency / excess of Vitamin D (Rickets and Hypervitaminosis D)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Physiology, Pathology	
PE12.8	Identify the clinical features of dietary deficiency of Vitamin D	S	SH	Y	Bedside clinics, Skills lab	Document in log book		Biochemistry, Physiology, Pathology	
PE12.9	Assess patients with Vitamin D deficiency, diagnose, classify and plan management	S	SH	Y	Bedside clinics	Document in log book		Biochemistry, Physiology, Pathology	
PE12.10	Discuss the role of screening for Vitamin D deficiency	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
PE12.11	Discuss the RDA, dietary sources of Vitamin E and their role in health and disease	K	K	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.12	Describe the causes, clinical features, diagnosis and management of deficiency of Vitamin E	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.13	Discuss the RDA, dietary sources of Vitamin K and their role in health and disease	K	K	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Physiology, Pathology	
PE12.14	Describe the causes, clinical features, diagnosis management and prevention of deficiency of Vitamin K	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Physiology, Pathology	
PE12.15	Discuss the RDA, dietary sources of Vitamin B and their role in health and disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE12.16	Describe the causes, clinical features, diagnosis and management of deficiency of B complex Vitamins	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	



Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE13.7	Discuss the RDA , dietary sources of Iodine and their role in Health and disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE13.8	Describe the causes, diagnosis and management of deficiency of Iodine	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE13.9	Identify the clinical features of Iodine deficiency disorders	S	SH	N	Lecture, Bedside clinic	Written/ Viva voce		Biochemistry	
PE13.10	Discuss the National Goiter Control program and their recommendations	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Community Medicine	
PE13.11	Discuss the RDA, dietary sources of Calcium and their role in health and disease	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE13.12	Describe the causes, clinical features, diagnosis and management of Ca Deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE13.13	Discuss the RDA, dietary sources of Magnesium and their role in health and disease	K	K	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
PE13.14	Describe the causes, clinical features, diagnosis and management of Magnesium Deficiency	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Biochemistry	
<b>Topic: Toxic elements and free radicals and oxygen toxicity</b> <span style="margin-left: 150px;"><b>Number of competencies: (05)</b></span> <span style="margin-left: 150px;"><b>Number of procedures that require certification (NIL)</b></span>									
PE14.1	Discuss the risk factors, clinical features, diagnosis and management of Lead Poisoning	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PE14.2	Discuss the risk factors, clinical features, diagnosis and management of Kerosene ingestion	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE14.3	Discuss the risk factors, clinical features, diagnosis and management of Organophosphorous poisoning	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE14.4	Discuss the risk factors, clinical features, diagnosis and management of paracetamol poisoning	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PE14.5	Discuss the risk factors, clinical features, diagnosis and management of Oxygen toxicity	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Fluid and electrolyte balance</b> <span style="margin-left: 200px;"><b>Number of competencies:(07)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification:(NIL)</b></span>									
PE15.1	Discuss the fluid and electrolyte requirement in health and disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE15.2	Discuss the clinical features and complications of fluid and electrolyte imbalance and outline the management	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE15.3	Calculate the fluid and electrolyte requirement in health	S	SH	Y	Bedside clinics, Small group discussion	Skill Assessment			
PE15.4	Interpret electrolyte report	S	SH	Y	Bedside clinics, Small group discussion	Skill Assessment			
PE15.5	Calculate fluid and electrolyte imbalance	S	SH	Y	Bedside clinics, Small group discussion	Skill Assessment			
PE15.6	Demonstrate the steps of inserting an IV cannula in a model	S	SH	Y	Skills Lab	mannequin			
PE15.7	Demonstrate the steps of inserting an interosseous line in a mannequin	S	SH	Y	Skills Lab	mannequin			
<b>Topic: Integrated Management of Neonatal and Childhood Illnesses (IMNCI) Guideline</b> <span style="margin-left: 200px;"><b>Number of competencies:(03)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
PE16.1	Explain the components of Integrated Management of Neonatal and Childhood Illnesses (IMNCI) guidelines and method of Risk stratification	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE16.2	Assess children <2 months using IMNCI Guidelines	S	SH	Y	DOAP session	Document in log Book			
PE16.3	Assess children >2 to 5 years using IMNCI guidelines and Stratify Risk	S	SH	Y	DOAP session	Document in log Book			
<b>Topic: The National Health programs, NHM</b> <span style="margin-left: 150px;"><b>Number of competencies:(02)</b></span> <span style="margin-left: 150px;"><b>Number of procedures that require certification: (NIL)</b></span>									
PE17.1	State the vision and outline the goals, strategies and plan of action of NHM and other important national programs pertaining to maternal and child health including RMNCH A+, RBSK, RKSK, JSSK mission Indradhanush and ICDS	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
PE17.2	Analyse the outcomes and appraise the monitoring and evaluation of NHM	K	KH	Y	Debate	Written/ Viva voce		Community Medicine	
<b>Topic: The National Health Programs: RCH</b> <span style="margin-left: 150px;"><b>Number of competencies: (08)</b></span> <span style="margin-left: 150px;"><b>Number of procedures that require certification: (NIL)</b></span>									
PE18.1	List and explain the components, plan, outcome of Reproductive Child Health (RCH) program and appraise its monitoring and evaluation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	Obstetrics & Gynaecology
PE18.2	Explain preventive interventions for child survival and safe motherhood	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	Obstetrics & Gynaecology
PE18.3	Conduct Antenatal examination of women independently and apply at-risk approach in antenatal care	S	SH	Y	Bedside clinics	Skill station		Community Medicine	Obstetrics & Gynaecology
PE18.4	Provide intra-natal care and conduct a normal delivery in a simulated environment	S	SH	Y	DOAP session, Skills lab	Document in Log Book		Community Medicine	Obstetrics & Gynaecology
PE18.5	Provide intra-natal care and observe the conduct of a normal delivery	S	SH	Y	DOAP session	Document in Log Book			Obstetrics & Gynaecology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE18.6	Perform Postnatal assessment of newborn and mother, provide advice on breast feeding, weaning and on family planning	S	SH	Y	Bed side clinics, Skill Lab	Skill Assessment		Community Medicine	Obstetrics & Gynaecology
PE18.7	Educate and counsel caregivers of children	A	SH	Y	Postnatal ward, standardized patient	Skill Assessment		AETCOM	
PE18.8	Observe the implementation of the program by visiting the Rural Health Centre	S	KH	Y	Bed side clinics, Skill Lab	Document in log book		Community Medicine	Obstetrics & Gynaecology
<b>Topic: National Programs, RCH - Universal Immunizations program      Number of competencies: (16)      Number of procedures that require certification: (01)</b>									
PE19.1	Explain the components of the Universal Immunization Program and the National Immunization Program	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology, Biochemistry	
PE19.2	Explain the epidemiology of Vaccine preventable diseases	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology, Biochemistry	
PE19.3	Vaccine description with regard to classification of vaccines, strain used, dose, route, schedule, risks, benefits and side effects, indications and contraindications	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology, Biochemistry	
PE19.4	Define cold chain and discuss the methods of safe storage and handling of vaccines	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology, Biochemistry	
PE19.5	Discuss immunization in special situations – HIV positive children, immunodeficiency, pre-term, organ transplants, those who received blood and blood products, splenectomised children, adolescents, travellers	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine, Microbiology, Biochemistry	
PE19.6	Assess patient for fitness for immunization and prescribe an age appropriate immunization schedule	S	P	Y	Out Patient clinics Skills lab	Skill Assessment	5		

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE19.7	Educate and counsel a patient for immunization	A/C	SH	Y	DOAP session	Document in Log Book			
PE19.8	Demonstrate willingness to participate in the National and sub national immunisation days	A	SH	Y	Lecture, Small group discussion	Document in Log Book		Community Medicine	
PE19.9	Describe the components of safe vaccine practice – Patient education/ counselling; adverse events following immunization, safe injection practices, documentation and Medico-legal implications	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			AETCOM
PE19.10	Observe the handling and storing of vaccines	S	SH	Y	DOAP session	Written/ Viva voce			
PE19.11	Document Immunization in an immunization record	S	SH	Y	Out Patient clinics, Skills lab	Skill assessment			
PE19.12	Observe the administration of UIP vaccines	S	SH	Y	DOAP session	Document in Log Book		Community Medicine	
PE19.13	Demonstrate the correct administration of different vaccines in a mannequin	S	SH	Y	DOAP session	Document in Log Book			
PE19.14	Practice Infection control measures and appropriate handling of the sharps	S	SH	Y	DOAP session	Document in Log Book			
PE19.15	Explain the term implied consent in Immunization services	K	K	Y	Small group discussion	Written/ Viva voce			
PE19.16	Enumerate available newer vaccines and their indications including pentavalent pneumococcal, rotavirus, JE, typhoid IPV & HPV	K	K	N	Lecture, Small group discussion	Written/ Viva voce			

Topic: Care of the Normal New born, and High risk New born

Number of competencies: (20)

Number of procedures that require certification: (NIL)

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE20.1	Define the common neonatal nomenclatures including the classification and describe the characteristics of a Normal Term Neonate and High Risk Neonates	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE20.2	Explain the care of a normal neonate	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE20.3	Perform Neonatal resuscitation in a manikin	S	SH	Y	DOAP session	Log book entry of Performance			
PE20.4	Assessment of a normal neonate	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment			
PE20.5	Counsel / educate mothers on the care of neonates	A/C	SH	Y	DOAP session	Log book documentation			
PE20.6	Explain the follow up care for neonates including Breast Feeding, Temperature maintenance, immunization, importance of growth monitoring and red flags	S	SH	Y	DOAP session	Log book entry			Obstetrics & Gynaecology
PE20.7	Discuss the etiology, clinical features and management of Birth asphyxia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE20.8	Discuss the etiology, clinical features and management of respiratory distress in New born including meconium aspiration and transient tachypnoea of newborn	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE20.9	Discuss the etiology, clinical features and management of Birth injuries	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE20.10	Discuss the etiology, clinical features and management of Hemorrhagic disease of New born	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE20.11	Discuss the clinical characteristics, complications and management of Low birth weight (preterm and Small for gestation)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE20.12	Discuss the temperature regulation in neonates, clinical features and management of Neonatal Hypothermia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE20.13	Discuss the temperature regulation in neonates, clinical features and management of Neonatal Hypoglycemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE20.14	Discuss the etiology, clinical features and management of Neonatal hypocalcemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE20.15	Discuss the etiology, clinical features and management of Neonatal seizures	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE20.16	Discuss the etiology, clinical features and management of Neonatal Sepsis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE20.17	Discuss the etiology, clinical features and management of Perinatal infections	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE20.18	Identify and stratify risk in a sick neonate using IMNCI guidelines	S	SH	Y	DOAP session	Document in Log Book			
PE20.19	Discuss the etiology, clinical features and management of Neonatal hyperbilirubinemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE20.20	Identify clinical presentations of common surgical conditions in the new born including TEF, esophageal atresia, anal atresia, cleft lip and palate, congenital diaphragmatic hernia and causes of acute abdomen	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Topic: Genito-Urinary system

Number of competencies: (17)

Number of procedures that require certification: (NIL)

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE21.1	Enumerate the etio-pathogenesis, clinical features, complications and management of Urinary Tract infection in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
PE21.2	Enumerate the etio-pathogenesis, clinical features, complications and management of acute post-streptococcal Glomerular Nephritis in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE21.3	Discuss the approach and referral criteria to a child with Proteinuria	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE21.4	Discuss the approach and referral criteria to a child with Hematuria	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	
PE21.5	Enumerate the etio-pathogenesis, clinical features, complications and management of Acute Renal Failure in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE21.6	Enumerate the etio-pathogenesis, clinical features, complications and management of Chronic Renal Failure in Children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE21.7	Enumerate the etio-pathogenesis, clinical features, complications and management of Wilms Tumor	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE21.8	Elicit, document and present a history pertaining to diseases of the Genitourinary tract	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment			General Surgery
PE21.9	Identify external markers for Kidney disease, like Failing to thrive, hypertension, pallor, Icthyosis, anasarca	S	SH	Y	Bedside clinics, Skills lab	Document in log book			
PE21.10	Analyse symptom and interpret the physical findings and arrive at an appropriate provisional / differential diagnosis	S	SH	Y	Bedside clinics, Skills lab	Log book			
PE21.11	Perform and interpret the common analytes in a Urine examination	S	SH	Y	Bedside clinics, Skills lab	Skill assessment		Biochemistry, Pathology	
PE21.12	Interpret report of Plain X Ray of KUB	S	SH	Y	Bedside clinics, Skills lab	Log book		Radiodiagnosis	



Number	<b>COMPETENCY</b> The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE23.2	Discuss the Hemodynamic changes, clinical presentation, complications and management of Cyanotic Heart Diseases – Fallot’s Physiology	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
PE23.3	Discuss the etio-pathogenesis, clinical presentation and management of cardiac failure in infant and children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
PE23.4	Discuss the etio-pathogenesis, clinical presentation and management of Acute Rheumatic Fever in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
PE23.5	Discuss the clinical features, complications, diagnosis, management and prevention of Acute Rheumatic Fever	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology	
PE23.6	Discuss the etio-pathogenesis, clinical features and management of Infective endocarditis in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Pathology, Microbiology	
PE23.7	Elicit appropriate history for a cardiac disease, analyse the symptoms e.g. breathlessness, chest pain, tachycardia, feeding difficulty, failing to thrive, reduced urinary output, swelling, syncope, cyanotic spells, Suck rest cycle, frontal swelling in infants. Document and present	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment			
PE23.8	Identify external markers of a cardiac disease e.g. Cyanosis, Clubbing, dependent edema, dental caries, arthritis, erythema rash, chorea, subcutaneous nodules, Osler’s node, Janeway lesions and document	S	SH	Y	Bedside clinics, Skills Lab	Skill Assessment			
PE23.9	Record pulse, blood pressure, temperature and respiratory rate and interpret as per the age	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment			
PE23.10	Perform independently examination of the cardiovascular system – look for precordial bulge, pulsations in the precordium, JVP and its significance in children and infants, relevance of percussion in Pediatric examination, Auscultation and other system examination and document	S	SH	Y	Bedside clinics, Skills lab	Skill station			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE23.11	Develop a treatment plan and prescribe appropriate drugs including fluids in cardiac diseases, anti -failure drugs, and inotropic agents	S	SH	Y	Bedside clinics, Skills lab	log book			
PE23.12	Interpret a chest X ray and recognize Cardiomegaly	S	SH	Y	Bedside clinics, Skills lab	Log book entry		Radiodiagnosis	
PE23.13	Choose and Interpret blood reports in Cardiac illness	S	P	Y	Bedside clinics, Small group discussion	Log book entry			
PE23.14	Interpret Pediatric ECG	S	SH	Y	Bedside clinics, Skills lab	Log book entry			
PE23.15	Use the ECHO reports in management of cases	S	SH	Y	Bedside clinics	Log book entry		Radiodiagnosis	
PE23.16	Discuss the indications and limitations of Cardiac catheterization	K	K	N	Small group discussion	Viva voce			
PE23.17	Enumerate some common cardiac surgeries like BT shunt, Potts and Waterston's and corrective surgeries	K	K	N	Small group discussion	Viva voce			
PE23.18	Demonstrate empathy while dealing with children with cardiac diseases in every patient encounter	A	SH	Y	Small group discussion	Document in Log Book		AETCOM	
<b>Topic:Diarrhoeal diseases and Dehydration</b>		<b>Number of competencies: (17)</b>			<b>Number of procedures that require certification:(03)</b>				
PE24.1	Discuss the etio-pathogenesis, classification, clinical presentation and management of diarrheal diseases in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Microbiology	
PE24.2	Discuss the classification and clinical presentation of various types of diarrheal dehydration	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE24.3	Discuss the physiological basis of ORT, types of ORS and the composition of various types of ORS	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE24.4	Discuss the types of fluid used in Paediatric diarrheal diseases and their composition	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE24.5	Discuss the role of antibiotics, antispasmodics, anti-secretory drugs, probiotics, anti-emetics in acute diarrheal diseases	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology, Microbiology	
PE24.6	Discuss the causes, clinical presentation and management of persistent diarrhoea in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
PE24.7	Discuss the causes, clinical presentation and management of chronic diarrhoea in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE24.8	Discuss the causes, clinical presentation and management of dysentery in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology, Microbiology	
PE24.9	Elicit, document and present history pertaining to diarrheal diseases	S	SH	Y	Bedside clinics, Skills lab	Skill assessment			
PE24.10	Assess for signs of dehydration, document and present	S	SH	Y	Bedside clinics, Skills lab	Skill assessment			
PE24.11	Apply the IMNCI guidelines in risk stratification of children with diarrheal dehydration and refer	S	SH	Y	Bedside clinics, Skills lab	Document in Log book			
PE24.12	Perform and interpret stool examination including Hanging Drop	S	SH	N	Bedside clinics, Skills lab	Log book		Microbiology	
PE24.13	Interpret RFT and electrolyte report	S	SH	Y	Bedside clinics, Small group discussion	Document in Log Book			
PE24.14	Plan fluid management as per the WHO criteria	S	SH	Y	Bedside clinics, Small group activity	Skills Station			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE24.15	Perform NG tube insertion in a manikin	S	P	Y	DOAP session	Document in Log book	2		
PE24.16	Perform IV cannulation in a model	S	P	Y	DOAP session	Document in Log book	2		
PE24.17	Perform Interosseous insertion model	S	P	Y	DOAP session	Document in Log book	2		
<b>Topic: Malabsorption</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification:(NIL)</b>				
PE25.1	Discuss the etio-pathogenesis, clinical presentation and management of Malabsorption in Children and its causes including celiac disease	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	
<b>Topic: Acute and chronic liver disorders</b>		<b>Number of competencies: (13)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PE26.1	Discuss the etio-pathogenesis, clinical features and management of acute hepatitis in children	K	KH	Y	Lecture, Small group activity	Written/ Viva voce		Pathology, Microbiology	
PE26.2	Discuss the etio-pathogenesis, clinical features and management of Fulminant Hepatic Failure in children	K	KH	Y	Lecture, Small group activity	Written/ Viva voce		Pathology, Microbiology	
PE26.3	Discuss the etio-pathogenesis, clinical features and management of chronic liver diseases in children	K	KH	Y	Lecture, Small group activity	Written/ Viva voce		Pathology, Microbiology	
PE26.4	Discuss the etio-pathogenesis, clinical features and management of Portal Hypertension in children	K	KH	Y	Lecture, Small group activity	Written/ Viva voce		Pathology	
PE26.5	Elicit document and present the history related to diseases of Gastrointestinal system	S	SH	Y	Bedside clinics, Skills lab	Skills Station			
PE26.6	Identify external markers for GI and Liver disorders e.g.. Jaundice, Pallor, Gynaecomastia, Spider angioma, Palmar erythema, Icthyosis, Caput medusa, Clubbing, Failing to thrive, Vitamin A and D deficiency	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE26.7	Perform examination of the abdomen, demonstrate organomegaly, ascites etc.	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment			
PE26.8	Analyse symptoms and interpret physical signs to make a provisional/ differential diagnosis	S	SH	Y	Bedside clinics, Skill lab	Skill Assessment			
PE26.9	Interpret Liver Function Tests, viral markers, ultra sonogram report	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment		Pathology	
PE26.10	Demonstrate the technique of liver biopsy in a Perform Liver Biopsy in a simulated environment	S	SH	Y	DOAP session	Document in log book			
PE26.11	Enumerate the indications for Upper GI endoscopy	K	K	N	Small group discussion	Viva voce			
PE26.12	Discuss the prevention of Hep B infection – Universal precautions and Immunisation	K	KH	Y	Lecture, Small group activity	Written/ Viva voce		Microbiology	
PE26.13	Counsel and educate patients and their family appropriately on liver diseases	A/C	P	y	Bedside clinics, Skills lab	Document in log book			
<b>Topic: Pediatric Emergencies – Common Pediatric Emergencies</b> <b>Number of competencies: (35)</b> <b>Number of procedures that require certification:(10)</b>									
PE27.1	List the common causes of morbidity and mortality in the under five children	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
PE27.2	Describe the etio-pathogenesis, clinical approach and management of cardiorespiratory arrest in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE27.3	Describe the etio-pathogenesis of respiratory distress in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE27.4	Describe the clinical approach and management of respiratory distress in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE27.5	Describe the etio-pathogenesis, clinical approach and management of Shock in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE27.6	Describe the etio-pathogenesis, clinical approach and management of Status epilepticus	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE27.7	Describe the etio-pathogenesis, clinical approach and management of an unconscious child	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE27.8	Discuss the common types, clinical presentations and management of poisoning in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE27.9	Discuss oxygen therapy, in Pediatric emergencies and modes of administration	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE27.10	Observe the various methods of administering Oxygen	S	KH	Y	Demonstration	Document in log book			
PE27.11	Explain the need and process of triage of sick children brought to health facility	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE27.12	Enumerate emergency signs and priority signs	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE27.13	List the sequential approach of assessment of emergency and priority signs	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE27.14	Assess emergency signs and prioritize	S	SH	Y	DOAP session, Skills lab	Skills Assessment			
PE27.15	Assess airway and breathing: recognise signs of severe respiratory distress. Check for cyanosis, severe chest indrawing, grunting	S	P	Y	DOAP session, Skills lab	Skills Assessment	3		

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE27.16	Assess airway and breathing. Demonstrate the method of positioning of an infant & child to open airway in a simulated environment	S	P	Y	DOAP session, Skills Lab	Skills Assessment	3		
PE27.17	Assess airway and breathing: administer oxygen using correct technique and appropriate flow rate	S	P	Y	DOAP session, Skills Lab	Skills Assessment	3		
PE27.18	Assess airway and breathing: perform assisted ventilation by Bag and mask in a simulated environment	S	P	Y	DOAP session, Skills lab	Skills Assessment	3		
PE27.19	Check for signs of shock i.e. pulse, Blood pressure, CRT	S	P	Y	DOAP session, Skills Lab	Skills Assessment	3		
PE27.20	Secure an IV access in a simulated environment	S	P	Y	DOAP session, Skills Lab	Skills Assessment	3		
PF27.21	Choose the type of fluid and calculate the fluid requirement in shock	S	P	Y	DOAP session, Small group activity	Skills Assessment	3		
PE27.22	Assess level of consciousness & provide emergency treatment to a child with convulsions/ coma - Position an unconscious child - Position a child with suspected trauma - Administer IV/per rectal Diazepam for a convulsing child in a simulated environment	S	P	Y	DOAP session, Skills Lab	Skills Assessment	3		
PE27.23	Assess for signs of severe dehydration	S	P	Y	Bedside clinics, Skills lab	Skill station	3		
PE27.24	Monitoring and maintaining temperature: define hypothermia. Describe the clinical features, complications and management of Hypothermia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE27.25	Describe the advantages and correct method of keeping an infant warm by skin to skin contact	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE27.26	Describe the environmental measures to maintain temperature	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE27.27	Assess for hypothermia and maintain temperature	S	SH	Y	Skills lab	Skills Assessment			
PE27.28	Provide BLS for children in manikin	S	P	Y	Skills Lab		3		
PE.27.29	Discuss the common causes, clinical presentation, medico-legal implications of abuse	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE27.30	Demonstrate confidentiality with regard to abuse	A	SH	Y	Skills lab, standardized patients	Skills Station			
PE27.31	Assess child for signs of abuse	S	SH	Y	DOAP session, Skills lab	Log book			
PE27.32	Counsel parents of dangerously ill / terminally ill child to break a bad news	S	SH	Y	DOAP session	Document in Log book			
PE27.33	Obtain Informed Consent	S	SH	Y	DOAP session	Document in Log book			
PE27.34	Willing to be a part of the ER team	A	SH	Y	DOAP session	Document in Log book			
PE27.35	Attends to emergency calls promptly	A	SH	Y	DOAP session	Document in Log Book			
<b>Topic: Respiratory system</b>		<b>Number of competencies: (20)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PE28.1	Discuss the etio-pathogenesis, clinical features and management of Naso pharyngitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE28.2	Discuss the etio-pathogenesis of Pharyngo Tonsillitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE28.3	Discuss the clinical features and management of Pharyngo Tonsillitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE28.4	Discuss the etio-pathogenesis, clinical features and management of Acute Otitis Media (AOM)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE28.5	Discuss the etio-pathogenesis, clinical features and management of Epiglottitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE28.6	Discuss the etio-pathogenesis, clinical features and management of Acute laryngo- trachea-bronchitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE28.7	Discuss the etiology, clinical features and management of Stridor in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE28.8	Discuss the types, clinical presentation, and management of foreign body aspiration in infants and children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE28.9	Elicit, document and present age appropriate history of a child with upper respiratory problem including Stridor	S	SH	Y	Bedside clinics, skill lab	Skill Assessment		ENT	
PE28.10	Perform otoscopic examination of the ear	S	SH	Y	DOAP session	Skills Assessment		ENT	
PE28.11	Perform throat examination using tongue depressor	S	SH	Y	DOAP session	Skills Assessment		ENT	
PE28.12	Perform examination of the nose	S	SH	Y	DOAP session	Skills Assessment		ENT	
PE28.13	Analyse the clinical symptoms and interpret physical findings and make a provisional / differential diagnosis in a child with ENT symptoms	S	SH	Y	Bedside clinics	Skills Assessment			
PE28.14	Develop a treatment plan and document appropriately in a child with upper respiratory symptoms	S	SH	Y	Bedside clinics	Skills Assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE28.15	Stratify risk in children with stridor using IMNCI guidelines	S	SH	Y	Bedside clinics	Log book documentation			
PE28.16	Interpret blood tests relevant to upper respiratory problems	S	SH	N	Bedside clinics, Small group discussion	Log book			
PE28.17	Interpret X-ray of the paranasal sinuses and mastoid; and /or use written report in case of management Interpret CXR in foreign body aspiration and lower respiratory tract infection, understand the significance of thymic shadow in pediatric chest X-rays	S	SH	Y	Bedside clinics, Small group discussion	Skills Assessment		ENT, Radiodiagnosis	
PE28.18	Describe the etio-pathogenesis, diagnosis, clinical features, management and prevention of lower respiratory infections including bronchiolitis, wheeze associated LRTI Pneumonia and empyema	S	SH	Y	Bedside clinics, Small group discussion, Lecture	Skill Assessment/ Written/ Viva voce			
PE28.19	Describe the etio-pathogenesis, diagnosis, clinical features, management and prevention of asthma in children	S	SH	Y	Bedside clinics, Small group discussion, Lecture	Skill Assessment/ Written/ Viva voce		Respiratory Medicine	
PE28.20	Counsel the child with asthma on the correct use of inhalers in a simulated environment	S	SH	Y	Bedside clinics, Small group discussion, Lecture	Skills Assessment/ Written/ Viva voce		Respiratory Medicine	
<b>Topic: Anemia and other Hemato-oncologic disorders in children</b> <b>Number of competencies: (20 )</b> <b>Number of procedures that require certification: (NIL)</b>									
PE29.1	Discuss the etio-pathogenesis, clinical features, classification and approach to a child with anaemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
PE29.2	Discuss the etio-pathogenesis, clinical features and management of Iron Deficiency anaemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE29.3	Discuss the etiopathogenesis, clinical features and management of VIT B12, Folate deficiency anaemia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
PE29.4	Discuss the etio-pathogenesis, clinical features and management of Hemolytic anemia, Thalassemia Major, Sickle cell anaemia, Hereditary spherocytosis, Auto-immune hemolytic anaemia and hemolytic uremic syndrome	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
PE29.5	Discuss the National Anaemia Control Program	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
PE29.6	Discuss the cause of thrombocytopenia in children: describe the clinical features and management of Idiopathic Thrombocytopenic Purpura (ITP)	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE29.7	Discuss the etiology, classification, pathogenesis and clinical features of Hemophilia in children	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE29.8	Discuss the etiology, clinical presentation and management of Acute Lymphoblastic Leukemia in children	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE29.9	Discuss the etiology, clinical presentation and management of lymphoma in children	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	
PE29.10	Elicit, document and present the history related to Hematology	S	SH	Y	Bedside clinics, Skills lab	Skills Station			
PE29.11	Identify external markers for hematological disorders e.g.. Jaundice, Pallor, Petechiae purpura, Ecchymosis, Lymphadenopathy, bone tenderness, loss of weight, Mucosal and large joint bleed	S	SH	Y	Bedside clinics, Skills lab	Skill assessment			
PE29.12	Perform examination of the abdomen, demonstrate organomegaly	S	SH	Y	Bedside clinics, Skills lab	Skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE29.13	Analyse symptoms and interpret physical signs to make a provisional/ differential diagnosis	S	SH	Y	Bedside clinics, Skill lab	Skill assessment			
PE29.14	Interpret CBC, LFT	S	SH	Y	Bedside clinics, Skills lab	Skill assessment			
PE29.15	Perform and interpret peripheral smear	S	SH	Y	DOAP session	Document in log book			
PE29.16	Discuss the indications for Hemoglobin electrophoresis and interpret report	K	K	N	Small group discussion	Viva voce		Biochemistry	
PE29.17	Demonstrate performance of bone marrow aspiration in manikin	S	SH	Y	Skills lab	Document in log Book			
PE29.18	Enumerate the referral criteria for Hematological conditions	S	SH	Y	Bedside clinics, Small group activity	Viva voce			
PE29.19	Counsel and educate patients about prevention and treatment of anemia	A/C	SH	Y	Bedside clinics, Skills lab	Document in log book			
PE29.20	Enumerate the indications for splenectomy and precautions	K	K	N	Small group Activity	Viva voce			
<b>Topic: Systemic Pediatrics-Central Nervous system</b> <span style="margin-left: 150px;"><b>Number of competencis: (23)</b></span> <span style="margin-left: 150px;"><b>Number of procedures that require certification:(NIL)</b></span>									
PE30.1	Discuss the etio-pathogenesis, clinical features , complications, management and prevention of meningitis in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
PE30.2	Distinguish bacterial, viral and tuberculous meningitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
PE30.3	Discuss the etio-pathogenesis, classification, clinical features, complication and management of Hydrocephalus in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	<b>COMPETENCY</b> The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE30.4	Discuss the etio-pathogenesis, classification, clinical features, and management of Microcephaly in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE30.5	Enumerate the Neural tube defects. Discuss the causes, clinical features, types, and management of Neural Tube defect	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE30.6	Discuss the etio-pathogenesis, clinical features, and management of Infantile hemiplegia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE30.7	Discuss the etio-pathogenesis, clinical features, complications and management of Febrile seizures in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE30.8	Define epilepsy. Discuss the pathogenesis, clinical types, presentation and management of Epilepsy in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE30.9	Define status Epilepticus. Discuss the clinical presentation and management	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE30.10	Discuss the etio-pathogenesis, clinical features and management of Mental retardation in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE30.11	Discuss the etio-pathogenesis, clinical features and management of children with cerebral palsy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE30.12	Enumerate the causes of floppiness in an infant and discuss the clinical features, differential diagnosis and management	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE30.13	Discuss the etio-pathogenesis, clinical features, management and prevention of Poliomyelitis in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
PE30.14	Discuss the etio-pathogenesis, clinical features and management of Duchene muscular dystrophy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE30.15	Discuss the etio-pathogenesis, clinical features and management of Ataxia in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE30.16	Discuss the approach to and management of a child with headache	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE30.17	Elicit document and present an age appropriate history pertaining to the CNS	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment			
PE30.18	Demonstrate the correct method for physical examination of CNS including identification of external markers. Document and present clinical findings	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment			
PE30.19	Analyse symptoms and interpret physical findings and propose a provisional / differential diagnosis	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment			
PE30.20	Interpret and explain the findings in a CSF analysis	S	SH	Y	Small group discussion	Log book		Microbiology	
PE30.21	Enumerate the indication and discuss the limitations of EEG, CT, MRI	K	K	N	Bedside clinics	Log book			
PE30.22	Interpret the reports of EEG, CT, MRI	S	SH	Y	Bedside clinics, Skills lab	Log book		Radiodiagnosis	
PE30.23	Perform in a mannequin lumbar puncture. Discuss the indications, contraindication of the procedure	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment			

**Topic: Allergic Rhinitis , Atopic Dermatitis, Bronchial Asthma , Urticaria Angioedema**

**Number of competencies: (12)**

**Number of procedures that require certification: (NIL)**

PE31.1	Describe the etio-pathogenesis, management and prevention of Allergic Rhinitis in Children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE31.2	Recognize the clinical signs of Allergic Rhinitis	S	SH	Y	Bedside clinics' Skill Lab	Skill Assessment		ENT	
PE31.3	Describe the etio-pathogenesis, clinical features and management of Atopic dermatitis in Children	K	KH	Y	Lecture Small group discussion	Written/ Viva voce		ENT	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE31.4	Identify Atopic dermatitis and manage	S	SH		Bedside clinics Skills lab	Skill Assessment		Dermatology, Venereology & Leprosy	
PE31.5	Discuss the etio-pathogenesis, clinical types, presentations, management and prevention of childhood Asthma	K	KH	Y	Lecture Small group discussion	Written/ Viva voce			
PE31.6	Recognise symptoms and signs of Asthma	S	SH	Y	Bedside clinic, Small group activity	Skill Assessment			
PE31.7	Develop a treatment plan for Asthma appropriate to clinical presentation & severity	S	SH	Y	Bedside clinic, Small group activity	Skill Assessment			
PE31.8	Enumerate criteria for referral	K	KH	Y	Bedside clinic, Small group activity	Written/ Viva voce			
PE31.9	Interpret CBC and CX Ray in Asthma	S	SH	Y	Bedside clinic, Small group activity	Skill Assessment			
PE31.10	Enumerate the indications for PFT	K	K	N	Bedside clinic, Small group activity	Viva voce			
PE31.11	Observe administration of Nebulisation	S	SH	Y	DOAP session	Document in log book			
PE31.12	Discuss the etio-pathogenesis, clinical features and complications and management of Urticaria Angioedema	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Chromosomal Abnormalities</b>		<b>Number of competencies: (13)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PE32.1	Discuss the genetic basis, risk factors, complications, prenatal diagnosis, management and genetic counselling in Down's Syndrome	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE32.2	Identify the clinical features of Down's Syndrome	S	SH	Y	Bedside clinics, Skills lab	log book		General Medicine	
PE32.3	Interpret normal Karyotype and recognize Trisomy 21	S	SH	Y	Bedside clinics, Skills lab	Log book			General Medicine
PE32.4	Discuss the referral criteria and Multidisciplinary approach to management	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE32.5	Counsel parents regarding 1. Present child 2. Risk in the next pregnancy	A/C	SH	N	Bedside clinics, Skills lab	Log book			
PE32.6	Discuss the genetic basis, risk factors, clinical features, complications, prenatal diagnosis, management and genetic counselling in Turner's Syndrome	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Obstetrics & Gynaecology	
PE32.7	Identify the clinical features of Turner Syndrome	S	SH	N	Bedside clinics, Skills lab	Log book		General Medicine	
PE32.8	Interpret normal Karyotype and recognize the Turner Karyotype	S	SH	N	Bedside clinics, Skills lab	log book		General Medicine, Obstetrics & Gynaecology	
PE32.9	Discuss the referral criteria and multidisciplinary approach to management of Turner Syndrome	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			General Medicine, Obstetrics & Gynaecology
PE32.10	Counsel parents regarding 1. Present child 2. Risk in the next pregnancy	A/C	SH	N	Bedside clinics, Skills lab	Log book			
PE32.11	Discuss the genetic basis, risk factors, complications, prenatal diagnosis, management and genetic counselling in Klinefelter Syndrome	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE32.12	Identify the clinical features of Klinefelter Syndrome	S	SH	N	Bedside clinics, Skills lab	Log book		General Medicine	
PE32.13	Interpret normal Karyotype and recognize the Klinefelter Karyotype	S	SH	N	Bedside clinics, Skills lab	Log book		General Medicine	
<b>Topic: Endocrinology</b> <span style="margin-left: 200px;"><b>Number of competencies: ( 11)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (02)</b></span>									
PE33.1	Describe the etio-pathogenesis clinical features, management of Hypothyroidism in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PE33.2	Recognize the clinical signs of Hypothyroidism and refer	S	SH	Y	Bedside clinics, Skill Lab	Skill Assessment			
PE33.3	Interpret and explain neonatal thyroid screening report	S	SH	Y	Bedside clinics, Small group discussion	Skill Assessment			
PE33.4	Discuss the etio-pathogenesis, clinical types, presentations, complication and management of Diabetes mellitus in children	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce			
PE33.5	Interpret Blood sugar reports and explain the diagnostic criteria for Type 1 Diabetes	S	SH	Y	Bedside clinic, small group activity	Skill Assessment			
PE33.6	Perform and interpret Urine Dip Stick for Sugar	S	P	Y	DOAP session	Skill Assessment	3	Biochemistry	
PE33.7	Perform genital examination and recognize Ambiguous Genitalia and refer appropriately	S	SH	Y	Bedside clinic Skills lab	Skill Assessment			
PE33.8	Define precocious and delayed Puberty	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE33.9	Perform Sexual Maturity Rating (SMR) and interpret	S	SH	Y	Bedside clinics Skills Lab	Skill Assessment			
PE33.10	Recognize precocious and delayed Puberty and refer	S	SH	Y	Bedside clinics Skills Lab	log book			
PE33.11	Identify deviations in growth and plan appropriate referral	S	P	Y	Bedside clinics Skills Lab	log book	2		
<b>Topic:Vaccine preventable Diseases - Tuberculosis</b> <span style="margin-left: 150px;"><b>Number of competencies: ( 20)</b></span> <span style="margin-left: 150px;"><b>Number of procedures that require certification: (03)</b></span>									
PE34.1	Discuss the epidemiology, clinical features, clinical types, complications of Tuberculosis in Children and Adolescents	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	Respiratory Medicine
PE34.2	Discuss the various diagnostic tools for childhood tuberculosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	Respiratory Medicine
PE34.3	Discuss the various regimens for management of Tuberculosis as per National Guidelines	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Community Medicine, Pharmacology	Respiratory Medicine
PE34.4	Discuss the preventive strategies adopted and the objectives and outcome of the National Tuberculosis Control Program	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology, Community Medicine, Pharmacology	Respiratory Medicine
PE34.5	Able to elicit, document and present history of contact with tuberculosis in every patient encounter	S	SH	Y	Bedside clinics, Skill lab	Skill Assessment			Respiratory Medicine
PE34.6	Identify a BCG scar	S	P	Y	Bedside clinics, Skills lab	Skill Assessment	3	Microbiology	Respiratory Medicine
PE34.7	Interpret a Mantoux test	S	P	Y	Bedside clinics Skills lab	Skill assessment	3	Microbiology	Respiratory Medicine
PE34.8	Interpret a Chest Radiograph	S	SH	Y	Bedside clinics Skills lab	Skill assessment		Radiodiagnosis	Respiratory Medicine

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE34.9	Interpret blood tests in the context of laboratory evidence for tuberculosis	S	SH	N	Bedside clinics, Small group discussion	log book		Microbiology	Respiratory Medicine
PE34.10	Discuss the various samples for demonstrating the organism e.g. Gastric Aspirate, Sputum , CSF, FNAC	K	KH	Y	Bedside clinics, Small group discussion	Written/ Viva voce		Microbiology	Respiratory Medicine
PE34.11	Perform AFB staining	S	P	Y	DOAP session	Log book/Journal	3	Microbiology	Respiratory Medicine
PE34.12	Enumerate the indications and discuss the limitations of methods of culturing M.Tuberculi	K	KH	Y	Small group discussion	Written/ Viva voce		Microbiology	Respiratory Medicine
PE34.13	Enumerate the newer diagnostic tools for Tuberculosis including BACTEC CBNAAT and their indications	K	K	N	Lecture, Small group discussion	Written/ Viva voce			
PE34.14	Enumerate the common causes of fever and discuss the etiopathogenesis, clinical features, complications and management of fever in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
PE34.15	Enumerate the common causes of fever and discuss the etiopathogenesis, clinical features, complications and management of child with exanthematous illnesses like Measles, Mumps, Rubella & Chicken pox	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
PE34.16	Enumerate the common causes of fever and discuss the etiopathogenesis, clinical features, complications and management of child with Diphtheria, Pertussis, Tetanus.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
PE34.17	Enumerate the common causes of fever and discuss the etiopathogenesis, clinical features, complications and management of child with Typhoid	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PE34.18	Enumerate the common causes of fever and discuss the etiopathogenesis, clinical features, complications and management of child with Dengue, Chikungunya and other vector born diseases	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
PE34.19	Enumerate the common causes of fever and discuss the etiopathogenesis, clinical features, complications and management of children with Common Parasitic infections, malaria, leishmaniasis, filariasis, helminthic infestations, amebiasis, giardiasis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
PE34.20	Enumerate the common causes of fever and discuss the etiopathogenesis, clinical features, complications and management of child with Rickettsial diseases	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
<b>Topic: The role of the physician in the community</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification : (NIL)</b>				
PE35.1	Identify, discuss and defend medicolegal, socio-cultural and ethical issues as they pertain to health care in children (including parental rights and right to refuse treatment)	K	KH	Y	Small group discussion	Written/ Viva voce			
<p><b>Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.</b>  <b>Column D: K – Knows, KH - Knows How, SH- Shows how, P- performs independently,</b>  <b>Column F: DOAP session – Demonstrate, Observe, Assess, Perform.</b>  <b>Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation</b></p>									
<b>Integration</b>									
<b>Human Anatomy</b>									
AN25.4	Describe embryological basis of: 1) atrial septal defect, 2)ventricular septal defect , 3)Fallot's tetralogy & 4) tracheo-oesophageal fistula	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics	Physiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN25.5	Describe developmental basis of congenital anomalies, transposition of great vessels, dextrocardia, patent ductus arteriosus and coarctation of aorta	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics	Physiology
AN25.9	Demonstrate surface marking of lines of pleural reflection, Lung borders and fissures, Trachea, Heart borders, Apex beat & surface projection of valves of heart	K/S	SH	Y	Practical	Viva voce/ skill assessment		General Medicine, Pediatrics	Physiology
AN63.2	Describe anatomical basis of congenital hydrocephalus	K	KH	N	Lecture	Written		Pediatrics	Physiology
AN64.3	Describe various types of open neural tube defects with its embryological basis	K	KH	N	Lecture	Written/ Viva voce		Obstetrics & Gynaecology, Pediatrics	
AN74.1	Describe the various modes of inheritance with examples	K	KH	Y	Lecture	Written		General Medicine, Pediatrics	
AN74.2	Draw pedigree charts for the various types of inheritance & give examples of diseases of each mode of inheritance	K	KH	Y	Lecture	Written		General Medicine, Pediatrics	
AN74.4	Describe the genetic basis & clinical features of Achondroplasia, Cystic Fibrosis, Vitamin D resistant rickets, Hemophilia, Duchene's muscular dystrophy & Sickle cell anaemia	K	KH	N	Lecture	Written		General Medicine, Pediatrics	
AN75.1	Describe the structural and numerical chromosomal aberrations	K	KH	Y	Lecture	Written		Pediatrics	
AN75.2	Explain the terms mosaics and chimeras with example	K	KH	N	Lecture	Written		Pediatrics	
AN75.3	Describe the genetic basis & clinical features of Prader Willi syndrome, Edward syndrome & Patau syndrome	K	KH	N	Lecture	Written		Pediatrics	
AN75.4	Describe genetic basis of variation; polymorphism and mutation	K	KH	Y	Lecture	Written		Pediatrics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
AN75.5	Describe the principles of genetic counselling	K	KH	Y	Lecture	Written		Pediatrics, Obstetrics & Gynaecology	
<b>Physiology</b>									
PY11.6	Describe physiology of Infancy	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
PY11.9	Interpret growth charts	K	KH	Y	Small group teaching	Practical/OSPE/ Viva voce		Pediatrics	
PY11.10	Interpret anthropometric assessment of infants	K	KH	Y	Small group teaching	Practical/OSPE/Viva voce		Pediatrics	
<b>Biochemistry</b>									
BI5.3	Describe the digestion and absorption of dietary proteins	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
BI5.4	Describe common disorders associated with protein metabolism	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
BI7.3	Describe gene mutations and basic mechanism of regulation of gene expression	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
BI7.4	Describe applications of recombinant DNA technology, PCR in the diagnosis and treatment of diseases with genetic basis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics, General Medicine	
BI8.1	Discuss the importance of various dietary components and explain importance of dietary fibre	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics, Pathology	
BI8.2	Describe the types and causes of protein energy malnutrition and its effects	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics, Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
BI8.5	Summarize the nutritional importance of commonly used items of food including fruits and vegetables. (macro-molecules & its importance)	K	KH	Y	Lecture , Small group discussion	Written/ Viva voce		Community Medicine, General Medicine, Pediatrics	
BI10.5	Describe antigens and concepts involved in vaccine development	K	KH	Y	Lecture , Small group discussion	Written/ Viva voce		Pathology, Pediatrics, Microbiology	
<b>Pathology</b>									
PA12.2	Describe the pathogenesis of disorders caused by protein calorie malnutrition and starvation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Pediatrics	
PA21.2	Classify and describe the etiology, pathogenesis and pathology of vascular and platelet disorders including ITP and hemophilias	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
PA28.12	Define, classify and describe the genetics, inheritance etiology, pathogenesis, pathology, laboratory, urinary findings, distinguishing features, progression and complications of cystic disease of the kidney	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics	
PA28.14	Classify and describe the etiology, genetics, pathogenesis, pathology, presenting features, progression and spread of renal tumors	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
PA31.4	Enumerate and describe the etiology, hormonal dependency and pathogenesis of gynecomastia	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pediatrics, General Medicine	
PA35.2	Classify and describe the etiology, genetics, pathogenesis, pathology, presentation sequelae and complications of CNS tumors	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
<b>Microbiology</b>									

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
MI1.8	Describe the mechanisms of immunity and response of the host immune system to infections	K	KH	Y	Lecture	Written/ Viva voce		Pediatrics	Pathology
MI1.9	Discuss the immunological basis of vaccines and describe the Universal Immunisation schedule	K	KH	Y	Lecture	Written/ Viva voce		Paediatrics	
MI1.10	Describe the immunological mechanisms in immunological disorder (hypersensitivity, autoimmune disorders and immunodeficiency states) and discuss the laboratory methods used in detection	K	KH	Y	Lecture	Written/ Viva voce		Paediatrics	
MI3.1	Enumerate the microbial agents causing diarrhea and dysentery. Describe the epidemiology, morphology, pathogenesis, clinical features, and diagnostic modalities of these agents	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Paediatrics	Pathology
MI3.2	Identify the common etiologic agents of diarrhea and dysentery	S	SH	Y	DOAP session	Skill assessment		General Medicine, Paediatrics	
MI5.1	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of meningitis	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Paediatrics	Pathology
MI5.2	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of encephalitis	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Paediatrics	Pathology
MI5.3	Identify the microbial agents causing meningitis	S	SH	Y	DOAP session	Skill assessment		General Medicine, Paediatrics	
<b>Pharmacology</b>									
PH1.12	Calculate the dosage of drugs using appropriate formulae for an individual patient, including children, elderly and patient with renal dysfunction	K/S	SH	Y	Lecture, practical	Written/ Viva voce		Pediatrics, General Medicine	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
PH1.43	Describe and discuss the rational use of antimicrobials including antibiotic stewardship program	K	KH	Y	Lecture	Written/ Viva voce		General Medicine Pediatrics	Microbiology
PH1.56	Describe basic aspects of Geriatric and Pediatric pharmacology	K	KH	Y	Lecture	Written/ Viva voce		Pediatrics	
PH2.4	Demonstrate the correct method of calculation of drug dosage in patients including those used in special situations	S	SH	Y	DOAP sessions	Skills assessment		Pharmacology, General Medicine	
<b>Community Medicine</b>									
CM3.3	Describe the aetiology and basis of water borne diseases /jaundice/hepatitis/ diarrheal diseases	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Microbiology, General Medicine, Pediatrics	
CM5.1	Describe the common sources of various nutrients and special nutritional requirements according to age, sex, activity, physiological conditions	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics	
CM5.2	Describe and demonstrate the correct method of performing a nutritional assessment of individuals, families and the community by using the appropriate method	S	SH	Y	DOAP session	Skill Assessment		General Medicine, Pediatrics	
CM5.3	Define and describe common nutrition related health disorders (including macro-PEM, Micro-iron, Zn, iodine, Vit. A), their control and management.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics	
CM5.4	Plan and recommend a suitable diet for the individuals and families based on local availability of foods and economic status, etc in a simulated environment	S	SH	Y	DOAP session	Skill Assessment		General Medicine, Pediatrics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
CM5.5	Describe the methods of nutritional surveillance, principles of nutritional education and rehabilitation in the context of socio-cultural factors	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics	
CM5.6	Enumerate and discuss the National Nutrition Policy, important national nutritional Programs including the Integrated Child Development Services Scheme (ICDS) etc	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
CM5.8	Describe and discuss the importance and methods of food fortification and effects of additives and adulteration	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
CM6.1	Formulate a research question for a study	K	KH	Y	Small group, Lecture, DOAP session	Written/ Viva voce/ Skill Assessment		General Medicine, Pediatrics	
CM6.2	Describe and discuss the principles and demonstrate the methods of collection, classification, analysis, interpretation and presentation of statistical data	S	SH	Y	Small group discussion, Lecture, DOAP session	Written/ Viva voce/ Skill Assessment		General Medicine, Pediatrics	
CM6.3	Describe, discuss and demonstrate the application of elementary statistical methods including test of significance in various study designs	S	SH	Y	Small group discussion, Lecture, DOAP session	Written/ Viva voce/ Skill Assessment		General Medicine, Pediatrics	
CM6.4	Enumerate, discuss and demonstrate common sampling techniques, simple statistical methods, frequency distribution, measures of central tendency and dispersion	S	SH	Y	Small group discussion, Lecture, DOAP session	Written/ Viva voce/ Skill Assessment		General Medicine, Pediatrics	
CM8.1	Describe and discuss the epidemiological and control measures including the use of essential laboratory tests at the primary care level for communicable diseases	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		General Medicine, Pediatrics	Microbiology, Pathology
CM8.3	Enumerate and describe disease specific National Health Programs including their prevention and treatment of a case	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		General Medicine, Pediatrics	
CM8.4	Describe the principles and enumerate the measures to control a disease epidemic	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		General Medicine, Pediatrics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
CM8.5	Describe and discuss the principles of planning, implementing and evaluating control measures for disease at community level bearing in mind the public health importance of the disease	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		General Medicine, Pediatrics	
CM9.2	Define, calculate and interpret demographic indices including birth rate, death rate, fertility rates	S	SH	Y	Lecture, Small group discussion, DOAP sessions	Skill assessment		Obstetrics & Gynaecology, Pediatrics	
CM10.1	Describe the current status of Reproductive, maternal, newborn and Child Health	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		Obstetrics & Gynaecology, Pediatrics	
CM10.2	Enumerate and describe the methods of screening high risk groups and common health problems	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		Obstetrics & Gynaecology, Pediatrics	
CM10.3	Describe local customs and practices during pregnancy, childbirth, lactation and child feeding practices	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		Obstetrics & Gynaecology, Pediatrics	
CM10.4	Describe the reproductive, maternal, newborn & child health (RMCH); child survival and safe motherhood interventions	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		Obstetrics & Gynaecology, Pediatrics	
CM10.5	Describe Universal Immunization Program; Integrated Management of Neonatal and Childhood Illness (IMNCI) and other existing Programs	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		Pediatrics	
<b>Forensic Medicine &amp; Toxicology</b>									

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
FM1.9	Describe the importance of documentation in medical practice in regard to medicolegal examinations, Medical Certificates and medicolegal reports especially – maintenance of patient case records, discharge summary, prescribed registers to be maintained in Health Centres. -- maintenance of medico-legal register like accident register. -- documents of issuance of wound certificate -- documents of issuance of drunkenness certificate. -- documents of issuance of sickness and fitness certificate. -- documents for issuance of death certificate. -- documents of Medical Certification of Cause of Death - Form Number 4 and 4A -- documents for estimation of age by physical, dental and radiological examination and issuance of certificate	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Radiodiagnosis, General Surgery, General Medicine, Paediatrics	
FM2.27	Define and discuss infanticide, foeticide and stillbirth	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Pediatrics	
FM2.28	Describe and discuss signs of intrauterine death, signs of live birth, viability of foetus, age determination of foetus, DOAP session of ossification centres, Hydrostatic test, Sudden infants death syndrome and Munchausen's syndrome by proxy	K	KH	Y	Lecture, Small group discussions, Autopsy, DOAP session	Written/ Viva voce/ OSCE		Pediatrics, Human Anatomy	
FM3.29	Describe and discuss child abuse and battered baby syndrome	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
<b>Dermatology, Venereology &amp; Leprosy</b>									
DR5.1	Describe the etiology, microbiology, pathogenesis, natural history, clinical features, presentations and complications of scabies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
DR5.2	Identify and differentiate scabies from other lesions	S	SH	Y	Bedside clinic	Skill assessment		Pediatrics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
DR5.3	Enumerate and describe the pharmacology, administration and adverse reaction of pharmacotherapies for scabies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	Pharmacology
DR6.1	Describe the etiology, pathogenesis and diagnostic features of pediculosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	Microbiology
DR6.2	Identify and differentiate pediculosis from other skin lesions	S	SH	Y	Bedside clinic	Skill assessment		Pediatrics	
DR7.1	Describe the etiology, microbiology, pathogenesis, clinical presentations and diagnostic features of dermatophytes	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	Microbiology
DR8.1	Describe the etiology, microbiology, pathogenesis, clinical presentations and diagnostic features of common viral infections of the skin	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	Microbiology
DR17.1	Enumerate and identify the cutaneous findings in vitamin A deficiency	K/S	SH	Y	Lecture, Small group discussion, Bedside clinic	Skill assessment/ Viva voce		General Medicine, Pediatrics, Biochemistry	
DR17.2	Enumerate and describe the various skin changes in Vitamin B complex deficiency	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics, Biochemistry	
DR17.3	Enumerate and describe the various changes in Vitamin C deficiency	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics, Biochemistry	
DR17.4	Enumerate and describe the various changes in Zinc deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics, Biochemistry	

**Anesthesiology**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
AS2.1	Enumerate the indications, describe the steps and demonstrate in a simulated environment basic life support in adults children and neonates	S	SH	N	DOAP session	Skill assessment		General Medicine, Pediatrics	
<b>Psychiatry</b>									
PS14.1	Enumerate and describe the magnitude and etiology of psychiatric disorders occurring in childhood and adolescence	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
PS14.2	Enumerate, elicit, describe and document clinical features in patients with psychiatric disorders occurring in childhood and adolescence	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Pediatrics	
PS14.3	Describe the treatment of stress related disorders including behavioural, psychosocial and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
PS14.4	Demonstrate family education in a patient with psychiatric disorders occurring in childhood and adolescence in a simulated environment	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Pediatrics	
PS14.5	Enumerate and describe the pharmacologic basis and side effects of drugs used in psychiatric disorders occurring in childhood and adolescence	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
PS15.1	Describe the aetiology and magnitude of mental retardation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
PS15.2	Describe and discuss intelligence quotient and its measurement	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
PS15.3	Elicit and document a history and clinical examination and choose appropriate investigations in a patient with mental retardation	K/S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Pediatrics	
PS15.4	Describe the psychosocial interventions and treatment used in mental retardation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
<b>General Medicine</b>									
IM23.1	Discuss and describe the methods of nutritional assessment in an adult and calculation of caloric requirements during illnesses	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM23.2	Discuss and describe the causes and consequences of protein caloric malnutrition in the hospital	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM23.3	Discuss and describe the aetiology, causes, clinical manifestations, complications, diagnosis and management of common vitamin deficiencies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
IM23.4	Enumerate the indications for enteral and parenteral nutrition in critically ill patients	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	Pediatrics
<b>Obstetrics &amp; Gynecology</b>									
OG1.2	Define and discuss perinatal mortality and morbidity including perinatal and neonatal mortality and morbidity audit	K	KH	Y	Lecture, Small group discussion	Short notes		Community Medicine	Pediatrics
OG18.1	Describe and discuss the assessment of maturity of the newborn, diagnosis of birth asphyxia, principles of resuscitation, common problems	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Pediatrics
OG18.2	Demonstrate the steps of neonatal resuscitation in a simulated environment	S	SH	Y	DOAP session	Skill assessment			Pediatrics
OG18.3	Describe and discuss the diagnosis of birth asphyxia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Pediatrics
OG18.4	Describe the principles of resuscitation of the newborn and enumerate the common problems encountered	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Pediatrics

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested Teaching Learning methods	Suggested Assessment methods	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Physical Medicine &amp; Rehabilitation</b>									
PM3.1	Describe and discuss the clinical features, types, evaluation, diagnosis and management of cerebral palsy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	Pediatrics
PM3.2	Recognize, describe and discuss the spectrum of multiple disability : cognitive, motor, visual and hearing in cerebral palsy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Pediatrics
PM3.3	Recognize, describe and discuss the role of special education in children with learning disabilities	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			Pediatrics
PM3.4	Demonstrate spasticity, rigidity and dystonia in children with cerebral palsy	S	SH	Y	DOAP session, Small group discussion, Bedside clinic	Skill assessment			Pediatrics
PM3.5	Enumerate the indications and describe the therapies for spasticity including medications, serial casts, nerve blocks, botulinum toxin injections	K	KH	Y	Lecture, Small group discussion			Pharmacology	Pediatrics, Orthopedics
PM3.6	Enumerate the indications and describe prevention of joint subluxations and contractures by proper positioning, and use of special chairs, and appliances	K	KH	Y	DOAP session, Small group discussion, Bedside clinic				Pediatrics
PM3.7	Enumerate the first aid measures to be used in patients with seizures	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			Pediatrics
PM4.2	Describe and discuss the principles of management of chronic pain and role of common modalities (moist heat, ultrasound, Short wave diathermy)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Pediatrics

**PSYCHIATRY (CODE: PS)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
<b>PSYCHIATRY</b>									
<b>Topic: Doctor patient relationship</b>		<b>Number of competencies: (04)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PS1.1	Establish rapport and empathy with patients	A/C	SH	Y	DOAP session	Skill station			
PS1.2	Describe the components of communication	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PS1.3	Demonstrate breaking of bad news in a simulated environment	A/C	SH	Y	DOAP session	Skill station			
PS1.4	Describe and demonstrate the importance of confidentiality in patient encounters	A/C	SH	Y	DOAP session	Faculty observation			
<b>Topic: Mental health</b>		<b>Number of competencies: (05)</b>			<b>Number of procedures that require certification:(NIL)</b>				
PS2.1	Define stress and describe its components and causes	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
PS2.2	Describe the role of time management, study skills, balanced diet and sleep wake habits in stress avoidance	K	KH	Y	Lecture, Small group discussion	Viva voce			
PS2.3	Define and describe the principles and components of learning memory and emotions	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
PS2.4	Describe the principles of personality development and motivation	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
PS2.5	Define and distinguish normality and abnormality	K	K	Y	Lecture, Small group discussion	Viva voce			
<b>Topic: Introduction to psychiatry</b>		<b>Number of competencies: (12)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PS3.1	Describe the growth of psychiatry as a medical specialty, its history and contribution to society	K	KH	Y	Lecture	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PS3.2	Enumerate, describe and discuss important signs & symptoms of common mental disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PS3.3	Elicit, present and document a history in patients presenting with a mental disorder	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS3.4	Describe the importance of establishing rapport with patients	S/A	SH	Y	Bedside clinic, DOAP session	Skill assessment/ Faculty observation			
PS3.5	Perform, demonstrate and document a minimal examination	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS3.6	Describe and discuss biological, psychological & social factors & their interactions in the causation of mental disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PS3.7	Enumerate and describe common organic psychiatric disorders, magnitude, etiology and clinical features	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PS3.8	Enumerate and describe the essential investigations in patients with organic psychiatric disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PS3.9	Describe the steps and demonstrate in a simulated environment family education in patients with organic psychiatric disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS3.10	Enumerate and describe the pharmacologic basis and side effects of drugs used in psychiatric disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PS3.11	Enumerate the appropriate conditions for specialist referral in patients with psychiatric disorders	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
PS3.12	Describe, discuss and distinguish psychotic & non-psychotic (Mood, Anxiety, Stress related) disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Psychotic disorders</b>		<b>Number of competencies: (07)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PS4.1	Describe the magnitude and etiology of alcohol and substance use disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PS4.2	Elicit, describe and document clinical features of alcohol and substance use disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Medicine

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PS4.3	Enumerate and describe the indications and interpret laboratory and other tests used in alcohol and substance abuse disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Medicine
PS4.4	Describe the treatment of alcohol and substance abuse disorders including behavioural and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PS4.5	Demonstrate family education in a patient with alcohol and substance abuse in a simulated environment	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		AETCOM	
PS4.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in alcohol and substance abuse	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PS4.7	Enumerate the appropriate conditions for specialist referral in patients with alcohol and substance abuse disorders	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Psychotic disorders</b>		<b>Number of competencies: (06)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PS5.1	Classify and describe the magnitude and etiology of schizophrenia & other psychotic disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PS5.2	Enumerate, elicit, describe and document clinical features, positive s	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS5.3	Describe the treatment of schizophrenia including behavioural and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS5.4	Demonstrate family education in a patient with schizophrenia in a simulated environment	K/S/A/C	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS5.5	Enumerate and describe the pharmacologic basis and side effects of drugs used in schizophrenia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS5.6	Enumerate the appropriate conditions for specialist referral in patients with psychotic disorders	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Depression</b>		<b>Number of competencies: (07)</b>			<b>Number of procedures that require certification: (NIL)</b>				

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PS6.1	Classify and describe the magnitude and etiology of depression	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PS6.2	Enumerate, elicit, describe and document clinical features in patients with depression	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS6.3	Enumerate and describe the indications and interpret laboratory and other tests used in depression	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS6.4	Describe the treatment of depression including behavioural and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS6.5	Demonstrate family education in a patient with depression in a simulated environment	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS6.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in depression	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS6.7	Enumerate the appropriate conditions for specialist referral in patients with depression	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Bipolar disorders</b>		<b>Number of competencies: (07)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PS7.1	Classify and describe the magnitude and etiology of bipolar disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PS7.2	Enumerate, elicit, describe and document clinical features in patients with bipolar disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS7.3	Enumerate and describe the indications and interpret laboratory and other tests used in bipolar disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS7.4	Describe the treatment of bipolar disorders including behavioural and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS7.5	Demonstrate family education in a patient with bipolar disorders in a simulated environment	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS7.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in bipolar disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PS7.7	Enumerate the appropriate conditions for specialist referral in patients with bipolar disorders	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Anxiety disorders</b> <span style="float: right;">Number of competencies: (07)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
PS8.1	Enumerate and describe the magnitude and etiology of anxiety disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PS8.2	Enumerate, elicit, describe and document clinical features in patients with anxiety disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS8.3	Enumerate and describe the indications and interpret laboratory and other tests used in anxiety disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS8.4	Describe the treatment of anxiety disorders including behavioural and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS8.5	Demonstrate family education in a patient with anxiety disorders in a simulated environment	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS8.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in anxiety disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS8.7	Enumerate the appropriate conditions for specialist referral in anxiety disorders	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Stress related disorders</b> <span style="float: right;">Number of competencies: (07)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
PS9.1	Enumerate and describe the magnitude and etiology of stress related disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PS9.2	Enumerate, elicit, describe and document clinical features in patients with stress related disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS9.3	Enumerate and describe the indications and interpret laboratory and other tests used in stress related disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS9.4	Describe the treatment of stress related disorders including behavioural and psychosocial therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PS9.5	Demonstrate family education in a patient with stress related disorders in a simulated environment	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PS9.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in stress related disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PS9.7	Enumerate the appropriate conditions for specialist referral in stress disorders	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Somatoform disorders</b> <span style="float: right;">Number of competencies: (07)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
PS10.1	Enumerate and describe the magnitude and etiology of somatoform, dissociative and conversion disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PS10.2	Enumerate, elicit, describe and document clinical features in patients with somatoform, dissociative and conversion disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Medicine
PS10.3	Enumerate and describe the indications and interpret laboratory and other tests used in somatoform, dissociative and conversion disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Medicine
PS10.4	Describe the treatment of <b>somatoform</b> disorders including behavioural, psychosocial and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PS10.5	Demonstrate family education in a patient with somatoform, dissociative and conversion disorders in a simulated environment	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS10.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in somatoform, dissociative and conversion disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PS10.7	Enumerate the appropriate conditions for specialist referral in patients with somato form dissociative and conversion disorders	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Personality disorders</b> <span style="float: right;">Number of competencies: (07)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
PS11.1	Enumerate and describe the magnitude and etiology of personality disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PS11.2	Enumerate, elicit, describe and document clinical features in patients with personality disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PS11.3	Enumerate and describe the indications and interpret laboratory and other tests used in personality disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS11.4	Describe the treatment of <b>personality</b> disorders including behavioural, psychosocial and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS11.5	Demonstrate family education in a patient with personality disorders in a simulated environment	S/A/C	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS11.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in personality disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS11.7	Enumerate the appropriate conditions for specialist referral	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Psychosomatic disorders</b>		<b>Number of competencies: (07)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PS12.1	Enumerate and describe the magnitude and etiology of psychosomatic disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PS12.2	Enumerate, elicit, describe and document clinical features in patients with magnitude and etiology of psychosomatic disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Medicine
PS12.3	Enumerate and describe the indications and interpret laboratory and other tests of psychosomatic disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Medicine
PS12.4	Describe the treatment of <b>psychosomatic</b> disorders including behavioural, psychosocial and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PS12.5	Demonstrate family education in a patient with psychosomatic disorders in a simulated environment	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS12.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in psychosomatic disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS12.7	Enumerate the appropriate conditions for specialist referral	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
<b>Topic: Psychosexual and gender identity disorders</b>		<b>Number of competencies: (07)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PS13.1	Enumerate and describe the magnitude and etiology of psychosexual and gender identity disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PS13.2	Enumerate, elicit, describe and document clinical features in patients with magnitude and etiology of psychosexual and gender identity disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS13.3	Enumerate and describe the indications and interpret laboratory and other tests used in psychosexual and gender identity disorders	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS13.4	Describe the treatment of psychosexual and gender identity disorders including behavioural, psychosocial and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
PS13.5	Demonstrate family education in a patient with psychosexual and gender identity disorders in a simulated environment	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			
PS13.6	Enumerate and describe the pharmacologic basis and side effects of drugs used in psychosexual and gender identity disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PS13.7	Enumerate the appropriate conditions for specialist referral	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Psychiatric disorders in childhood and adolescence</b>		<b>Number of competencies: (06)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PS14.1	Enumerate and describe the magnitude and etiology of psychiatric disorders occurring in childhood and adolescence	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
PS14.2	Enumerate, elicit, describe and document clinical features in patients with psychiatric disorders occurring in childhood and adolescence	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Pediatrics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PS14.3	Describe the treatment of stress related disorders including behavioural, psychosocial and pharmacologic therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
PS14.4	Demonstrate family education in a patient with psychiatric disorders occurring in childhood and adolescence in a simulated environment	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Pediatrics	
PS14.5	Enumerate and describe the pharmacologic basis and side effects of drugs used in psychiatric disorders occurring in childhood and adolescence	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
PS14.6	Enumerate the appropriate conditions for specialist referral in children and adolescents with psychiatric disorders	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Mental retardation</b> <span style="float: right;"><b>Number of competencies: (04 )</b> <b>Number of procedures that require certification: (NIL)</b></span>									
PS15.1	Describe the aetiology and magnitude of mental retardation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
PS15.2	Describe and discuss intelligence quotient and its measurement	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
PS15.3	Elicit and document a history and clinical examination and choose appropriate investigations in a patient with mental retardation	K/S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Pediatrics	
PS15.4	Describe the psychosocial interventions and treatment used in mental retardation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
<b>Topic: Psychiatric disorders in the elderly</b> <span style="float: right;"><b>Number of competencies: (05)</b> <b>Number of procedures that require certification: (NIL)</b></span>									
PS16.1	Enumerate and describe common psychiatric disorders in the elderly including dementia, depression and psychosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PS16.2	Describe the aetiology and magnitude of psychiatric illness in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
PS16.3	Describe the therapy of psychiatric illness in elderly including psychosocial and behavioural therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	



Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PS19.2	Describe the objectives strategies and contents of the National Mental Health Act	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
PS19.3	Describe and discuss the basic legal and ethical issues in psychiatry	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic Medicine & Toxicology, AETCOM	
PS19.4	Enumerate and describe the salient features of the prevalent mental health laws in India	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
PS19.5	Describe the concept and principles of preventive psychiatry and mental health promotion (positive mental health); and community education	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
PS19.6	Enumerate and describe the identifying features and the principles of participatory management of mental illness occurring during and after disasters	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<p><b>Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.</b>  <b>Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,</b>  <b>Column F: DOAP session – Demonstrate, Observe, Assess, Perform.</b>  <b>Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation</b></p>									

### Integration

Physiology									
PY10.7	Describe and discuss functions of cerebral cortex, basal ganglia, thalamus, hypothalamus, cerebellum and limbic system and their abnormalities	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Psychiatry	Human Anatomy
PY10.8	Describe and discuss behavioural and EEG characteristics during sleep and mechanism responsible for its production	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Psychiatry	
PY10.9	Describe and discuss the physiological basis of memory, learning and speech	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Psychiatry	
PY10.12	Identify normal EEG forms	S	S	Y	Small group teaching	OSPE/Viva voce		Psychiatry	
Pharmacology									

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PH1.19	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of the drugs which act on CNS, (including anxiolytics, sedatives & hypnotics, antipsychotic, antidepressant drugs, antimaniacs, opioid agonists and antagonists, drugs used for neurodegenerative disorders, antiepileptics drugs)	K	KH	Y	Lecture	Written/ Viva voce		Psychiatry, Physiology	
PH1.20	Describe the effects of acute and chronic ethanol intake. Describe the symptoms and management of methanol and ethanol poisonings	K	KH	Y	Lecture, Small group discussions	Written/ Viva voce		Psychiatry	
PH1.22	Describe drugs of abuse (dependence, addiction, stimulants, depressants, psychedelics, drugs used for criminal offences)	K	KH	Y	Lecture, Small group discussions	Written/Viva voce		Psychiatry	Forensic Medicine
PH1.23	Describe the process and mechanism of drug deaddiction	K/ S	KH	Y	Lecture, Small group discussions	Written/Viva voce		Psychiatry	
PH5.5	Demonstrate an understanding of the caution in prescribing drugs likely to produce dependence and recommend the line of management	K	KH	Y	Small group discussion	Short note/Viva voce		Psychiatry	
PH5.6	Demonstrate ability to educate public & patients about various aspects of drug use including drug dependence and OTC drugs.	A/C	SH	Y	Small group discussion	Skill station		Psychiatry	
<b>Community Medicine</b>									
CM15.1	Define and describe the concept of mental Health	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	
CM15.2	Describe warning signals of mental health disorder	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	
CM15.3	Describe National Mental Health program	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	
<b>Forensic Medicine &amp; Toxicology</b>									

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
FM3.17	Describe and discuss the sexual perversions fetichism, transvestism, voyeurism, sadism, necrophagia, masochism, exhibitionism, frotteurism, Necrophilia	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, Psychiatry	
FM5.1	Classify common mental illnesses including post-traumatic stress disorder (PTSD)	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	
FM5.2	Define, classify and describe delusions, hallucinations, illusion, lucid interval and obsessions with exemplification	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	
FM5.3	Describe civil and criminal responsibilities of a mentally ill person	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	
FM5.4	Differentiate between true insanity from feigned insanity	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	
FM5.5	Describe & discuss Delirium tremens	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry, General Medicine	
FM5.6	Describe the Indian Mental Health Act, 1987 with special reference to admission, care and discharge of a mentally ill person	K	K/KH	N	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	
<b>General Medicine</b>									
IM17.14	Counsel patients with migraine and tension headache on lifestyle changes and need for prophylactic therapy	A/C	SH	N	DOAP session	Skill Assessment		Pharmacology	Psychiatry
IM21.8	Enumerate the indications for psychiatric consultation and describe the precautions to be taken in a patient with suspected suicidal ideation / gesture	K	KH	Y	DOAP session	Skill assessment		Forensic Medicine, Psychiatry	
IM24.2	Perform multidimensional geriatric assessment that includes medical, psycho-social and functional components	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Psychiatry	
IM24.5	Describe and discuss the aetiopathogenesis, clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of depression in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Psychiatry

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
IM24.7	Describe and discuss the aetiopathogenesis, clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of personality changes in the elderly	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
IM24.19	Enumerate and describe the social problems in the elderly including isolation, abuse, change in family structure and their impact on health	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
<b>Pediatrics</b>									
PE1.2	Discuss and describe the patterns of growth in infants, children and Adolescents	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE1.3	Discuss and describe the methods of assessment of growth including use of WHO and Indian national standards. Enumerate the parameters used for assessment of physical growth in infants, children and adolescents	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE1.5	Define development and discuss the normal developmental milestones with respect to motor, behaviour, social, adaptive and language	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE5.4	Describe the clinical features, diagnosis and management of Breath Holding spells	K	K	N	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE5.5	Describe the clinical features, diagnosis and management of Temper tantrums	K	K	N	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE5.7	Describe the clinical features, diagnosis and management of Fussy infant	K	K	N	Lecture, Small group discussion	Written			Psychiatry
PE5.10	Discuss the role of child guidance clinic in children with Behavioral problems and the referral criteria	K	K	N	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE6.2	Describe the physical , physiological and psychological changes during Adolescence (Puberty)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Psychiatry

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal Integration
PE6.4	Describe Adolescent sexuality and common problems related to it	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE6.5	Explain Adolescent Nutrition and common nutritional problems	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE6.6	Discuss the common Adolescent Eating disorders ( Anorexia Nervosa, Bulimia)	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
PE6.7	Describe the common mental health problems during Adolescence	K	KH	Y	Lecture, Small Group discussion	Written/ Viva voce			Psychiatry
PE6.13	Enumerate the prevalence and the importance of recognition of sexual drug abuse in adolescents and children	K	K	N	Lecture, Small group discussion	Written/ Viva voce			Psychiatry
<b>Physical Medicine &amp; Rehabilitation</b>									
PM 9.1	Describe rehabilitative aspects as they pertain to the elderly including patients with dementia, depression, incontinence immobility and nutritional needs	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine, Psychiatry
<b>Dermatology, Venereology &amp; Leprosy</b>									
DR9.7	Enumerate and describe the complications of leprosy and its management, including understanding disability and stigma	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Medicine	Pharmacology, Psychiatry
<b>Forensic Medicine &amp; Toxicology</b>									
FM2.5	Discuss moment of death, modes of death- coma, asphyxia and syncope	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Psychiatry	Pathology
FM3.14	<b>SEXUAL OFFENCES</b> Describe and discuss the examination of the victim of an alleged case of rape, and the preparation of report, framing the opinion and preservation and despatch of trace evidences in such cases	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic, DOAP session	Written/ Viva voce / OSCE		Obstetrics & Gynaecology, Psychiatry	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify <b>P</b>	Vertical integration	Horizontal Integration
FM3.15	SEXUAL OFFENCES Describe and discuss examination of accused and victim of sodomy, preparation of report, framing of opinion, preservation and despatch of trace evidences in such cases	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic, DOAP session	Written/ Viva voce / OSCE		Obstetrics & Gynaecology, Psychiatry	
FM3.16	SEXUAL OFFENCES Describe and discuss adultery and unnatural sexual offences- sodomy, incest, lesbianism, buccal coitus, bestiality, indecent assault and preparation of report, framing the opinion and preservation and despatch of trace evidences in such cases	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, Psychiatry	

**DERMATOLOGY, VENEROLOGY AND LEPROSY (CODE: DR)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
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## DERMATOLOGY, VENEREOLOGY & LEPROSY

<b>Topic: Acne</b>		<b>Number of competencies:(03)</b>			<b>Number of procedures that require certificaion:(NIL)</b>				
DR1.1	Enumerate the causative and risk factors of acne	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
DR1.2	Identify and grade the various common types of acne	S	SH	Y	Bedside clinic	Skill assessment			
DR1.3	Describe the treatment and preventive measures for various kinds of acne	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Vitiligo</b>		<b>Number of competencies: (02)</b>			<b>Number of procedures that require certificaion:(NIL)</b>				
DR2.1	Identify and differentiate vitiligo from other causes of hypopigmented lesions	S	S	Y	Bedside clinic	Skill assessment			
DR2.2	Describe the treatment of vitiligo	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Papulosquamous disorders</b>		<b>Number of competencies:(03)</b>			<b>Number of procedures that require certificaion:(NIL)</b>				
DR3.1	Identify and distinguish psoriatic lesions from other causes	K	SH	Y	Bedside clinic	Skill assessment/ Written/ Viva voce			
DR3.2	Demonstrate the grattage test	S	SH	Y	Bedside clinic	Skill assessment			
DR3.3	Enumerate the indications for and describe the various modalities of treatment of psoriasis including topical, systemic and phototherapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Lichen Planus</b>		<b>Number of competencies:(02)</b>			<b>Number of procedures that require certificaion:(NIL)</b>				
DR4.1	Identify and distinguish lichen planus lesions from other causes	S	SH	Y	Bedside clinic	Skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
DR4.2	Enumerate and describe the treatment modalities for lichen planus	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Scabies</b>		<b>Number of competencies:(03)</b>			<b>Number of procedures that require certificaion:(NIL)</b>				
DR5.1	Describe the etiology, microbiology, pathogenesis, natural history, clinical features, presentations and complications of scabies in adults and children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	
DR5.2	Identify and differentiate scabies from other lesions in adults and children	S	SH	Y	Bedside clinic	Skill assessment		Pediatrics	
DR5.3	Enumerate and describe the pharmacology, administration and adverse reaction of pharmacotherapies for scabies	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	Pharmacology
<b>Topic: Pediculosis</b>		<b>Number of competencies : (02)</b>			<b>Number of procedures that require certificaion:(NIL)</b>				
DR6.1	Describe the etiology pathogenesis and diagnostic features of pediculosis in adults and children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	Microbiology
DR6.2	Identify and differentiate pediculosis from other skin lesions in adults and children	S	SH	Y	Bedside clinic	Skill assessment		Pediatrics	
<b>Topic: Fungal Infections</b>		<b>Number of competencies: (03)</b>			<b>Number of procedures that require certificaion:(NIL)</b>				
DR7.1	Describe the etiology, microbiology, pathogenesis and clinical presentations and diagnostic features of dermatophytes in adults and children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	Microbiology
DR7.2	Identify Candida species in fungal scrapings and KOH mount	S	SH	Y	DOAP session	Skill assessment			Microbiology
DR7.3	Describe the pharmacology and action of antifungal (systemic and topical) agents. Enumerate side effects of antifungal therapy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Microbiology, Pharmacology
<b>Topic: Viral infections</b>		<b>Number of competencies (07)</b>			<b>Number of procedures that require certification: (NIL)</b>				

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
DR8.1	Describe the etiology, microbiology, pathogenesis and clinical presentations and diagnostic features of common viral infections of the skin in adults and children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pediatrics	Microbiology
DR8.2	Identify and distinguish herpes simplex and herpes labialis from other skin lesions	S	SH	Y	DOAP session	Skill assessment			
DR8.3	Identify and distinguish herpes zoster and varicella from other skin lesions	S	SH	Y	DOAP session	Skill assessment			
DR8.4	Identify and distinguish viral warts from other skin lesions	S	SH	Y	DOAP session	Skill assessment			
DR8.5	Identify and distinguish molluscum contagiosum from other skin lesions	S	SH	Y	DOAP session	Skill assessment			
DR8.6	Enumerate the indications, describe the procedure and perform a Tzanck smear	S	SH	Y	DOAP session	Skill assessment			
DR8.7	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for common viral illnesses of the skin	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Pharmacology

**Topic: Leprosy**

**Number of competencies: (07)**

**Number of procedures that require certification:(NIL)**

DR9.1	Classify, describe the epidemiology, etiology, microbiology, pathogenesis, clinical presentations and diagnostic features of Leprosy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology, Community Medicine
DR9.2	Demonstrate (and classify based on) the clinical features of leprosy including an appropriate neurologic examination	S	SH	Y	Bedside clinic	Bedside clinic/ Skill assessment		General Medicine	
DR9.3	Enumerate the indications and observe the performance of a slit skin smear in patients with leprosy	S	KH	Y	Bedside clinic, DOAP session	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
DR9.4	Enumerate, describe and identify lepra reactions and supportive measures and therapy of lepra reactions	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology
DR9.5	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for various classes of leprosy based on national guidelines	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Community Medicine
DR9.6	Describe the treatment of Leprosy based on the WHO guidelines	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Community Medicine
DR9.7	Enumerate and describe the complications of leprosy and its management, including understanding disability and stigma.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Psychiatry
<b>Topic: Sexually Transmitted Diseases</b> <span style="margin-left: 200px;"><b>Number of competencies: (11)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification:(NIL)</b></span>									
DR10.1	Identify and classify syphilis based on the presentation and clinical manifestations	S	SH	Y	Bedside clinic	Skill assessment		General Medicine	Microbiology
DR10.2	Identify spirochete in a dark ground microscopy	S	SH	Y	DOAP session	Skill assessment			Microbiology
DR10.3	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for syphilis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Microbiology
DR10.4	Describe the prevention of congenital syphilis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
DR10.5	Counsel in a non-judgemental and empathetic manner patients on prevention of sexually transmitted disease	C	SH	Y	DOAP session	Skill assessment		General Medicine	
DR10.6	Describe the etiology, diagnostic and clinical features of non-syphilitic sexually transmitted diseases (chancroid, donovanosis and LGV)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
DR10.7	Identify and differentiate based on the clinical features non-syphilitic sexually transmitted diseases (chancroid, donovanosis and LGV)	S	SH	Y	Bedside clinic	Skill assessment		General Medicine	Microbiology
DR10.8	Enumerate the indications and describe the pharmacology, indications and adverse reactions of drugs used in the non-syphilitic sexually transmitted diseases (chancroid, donovanosis and LGV)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Microbiology
DR10.9	Describe the syndromic approach to ulcerative sexually transmitted disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
DR10.10	Describe the etiology, diagnostic and clinical features and management of gonococcal and non-gonococcal urethritis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
DR10.11	Describe the etiology, diagnostic and clinical features and management of vaginal discharge	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
<b>Topic: HIV</b>		<b>Number of competencies: (03)</b>			<b>Number of procedures that require certification:(NIL)</b>				
DR11.1	Describe the etiology, pathogenesis and clinical features of the dermatologic manifestations of HIV and its complications including opportunistic infections	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Microbiology
DR11.2	Identify and distinguish the dermatologic manifestations of HIV, its complications, opportunistic infections and adverse reactions	S	SH	Y	Bedside clinic	Skill assessment		General Medicine	Microbiology
DR11.3	Enumerate the indications and describe the pharmacology, administration and adverse reaction of pharmacotherapies for dermatologic lesions in HIV	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	Pharmacology, Microbiology
<b>Topic: Dermatitis and Eczema</b>		<b>Number of competencies: (07)</b>			<b>Number of procedures that require certification:(NIL)</b>				
DR12.1	Describe the aetiopathogenesis of eczema	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
DR12.2	Identify eczema and differentiate it from lichenification and changes of aging	S	SH	Y	Bedside clinic	Skill assessment			
DR12.3	Classify and grade eczema	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
DR12.4	Enumerate the indications and describe the pharmacology, indications and adverse reactions of drugs used in the treatment of eczema	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
DR12.5	Define erythroderma. Enumerate and identify the causes of erythroderma. Discuss the treatment	S	KH	Y	Bedside clinic	Written/ Skill assessment			
DR12.6	Identify and distinguish exfoliative dermatitis from other skin lesions	S	SH	Y	Bedside clinic	Skill assessment			
DR12.7	Identify and distinguish fixed drug eruptions and Steven Johnson syndrome from other skin lesions	S	SH	Y	Bedside clinic	Skill assessment		General Medicine	Pathology, Microbiology
<b>Topic: Vesicubullous Lesions</b> <span style="float: right;">Number of competencies:(03)</span> <span style="float: right;">Number of procedures that require certificaion:(NIL)</span>									
DR13.1	Distinguish bulla from vesicles	S	SH	Y	Bedside clinic	Skill assessment			
DR13.2	Demonstrate the Tzanck test, nikolsky sign and bulla spread sign	S	SH	Y	Bedside clinic	Skill assessment			
DR13.3	Calculate the body surface area of involvement of vesiculobullous lesions	S	SH	Y	Bedside clinic	Skill assessment			
<b>Topic: Urticaria Angioedema</b> <span style="float: right;">Number of competencies: (05)</span> <span style="float: right;">Number of procedures that require certificaion:(NIL)</span>									
DR14.1	Describe the etiology, pathogenesis and clinical precipitating features and classification of Urticaria and angioedema	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Microbiology, Pathology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
DR14.2	Identify and distinguish urticarial from other skin lesions	S	SH	Y	Bedside clinic	Skill assessment			
DR14.3	Demonstrate dermographism	S	SH	Y	Bedside clinic	Skill assessment			
DR14.4	Identify and distinguish angioedema from other skin lesions	S	SH	Y	Bedside clinic	Skill assessment			
DR14.5	Enumerate the indications and describe the pharmacology indications and adverse reactions of drugs used in the urticaria and angioedema	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Pharmacology
<b>Topic: Pyoderma</b>		<b>Number of competencies: (04)</b>			<b>Number of procedures that require certification:(NIL)</b>				
DR15.1	Identify and distinguish folliculitis impetigo and carbuncle from other skin lesions	S	SH	Y	Bedside clinic	Skill assessment			
DR15.2	Identify staphylococcus on a gram stain	S	SH	Y	Bedside clinic	Skill assessment			Microbiology
DR15.3	Enumerate the indications and describe the pharmacology, indications and adverse reactions of topical and systemic drugs used in treatment of pyoderma	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	Microbiology, Pharmacology
DR15.4	Enumerate the indications for surgical referral	S	KH	Y	DOAP session	Written/ Viva voce		General Surgery	
<b>Topic: Collagen Vascular disease</b>		<b>Number of competencies: (02)</b>			<b>Number of procedures that require certification:(NIL)</b>				
<b>See also major competencies listed in General Medicine</b>									
DR16.1	Identify and distinguish skin lesions of SLE	S	SH	Y	Bedside clinic	Skill assessment		General Medicine	Pathology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
DR16.2	Identify and distinguish Raynaud's phenomenon	S	SH	Y	Bedside clinic	Skill assessment		General Medicine	Pathology
<b>Topic: Nutritional Deficiencies and Skin</b>		<b>Number of competencies: (04)</b>			<b>Number of procedures that require certification:(NIL)</b>				
DR17.1	Enumerate and identify the cutaneous findings in vitamin A deficiency	K/S	SH	Y	Lecture, Small group discussion, Bedside clinic	Skill assessment/ Viva voce		General Medicine, Pediatrics, Biochemistry	
DR17.2	Enumerate and describe the various skin changes in Vitamin B complex deficiency	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics, Biochemistry	
DR17.3	Enumerate and describe the various changes in Vitamin C deficiency	K	KH	Y	Lecture	Written/ Viva voce		General Medicine, Pediatrics, Biochemistry	
DR17.4	Enumerate and describe the various changes in Zinc deficiency	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, Pediatrics, Biochemistry	
<b>Topic: Systemic diseases and the skin</b>		<b>Number of competencies:(02)</b>			<b>Number of procedures that require certification:(NIL)</b>				
DR18.1	Enumerate the cutaneous features of Type 2 diabetes	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
DR18.2	Enumerate the cutaneous features of hypo/hyper-thyroidism	K	K	Y	Lecture, Small group	Written/ Viva voce		General Medicine	

Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.

Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,

Column F: DOAP session – Demonstrate, Observe, Assess, Perform.

Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation

## Integration

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Human Anatomy</b>									
AN4.2	Describe structure & function of skin with its appendages	K	KH	Y	Lecture, DOAP session	Written/ Viva voce		Dermatology, Venereology & Leprosy	
AN4.4	Describe modifications of deep fascia with its functions	K	KH	Y	Lecture, DOAP session	Written/ Viva voce		Dermatology, Venereology & Leprosy	
AN4.5	Explain principles of skin incisions	K	KH	N	Lecture	Written		Dermatology, Venereology & Leprosy	

**Pathology**

PA34.1	Describe the risk factors, pathogenesis, pathology and natural history of squamous cell carcinoma of the skin	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Dermatology, Venereology & Leprosy	
PA34.2	Describe the risk factors, pathogenesis, pathology and natural history of basal cell carcinoma of the skin	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Dermatology, Venereology & Leprosy	
PA34.3	Describe the distinguishing features between a nevus and melanoma. Describe the etiology, pathogenesis, risk factors, morphology, clinical features and metastases of melanoma	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Dermatology, Venereology & Leprosy	
PA34.4	Identify, distinguish and describe common tumors of the skin	S	SH	N	DOAP session	Skill Assessment		Dermatology, Venereology & Leprosy	

**Microbiology**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
MI4.3	Describe the etio-pathogenesis of Skin and soft tissue infections and discuss the clinical course, and the laboratory diagnosis.	K	KH	Y	Lecture	Written/ Viva voce		Dermatology, Venereology & Leprosy, General Surgery	
MI7.2	Describe the etio-pathogenesis and discuss the laboratory diagnosis of sexually transmitted infections. Recommend preventive measures, wherever relevant.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Dermatology, Venereology & Leprosy, Obstetrics & Gynaecology	

#### Pharmacology

PH1.46	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of antileprotic drugs	K	KH	Y	Lecture	Written/ Viva voce		Dermatology, Venereology & Leprosy	Microbiology
PH1.57	Describe drugs used in skin disorders	K	KH	Y	Lecture	Written/ Viva voce		Dermatology, Venereology & Leprosy	

#### Pediatrics

PE31.4	Identify Atopic dermatitis and manage	S	SH		Bedside clinics, Skill Lab	Skill Assessment		Dermatology, Venereology & Leprosy	
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**PHYSICAL MEDICINE & REHABILITATION (CODE: PM)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>PHYSICAL MEDICINE &amp; REHABILITATION</b>									
<b>Topic: Introduction to Physical Medicine</b>		<b>Number of competencies: (04)</b>			<b>Number of procedures that require certification:(NIL)</b>				
PM1.1	Define and describe the scope of physical Medicine and Rehabilitation and functional restoration	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
PM1.2	Define and describe disability, its cause, and magnitude, identification and prevention of disability	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine, Orthopedics
PM1.3	Define and describe the methods to identify and prevent disability	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine, Orthopedics
PM1.4	Enumerate the rights and entitlements of differently abled persons	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine, Orthopedics
<b>Topic: Cerebrovascular accident</b>		<b>Number of competencies: (04)</b>			<b>Number of procedures that require certification:(NIL)</b>				
PM2.1	Describe the causes of disability in the patient with a cerebrovascular accident	K	KH	Y	Lecture, small group discussion	Written/ Viva voce		Human Anatomy	General Medicine
PM2.2	Describe and discuss the treatment of rigidity and spasticity	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PM2.3	Describe and discuss the principles of early mobilizations, mobility aids and splints	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PM2.4	Describe and discuss the impact of co-morbidities on the rehabilitation of the patient with cerebrovascular accident	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
<b>Topic: Cerebral Palsy</b>		<b>Number ocompetencies: (07)</b>			<b>Number of procedures that require certification: (NIL)</b>				
PM3.1	Describe and discuss the clinical features, types, evaluation, diagnosis and management of cerebral palsy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	Pediatrics

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PM3.2	Recognize, Describe and discuss the spectrum of multiple disability: cognitive, motor, visual and hearing in cerebral palsy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Pediatrics
PM3.3	Recognize describe and discuss the role of special education in children with learning disabilities	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			Pediatrics
PM3.4	Demonstrate spasticity rigidity and dystonia in children with cerebral palsy	S	SH	Y	DOAP session, Small group discussion, Bedside clinic	Skill assessment			Pediatrics
PM3.5	Enumerate the indications and describe the therapies for spasticity including medications, serial casts, nerve blocks, botulinum toxin injections	K	KH	Y	Lecture, Small group discussion			Pharmacology	Pediatrics, Orthopedics
PM3.6	Enumerate the indications and describe prevention of joint subluxations and contractures by proper positioning, and use of special chairs, and appliances	K	KH	Y	DOAP session, Small group discussion, Bedside clinic				Pediatrics
PM3.7	Enumerate the first aid measures to be used in patients with seizures	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			Pediatrics

**Topic: Musculoskeletal system**

**Number of competencies : (05)**

**Number of procedures that require certification: (NIL)**

PM4.1	Describe the common patterns, clinical features, investigations, diagnosis and treatment of common causes of arthritis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine, Orthopedics
PM4.2	Describe and discuss the principles of management of chronic pain and role of common modalities (moist heat, ultrasound, Short wave diathermy)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Pediatrics
PM4.3	Observe in a mannequin or equivalent the administration of an intra-articular injection	S	KH	N	DOAP session	Skill assessment			Orthopedics
PM4.4	Describe the role of exercise as a therapeutic modality	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PM4.5	Demonstrate correct assessment of muscle strength and range of movements	S	SH	Y	DOAP session, Bedside clinic	Skill assessment			General Medicine, Orthopedics
<b>Topic: Amputation</b> <span style="float: right;"><b>Number of competencies : (04)</b> <b>Number of procedures that require certification: (NIL)</b></span>									
PM5.1	Enumerate the indications and describe the principles of amputation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics, General Surgery
PM5.2	Describe the principles of early mobilization, evaluation of the residual limb, contralateral limb and the influence of co-morbidities	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
PM5.3	Demonstrate the correct use of crutches in ambulation and postures to correct contractures and deformities	S	SH	Y	DOAP session, Bedside clinic	Skill assessment			Orthopedics
PM5.4	Identify the correct prosthesis for common amputations	S	SH	Y	DOAP session	Skill assessment written			Orthopedics
<b>Topic: Lower motor neuron lesion</b> <span style="float: right;"><b>Number of competencies :(04)</b> <b>Number of procedures that require certification: (NIL)</b></span>									
PM6.1	Perform and demonstrate a clinical examination of sensory and motor deficits of peripheral nerve	S	SH	Y	Bedside clinic	Skill assessment			General Medicine
PM6.2	Enumerate the indications and describe the principles of nerve conduction velocity and EMG	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PM6.3	Describe the principles principles of skin traction, serial casts and surgical treatment including contracture release, tendon transfer, osteotomies and arthrodesis.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
PM6.4	Describe the principles of orthosis for ambulation in PPRP	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
<b>Topic: Spinal injury</b> <span style="float: right;"><b>Number of competencies:(09)</b> <b>Number of procedures that require certification: (NIL)</b></span>									

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PM7.1	Describe and discuss the clinical features, diagnostic work up and management of spinal cord injury	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
PM7.2	Describe and demonstrate process of transfer, application of collar restraints while maintaining airway and prevention of secondary injury in a mannequin/model	S	SH	Y	DOAP session, Small group discussion, Bedside clinic	Skill assessment			Orthopedics
PM7.3	Perform and demonstrate a correct neurological examination in a patient with spinal injury and determine the neurologic level of injury	S	SH	Y	Bed side clinic	Skill assessment			Orthopedics
PM7.4	Assess bowel and bladder function and identify common patterns of bladder dysfunction	S	KH	Y	Small group discussion	Written/ Viva voce			General Medicine, Orthopedics
PM7.5	Enumerate the indications and identify the common mobility aids and appliances, wheel chairs	S	S	Y	DOAP session	Skill assessment /Viva voce			Orthopedics
PM7.6	Enumerate the indications and describe the pharmacology and side effects of commonly used drugs in neuropathic bladder	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Medicine
PM7.7	Enumerate and describe common life threatening complications following SCI like Deep vein Thrombosis, Aspiration Pneumonia, Autonomic dysreflexia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine, Orthopedics
PM7.8	Enumerate the causes of, describe and classify Pressure Sores, their prevention, and treatment.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Surgery
PM7.9	Enumerate the indications of debridement, and Split thickness skin grafting.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Surgery

Topic: Traumatic brain injury (TBI)

Number of competencies:(05)

Number of procedures that require certification: (NIL)

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PM8.1	Describe the clinical features, evaluation, diagnosis and management of disability following traumatic brain injury	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine, Orthopedics, General Surgery
PM8.2	Describe and discuss cognitive dysfunction like deficits in attention, memory and communication.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PM8.3	Describe and discuss common behavior and mood changes following TBI.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PM8.4	Describe metabolic co-morbidities like SIADH, diabetes mellitus, insipidus and endocrine dysfunction following TBI	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
PM8.5	Describe the vocational opportunities and community based rehabilitation following TBI	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine

**Topic: Geriatrics**

**Number of competencies:(01)**

**Number of procedures that require certification: (NIL)**

PM 9.1	Describe rehabilitative aspects as they pertain to the elderly including patients with dementia, depression, incontinence immobility and nutritional needs	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine, Psychiatry
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**Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.**  
**Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,**  
**Column F: DOAP session – Demonstrate, Observe, Assess, Perform.**  
**Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation**

**Integration**

General Medicine									
IM18.16	Enumerate the indications, describe and observe the multidisciplinary rehabilitation of patients with a CVA	S	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Physical Medicine & Rehabilitation
IM24.13	Describe and discuss the aetiopathogenesis, clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of falls in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics, Physical Medicine & Rehabilitation

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/S H/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM24.16	Describe and discuss the principles of physical and social rehabilitation, functional assessment, role of physiotherapy and occupational therapy in the management of disability in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics, Physical Medicine & Rehabilitation

**Pediatrics**

PE3.8	Discuss the etio-pathogenesis, clinical presentation and multi-disciplinary approach in the management of Cerebral palsy	K	KH	Y	Lecture, Small group discussion, Bed side clinics	Written/ Viva voce			Physical Medicine & Rehabilitation

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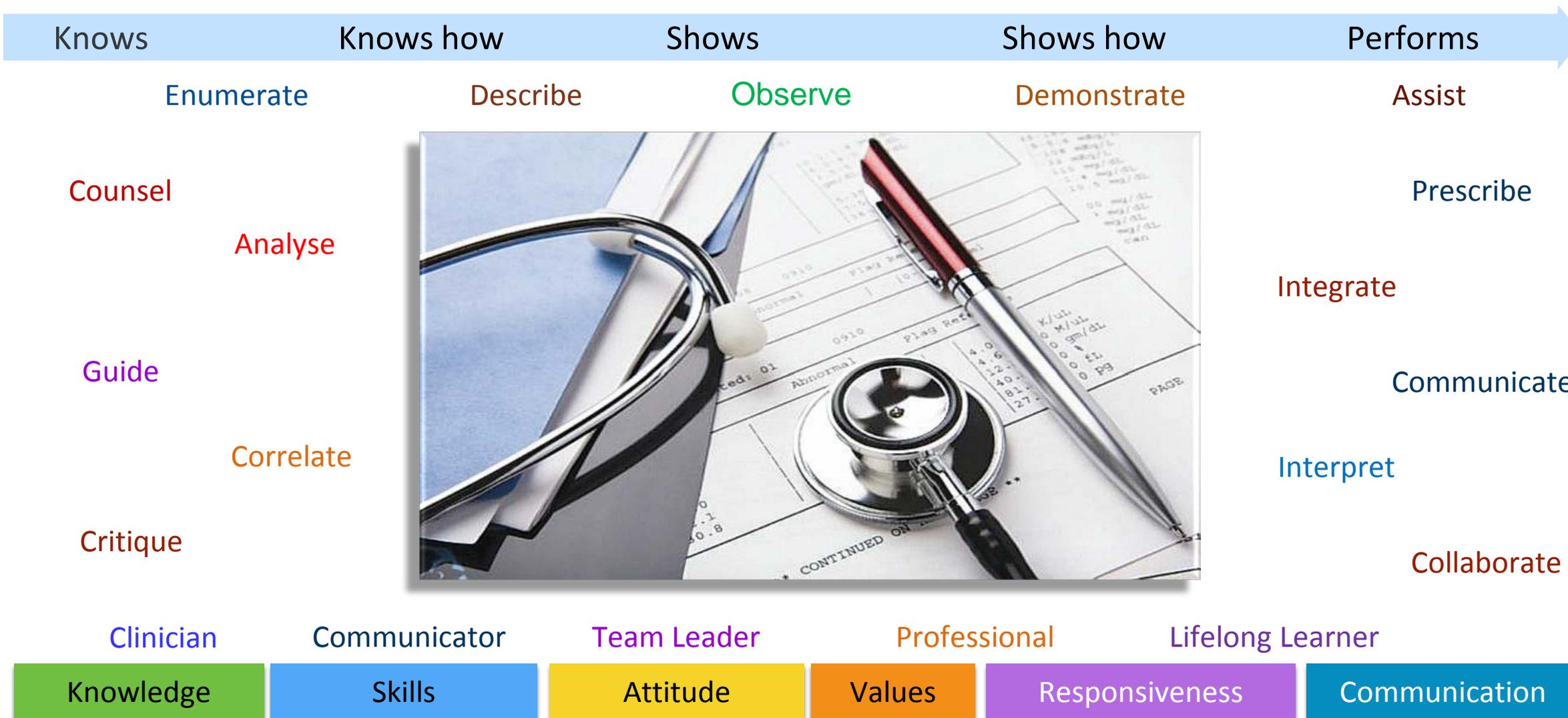
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# MEDICAL COUNCIL OF INDIA

## COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR THE INDIAN MEDICAL GRADUATE



VOLUME-III (2018)

**COMPETENCY BASED UNDERGRADUATE CURRICULUM  
FOR THE  
INDIAN MEDICAL GRADUATE**

**2018**



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## भारतीय आयुर्विज्ञान परिषद के अधिक्रमण में शासी बोर्ड

### BOARD OF GOVERNORS IN SUPERSESSION OF MEDICAL COUNCIL OF INDIA

#### FOREWORD

The Medical Council of India, aware of its responsibilities in creation of trained health manpower, has been engaged for the past few years in updating the medical curriculum for undergraduates and postgraduates to be in consonance with the changing health needs of the country. The task of updating and reorganization of the postgraduate curriculum in nearly 50 broad specialty disciplines to the competency pattern was accomplished by the Academic Cell of the Council with the help of subject experts and members of its Reconciliation Board and have been uploaded on the Council Website for use of the medical fraternity.

The Council visualized that the Indian Medical Graduate, at the end of the undergraduate training program, should be able to recognize "health for all" as a national goal and should be able to fulfill his/her societal obligations towards the realization of this goal. To fulfill the mandate of the undergraduate medical curriculum which is to produce a clinician, who understands and is able to provide preventive, promotive, curative, palliative and holistic care to his patients, the curriculum must enunciate clearly the competencies the student must be imparted and must have learnt, with clearly defined teaching-learning strategies and effective methods of assessment. The student should be trained to effectively communicate with patients and their relatives in a manner respectful of the patient's preferences, values, beliefs, confidentiality and privacy and to this purpose, a book on Attitude, Ethics & Communication was prepared by the Medical Council of India; the teaching faculty of medical colleges have been receiving training on this module since 2015.

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Competency based Medical Education provides an effective outcome-based strategy where various domains of teaching including teaching learning methods and assessment form the framework of competencies. Keeping this objective as the core ingredient, the Medical Council of India with the help of panel of experts drawn from across the country, laid the basic framework for the revised undergraduate medical curriculum. Over the past four years, a group of highly committed medical professionals working as Members of the MCI Reconciliation Board developed this information into a document incorporating appropriate teaching-learning strategies, tools and techniques of teaching, and modes of assessment which have culminated in the current competency based undergraduate curriculum. We understand that maximum efforts were made to encourage integrated teaching between traditional subject areas using a problem-based learning approach starting with clinical or community cases and exploring the relevance of various preclinical disciplines in both the understanding and resolution of the problem. All efforts have been made to de-emphasize compartmentalisation of disciplines so as to achieve both horizontal and vertical integration in different phases. We are proud of their work accomplishment and congratulate them in the onerous task accomplished.

It gives us great satisfaction to state that the '**competency based undergraduate curriculum**' that has been prepared by the Medical Council of India would definitely serve the cause of medical education and in creating a competent Indian Medical Graduate to serve the community.

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# **COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR THE INDIAN MEDICAL GRADUATE**

## **Preamble**

The new Graduate Medical Education Regulations attempts to stand on the shoulder of the contributions and the efforts of resource persons, teachers and students (past and present). It intends to take the learner to provide health care to the evolving needs of the nation and the world.

More than twenty years have passed since the existing Regulations on Graduate Medical Education, 1997 was notified, necessitating a relook at all aspects of the various components in the existing regulations and adapt them to the changing demography, socio-economic context, perceptions, values and expectations of stakeholders. Emerging health care issues particularly in the context of emerging diseases, impact of advances in science and technology and shorter distances on diseases and their management also need consideration. The strong and forward looking fundamentals enshrined in the Regulations on Graduate Medical Education, 1997 has made this job easier. A comparison between the 1997 Regulations and proposed Graduate Medical Education Regulations, 2018 will reveal that the 2018 Regulations have evolved from several key principles enshrined in the 1997 Regulations.

The thrust in the new regulations is continuation and evolution of thought in medical education making it more learner-centric, patient-centric, gender-sensitive, outcome -oriented and environment appropriate. The result is an outcome driven curriculum which conforms to global trends. Emphasis is made on alignment and integration of subjects both horizontally and vertically while respecting the strengths and necessity of subject-based instruction and assessment. This has necessitated a deviation from using “broad competencies”; instead, the reports have written end of phase subject (sub) competencies. These “sub-competencies” can be mapped to the global competencies in the Graduate Medical Education Regulations.

A significant attempt has been made in the outcome driven undergraduate curriculum to provide the orientation and the skills necessary for life-long learning to enable proper care of the patient. In particular, the curriculum provides for early clinical exposure, electives and longitudinal care. Skill acquisition is an indispensable component of the learning process in medicine. The curriculum reinforces this aspect by necessitating certification of certain essential skills. The experts and the writing group have factored in patient availability, access, consent, number of students in a class etc. in suggesting skill acquisition and assessment methods; use of skills labs, simulated and guided environments are encouraged. In the pre-internship years,- the highest level of skill acquisition is a show how (SH) in a simulated or guided environment; few skills require independent performance and certification - these are marked with P (for performance). Opportunity to 'perform' these skills will be available during internship.

The importance of ethical values, responsiveness to the needs of the patient and acquisition of communication skills is underscored by providing dedicated curriculum time in the form of a longitudinal program based on Attitude, Ethics and Communication (AETCOM) competencies. Great emphasis has been placed on collaborative and inter-disciplinary teamwork, professionalism, altruism and respect in professional relationships with due sensitivity to differences in thought, social and economic position and gender.

In addition to the above, an attempt has been made to allow students from diverse educational streams and backgrounds to transition appropriately through a Foundation Course. Dedicated time has been allotted for self directed learning and co-curricular activities.

Formative and internal assessments have been streamlined to achieve the objectives of the curriculum. Minor tweaks to the summative assessment have been made to reflect evolving thought and regulatory requirements. Curricular governance and support have been strengthened, increasing the involvement of Curriculum Committee and Medical Education Departments/Units.

The curriculum document in conjunction with the new Graduate Medical Education Regulations (GMR), when notified, must be seen as a "living document" that should evolve as stakeholder requirements and aspirations change. We hope that the current GMR does just that. The Medical Council of India is

grateful to all the teachers, subject experts, process experts, patients, students and trainees who have contributed through invaluable inputs, intellectual feedbacks and valuable time spent to make this possible. This document would not have been possible without the dedicated and unstinting intellectual, mental and time-consuming efforts of the members of the Reconciliation Board of the Council and the Academic Cell of MCI.

## How to use the Manual

This Manual is intended for curriculum planners in an institution to design learning and assessment experiences for the MBBS student. Contents created by subject experts have been curated to provide guidance for the curriculum planners, leaders and teachers in medical schools. They must be used with reference to and in the context of the Regulations.

### Section 1

#### Competencies for the Indian Medical Graduate

**Section 1** - provides the global competencies extracted from the Graduate Medical Education Regulations, 2018. The global competencies identified as defining the roles of the **Indian Medical Graduate** are the broad competencies that the learner has to aspire to achieve; teachers and curriculum planners must ensure that the learning experiences are aligned to this Manual.

#### Extract from the Graduate Medical Education Regulations, 2018

##### 2. Objectives of the Indian Graduate Medical Training Programme

The undergraduate medical education program is designed with a goal to create an “Indian Medical Graduate” (IMG) possessing requisite knowledge, skills, attitudes, values and responsiveness, so that she or he may function appropriately and effectively as a physician of first contact of the community while being globally relevant. To achieve this, the following national and institutional goals for the learner of the Indian Medical Graduate training program are hereby prescribed:-

## **2.1. National Goals**

At the end of undergraduate program, the Indian Medical Graduate should be able to:

- (a) recognize “health for all” as a national goal and health right of all citizens and by undergoing training for medical profession fulfill his/her social obligations towards realization of this goal.
- (b) learn every aspect of National policies on health and devote herself/himself to its practical implementation.
- (c) achieve competence in practice of holistic medicine, encompassing promotive, preventive, curative and rehabilitative aspects of common diseases.
- (d) develop scientific temper, acquire educational experience for proficiency in profession and promote healthy living.
- (e) become exemplary citizen by observance of medical ethics and fulfilling social and professional obligations, so as to respond to national aspirations.

## **2.2. Institutional Goals**

In consonance with the national goals, each medical institution should evolve institutional goals to define the kind of trained manpower (or professionals) they intend to produce. The Indian Medical Graduates coming out of a medical institute should:

- (a) be competent in diagnosis and management of common health problems of the individual and the community, commensurate with his/her position as a member of the health team at the primary, secondary or tertiary levels, using his/her clinical skills based on history, physical examination and relevant investigations.
- (b) be competent to practice preventive, promotive, curative and rehabilitative medicine in respect to the commonly encountered health problems.
- (c) appreciate rationale for different therapeutic modalities, be familiar with the administration of the "essential drugs" and their common side effects.
- (d) be able to appreciate the socio-psychological, cultural, economic and environmental factors affecting health and develop humane attitude towards the patients in discharging one's professional responsibilities.

- (e) possess the attitude for continued self learning and to seek further expertise or to pursue research in any chosen area of medicine, action research and documentation skills.
- (f) be familiar with the basic factors which are essential for the implementation of the National Health Programs including practical aspects of the following:
  - (i) Family Welfare and Maternal and Child Health (MCH);
  - (ii) Sanitation and water supply;
  - (iii) Prevention and control of communicable and non-communicable diseases;
  - (iv) Immunization;
  - (v) Health Education;
  - (vi) Indian Public Health Standards (IPHS) at various level of service delivery;
  - (vii) Bio-medical waste disposal; and
  - (viii) Organizational and or institutional arrangements.
- (g) acquire basic management skills in the area of human resources, materials and resource management related to health care delivery, General and hospital management, principal inventory skills and counseling.
- (h) be able to identify community health problems and learn to work to resolve these by designing, instituting corrective steps and evaluating outcome of such measures.
- (i) be able to work as a leading partner in health care teams and acquire proficiency in communication skills.
- (j) be competent to work in a variety of health care settings.
- (k) have personal characteristics and attitudes required for professional life including personal integrity, sense of responsibility and dependability and ability to relate to or show concern for other individuals.

All efforts must be made to equip the medical graduate to acquire the skills as detailed in Table 11 Certifiable procedural skills – A Comprehensive list of skills recommended as desirable for Bachelor of Medicine and Bachelor of Surgery (MBBS) – Indian Medical Graduate, as given in the Graduate Medical Education Regulations, 2018

### **2.3. Goals for the Learner**

In order to fulfil this goal, the Indian Medical Graduate must be able to function in the following roles appropriately and effectively:-

- 2.3.1. Clinician who understands and provides preventive, promotive, curative, palliative and holistic care with compassion.
- 2.3.2. Leader and member of the health care team and system with capabilities to collect, analyze, synthesize and communicate health data appropriately.
- 2.3.3. Communicator with patients, families, colleagues and community.
- 2.3.4. Lifelong learner committed to continuous improvement of skills and knowledge.
- 2.3.5. Professional, who is committed to excellence, is ethical, responsive and accountable to patients, community and profession.

### **3. Competency Based Training Programme of the Indian Medical Graduate**

Competency based learning would include designing and implementing medical education curriculum that focuses on the desired and observable ability in real life situations. In order to effectively fulfil the roles as listed in clause 2, the Indian Medical Graduate would have obtained the following set of competencies at the time of graduation:

#### **3.1. *Clinician, who understands and provides preventive, promotive, curative, palliative and holistic care with compassion***

- 3.1.1 Demonstrate knowledge of normal human structure, function and development from a molecular, cellular, biologic, clinical, behavioral and social perspective.
- 3.1.2. Demonstrate knowledge of abnormal human structure, function and development from a molecular, cellular, biological, clinical, behavioural and social perspective.
- 3.1.3 Demonstrate knowledge of medico-legal, societal, ethical and humanitarian principles that influence health care.

- 3.1.4 Demonstrate knowledge of national and regional health care policies including the National Health Mission that incorporates National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM), frameworks, economics and systems that influence health promotion, health care delivery, disease prevention, effectiveness, responsiveness, quality and patient safety.
- 3.1.5. Demonstrate ability to elicit and record from the patient, and other relevant sources including relatives and caregivers, a history that is complete and relevant to disease identification, disease prevention and health promotion.
- 3.1.6. Demonstrate ability to elicit and record from the patient, and other relevant sources including relatives and caregivers, a history that is contextual to gender, age, vulnerability, social and economic status, patient preferences, beliefs and values.
- 3.1.7 Demonstrate ability to perform a physical examination that is complete and relevant to disease identification, disease prevention and health promotion.
- 3.1.8 Demonstrate ability to perform a physical examination that is contextual to gender, social and economic status, patient preferences and values.
- 3.1.9 Demonstrate effective clinical problem solving, judgment and ability to interpret and integrate available data in order to address patient problems, generate differential diagnoses and develop individualized management plans that include preventive, promotive and therapeutic goals.
- 3.1.10 Maintain accurate, clear and appropriate record of the patient in conformation with legal and administrative frameworks.
- 3.1.11 Demonstrate ability to choose the appropriate diagnostic tests and interpret these tests based on scientific validity, cost effectiveness and clinical context.
- 3.1.12 Demonstrate ability to prescribe and safely administer appropriate therapies including nutritional interventions, pharmacotherapy and interventions based on the principles of rational drug therapy, scientific validity, evidence and cost that conform to established national and regional health programmes and policies for the following:
  - i) Disease prevention,
  - ii) Health promotion and cure,
  - iii) Pain and distress alleviation, and
  - iv) Rehabilitation and palliation.

- 3.1.13 Demonstrate ability to provide a continuum of care at the primary and/or secondary level that addresses chronicity, mental and physical disability.
- 3.1.14 Demonstrate ability to appropriately identify and refer patients who may require specialized or advanced tertiary care.
- 3.1.15 Demonstrate familiarity with basic, clinical and translational research as it applies to the care of the patient.

**3.2. *Leader and member of the health care team and system***

- 3.2.1 Work effectively and appropriately with colleagues in an inter-professional health care team respecting diversity of roles, responsibilities and competencies of other professionals.
- 3.2.2 Recognize and function effectively, responsibly and appropriately as a health care team leader in primary and secondary health care settings.
- 3.2.3 Educate and motivate other members of the team and work in a collaborative and collegial fashion that will help maximize the health care delivery potential of the team.
- 3.2.4 Access and utilize components of the health care system and health delivery in a manner that is appropriate, cost effective, fair and in compliance with the national health care priorities and policies, as well as be able to collect, analyze and utilize health data.
- 3.2.5 Participate appropriately and effectively in measures that will advance quality of health care and patient safety within the health care system.
- 3.2.6 Recognize and advocate health promotion, disease prevention and health care quality improvement through prevention and early recognition: in a) life style diseases and b) cancer, in collaboration with other members of the health care team.

**3.3. *Communicator with patients, families, colleagues and community***

- 3.3.1 Demonstrate ability to communicate adequately, sensitively, effectively and respectfully with patients in a language that the patient understands and in a manner that will improve patient satisfaction and health care outcomes.
- 3.3.2 Demonstrate ability to establish professional relationships with patients and families that are positive, understanding, humane, ethical, empathetic, and trustworthy.
- 3.3.3 Demonstrate ability to communicate with patients in a manner respectful of patient's preferences, values, prior experience, beliefs, confidentiality and privacy.

3.3.4 Demonstrate ability to communicate with patients, colleagues and families in a manner that encourages participation and shared decision-making.

**3.4. Lifelong learner committed to continuous improvement of skills and knowledge**

3.4.1. Demonstrate ability to perform an objective self-assessment of knowledge and skills, continue learning, refine existing skills and acquire new skills.

3.4.2. Demonstrate ability to apply newly gained knowledge or skills to the care of the patient.

3.4.3. Demonstrate ability to introspect and utilize experiences, to enhance personal and professional growth and learning.

3.4.4. Demonstrate ability to search (including through electronic means), and critically reevaluate the medical literature and apply the information in the care of the patient.

3.4.5. Be able to identify and select an appropriate career pathway that is professionally rewarding and personally fulfilling.

**3.5. *Professional who is committed to excellence, is ethical, responsive and accountable to patients, community and the profession***

3.5.1. Practice selflessness, integrity, responsibility, accountability and respect.

3.5.2. Respect and maintain professional boundaries between patients, colleagues and society.

3.5.3. Demonstrate ability to recognize and manage ethical and professional conflicts.

3.5.4. Abide by prescribed ethical and legal codes of conduct and practice.

3.5.5. Demonstrate a commitment to the growth of the medical profession as a whole.

## Section 2

### Subject-wise outcomes

Section 2 contains subject-wise outcomes so called “sub-competencies” that must be achieved at the end of instruction in that subject. These are organised in tables and have two parts. The core subject outcomes are in first part. The second part in the same document (titled Integration) contains outcomes/competencies in other subjects which have been identified by experts in those subjects as requiring alignment or integration with the core subject.

Outcomes (competencies) in each subject are grouped according to topics number-wise. It is important to review the individual outcomes (competencies) in the light of the topic outcomes as a whole. For each competency outlined - the learning domains (Knowledge, Skill, Attitude, Communication) are identified. The expected level of achievement in that subject is identified as – [knows (K), knows how (KH), shows how (SH), perform (P)]. As a rule, ‘perform’ indicates independent performance without supervision and is required rarely in the pre-internship period. The outcome is a core (Y - must achieve) or a non-core (N - desirable) outcome. Suggested learning and assessment methods (these are suggestions) and explanation of the terms used are given under the section “definitions used in this document”. The suggested number of times a skill must be performed independently for certification in the learner’s log book is also given. Last two columns indicate subjects within the same phase and other phases with which the topic can be taught - together - aligned (temporal coordination), shared, correlated or nested.

The number of topics and competencies in each subject are given below:

## **Topics & outcomes in Pre-clinical & Para-clinical subjects**

<b>Sr. No.</b>	<b>Subjects</b>	<b>Number of topics</b>	<b>Number of outcomes</b>
1.	<b>Human Anatomy</b>	82	409
2.	<b>Physiology</b>	11	137
3.	<b>Biochemistry</b>	11	89
4.	<b>Pharmacology</b>	05	85
5.	<b>Pathology</b>	36	182
6.	<b>Microbiology</b>	08	54
7.	<b>Forensic Medicine &amp; Toxicology</b>	14	162
	<b>Total</b>	<b>167</b>	<b>1118</b>

## **Topics & outcomes in Medicine and Allied subjects**

<b>Sr. No.</b>	<b>Subjects</b>	<b>Number of topics</b>	<b>Number of outcomes</b>
<b>1.</b>	<b>Community Medicine</b>	20	107
<b>2.</b>	<b>General Medicine</b>	26	506
<b>3.</b>	<b>Respiratory Medicine</b>	02	47
<b>4.</b>	<b>Pediatrics</b>	35	406
<b>5.</b>	<b>Psychiatry</b>	19	117
<b>6.</b>	<b>Dermatology, Venereology &amp; Leprosy</b>	18	73
<b>7.</b>	<b>Physical Medicine &amp; Rehabilitation</b>	09	43
	<b>Total</b>	<b>129</b>	<b>1299</b>

## **Topics & outcomes in Surgery and Allied subjects**

<b>Sr. No.</b>	<b>Subjects</b>	<b>Number of topics</b>	<b>Number of outcomes</b>
<b>1.</b>	<b>General Surgery</b>	30	133
<b>2.</b>	<b>Ophthalmology</b>	09	60
<b>3.</b>	<b>Otorhinolaryngology</b>	04	76
<b>4.</b>	<b>Obstetrics &amp; Gynaecology</b>	38	126
<b>5.</b>	<b>Orthopedics</b>	14	39
<b>6.</b>	<b>Anesthesiology</b>	10	46
<b>7.</b>	<b>Radiodiagnosis</b>	01	13
<b>8.</b>	<b>Radiotherapy</b>	05	16
<b>9.</b>	<b>Dentistry</b>	05	23
	<b>Total</b>	<b>116</b>	<b>532</b>

## **Section 3**

### **Sample topics used for alignment & integration**

Section 3 contains a sample selection of topics that run across the phases which can be used for alignment and integration. These are suggestions and institutions can select their own set of topics which can run across phases.

It is important to design the curriculum with a view to ensure with several broad outcomes in mind: a) achievement of the broad competencies by the learner at the end of the MBBS program, b) retain the subject - wise character of learning and assessment and ensure that phase-wise subject outcomes are met and assessed, c) teaching topics that are similar together thereby reducing redundancy and allowing the learner to integrate the concept as the most important step in integration (alignment or temporal coordination) (see document on integration), and d) align learning and assessment experiences to the outcome and the level of achievement specified.

## **Understanding the competencies table**

## Understanding the competencies table

A	B	C	D	E	F	G	H	I	J
No.	Competencies	Domain	K/KH/SH/P	Core	Suggested Teaching Learning Method	Suggested Assessment method	No. required to certify (P)	Vertical Integration	Horizontal Integration
<b>Physiology</b>									
<b>Summary</b>									
Name of Topic: <b>General Physiology</b>									
Number of Competencies: <b>(08)</b>									
PY1.1	Describe the structure and functions of a	K	KH	Y	Lectures, Small group discussion	Written/Viva			Biochemistry
IM15.4	Elicit <i>document</i> and present a medical history that helps delineate the	S	SH	Y	Bed Side clinic, DOAP	Skill assessment		Community Medicine	

Description of competency

Unique number of the competency. First two alphabets represent the subject (see list); number following alphabet reflects topic number, following period is a running number.

Identifies the domain or domains addressed  
 K - Knowledge  
 S - Skill  
 A - Attitude  
 C - Communication

Identifies the level of competency required based on the Miller's pyramid  
 K - Knows  
 KH - Knows How  
 S - Skill  
 SH - Show How  
 P - Perform independently

Identifies if the competency is core or desirable.  
 Y indicates Core;  
 N-non-core

Identifies the suggested learning method.  
 DOAP - Demonstrate (by Student) Observe, Assist Perform)

Identifies the suggested assessment method  
 Skill assessment - Clinics, Skills lab, Practicals etc.

no of times a skill needs to be done independently to be certified for independent performance;  
 Rarely used in UG

Subject (s) in other phases with which the competency can be vertically integrated to increase relevance or improve basic understanding

Subject (s) in the same phase with which the competency can be horizontally integrated or aligned to allow a more wholesome understanding

**\*Numbers given are for illustrative purposes only and should not be compared with the same in curriculum documents**

## **Deriving learning objectives from competencies**

## Deriving learning objectives from competencies

K	Knows	A knowledge attribute – Usually enumerates or describes
KH	Knows how	A higher level of knowledge – is able to discuss or analyse
S	Shows	A skill attribute: is able to identify or demonstrate the steps
SH	Shows how	A skill attribute: is able to interpret / demonstrate a complex procedure requiring thought, knowledge and behaviour
P	Performs (under supervision or independently)	Mastery for the level of competence - When done independently under supervision a pre-specified number of times - certification or capacity to perform independently results

**Competency:** An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

PA42.3*	Identify the etiology of meningitis based on given CSF parameters	K/S	SH	Y
---------	---	-----	----	---

PA42.1*	At the end of the session the <b>phase II student</b> must be able to enumerate the most common causes of meningitis correctly
PA42.2*	At the end of the session the <b>phase II student</b> must be able to enumerate the components of CSF analysis correctly
PA42.3*	At the end of the session the <b>phase II student</b> must be able to <b>describe</b> the CSF features for a given etiology of meningitis <b>accurately</b>
PA42.4*	At the end of the session the <b>phase II student</b> must be able to identify the aetiology of meningitis correctly from a <b>given set of CSF parameters</b>

Audience - who will do the behavior

Behavior - What should the learner be able to do?

Condition - Under what conditions should the learner be able to do it?

Degree – How well must it be done

**Objective:** Statement of what a learner should be able to do at the end of a specific learning experience

**\*Numbers given are for illustrative purposes only and should not be compared with the same in curriculum documents**

## **Deriving learning methods from competencies**

## Deriving learning methods from competencies

**Competency:** An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

PA42.3*	Identify the etiology of meningitis based on given CSF parameters	K/S	SH	Y
---------	---	-----	----	---

**Objective:** Statement of what a learner should be able to do at the end of a specific learning experience

PA42.1*	At the end of the session the <b>Phase II student</b> must be able to enumerate the most common causes of meningitis <b>correctly</b>	Lecture → small group discussion
PA42.2*	At the end of the session the <b>Phase II student</b> must be able to enumerate the components of a CSF analysis <b>correctly</b>	Related objectives can be combined into one teaching session
PA42.3*	At the end of the session the <b>Phase II student</b> must be able to <b>describe</b> the CSF features for a given etiologic of meningitis <b>accurately</b>	
PA42.4*	At the end of the session the <b>Phase II student</b> must the able to identify the aetiology of meningitis correctly from a <b>given set of CSF parameters</b>	small group discussion, practical session

\*Numbers given are for illustrative purposes only and should not be compared with the same in curriculum documents

## **Deriving assessment methods from competencies**

## Deriving assessment methods from competencies-1

**Competency:** An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

PA42.3*	Identify the etiology of meningitis based on given CSF parameters	K/S	SH	Y
---------	---	-----	----	---

**Objective:** Statement of what a learner should be able to do at the end of a specific learning experience

PA42.1*	At the end of the session the <del>Phase II student</del> must be able to enumerate the most common causes of meningitis correctly	Short note or part of structured essay: Enumerate 5 causes of meningitis based on their prevalence in India
PA42.2*	At the end of the session the <b>Phase II student</b> must be able to enumerate the components of a CSF analysis correctly	Short note or part of structured essay: Enumerate the components tested in a CSF analysis
PA42.3*	At the end of the session the <b>Phase II student</b> must be able to <b>describe</b> the CSF features for a given aetiology of meningitis <b>accurately</b>	Short note or part of structured essay: Describe the CSF findings that are characteristic of tuberculous meningitis
PA42.4*	At the end of the session the <b>Phase II student</b> must be able to identify the aetiology of meningitis correctly from a <b>given set of CSF parameters</b>	Short note / part of the structured essay/ Skill station/ Viva voce Review the CSF findings in the following patient and identify (write or vocalise) the most likely etiology

\* Numbers given are for illustrative purposes only and should not be compared with numbers in the curriculum document

## Deriving assessment methods from competencies-2

**Competency:** An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

MI2.4*	List the common microbial agents causing anemia. Describe the morphology, mode of infection and discuss the pathogenesis, clinical course, diagnosis and prevention and treatment of the common microbial agents causing Anemia.	K	KH	Y	Didactic Small group discussion	Written/ Viva voce	Medicine	Pathology
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↓  
**Objective:** Statement of what a learner should be able to do at the end of a specific learning experience

MI2.1*	Enumerate the common microbial agents causing anaemia
MI2.2*	Describe the morphology of agent (1,2 etc)
MI2.3*	Describe the mode of infection of agent in humans
MI2.4*	Discuss the pathogenesis of anemia caused by agent
MI2.5*	Describe the clinical course of infection by agent
MI2.6*	Enumerate the diagnostic tests to identify the aetiology of agent as a cause of anemia
MI2.7*	Discuss the methods to prevent infection by agent
MI2.8*	Describe the treatment of infection by agent

↑  
Integrate concept - not necessarily teachers  
Plan session with teachers of both subjects -teachers from both subjects usually not needed. Ensure redundancy and duplication by reviewing both subjects

↔  
Horizontally aligned and integrated with pathology

↕  
Vertically integrated with General Medicine

↓  
Integrate concept - not necessarily teachers Plan session with teachers from both phases. Make a decision on how much of the information needs to be brought down to this phase to make it relevant. Consider how a competency can ascend over phases: for eg. - can be at a KH -( know how) in phase II but becomes SH in phase III. For vertical integration with clinical subjects, use of a case to link the concept (a well written paper, case is sufficient). Using teachers from both phases is rarely required

# The concept of integration

## Concept of integration used in the Manual

*Integration is a learning experience that allows the learner to perceive relationships from blocks of knowledge and develop a unified view of its basis and its application.* The GMR 2018 applies these principles to the extent that will retain the strengths of silo - based education and assessment while providing experiences that will allow learners to integrate concepts.

Keeping this in mind, the Regulations recommend temporal coordination as described by Harden (called alignment in this document) as the major method to be followed allowing similar topics in different subjects to be thought separately but during the same time frame (Figure 1a ).

In a small proportion - not to exceed 20% of the total curriculum an attempt can be made to Share (Figure 1b) topics or Correlate (Figure 1c) topics by using an integration session. The integration session most preferred will be a case based discussion in an appropriate format ensuring that elements in the same phase (horizontal) and from other phases are addressed. Care must be taken to ensure that achievement phase - based objectives are given primacy - the integrative elements from other phases are used only to provide adequate recall and understand the clinical application of concepts. It must be emphasized that integration does not necessarily require multiple teachers in each class. Experts from each phase and subject may be involved in the lesson planning but not it in its delivery unless deemed necessary.

As much as possible the necessary correlates from other phases must also be introduced while discussing a topic in a given subject - Nesting (Figure 1d) (Harden). Topics that cannot be aligned and integrated must be provided adequate time in the curriculum throughout the year.

Assessment will continue to be subject based. However, efforts must be made to ensure that phase appropriate correlates are tested to determine if the learner has internalized and integrated the concept and its application.

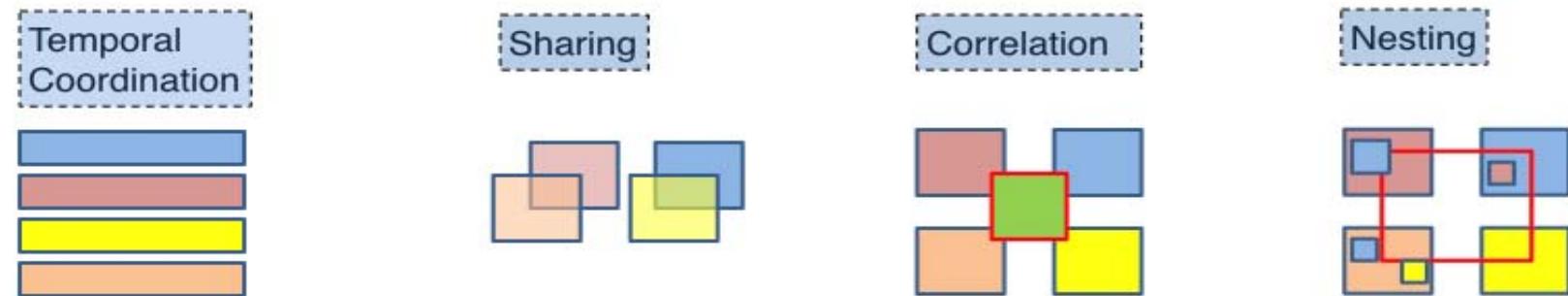


Figure 1 : Integration concepts framed in the GMR. Coloured boxes represent subjects. 1 a. Temporal coordination: The timetable is adjusted so that topics within the subjects or disciplines which are related, are scheduled at the same time. b. Sharing: Two disciplines may agree to plan and jointly implement a teaching program c. Correlation: the emphasis remains on disciplines or subjects with subject-based courses taking up most of the curriculum time. Within this framework, an integrated teaching session or course is introduced in addition to the subject-based teaching (green box with red border) d. Nesting: the teacher targets, within a subject-based course, skills relating to other subjects. Adapted from Harden R Med Edu 2000. 34; 551

## Definitions used in the Manual

1. **Goal:** A projected state of affairs that a person or system plans to achieve.

In other words: Where do you want to go? or What do you want to become?

2. **Competency:** The habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and community being served.

In other words: What should you have? or What should have changed?

3. **Objective:** Statement of what a learner should be able to do at the end of a specific learning experience.

In other words: What the Indian Medical Graduate should know, do, or behave.

### Action Verbs used in this manual

Knowledge	Skill	Attitude/communicate
Enumerate	Identify	Counsel
List	Demonstrate	Inform
Describe	Perform under supervision	Demonstrate understanding of
Discuss	Perform independently	
Differentiate	Document	
Define	Present	
Classify	Record	
Choose	Interpret	
Elicit		
Report		

**Note:**

1. Specified essential competencies only will be required to be performed independently at the end of the final year MBBS.
2. The word 'perform' or 'do' is used ONLY if the task has to be done on patients or in laboratory practical in the pre/para- clinical phases.
3. Most tasks that require performance during undergraduate years will be performed under supervision.
4. If a certification to perform independently has been done, then the number of times the task has to be performed under supervision will be indicated in the last column.

## Explanation of terms used in this manual

Lecture	Any instructional large group method including traditional lecture and interactive lecture
Small group discussion	Any instructional method involving small groups of students in an appropriate learning context
DOAP (Demonstration- Observation - Assistance - Performance)	A practical session that allows the student to observe a demonstration, assist the performer, perform in a simulated environment, perform under supervision or perform independently
Skill assessment	A session that assesses the skill of the student including those in the practical laboratory, skills lab, skills station that uses mannequins/ paper case/simulated patients/real patients as the context demands
Core	A competency that is necessary in order to complete the requirements of the subject (traditional must know)
Non-Core	A competency that is optional in order to complete the requirements of the subject (traditional nice (good) to know/ desirable to know)
National Guidelines	Health programs as relevant to the competency that are part of the National Health Program

### Domains of learning

K	Knowledge
S	Skill
A	Attitude
C	Communication

### Levels of competency

K	Knows	A knowledge attribute - Usually enumerates or describes
KH	Knows how	A higher level of knowledge - is able to discuss or analyze
S	Shows	A skill attribute: is able to identify or demonstrate the steps
SH	Shows how	A skill attribute: is able to interpret/ demonstrate a complex procedure requiring thought, knowledge and behavior
P	Performs (under supervision or independently)	Mastery for the level of competence - When done independently under supervision a pre-specified number of times - certification or capacity to perform independently results

**Note:**

In the table of competency - the highest level of competency acquired is specified and implies that the lower levels have been acquired already. Therefore, when a student is able to SH - Show how - an informed consent is obtained - it is presumed that the preceding steps - the knowledge, the analytical skills, the skill of communicating have all been obtained.

It may also be noted that attainment of the highest level of competency may be obtained through steps spread over several subjects or phases and not necessarily in the subject or the phase in which the competency has been identified.

## **Volume III**

# **Competency based Undergraduate Curriculum in Surgery and Allied subjects**

**GENERAL SURGERY (CODE: SU)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>GENERAL SURGERY</b>									
<b>Topic: Metabolic response to injury</b>		<b>Number of competencies: (03)</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU1.1	Describe Basic concepts of homeostasis, enumerate the metabolic changes in injury and their mediators.	K	KH	Y	Lecture, Bed side clinic, Small group discussion	Written/ Viva voce		Physiology, Biochemistry	
SU1.2	Describe the factors that affect the metabolic response to injury.	K	KH	Y	Lecture, Bed side clinic, Small group discussion	Written/ Viva voce		Biochemistry	
SU1.3	Describe basic concepts of perioperative care.	K	KH	Y	Lecture, Bed side clinic, Small group discussion	Written/ Viva voce			
<b>Topic: Shock</b>		<b>Number of competencies: (03)</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU2.1	Describe Pathophysiology of shock, types of shock & principles of resuscitation including fluid replacement and monitoring.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology, Physiology	
SU2.2	Describe the clinical features of shock and its appropriate treatment.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU2.3	Communicate and counsel patients and families about the treatment and prognosis of shock demonstrating empathy and care	A/C	SH	Y	DOAP session	Skill assessment		AETCOM	
<b>Topic: Blood and blood components</b>		<b>Number of competencies: (03)</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU3.1	Describe the Indications and appropriate use of blood and blood products and complications of blood transfusion.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
SU3.2	Observe blood transfusions.	S	SH	Y	Small group discussion, DOAP session	Skills assessment/ Log book			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
SU3.3	Counsel patients and family/ friends for blood transfusion and blood donation.	A/C	SH	Y	DOAP session	Skills assessment			
<b>Topic: Burns</b>		<b>Number of competencies: (04 )</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU4.1	Elicit document and present history in a case of Burns and perform physical examination. Describe Pathophysiology of Burns.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology	
SU4.2	Describe Clinical features, Diagnose type and extent of burns and plan appropriate treatment.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU4.3	Discuss the Medicolegal aspects in burn injuries.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU4.4	Communicate and counsel patients and families on the outcome and rehabilitation demonstrating empathy and care.	A /C	SH	Y	Small group discussion, Role play, Skills assessment	Viva voce			
<b>Topic: Wound healing and wound care</b>		<b>Number of competencies: (04 )</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU5.1	Describe normal wound healing and factors affecting healing.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
SU5.2	Elicit, document and present a history in a patient presenting with wounds.	C	SH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU5.3	Differentiate the various types of wounds, plan and observe management of wounds.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU5.4	Discuss medico legal aspects of wounds	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Surgical infections</b> <span style="float: right;">Number of competencies: (02)      Number of procedures that require certification: (NIL)</span>									
SU6.1	Define and describe the aetiology and pathogenesis of surgical Infections	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
SU6.2	Enumerate Prophylactic and therapeutic antibiotics Plan appropriate management	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Surgical Audit and Research</b> <span style="float: right;">Number of competencies: (02)      Number of procedures that require certification: (NIL)</span>									
SU7.1	Describe the Planning and conduct of Surgical audit	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
SU7.2	Describe the principles and steps of clinical research in General Surgery	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	
<b>Topic: Ethics</b> <span style="float: right;">Number of competencies: (03)      Number of procedures that require certification: (NIL)</span>									
SU8.1	Describe the principles of Ethics as it pertains to General Surgery	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment	-	Forensic Medicine, AETCOM	
SU8.2	Demonstrate Professionalism and empathy to the patient undergoing General Surgery	A/C	SH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		Forensic Medicine, AETCOM	
SU8.3	Discuss Medico-legal issues in surgical practice	A/C	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment		Forensic Medicine, AETCOM	
<b>Topic: Investigation of surgical patient</b> <span style="float: right;">Number of competencies (03)      Number of procedures that require certification: (NIL)</span>									
SU9.1	Choose appropriate biochemical, microbiological, pathological, imaging investigations and interpret the investigative data in a surgical patient	C	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Microbiology, Pathology	





Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Basic Surgical Skills</b>		<b>Number of competencies: (04)</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU14.1	Describe Aseptic techniques, sterilization and disinfection.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
SU14.2	Describe Surgical approaches, incisions and the use of appropriate instruments in Surgery in general.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU14.3	Describe the materials and methods used for surgical wound closure and anastomosis (sutures, knots and needles)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU14.4	Demonstrate the techniques of asepsis and suturing in a simulated environment	S	SH	Y	DOAP session	Skill assessment/ Log book			
<b>Topic: Biohazard disposal</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU15.1	Describe classification of hospital waste and appropriate methods of disposal.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
<b>Topic: Minimally invasive General Surgery</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU16.1	Minimally invasive General Surgery: Describe indications advantages and disadvantages of Minimally invasive General Surgery	K	K	Y	Lecture, Demonstration, Bedside clinic, Discussion	Theory/ Practical / Orals/Written/ Viva voce			
<b>Topic: Trauma</b>		<b>Number of competencies: (10)</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU17.1	Describe the Principles of FIRST AID	S	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU17.2	Demonstrate the steps in Basic Life Support. Transport of injured patient in a simulated environment	S	SH	Y	DOAP session	Skill assessment			Anaesthesiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
SU17.3	Describe the Principles in management of mass casualties	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU17.4	Describe Pathophysiology, mechanism of head injuries	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU17.5	Describe clinical features for neurological assessment and GCS in head injuries	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU17.6	Chose appropriate investigations and discuss the principles of management of head injuries	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU17.7	Describe the clinical features of soft tissue injuries. Chose appropriate investigations and discuss the principles of management.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU17.8	Describe the pathophysiology of chest injuries.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU17.9	Describe the clinical features and principles of management of chest injuries.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU17.10	Demonstrate Airway maintenance. Recognize and manage tension pneumothorax, hemothorax and flail chest in simulated environment.	S	SH	Y	DOAP session	Skill assessment/ Log book			Anaesthesiology

**Topic: Skin and subcutaneous tissue**

**Number of competencies: (03)**

**Number of procedures that require certification: (NIL)**

SU18.1	Describe the pathogenesis, clinical features and management of various cutaneous and subcutaneous infections.	K	KH	Y	Lecture, Small group Discussion	Written/ Viva voce			
SU18.2	Classify skin tumors Differentiate different skin tumors and discuss their management.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment			
SU18.3	Describe and demonstrate the clinical examination of surgical patient including swelling and order relevant investigation for diagnosis. Describe and discuss appropriate treatment plan.	S	SH	Y	Bedside clinic, Small group discussion, DOAP session	Skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Developmental anomalies of face, mouth and jaws</b>		<b>Number of competencies: (02)</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU19.1	Describe the etiology and classification of cleft lip and palate	K	KH	Y	Lecture, Small group Discussion	Written/ Viva voce		Human Anatomy	
SU19.2	Describe the Principles of reconstruction of cleft lip and palate	K	KH	Y	Lecture, Small group Discussion	Written/ Viva voce		Human Anatomy	
<b>Topic: Oropharyngeal cancer</b>		<b>Number of competencies: (02)</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU20.1	Describe etiopathogenesis of oral cancer symptoms and signs of oropharyngeal cancer.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
SU20.2	Enumerate the appropriate investigations and discuss the Principles of treatment.	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Disorders of salivary glands</b>		<b>Number of competencies: (02)</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU21.1	Describe surgical anatomy of the salivary glands, pathology, and clinical presentation of disorders of salivary glands	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU21.2	Enumerate the appropriate investigations and describe the Principles of treatment of disorders of salivary glands	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Endocrine General Surgery: Thyroid and parathyroid</b>		<b>Number of competencies: (06)</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU22.1	Describe the applied anatomy and physiology of thyroid	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	
SU22.2	Describe the etiopathogenesis of thyroidal swellings	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
SU22.3	Demonstrate and document the correct clinical examination of thyroid swellings and discuss the differential diagnosis and their management	S	SH	Y	Bedside clinic	Skill assessment			
SU22.4	Describe the clinical features, classification and principles of management of thyroid cancer	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU22.5	Describe the applied anatomy of parathyroid	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	
SU22.6	Describe and discuss the clinical features of hypo - and hyperparathyroidism and the principles of their management	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
<b>Topic: Adrenal glands</b> <span style="margin-left: 200px;"><b>Number of competencies: (03)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
SU23.1	Describe the applied anatomy of adrenal glands	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	
SU23.2	Describe the etiology, clinical features and principles of management of disorders of adrenal gland	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
SU23.3	Describe the clinical features, principles of investigation and management of Adrenal tumors	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Pancreas</b>		<b>Number of competencies: (03)</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU24.1	Describe the clinical features, principles of investigation, prognosis and management of pancreatitis.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	
SU24.2	Describe the clinical features, principles of investigation, prognosis and management of pancreatic endocrine tumours	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce			
SU24.3	Describe the principles of investigation and management of Pancreatic disorders including pancreatitis and endocrine tumors.	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
<b>Topic: Breast</b>		<b>Number of competencies: (05)</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU25.1	Describe applied anatomy and appropriate investigations for breast disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment		Human Anatomy	
SU25.2	Describe the etiopathogenesis, clinical features and principles of management of benign breast disease including infections of the breast	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment			
SU25.3	Describe the etiopathogenesis, clinical features, Investigations and principles of treatment of benign and malignant tumours of breast.	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment		Radiodiagnosis	
SU25.4	Counsel the patient and obtain informed consent for treatment of malignant conditions of the breast	A/ C	SH	Y	DOAP session	Skill assessment			
SU25.5	Demonstrate the correct technique to palpate the breast for breast swelling in a mannequin or equivalent	S	SH	Y	DOAP session	Skill assessment			
<b>Topic: Cardio-thoracic General Surgery- Chest - Heart and Lungs</b>		<b>Number of competencies: (04)</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU26.1	Outline the role of surgery in the management of coronary heart disease, valvular heart diseases and congenital heart diseases	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			



Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
SU28.2	Demonstrate the correct technique to examine the patient with hernia and identify different types of hernias.	S	SH	Y	DOAP session, Bedside clinic	Skill assessment			
SU28.3	Describe causes, clinical features, complications and principles of management of peritonitis	K	K	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce			
SU28.4	Describe pathophysiology, clinical features, investigations and principles of management of Intra-abdominal abscess, mesenteric cyst, and retroperitoneal tumors	K	K	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce			
SU28.5	Describe the applied Anatomy and physiology of esophagus	K	K	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce		Human Anatomy, Physiology	
SU28.6	Describe the clinical features, investigations and principles of management of benign and malignant disorders of esophagus	K	K	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce			
SU28.7	Describe the applied anatomy and physiology of stomach	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	
SU28.8	Describe and discuss the aetiology, the clinical features, investigations and principles of management of congenital hypertrophic pyloric stenosis, Peptic ulcer disease, Carcinoma stomach	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment			
SU28.9	Demonstrate the correct technique of examination of a patient with disorders of the stomach	S	SH	Y	DOAP session, Bedside clinic	Skill assessment			
SU28.10	Describe the applied anatomy of liver. Describe the clinical features, Investigations and principles of management of liver abscess, hydatid disease, injuries and tumors of the liver	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce		Human Anatomy	
SU28.11	Describe the applied anatomy of spleen. Describe the clinical features, investigations and principles of management of splenic injuries. Describe the post-splenectomy sepsis - prophylaxis	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce		Human Anatomy	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
SU28.12	Describe the applied anatomy of biliary system. Describe the clinical features, investigations and principles of management of diseases of biliary system	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce		Human Anatomy	
SU28.13	Describe the applied anatomy of small and large intestine	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce		Human Anatomy	
SU28.14	Describe the clinical features, investigations and principles of management of disorders of small and large intestine including neonatal obstruction and Short gut syndrome	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce			
SU28.15	Describe the clinical features, investigations and principles of management of diseases of Appendix including appendicitis and its complications.	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
SU28.16	Describe applied anatomy including congenital anomalies of the rectum and anal canal	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment		Human Anatomy	
SU28.17	Describe the clinical features, investigations and principles of management of common anorectal diseases	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
SU28.18	Describe and demonstrate clinical examination of abdomen. Order relevant investigations. Describe and discuss appropriate treatment plan	S	SH	Y	Bedside clinic, DOAP session, Small group discussion	Skill assessment			
<b>Topic: Urinary System</b> <span style="margin-left: 200px;"><b>Number of competencies: (11)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
SU29.1	Describe the causes, investigations and principles of management of Hematuria	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU29.2	Describe the clinical features, investigations and principles of management of congenital anomalies of genitourinary system	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
SU29.3	Describe the Clinical features, Investigations and principles of management of urinary tract infections	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Microbiology	
SU29.4	Describe the clinical features, investigations and principles of management of hydronephrosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU29.5	Describe the clinical features, investigations and principles of management of renal calculi	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU29.6	Describe the clinical features, investigations and principles of management of renal tumours	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU29.7	Describe the principles of management of acute and chronic retention of urine	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU29.8	Describe the clinical features, investigations and principles of management of bladder cancer	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
SU29.9	Describe the clinical features, investigations and principles of management of disorders of prostate	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment			
SU29.10	Demonstrate a digital rectal examination of the prostate in a mannequin or equivalent	S	SH	Y	DOAP session	Skill assessment			
SU29.11	Describe clinical features, investigations and management of urethral strictures	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
<b>Topic: Penis, Testis and scrotum</b>		<b>Number of competencies: (06)</b>			<b>Number of procedures that require certification: (NIL)</b>				
SU30.1	Describe the clinical features, investigations and principles of management of phimosis, paraphimosis and carcinoma penis.	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
SU30.2	Describe the applied anatomy clinical features, investigations and principles of management of undescended testis.	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment		Human Anatomy	
SU30.3	Describe the applied anatomy clinical features, investigations and principles of management of epididymo-orchitis	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment		Human Anatomy	
SU30.4	Describe the applied anatomy clinical features, investigations and principles of management of varicocele	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment		Human Anatomy	
SU30.5	Describe the applied anatomy, clinical features, investigations and principles of management of Hydrocele	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment		Human Anatomy	
SU30.6	Describe classification, clinical features, investigations and principles of management of tumours of testis	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
<p><b>Column C: K- Knowledge, S – Skill , A - Attitude / professionalism, C- Communication.</b>  <b>Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,</b>  <b>Column F: DOAP session – Demonstrate, Observe, Assess, Perform.</b>  <b>Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation</b></p>									
<b>Integration</b>									
<b>Human Anatomy</b>									
AN6.3	Explain the concept of lymphoedema and spread of tumors via lymphatics and venous system	K	KH	N	Lecture	Written		General Surgery	
AN9.2	Breast-Describe the location, extent, deep relations, structure, age changes, blood supply, lymphatic drainage, microanatomy and applied anatomy of breast	K	KH	Y	Practical, Lecture	Written/ Viva voce		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN10.4	Describe the anatomical groups of axillary lymph nodes and specify their areas of drainage	K	KH	Y	Practical, Lecture	Written/ Viva voce		General Surgery	
AN10.6	Explain the anatomical basis of clinical features of Erb's palsy and Klumpke's paralysis	K	KH	N	Lecture	Written		General Surgery	
AN10.7	Explain anatomical basis of enlarged axillary lymph nodes	K	KH	N	Lecture	Written		General Surgery	
AN11.3	Describe the anatomical basis of Venepuncture of cubital veins	K	KH	Y	Practical, Lecture	Written/ Viva voce		General Surgery	
AN12.8	Describe anatomical basis of Claw hand	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN12.10	Explain infection of fascial spaces of palm	K	KH	N	Lecture	Written		General Surgery	
AN12.11	Identify, describe and demonstrate important muscle groups of dorsal forearm with attachments, nerve supply and actions	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN12.12	Identify & describe origin, course, relations, branches (or tributaries), termination of important nerves and vessels of back of forearm	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN12.13	Describe the anatomical basis of Wrist drop	K	KH	Y	Lecture	Written/Viva voce		General Surgery	
AN12.14	Identify & describe compartments deep to extensor retinaculum	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN15.3	Describe and demonstrate boundaries, floor, roof and contents of femoral triangle	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN15.4	Explain anatomical basis of Psoas abscess & Femoral hernia	K	KH	N	Lecture, DOAP session	Written/ Viva voce		General Surgery	
AN16.2	Describe anatomical basis of sciatic nerve injury during gluteal intramuscular injections	K	KH	Y	Lecture, DOAP session	Written/ Viva voce		General Surgery	
AN16.3	Explain the anatomical basis of Trendelenburg sign	K	KH	Y	Lecture, DOAP session	Written/ Viva voce		General Surgery	
AN18.3	Explain the anatomical basis of foot drop	K	KH	Y	Lecture, DOAP session	Written/ Viva voce		General Surgery	
AN19.3	Explain the concept of "Peripheral heart"	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN20.4	Explain anatomical basis of enlarged inguinal lymph nodes	K	KH	N	Lecture	Written/ Viva voce		General Surgery	
AN20.5	Explain anatomical basis of varicose veins and deep vein thrombosis	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN20.9	Identify & demonstrate palpation of vessels (femoral, popliteal, dorsalis pedis, post tibial), Mid inguinal point, Surface projection of: femoral nerve, Saphenous opening, Sciatic, tibial, common peroneal & deep peroneal nerve, great and small saphenous veins	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Viva voce/ Skill assessment		General Medicine General Surgery	
AN23.1	Describe & demonstrate the external appearance, relations, blood supply, nerve supply, lymphatic drainage and applied anatomy of oesophagus	K/S	SH	Y	Practical, Lecture, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN23.2	Describe & demonstrate the extent, relations, tributaries of thoracic duct and enumerate its applied anatomy	K/S	SH	Y	Practical, Lecture, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN23.7	Mention the extent, relations and applied anatomy of lymphatic duct	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN27.1	Describe the layers of scalp, its blood supply, its nerve supply and surgical importance	K	KH	Y	Practical, Lecture	Written/ Viva voce		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN28.8	Explain surgical importance of deep facial vein	K	KH	Y	Lecture	Written		General Surgery	
AN28.9	Describe & demonstrate the parts, borders, surfaces, contents, relations and nerve supply of parotid gland with course of its duct and surgical importance	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN28.10	Explain the anatomical basis of Frey's syndrome	K	KH	N	Lecture	Written		General Surgery	
AN29.2	Explain anatomical basis of Erb's & Klumpke's palsy	K	KH	Y	Lecture	Written		General Surgery	
AN29.3	Explain anatomical basis of wry neck	K	KH	N	Lecture	Written		General Surgery	
AN30.1	Describe the cranial fossae & identify related structures.	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/Skill assessment		General Surgery	
AN30.2	Describe & identify major foramina with structures passing through them	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN33.2	Describe & demonstrate attachments, direction of fibres, nerve supply and actions of muscles of mastication	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN33.4	Explain the clinical significance of pterygoid venous plexus	K	KH	Y	Lecture	Written		General Surgery	
AN33.5	Describe the features of dislocation of temporomandibular joint	K	KH	N	Lecture	Written		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN34.1	Describe & demonstrate the morphology, relations and nerve supply of submandibular salivary gland & submandibular ganglion	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN34.2	Describe the basis of formation of submandibular stones	K	KH	N	Lecture	Written		General Surgery	
AN35.2	Describe & demonstrate location, parts, borders, surfaces, relations & blood supply of thyroid gland	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN35.5	Describe & demonstrate extent, drainage & applied anatomy of cervical lymph nodes	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN35.8	Describe the anatomically relevant clinical features of Thyroid swellings	K	KH	N	Lecture	Written		General Surgery	
AN35.9	Describe the clinical features of compression of subclavian artery and lower trunk of brachial plexus by cervical rib	K	KH	N	Lecture	Written		General Surgery	
AN43.5	Demonstrate- 1) Testing of muscles of facial expression, extraocular muscles, muscles of mastication, 2) Palpation of carotid arteries, facial artery, superficial temporal artery, 3) Location of internal and external jugular veins, 4) Location of hyoid bone, thyroid cartilage and cricoid cartilage with their vertebral levels	K/S	SH	Y	Practical	Viva voce/ Skill assessment		General Surgery	
AN43.6	Demonstrate surface projection of Thyroid gland, Parotid gland and duct, Pterion, Common carotid artery, Internal jugular vein, Subclavian vein, External jugular vein, Facial artery in the face & Accessory nerve	K/S	SH	N	Practical	Viva voce/ Skill assessment		General Surgery	
AN44.1	Describe & demonstrate the Planes (transpyloric, transtuberular, subcostal, lateral vertical, linea alba, linea semilunaris), regions & Quadrants of abdomen	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN44.4	Describe & demonstrate extent, boundaries, contents of Inguinal canal including Hesselbach's triangle.	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN44.5	Explain the anatomical basis of inguinal hernia.	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN44.6	Describe & demonstrate attachments of muscles of anterior abdominal wall	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN44.7	Enumerate common Abdominal incisions	K	KH	N	Lecture	Written		General Surgery	
AN46.1	Describe & demonstrate coverings, internal structure, side determination, blood supply, nerve supply, lymphatic drainage & descent of testis with its applied anatomy	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN46.4	Explain the anatomical basis of varicocele	K	KH	N	Lecture	Written		General Surgery	
AN46.5	Explain the anatomical basis of Phimosi s & Circumcision	K	KH	N	Lecture	Written		General Surgery	
AN47.1	Describe & identify boundaries and recesses of Lesser & Greater sac	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN47.2	Name & identify various peritoneal folds & pouches with its explanation.	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN47.3	Explain anatomical basis of Ascites & Peritonitis	K	KH	N	Lecture	Written		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN47.4	Explain anatomical basis of Subphrenic abscess	K	KH	N	Lecture	Written		General Surgery	
AN47.5	Describe & demonstrate major viscera of abdomen under following headings (anatomical position, external and internal features, important peritoneal and other relations, blood supply, nerve supply, lymphatic drainage and applied aspects)	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written		General Surgery	
AN47.6	Explain the anatomical basis of Splenic notch, accessory spleens, Kehr's sign, different types of vagotomy, liver biopsy (site of needle puncture), referred pain in cholecystitis, Obstructive jaundice, referred pain around umbilicus, radiating pain of kidney to groin & Lymphatic spread in carcinoma stomach	K	KH	N	Lecture	Written		General Surgery	
AN47.7	Mention the clinical importance of Calot's triangle	K	KH	N	Lecture	Written		General Surgery	
AN47.10	Enumerate the sites of portosystemic anastomosis	K	KH	Y	Lecture	Written		General Surgery	
AN47.11	Explain the anatomic basis of hematemesis & caput medusae in portal hypertension	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN47.14	Describe the abnormal openings of thoracoabdominal diaphragm and diaphragmatic hernia	K	KH	N	Lecture	Written		General Surgery	
AN48.5	Explain the anatomical basis of suprapubic cystostomy, Urinary obstruction in benign prostatic hypertrophy, Retroverted uterus, Prolapse uterus, Internal and external haemorrhoids, Anal fistula, Vasectomy, Tubal pregnancy & Tubal ligation	K	KH	N	Lecture	Written		General Surgery	
AN48.6	Describe neurological basis of automatic bladder	K	KH	N	Lecture	Written		General Surgery	
AN48.7	Mention the lobes involved in benign prostatic hypertrophy & prostatic cancer	K	KH	N	Lecture	Written		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN48.8	Mention the structures palpable during vaginal & rectal examination	K	KH	N	Lecture	Written		Obstetrics & Gynaecology General Surgery	
AN49.4	Describe & demonstrate boundaries, content & applied anatomy of Ischiorectal fossa	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		General Surgery	
AN52.5	Describe the development and congenital anomalies of diaphragm	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN52.6	Describe the development and congenital anomalies of foregut, midgut & hindgut	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN52.7	Describe the development of urinary system	K	KH	Y	Lecture	Written/ Viva voce		General Surgery	
AN53.1	Identify & hold the bone in the anatomical position, describe the salient features, articulations & demonstrate the attachments of muscle groups	K/S	SH	Y	Lecture, DOAP session	Viva voce/ Skill assessment		General Surgery, Obstetrics & Gynaecology	
AN55.1	Demonstrate the surface marking of regions and planes of abdomen, superficial inguinal ring, deep inguinal ring, McBurney's point, Renal Angle & Murphy's point	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Viva voce/ Skill assessment		General Surgery	
AN55.2	Demonstrate the surface projections of: stomach, liver, fundus of gall bladder, spleen, duodenum, pancreas, ileocaecal junction, kidneys & root of mesentery	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Viva voce/ Skill assessment		General Surgery	
<b>Biochemistry</b>									
BI10.1	Describe the cancer initiation promotion oncogenes & oncogene activation.	K	KH	Y	Lectures, Small group discussion	Written/ viva voce		Obstetrics & Gynaecology, General Surgery, Pathology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
B110.2	Describe various biochemical tumor markers and the biochemical basis of cancer therapy.	K	KH	Y	Lectures, Small group discussion	Written/ viva voce		Obstetrics & Gynaecology, General Surgery, Pathology	
B110.3	Describe the cellular and humoral components of the immune system & describe the types and structure of antibody	K	KH	Y	Lectures, Small group discussion	Written/ viva voce		Obstetrics & Gynaecology, General Surgery, Pathology	
<b>Pathology</b>									
PA4.1	Define and describe the general features of acute and chronic inflammation including stimuli, vascular and cellular events	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA4.2	Enumerate and describe the mediators of acute inflammation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA5.1	Define and describe the process of repair and regeneration including wound healing and its types	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA6.3	Define and describe shock, its pathogenesis and its stages	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA8.1	Describe the diagnostic role of cytology and its application in clinical care	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA8.2	Describe the basis of exfoliative cytology including the technique, stains used	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ Skill assessment		General Surgery	
PA19.1	Enumerate the causes and describe the differentiating features of lymphadenopathy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA19.2	Describe the pathogenesis and pathology of tuberculous lymphadenitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA19.4	Describe and discuss the pathogenesis pathology and the differentiating features of Hodgkin's and non-Hodgkin's lymphoma	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PA19.5	Identify and describe the features of Hodgkin's lymphoma in a gross and microscopic specimen	S	SH	Y	DOAP session	Skill assessment		General Surgery	
PA19.6	Enumerate and differentiate the causes of splenomegaly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery, General Medicine	
PA22.4	Enumerate blood components and describe their clinical uses	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery, General Medicine	
PA24.4	Describe and etiology and pathogenesis and pathologic features of carcinoma of the stomach	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA24.5	Describe and etiology and pathogenesis and pathologic features of Tuberculosis of the intestine	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA24.6	Describe and etiology and pathogenesis and pathologic and distinguishing features of inflammatory bowel disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA24.7	Describe the etiology and pathogenesis and pathologic and distinguishing features of carcinoma of the colon	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA25.2	Describe the pathophysiology and pathologic changes seen in hepatic failure and their clinical manifestations, complications and consequences	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, General Surgery	
PA25.4	Describe the pathophysiology, pathology and progression of alcoholic liver disease including cirrhosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, General Surgery	
PA25.5	Describe the etiology, pathogenesis and complications of portal hypertension	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine, General Surgery	
PA28.10	Describe the etiology, pathogenesis, pathology, laboratory findings, distinguishing features progression and complications of acute and chronic pyelonephritis and reflux nephropathy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PA28.13	Define, classify and describe the etiology, pathogenesis, pathology, laboratory urinary findings, distinguishing features, progression and complications of renal stone disease and obstructive uropathy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA28.16	Describe the etiology, genetics, pathogenesis, pathology, presenting features and progression of urothelial tumors	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA29.1	Classify testicular tumors and describe the pathogenesis, pathology, presenting and distinguishing features, diagnostic tests, progression and spread of testicular tumors	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA29.2	Describe the pathogenesis, pathology, presenting and distinguishing features, diagnostic tests, progression and spread of carcinoma of the penis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA29.3	Describe the pathogenesis, pathology, hormonal dependency, presenting and distinguishing features, urologic findings and diagnostic tests of benign prostatic hyperplasia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA29.4	Describe the pathogenesis, pathology, hormonal dependency, presenting and distinguishing features, diagnostic tests, progression and spread of carcinoma of the prostate	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA29.5	Describe the etiology, pathogenesis, pathology and progression of prostatitis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA31.1	Classify and describe the types, etiology, pathogenesis, pathology and hormonal dependency of benign breast disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, General Surgery	
PA31.2	Classify and describe the epidemiology, pathogenesis, classification, morphology, prognostic factors, hormonal dependency, staging and spread of carcinoma of the breast	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PA31.3	Describe and identify the morphologic and microscopic features of carcinoma of the breast	S	SH	N	DOAP session	Skill assessment		General Surgery	
PA32.1	Enumerate, classify and describe the etiology, pathogenesis, pathology and iodine dependency of thyroid swellings	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy , Physiology, General Medicine, Pathology	
PA32.6	Describe the etiology, pathogenesis, manifestations, laboratory, morphologic features, complications and metastases of pancreatic cancer	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
PA32.9	Describe the etiology, pathogenesis, manifestations, laboratory and morphologic features of adrenal neoplasms	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Physiology, General Medicine, General Surgery	
<b>Microbiology</b>									
MI1.4	Classify and describe the different methods of sterilization and disinfection. Discuss the application of the different methods in the laboratory, in clinical and surgical practice	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
MI1.5	Choose the most appropriate method of sterilization and disinfection to be used in specific situations in the laboratory, in clinical and surgical practice	K	KH	Y	Small group discussions, Case discussion	Written/ Viva voce/ OSPE		General Surgery	
MI7.1	Describe the etio-pathogenesis and discuss the laboratory diagnosis of infections of genitourinary system	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
MI8.7	Demonstrate Infection control practices and use of Personal Protective Equipments (PPE)	S	P	Y	DOAP session	Skill assessment	3 each in (Hand hygiene & PPE)	General Surgery	Community Medicine
<b>Community Medicine</b>									
CM13.1	Define and describe the concept of Disaster management	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery, General Medicine	
CM13.2	Describe disaster management cycle	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery, General Medicine	
CM13.3	Describe man-made disasters in the world and in India	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Surgery, General Medicine	
CM13.4	Describe the details of the National Disaster management Authority	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Surgery, General Medicine	
<b>Forensic Medicine &amp; Toxicology</b>									
FM1.9	Describe the importance of documentation in medical practice in regard to medicolegal examinations, Medical Certificates and medicolegal reports especially --maintenance of patient case records, discharge summary, prescribed registers to be maintained in Health Centres. -- maintenance of medico-legal register like accident register. -- documents of issuance of wound certificate -- documents of issuance of drunkenness certificate. -- documents of issuance of sickness and fitness certificate. -- documents for issuance of death certificate. -- documents of Medical Certification of Cause of Death - Form Number 4 and 4A -- documents for estimation of age by physical, dental and radiological examination and issuance of certificate	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Radiodiagnosis, General Surgery, General Medicine, Pediatrics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM2.19	Investigation of anaesthetic, operative deaths: Describe and discuss special protocols for conduction of autopsy and for collection, preservation and dispatch of related material evidences	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Anesthesiology, General Surgery	
FM2.25	Describe types of injuries, clinical features, patho-physiology, post-mortem findings and medico-legal aspects in cases of burns, scalds, lightening, electrocution and radiations.	K	KH	Y	Lecture, Small group discussion, Autopsy, DOAP session	Written/ Viva voce/ OSPE		General Surgery	
FM3.3	Mechanical injuries and wounds: Define, describe and classify different types of mechanical injuries, abrasion, bruise, laceration, stab wound, incised wound, chop wound, defense wound, self-inflicted/fabricated wounds and their medico-legal aspects.	K	KH	Y	Lectures, Small group discussion, Bed side clinic/ DOAP session	Written/ Viva voce/ OSCE		General Surgery	
FM3.4	Mechanical injuries and wounds: define injury, assault & hurt. Describe IPC pertaining to injuries	K	KH	Y	Lectures, Small group discussion	Written/ Viva voce		General Surgery	
FM3.6	Mechanical injuries and wounds: Describe healing of injury and fracture of bones with its medico-legal importance	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	
FM3.8	Mechanical injuries and wounds: Describe and discuss different types of weapons including dangerous weapons and their examination.	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery, Orthopaedics	
FM3.9	Firearm injuries: Describe different types of firearms including structure and components, along with description of ammunition propellant charge and mechanism of fire-arms, different types of cartridges and bullets and various terminology in relation of firearm – caliber, range, choking.	K	K/KH	Y	Lecture, Small group discussion	Written/Viva voce		General Surgery, Orthopaedics	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM3.10	Firearm injuries: Describe and discuss wound ballistics-different types of firearm injuries, blast injuries and their interpretation, preservation and dispatch of trace evidences in cases of firearm and blast injuries, various tests related to confirmation of use of firearms	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, DOAP session	Written/ Viva voce/ OSCE		General Surgery, Orthopaedics	
FM3.11	Regional Injuries: Describe and discuss regional injuries to head (Scalp wounds, fracture skull, intracranial haemorrhages, coup and contrecoup injuries), neck, chest, abdomen, limbs, genital organs, spinal cord and skeleton	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic or autopsy, DOAP session	Written/ Viva voce/ OSCE/OSPE		General Surgery, Orthopaedics	
FM3.12	Regional Injuries: Describe and discuss injuries related to fall from height and vehicular injuries – Primary and Secondary impact, Secondary injuries, crush syndrome, railway spine.	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic or autopsy, DOAP session	Written/ Viva voce/ OSCE/OSPE		General Surgery, Orthopaedics	
<b>Dermatology, Venereology &amp; Leprosy</b>									
DR15.3	Enumerate the indications and describe the pharmacology, indications and adverse reactions of topical and systemic drugs used in treatment of pyoderma	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		General Surgery	Microbiology, Pharmacology
DR15.4	Enumerate the indications for surgical referral	S	KH	Y	DOAP session	Written/Viva voce		General Surgery	
<b>Anesthesiology</b>									
AS3.1	Describe the principles of preoperative evaluation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Surgery, General Medicine
AS3.2	Elicit, present and document an appropriate history including medication history in a patient undergoing Surgery as it pertains to a preoperative anaesthetic evaluation	S	SH	Y	DOAP session, Bedside clinic	Skill station			General Surgery, General Medicine

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AS3.3	Demonstrate and document an appropriate clinical examination in a patient undergoing General Surgery	S	SH	Y	DOAP session, Bedside clinic	Skill station			General Surgery, General Medicine
AS3.4	Choose and interpret appropriate testing for patients undergoing Surgery	S	SH	Y	DOAP session, Bedside clinic	Skill station			General Surgery, General Medicine
AS3.5	Determine the readiness for General Surgery in a patient based on the preoperative evaluation	S	SH	Y	DOAP session, Bedside clinic	Skill station			General Surgery, General Medicine
AS5.6	Observe and describe the principles and steps/ techniques involved in common blocks used in Surgery(including brachial plexus blocks)	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			General Surgery
AS6.3	Describe the common complications encountered by patients in the recovery room, their recognition and principles of management	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			General Surgery
AS9.3	Describe the principles of fluid therapy in the preoperative period	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			General Surgery
AS9.4	Enumerate blood products and describe the use of blood products in the preoperative period	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Pathology	General Surgery
AS10.3	Describe the role of communication in patient safety	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		AETCOM	General Surgery
<b>General Medicine</b>									
IM5.8	Describe and discuss the pathophysiology, clinical evolution and complications of cholelithiasis and cholecystitis	K	K	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM5.13	Enumerate the indications for ultrasound and other imaging studies including MRCP and ERCP and describe the findings in liver disease	K	K	Y	Bed side clinic, Small group discussion	Written/ Viva voce		Radiodiagnosis	General Surgery
IM5.16	Describe and discuss the management of hepatitis, cirrhosis, portal hypertension, ascites, spontaneous, bacterial peritonitis and hepatic encephalopathy	K	KH	Y	Written, Small group discussion	Skill assessment/ Written/ Viva voce		Pharmacology	General Surgery
IM5.18	Enumerate the indications for hepatic transplantation	K	K	Y	Written, Small group discussion	Written/ Viva voce			General Surgery
IM12.6	Perform and demonstrate a systematic examination based on the history that will help establish the diagnosis and severity including systemic signs of thyrotoxicosis and hypothyroidism, palpation of the pulse for rate and rhythm abnormalities, neck palpation of the thyroid and lymph nodes and cardiovascular findings	S	SH	Y	Bed side clinic, DOAP session	Skill assessment			General Surgery
IM12.7	Demonstrate the correct technique to palpate the thyroid	S	SH	Y	Bedside clinic, DOAP session	Skill assessment			General Surgery
IM12.8	Generate a differential diagnosis based on the clinical presentation and prioritise it based on the most likely diagnosis	K	KH	Y	Bedside clinic, small group discussion	Short case			General Surgery
IM12.9	Order and interpret diagnostic testing based on the clinical diagnosis including CBC, thyroid function tests and ECG and radio iodine uptake and scan	S	SH	Y	Bed side clinic, DOAP session	Skill assessment			General Surgery
IM12.10	Identify atrial fibrillation, pericardial effusion and bradycardia on ECG	S	SH	Y	Bedside clinic, lab	Skill assessment			General Surgery
IM12.11	Interpret thyroid function tests in hypo-and hyperthyroidism	S	SH	Y	Bedside clinic, lab	Skill assessment			General Surgery
IM12.13	Describe the pharmacology, indications, adverse reaction, interactions of thyroxine and antithyroid drugs	K	KH	Y	Lecture, Small group discussion	Viva voce/ Short note		Pharmacology	General Surgery
IM12.15	Describe and discuss the indications of thionamide therapy, radio iodine therapy and Surgery in the management of thyrotoxicosis	K	KH	Y	Bedside clinic, Small group discussion	Short note/ Viva voce, Skill assessment		Pharmacology	General Surgery

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM13.7	Elicit document and present a history that will help establish the aetiology of cancer and includes the appropriate risk factors, duration and evolution	S	K	Y	Bedside clinic	Skill assessment/ Short case			General Surgery
IM13.8	Perform and demonstrate a physical examination that includes an appropriate general and local examination that excludes the diagnosis, extent spread and complications of cancer	S	SH	Y	Bedside clinic	Skill assessment/ Short case			General Surgery
IM13.9	Demonstrate in a mannequin the correct technique for performing breast exam, rectal examination and cervical examination and pap smear	S	K	Y	Bedside clinic	Skill assessment/ Short case		Human Anatomy	General Surgery
IM13.10	Generate a differential diagnosis based on the presenting symptoms and clinical features and prioritise based on the most likely diagnosis	S	K	Y	Bedside clinic	Skill assessment/ Short case			General Surgery
IM13.13	Describe and assess pain and suffering objectively in a patient with cancer	K	KH	Y	Bedside clinic, Small group discussion	Short note/ Viva voce		Pharmacology	General Surgery
IM13.14	Describe the indications for General Surgery, radiation and chemotherapy for common malignancies	K	KH	Y	Bedside clinic, Small group discussion	Short note/ Viva voce		Pharmacology	General Surgery
IM14.14	Describe and enumerate the indications and side effects of bariatric surgery	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce			General Surgery
IM15.1	Enumerate, describe and discuss the aetiology of upper and lower GI bleeding	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology	General Surgery
IM15.2	Enumerate describe and discuss the evaluation and steps involved in stabilizing a patient who presents with acute volume loss and GI bleed	S	SH	Y	DOAP session, Small group discussion, Lecture	Written/ Viva voce/ Skill assessment		Pathology	General Surgery
IM15.3	Describe and discuss the physiologic effects of acute blood and volume loss	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology, Physiology	General Surgery
IM15.4	Elicit document and present an appropriate history that identifies the route of bleeding, quantity, grade, volume loss, duration, etiology, comorbid illnesses and risk factors	S	SH	Y	Bedside clinic	Skill assessment			General Surgery

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM15.5	Perform, demonstrate and document a physical examination based on the history that includes general examination, volume assessment and appropriate abdominal examination	S	SH	Y	Bedside clinic, Skills lab	Skill assessment			General Surgery
IM15.6	Distinguish between upper and lower gastrointestinal bleeding based on the clinical features	S	KH	Y	Lecture, Small group discussion	Short note/ Viva voce			General Surgery
IM15.7	Demonstrate the correct technique to perform an anal and rectal examination in a mannequin or equivalent	S	SH	Y	DOAP session	Skill assessment			General Surgery
IM15.8	Generate a differential diagnosis based on the presenting symptoms and clinical features and prioritise based on the most likely diagnosis	S	SH	Y	Bedside clinic, Skills lab	Skill assessment/ Short note/ Viva voce			General Surgery
IM15.9	Choose and interpret diagnostic tests based on the clinical diagnosis including complete blood count, PT and PTT, stool examination, occult blood, liver function tests, H.pylori test.	S	SH	Y	Bedside clinic, DOAP session, Small group discussion	Skill assessment/ Short note/ Viva voce		Pathology	General Surgery
IM15.10	Enumerate the indications for endoscopy, colonoscopy and other imaging procedures in the investigation of Upper GI bleeding	K	KH	Y	Lectures, Small group discussion	Written/ Viva voce			General Surgery
IM15.11	Develop, document and present a treatment plan that includes fluid resuscitation, blood and blood component transfusion, and specific therapy for arresting blood loss	S	KH	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology	General Surgery
IM15.12	Enumerate the indications for whole blood, component and platelet transfusion and describe the clinical features and management of a mismatched transfusion	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology	General Surgery
IM15.13	Observe cross matching and blood / blood component transfusion	S	SH	Y	Bedside clinic	Short note/ Viva voce/ Skill assessment		Pathology	General Surgery
IM15.14	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy of pressors used in the treatment of Upper GI bleed	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pharmacology	General Surgery

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM15.15	Describe and enumerate the indications, pharmacology and side effects of pharmacotherapy of acid peptic disease including Helicobacter pylori	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce		Pharmacology, Microbiology	General Surgery
IM15.16	Enumerate the indications for endoscopic interventions and Surgery	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce			General Surgery
IM15.17	Determine appropriate level of specialist consultation	S	K	Y	Small group discussion				General Surgery
IM15.18	Counsel the family and patient in an empathetic non-judgmental manner on the diagnosis and therapeutic options	S	SH	Y	DOAP session	Skill assessment			General Surgery
IM16.12	Enumerate and discuss the indications for further investigations including antibodies, colonoscopy, diagnostic imaging and biopsy in the diagnosis of chronic diarrhea	K	KH	Y	Lectures, Small group discussion	Written/ Viva voce		Pathology	General Surgery
IM16.15	Distinguish, based on the clinical presentation, Crohn's disease from ulcerative colitis	S	SH	Y	Lecture, Small group discussion	Short note/ Viva voce		Pathology	General Surgery
IM16.17	Describe and enumerate the indications for Surgery in inflammatory bowel disease	K	K	Y	Lecture, Small group discussion	Short note/ Viva voce			General Surgery
IM18.15	Enumerate the indications for Surgery in a hemorrhagic stroke	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			General Surgery
IM19.9	Enumerate the indications for use of Surgery and botulinum toxin in the treatment of movement disorders	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	General Surgery
IM22.2	Describe the aetiology, clinical manifestations, diagnosis and clinical approach to primary hyperparathyroidism	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Pathology	General Surgery

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM24.11	Describe and discuss the aetiopathogenesis, clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of the elderly undergoing surgery	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Anesthesiology, General Surgery
<b>Obstetrics &amp; Gynaecology</b>									
OG26.2	Describe the causes, prevention, clinical features, principles of management of genital injuries and fistulae	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			General Surgery
OG33.2	Describe the principles of management including Surgery and radiotherapy of benign, pre-malignant (CIN) and malignant Lesions of the Cervix	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Surgery
<b>Pediatrics</b>									
PE21.8	Elicit, document and present a history pertaining to diseases of the Genitourinary tract00	S	SH	Y	Bedside clinics, Skills lab	Skill Assessment			General Surgery
PE21.14	Recognize common surgical conditions of the abdomen and genitourinary system and enumerate the indications for referral including acute and subacute intestinal obstruction, appendicitis, pancreatitis perforation intussusception, Phimosi, undescended testis, Chordee, hypospadias, Torsion testis, hernia Hydrocele, Vulval Synechia	S	SH	Y	Bed side clinics, Skills lab	Log book assessment			General Surgery
<b>Orthopedics</b>									
OR1.1	Describe and discuss the principles of pre-hospital care and casualty management of a trauma victim including principles of triage	K/S/A/C	K/KH	Y	Lecture with video, Small group discussion	Written/ Viva voce/ OSCE/ Simulation			General Surgery - Anaesthesiology
OR1.2	Describe and discuss the aetiopathogenesis, clinical features, investigations, and principles of management of shock	K/S	K/KH	Y	Lecture	Written/ Viva voce/ OSCE/ Simulation			General Surgery

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OR1.3	Describe and discuss the aetiopathogenesis, clinical features, investigations, and principles of management of soft tissue injuries	K	KH/ SH	Y	Lecture, Small group discussion	Written/ OSCE			General Surgery
OR1.4	Describe and discuss the principles of management of soft tissue injuries	K	K/KH	Y	Lecture, Small group discussion	Written Assesment/ Viva voce			General Surgery
OR3.1	Describe and discuss the aetiopathogenesis, clinical features, Investigations and principles of management of Bone and Joint infections a) Acute Osteomyelitis b) Subacute osteomyelitis c) Acute Suppurative arthritis d) Septic arthritis & HIV infection e) Spirochaetal infection f) Skeletal Tuberculosis	K/S	K/KH/ SH	Y	Lecture, Small group discussion, Video assisted lecture	Written/ Viva voce/ OSCE		Pathology, Microbiology	General surgery
OR3.3	Participate as a member in team for procedures like drainage of abscess, sequestrectomy/ saucerisation and arthrotomy	K/S/A/C	SH	Y	DOAP session, Video demonstration	Viva voce/ OSCE/ Skills assessment			General Surgery
OR4.1	Describe and discuss the clinical features, Investigation and principles of management of Tuberculosis affecting major joints (Hip, Knee) including cold abscess and caries spine	K	K/KH	Y	Lecture, Small group discussion, Case discussion	Written/ Viva voce/ OSCE		Pathology	General surgery
OR10.1	Describe and discuss the aetiopathogenesis, clinical features, Investigations and principles of management of benign and malignant bone tumours and pathological fractures	K	K/KH	Y	Lecture, Small group discussion, Video assisted interactive lecture	Written/ Viva voce OSCE		Pathology	General surgery, Radiotherapy
OR11.1	Describe and discuss the aetiopathogenesis, clinical features, investigations and principles of management of peripheral nerve injuries in diseases like foot drop, wrist drop, claw hand, palsies of Radial, Ulnar, Median, Lateral Popliteal and Sciatic Nerves	K	K/H	Y	Lecture Small Group discussion, Case discussion	Written/ Viva voce/ OSCE		Human Anatomy	General Medicine, General surgery
<b>Physical Medicine &amp; Rehabilitation</b>									
PM5.1	Enumerate the indications and describe the principles of amputation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics, General Surgery

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PM7.8	Enumerate the causes of, describe, classify Pressure sores, prevention, and treatment.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Surgery
PM7.9	Enumerate the indications of debridement, and Split thickness skin grafting.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Surgery
PM8.1	Describe the clinical features, evaluation, diagnosis and management of disability following traumatic brain injury	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine, Orthopedics, General Surgery
<b>Radiotherapy</b>									
RT1.1	Describe and discuss definition of radiation, mechanism of action of radiation, types of radiation	K	KH	Y	Lecture	Written/ Viva voce			General Surgery Anaesthesiology
RT1.3	Enumerate, describe and discuss and classify staging of cancer (AJCC, FIGO etc.)	K	KH	Y	Lecture	Written/ Viva voce		Pathology	General Surgery, General Medicine
RT4.5	Describe and discuss role of radiation in management of common malignancies in India (region specific)	K	KH	Y	Lecture, Bed side clinic	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology
RT4.6	Describe and discuss radiotherapy for benign disease	K	KH	Y	Lecture	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology
RT4.7	Counsel patients regarding acute and late effects of radiation and supportive care	K/A/S	KH	Y	Bedside clinic, Group discussion	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology
RT4.8	Describe oncological emergencies and palliative care	K/A/S	K/KH	Y	Lecture, Group discussion	Written/ Viva voce			General Surgery, Obstetrics & Gynaecology
RT5.1	Describe and discuss cancer prevention, screening, vaccination, cancer registry	K	K	Y	Group discussion	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology

# **OPHTHALMOLOGY (CODE: OP)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>OPHTHALMOLOGY</b>									
<b>Topic: Visual Acuity Assessment</b>		<b>Number of Competens: (05)</b>			<b>Number of procedures that require certification : (NIL)</b>				
OP1.1	Describe the physiology of vision	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Physiology	
OP1.2	Define, classify and describe the types and methods of correcting refractive errors	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP1.3	Demonstrate the steps in performing the visual acuity assessment for distance vision, near vision, colour vision, the pin hole test and the menace and blink reflexes	S	SH	Y	DOAP session, Lecture	Skill assessment/ Logbook			
OP1.4	Enumerate the indications and describe the principles of refractive surgery	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP1.5	Define, enumerate the types and the mechanism by which strabismus leads to amblyopia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Lids and Adnexa, Orbit</b>		<b>Number of Competencies: (08)</b>			<b>Number of procedures that require certification: (NIL)</b>				
OP2.1	Enumerate the causes, describe and discuss the aetiology, clinical presentations and diagnostic features of common conditions of the lid and adnexa including Hordeolum externum/ internum, blepharitis, preseptal cellulitis, dacryocystitis, hemangioma, dermoid, ptosis, entropion, lid lag, lagophthalmos	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	
OP2.2	Demonstrate the symptoms & clinical signs of conditions enumerated in OP2.1	S	S	Y	DOAP session	Skill assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OP2.3	Demonstrate under supervision clinical procedures performed in the lid including: bells phenomenon, assessment of entropion/ectropion, perform the regurgitation test of lacrimal sac. massage technique in cong. dacryocystitis, and trichiatic cilia removal by epilation	S	SH	Y	DOAP session, Lecture	Skill assessment			
OP2.4	Describe the aetiology, clinical presentation. Discuss the complications and management of orbital cellulitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP2.5	Describe the clinical features on ocular examination and management of a patient with cavernous sinus thrombosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP2.6	Enumerate the causes and describe the differentiating features, and clinical features and management of proptosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP2.7	Classify the various types of orbital tumours. Differentiate the symptoms and signs of the presentation of various types of ocular tumours	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP2.8	List the investigations helpful in diagnosis of orbital tumors. Enumerate the indications for appropriate referral	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Conjunctiva</b>		<b>Number of Competencies (09 )</b>			<b>Number of procedures that require certification: (NIL)</b>				
OP3.1	Elicit document and present an appropriate history in a patient presenting with a "red eye" including congestion, discharge, pain	S	SH	Y	DOAP session	Skill Assessment			
OP3.2	Demonstrate document and present the correct method of examination of a "red eye" including vision assessment, corneal lustre, pupil abnormality, ciliary tenderness	S	SH	Y	DOAP session	Skill Assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OP3.3	Describe the aetiology, pathophysiology, ocular features, differential diagnosis, complications. and management of various causes of conjunctivitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP3.4	Describe the aetiology, pathophysiology, ocular features, differential diagnosis, complications and management of trachoma.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP3.5	Describe the aetiology, pathophysiology, ocular features, differential diagnosis, complications and management of vernal catarrh	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP3.6	Describe the aetiology, pathophysiology, ocular features, differential diagnosis, complications and management of pterygium	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP3.7	Describe the aetiology, pathophysiology, ocular features, differential diagnosis, complications and management of symblepharon	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP3.8	Demonstrate correct technique of removal of foreign body from the eye in a simulated environment	S	SH	Y	DOAP session	Skill assessment			
OP3.9	Demonstrate the correct technique of instillation of eye drops in a simulated environment	S	SH	Y	DOAP session	Skill assessment			
<b>Topic: Corneas</b> <span style="margin-left: 200px;"><b>Number of Competencies: (10)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
OP4.1	Enumerate, describe and discuss the types and causes of corneal ulceration	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	
OP4.2	Enumerate and discuss the differential diagnosis of infective keratitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OP4.3	Enumerate the causes of corneal edema	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP4.4	Enumerate the causes and discuss the management of dry eye	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP4.5	Enumerate the causes of corneal blindness	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP4.6	Enumerate the indications and the types of keratoplasty	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP4.7	Enumerate the indications and describe the methods of tarsorrhaphy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP4.8	Demonstrate technique of removal of foreign body in the cornea in a simulated environment	S	SH	Y	DOAP session	Skill assessment			
OP4.9	Describe and discuss the importance and protocols involved in eye donation and eye banking	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP4.10	Counsel patients and family about eye donation in a simulated environment	A/C	SH	Y	DOAP session	Skill assessment			
<b>Topic: Sclera</b> <span style="margin-left: 200px;"><b>Number of competencies: (02)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
OP5.1	Define, enumerate and describe the aetiology, associated systemic conditions, clinical features complications indications for referral and management of episcleritis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OP5.2	Define, enumerate and describe the aetiology, associated systemic conditions, clinical features, complications, indications for referral and management of scleritis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Medicine	
<b>Topic: Iris and Anterior chamber</b> <span style="margin-left: 200px;"><b>Number of Competencies (10)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
OP6.1	Describe clinical signs of intraocular inflammation and enumerate the features that distinguish granulomatous from non-granulomatous inflammation. Identify acute iridocyclitis from chronic condition	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP6.2	Identify and distinguish acute iridocyclitis from chronic iridocyclitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP6.3	Enumerate systemic conditions that can present as iridocyclitis and describe their ocular manifestations	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine
OP6.4	Describe and distinguish hyphema and hypopyon	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP6.5	Describe and discuss the angle of the anterior chamber and its clinical correlates	K	KH		Lecture, Small group discussion	Written/ Viva voce			
OP6.6	Identify and demonstrate the clinical features and distinguish and diagnose common clinical conditions affecting the anterior chamber	S	SH	Y	DOAP session, Bedside clinic	Skill assessment			
OP6.7	Enumerate and discuss the aetiology, the clinical distinguishing features of various glaucomas associated with shallow and deep anterior chamber. Choose appropriate investigations and treatment for patients with above conditions.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OP6.8	Enumerate and choose the appropriate investigation for patients with conditions affecting the Uvea	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP6.9	Choose the correct local and systemic therapy for conditions of the anterior chamber and enumerate their indications, adverse events and interactions	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP6.10	Counsel patients with conditions of the iris and anterior chamber about their diagnosis, therapy and prognosis in an empathetic manner in a simulated environment	A/C	SH	Y	DOAP session	Skill assessment			
<b>Topic: Lens</b>		<b>Number of Competencies: (06)</b>			<b>Number of procedures that require certification: (NIL)</b>				
OP7.1	Describe the surgical anatomy and the metabolism of the lens	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Biochemistry, Human Anatomy	
OP7.2	Describe and discuss the aetio-pathogenesis, stages of maturation and complications of cataract	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pathology	
OP7.3	Demonstrate the correct technique of ocular examination in a patient with a cataract	S	SH	Y	DOAP session	Skill assessment			
OP7.4	Enumerate the types of cataract surgery and describe the steps, intra-operative and post-operative complications of extracapsular cataract extraction surgery.	S	KH	Y	DOAP session, Lecture, Small group discussion	Written/ Viva voce			
OP7.5	To participate in the team for cataract surgery	S	SH	Y	DOAP session	Skill assessment/ Logbook documentation			
OP7.6	Administer informed consent and counsel patients for cataract surgery in a simulated environment	S	SH	Y	DOAP session	Skill Assessment			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Retina &amp; optic Nerve</b>		<b>Number of Competencies (05)</b>			<b>Number of procedures that require certification : (NIL)</b>				
OP8.1	Discuss the aetiology, pathology, clinical features and management of vascular occlusions of the retina	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Pathology	
OP8.2	Enumerate the indications for laser therapy in the treatment of retinal diseases (including retinal detachment, retinal degenerations, diabetic retinopathy & hypertensive retinopathy)	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			
OP8.3	Demonstrate the correct technique of a fundus examination and describe and distinguish the fundoscopic features in a normal condition and in conditions causing an abnormal retinal exam	S	SH	Y	Lecture, Small group discussion	Skill Assessment			
OP8.4	Enumerate and discuss treatment modalities in management of diseases of the retina	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OP8.5	Describe and discuss the correlative anatomy, aetiology, clinical manifestations, diagnostic tests, imaging and management of diseases of the optic nerve and visual pathway	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Miscellaneous</b>		<b>Number of Competencies (05)</b>			<b>Number of procedures that require certification: (01)</b>				
OP9.1	Demonstrate the correct technique to examine extra ocular movements (Uniocular & Binocular)	S	P	Y	DOAP session	Skill Assessment	5		
OP9.2	Classify, enumerate the types, methods of diagnosis and indications for referral in a patient with heterotropia/ strabismus	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ skill assessment			
OP9.3	Describe the role of refractive error correction in a patient with headache and enumerate the indications for referral	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OP9.4	Enumerate, describe and discuss the causes of avoidable blindness and the National Programs for Control of Blindness (including vision 2020)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Community Medicine
OP9.5	Describe the evaluation and enumerate the steps involved in the stabilisation, initial management and indication for referral in a patient with ocular injury	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.

Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,

Column F: DOAP session – Demonstrate, Observe, Assess, Perform.

Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation

## Integration

### Human Anatomy

AN30.5	Explain effect of pituitary tumours on visual pathway	K	KH	N	Lecture	Written		Ophthalmology	
AN31.3	Describe anatomical basis of Horner's syndrome	K	KH	N	Lecture	Written		Ophthalmology	
AN31.5	Explain the anatomical basis of oculomotor, trochlear and abducent nerve palsies along with strabismus	K	KH	Y	Lecture	Written		Ophthalmology	
AN41.1	Describe & demonstrate parts and layers of eyeball	K/S	SH	Y	Practical, Lecture, Small group discussion	Written/ Viva voce		Ophthalmology	
AN41.2	Describe the anatomical aspects of cataract, glaucoma & central retinal artery occlusion	K	KH	N	Lecture	Written		Ophthalmology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN41.3	Describe the position, nerve supply and actions of intraocular muscles	K	KH	N	Lecture	Written		Ophthalmology	

#### Physiology

PY10.17	Describe and discuss functional anatomy of eye, physiology of image formation, physiology of vision including colour vision, Refractive errors, colour blindness, Physiology of pupil and light reflex	K	KH	Y	Lecture, Small group discussion	Written/viva		Ophthalmology	
PY10.18	Describe and discuss the physiological basis of lesion in visual pathway	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		Ophthalmology	
PY10.19	Describe and discuss auditory & visual evoke potentials	K	KH	Y	Lecture, Small group discussion	Written/ viva		Ophthalmology	
PY10.20	Demonstrate testing of visual acuity, colour and field of vision in volunteer/ simulated environment	S	P	Y	DOAP sessions	Skill assessment/ Viva voce	1	ENT, Ophthalmology	

#### Pathology

PA36.1	Describe the etiology, genetics, pathogenesis, pathology, presentation, sequelae and complications of retinoblastoma	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Ophthalmology	
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#### Pharmacology

PH1.58	Describe drugs used in Ocular disorders	K	KH	Y	Lecture	Written/ Viva voce		Ophthalmology	
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#### General Medicine

IM24.15	Describe and discuss the aetiopathogenesis, clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of vision and visual loss in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Ophthalmology
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**OTORHINOLARYNGOLOGY (ENT) (CODE: EN)**

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>OTORHINOLARYNGOLOGY (ENT)</b>									
<b>Topic: Anatomy and Physiology of ear, nose, throat, head &amp; neck</b>		<b>Number of competencies:(02)</b>			<b>Number of procedures that require certification:(NIL)</b>				
EN1.1	Describe the Anatomy & physiology of ear, nose, throat, head & neck	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment		Human Anatomy	
EN1.2	Describe the pathophysiology of common diseases in ENT	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment		Pathology	
<b>Topic: Clinical Skills</b>		<b>Number of competencies: (15)</b>			<b>Number of procedures that require certification : (NIL)</b>				
EN2.1	Elicit document and present an appropriate history in a patient presenting with an ENT complaint	K/S/A/C	SH	Y	Lecture, Small group discussion, Demonstration	Skill assessment			
EN2.2	Demonstrate the correct use of a headlamp in the examination of the ear, nose and throat	S	SH	Y	DOAP session	Skill assessment/ OSCE			
EN2.3	Demonstrate the correct technique of examination of the ear including Otoscopy	K/S/A	SH	Y	DOAP session, Bedside clinic	Skill assessment/ OSCE			
EN2.4	Demonstrate the correct technique of performance and interpret tuning fork tests	K/S/A	SH	Y	DOAP session, Bedside clinic	Skill assessment/ OSCE			
EN2.5	Demonstrate the correct technique of examination of the nose & paranasal sinuses including the use of nasal speculum	S	SH	Y	DOAP session, Bedside clinic	Skill assessment/ OSCE			
EN2.6	Demonstrate the correct technique of examining the throat including the use of a tongue depressor	S	SH	Y	DOAP session, Bedside clinic	Skill assessment/ OSCE			
EN2.7	Demonstrate the correct technique of examination of neck including elicitation of laryngeal crepitus	S	SH	Y	DOAP session, Bedside clinic	Skill assessment			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
EN2.8	Demonstrate the correct technique to perform and interpret pure tone audiogram & impedance audiogram	K/S	SH	Y	DOAP session, Bedside clinic	Skill assessment			
EN2.9	Choose correctly and interpret radiological, microbiological & histological investigations relevant to the ENT disorders	K/S	SH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment			
EN2.10	Identify and describe the use of common instruments used in ENT surgery	K	SH	Y	DOAP session, Bedside clinic	Skill assessment			
EN2.11	Describe and identify by clinical examination malignant & pre- malignant ENT diseases	K/S	SH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN2.12	Counsel and administer informed consent to patients and their families in a simulated environment	S/A/C	SH	Y	DOAP session, Bedside clinic	Skill assessment			
EN2.13	Identify, resuscitate and manage ENT emergencies in a simulated environment (including tracheostomy, anterior nasal packing, removal of foreign bodies in ear, nose, throat and upper respiratory tract)	K/S/A	SH	Y	DOAP session, Bedside clinic	Skill assessment			
EN2.14	Demonstrate the correct technique to instilling topical medications into the ear, nose and throat in a simulated environment	K/S	SH	Y	DOAP session, Bedside clinic	Skill assessment/ OSCE			
EN2.15	Describe the national programs for prevention of deafness, cancer, noise & environmental pollution	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce			
<b>Topic: Diagnostic and Therapeutic procedures in ENT</b>		<b>Number of competencies:(06)</b>			<b>Number of procedures that require certification:(NIL)</b>				
EN3.1	Observe and describe the indications for and steps involved in the performance of Otomicroscopic examination in a simulated environment	S	KH	N	Lecture, Small group discussion, Demonstration	Written/ Viva voce			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
EN3.2	Observe and describe the indications for and steps involved in the performance of diagnostic nasal Endoscopy	S	KH	N	Lecture, Small group discussion, Demonstration	Written/ Viva voce			
EN3.3	Observe and describe the indications for and steps involved in the performance of Rigid/Flexible Laryngoscopy	K	KH	N	Lecture, Small group discussion, Demonstration	Written/ Viva voce			
EN3.4	Observe and describe the indications for and steps involved in the removal of foreign bodies from ear, nose & throat	K	KH	N	Lecture, Small group discussion, Demonstration	Written/ Viva voce			
EN3.5	Observe and describe the indications for and steps involved in the surgical procedures in ear, nose & throat	K	KH	N	Lecture, small group discussion, Demonstration	Written/ Viva voce			
EN3.6	Observe and describe the indications for and steps involved in the skills of emergency procedures in ear, nose & throat	K	KH	N	Lecture, Small group discussion, Demonstration	Written/ Viva voce			
<b>Topic: Management of diseases of ear, nose &amp; throat</b> <span style="margin-left: 200px;"><b>Number of competencies: (53)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
EN4.1	Elicit document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of Otagia	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			
EN4.2	Elicit document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of diseases of the external Ear	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			
EN4.3	Elicit document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of ASOM	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
EN4.4	Demonstrate the correct technique to hold visualize and assess the mobility of the tympanic membrane and its mobility and interpret and diagrammatically represent the findings	K/S/A	SH	Y	Clinical, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.5	Elicit document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of OME	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			
EN4.6	Elicit document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of Discharging ear	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			
EN4.7	Elicit document and present a correct history demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of CSOM	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			
EN4.8	Elicit document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of squamosal type of CSOM	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			
EN4.9	Demonstrate the correct technique for syringing wax from the ear in a simulated environment	S	SH	Y	DOAP session	Skill assessment			
EN4.10	Observe and describe the indications for and steps involved in myringotomy and myringoplasty	S	KH	Y	DOAP session	Written/ Viva voce			
EN4.11	Enumerate the indications describe the steps and observe a mastoidectomy	K/S	KH	Y	DOAP session	Written/ Viva voce			
EN4.12	Elicit document and present a correct history demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of Hearing loss	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
EN4.13	Describe the clinical features, investigations and principles of management of Otosclerosis	K	KH	Y	Lecture, Small group discussion; Demonstration	Written/ Viva voce/ Skill assessment			
EN4.14	Describe the clinical features, investigations and principles of management of Sudden Sensorineural Hearing Loss	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.15	Describe the clinical features, investigations and principles of management of Noise Induced Hearing Loss	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.16	Observe and describe the indications for and steps involved in the performance of pure tone audiometry	S	KH	Y	DOAP session	Written/ Viva			
EN4.17	Enumerate the indications and interpret the results of an audiogram	S	SH	Y	DOAP session	Skill assessment			
EN4.18	Describe the clinical features, investigations and principles of management of Facial Nerve palsy	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.19	Describe the clinical features, investigations and principles of management of Vertigo	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.20	Describe the clinical features, investigations and principles of management of Meniere's Disease	K	KH	N	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.21	Describe the clinical features, investigations and principles of management of Tinnitus	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.22	Elicit document and present a correct history demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of squamosal type of Nasal Obstruction	K/S	SH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
EN4.23	Describe the clinical features, investigations and principles of management of DNS	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.24	Enumerate the indications observe and describe the steps in a septoplasty	S	KH	Y	DOAP session	Written/ Viva voce			
EN4.25	Elicit document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of squamosal type of Nasal Polyps	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			
EN4.26	Elicit document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of squamosal type of Adenoids	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			
EN4.27	Elicit document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of squamosal type of Allergic Rhinitis	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			
EN4.28	Elicit document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of squamosal type of Vasomotor Rhinitis	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			
EN4.29	Elicit, document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of squamosal type of Acute & Chronic Rhinitis	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			
EN4.30	Elicit document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of squamosal type of Epistaxis	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
EN4.31	Describe the clinical features, investigations and principles of management of trauma to the face & neck	K/S	KH	N	Lecture, Small group discussion, Demonstration	Written/ Viva voce			
EN4.32	Describe the clinical features, investigations and principles of management of nasopharyngeal Angiofibroma	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce			
EN4.33	Elicit document and present a correct history demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of squamosal type of Acute & Chronic Sinusitis	K/S	SH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.34	Describe the clinical features, investigations and principles of management of Tumors of Maxilla	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce			
EN4.35	Describe the clinical features, investigations and principles of management of Tumors of Nasopharynx	K	KH	N	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.36	Describe the clinical features, investigations and principles of management of diseases of the Salivary glands	K	KH	N	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.37	Describe the clinical features, investigations and principles of management of Ludwig's angina	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.38	Elicit document and present a correct history demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of type of dysphagia	K/S	SH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.39	Elicit document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of squamosal type of Acute & Chronic Tonsillitis	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
EN4.40	Observe and describe the indications for and steps involved in a tonsillectomy / adenoidectomy	S	KH	Y	DOAP session	Written/ Viva voce			
EN4.41	Describe the clinical features, investigations and principles of management of Acute & chronic abscesses in relation to Pharynx	K/S	KH	Y	Lecture, Small group discussion Demonstration	Written/ Viva voce			
EN4.42	Elicit, document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of hoarseness of voice	K/S	SH	Y	Lecture, Small group discussion, DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			
EN4.43	Describe the clinical features, investigations and principles of management of Acute & Chronic Laryngitis	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce			
EN4.44	Describe the clinical features, investigations and principles of management of Benign lesions of the vocal cord	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce			
EN4.45	Describe the clinical features, investigations and principles of management of Vocal cord palsy	K	KH	N	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.46	Describe the clinical features, investigations and principles of management of Malignancy of the Larynx & Hypopharynx	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.47	Describe the clinical features, investigations and principles of management of Stridor	K	KH	Y	Lecture, Small group discussion Demonstration	Written/ Viva voce/ Skill assessment			
EN4.48	Elicit document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of Airway Emergencies	S	SH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
EN4.49	Elicit document and present a correct history, demonstrate and describe the clinical features, choose the correct investigations and describe the principles of management of foreign bodies in the air & food passages	S	SH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.50	Observe and describe the indications for and steps involved in tracheostomy	S	KH	Y	DOAP session	Written/ Viva voce			
EN4.51	Observe and describe the care of the patient with a tracheostomy	S	KH	Y	DOAP session	Written/ Viva voce			
EN4.52	Describe the Clinical features, Investigations and principles of management of diseases of Oesophagus	K	ENT	N	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment			
EN4.53	Describe the clinical features, investigations and principles of management of HIV manifestations of the ENT	K	KH	N	Lecture, Small group discussion, Demonstration	Written/ Viva voce/ Skill assessment		General Medicine	
<p><b>Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.</b>  <b>Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,</b>  <b>Column F: DOAP session – Demonstrate, Observe, Assess, Perform.</b>  <b>Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation</b></p>									

## Integration

### Human Anatomy

AN36.1	Describe the (1) morphology, relations, blood supply and applied anatomy of palatine tonsil and (2) composition of soft palate	K	KH	Y	Lecture	Written		ENT	
AN36.2	Describe the components and functions of waldeyer's lymphatic ring	K	KH	Y	Lecture	Written		ENT	
AN36.3	Describe the boundaries and clinical significance of pyriform fossa	K	KH	N	Lecture	Written		ENT	
AN36.4	Describe the anatomical basis of tonsillitis, tonsillectomy, adenoids and peri-tonsillar abscess	K	KH	N	Lecture	Written		ENT	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN36.5	Describe the clinical significance of Killian's dehiscence	K	KH	N	Lecture	Written		ENT	
AN37.1	Describe & demonstrate features of nasal septum, lateral wall of nose, their blood supply and nerve supply	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		ENT	
AN37.2	Describe location and functional anatomy of paranasal sinuses	K	KH	Y	Lecture	Written		ENT	
AN37.3	Describe anatomical basis of sinusitis & maxillary sinus tumours	K	KH	N	Lecture	Written		ENT	
AN38.1	Describe the morphology, identify structure of the wall, nerve supply, blood supply and actions of intrinsic and extrinsic muscles of the larynx	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		ENT	
AN38.2	Describe the anatomical aspects of laryngitis	K	KH	N	Lecture	Written		ENT	
AN38.3	Describe anatomical basis of recurrent laryngeal nerve injury	K	KH	N	Lecture	Written		ENT	
AN39.2	Explain the anatomical basis of hypoglossal nerve palsy	K	KH	N	Lecture	Written		ENT	
AN40.1	Describe & identify the parts, blood supply and nerve supply of external ear	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		ENT	
AN40.2	Describe & demonstrate the boundaries, contents, relations and functional anatomy of middle ear and auditory tube	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		ENT	
AN40.3	Describe the features of internal ear	K	KH	N	Lecture	Written		ENT	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN40.4	Explain anatomical basis of otitis externa and otitis media	K	KH	N	Lecture	Written		ENT	
AN40.5	Explain anatomical basis of myringotomy	K	KH	N	Lecture	Written		ENT	
<b>Physiology</b>									
PY10.13	Describe and discuss perception of smell and taste sensation	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		ENT	
PY10.15	Describe and discuss functional anatomy of ear and auditory pathways & physiology of hearing	K	KH	Y	Lecture, Small group discussion	Written/Viva voce		ENT	
PY10.16	Describe and discuss pathophysiology of deafness. Describe hearing tests	K	KH	Y	Lecture, Small group discussion	Written /Viva voce		ENT	
PY10.20	Demonstrate (i) hearing (ii) testing for smell and (iii) taste sensation in volunteer/ simulated environment	S	P	Y	DOAP sessions	Skill assessment/ Viva voce	1 each x 3	ENT, Ophthalmology	
<b>Community Medicine</b>									
CM3.1	Describe the health hazards of air, water, noise, radiation and pollution.	K	KH	Y	Lecture, small group discussion	Written/ Viva voce		General Medicine, ENT	
<b>Dentistry</b>									
DE4.1	Discuss the prevalence of oral cancer and enumerate the common types of cancer that can affect tissues of the oral cavity	K	K	N	Lecture	Viva voce		Pathology	ENT
DE4.2	Discuss the role of etiological factors in the formation of precancerous /cancerous lesions	K	KH	Y	Lecture, Small group discussion	Viva voce		Pathology	ENT
DE4.3	Identify potential pre-cancerous /cancerous lesions	S	SH	N	Observation, Bed side clinics	Skill assessment		Pathology	ENT

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
DE4.4	Counsel patients to risks of oral cancer with respect to tobacco, smoking, alcohol and other causative factors	A/C	SH	Y	DOAP session	Document in Log book	2	Pathology	ENT
<b>General Medicine</b>									
IM24.17	Describe and discuss the aetiopathogenesis, clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of hearing loss in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			ENT
<b>Pediatrics</b>									
PE14.2	Discuss the risk factors, clinical features, Diagnosis and management of Kerosene ingestion	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE28.1	Discuss the etio-pathogenesis, clinical features and management of Naso pharyngitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE28.2	Discuss the etio-pathogenesis of Pharyngo Tonsillitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE28.3	Discuss the clinical features and management of Pharyngo Tonsillitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE28.4	Discuss the etio-pathogenesis, clinical features and management of Acute Otitis Media (AOM)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE28.5	Discuss the etio-pathogenesis, clinical features and management of Epiglottitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE28.6	Discuss the etio-pathogenesis, clinical features and management of Acute laryngo- trachea-bronchitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE28.7	Discuss the etiology, clinical features and management of Stridor in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
PE28.8	Discuss the types, clinical presentation, and management of foreign body aspiration in infants and children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PE28.9	Elicit, document and present age appropriate history of a child with upper respiratory problem including Stridor	S	SH	Y	Bedside clinics, skill lab	Skill Assessment		ENT	
PE28.10	Perform otoscopic examination of the ear	S	SH	Y	DOAP session	Skill Assessment		ENT	
PE28.11	Perform throat examination using tongue depressor	S	SH	Y	DOAP session	Skill Assessment		ENT	
PE28.12	Perform examination of the nose	S	P	Y	DOAP session	Skill Assessment		ENT	
PE28.17	Interpret X-ray of the paranasal sinuses and mastoid; and /or use written report in case of management. Interpret CXR in foreign body aspiration and lower respiratory tract infection, understand the significance of thymic shadow in pediatric chest X-rays	S	P	Y	Bedside clinics, Small group discussion	Skills Assessment	3	ENT, Radiodiagnosis	
PE31.1	Describe the etio-pathogenesis, management and prevention of Allergic Rhinitis in Children	K	KH	Y	Lecture Small group discussion	Written/ Viva voce		ENT	
PE31.3	Describe the etio-pathogenesis, clinical features and management of Atopic dermatitis in children	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	
<b>General Surgery</b>									
SU20.1	Describe etiopathogenesis of oral cancer, symptoms and signs of pharyngeal cancer. Enumerate the appropriate investigations and discuss the principles of treatment.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		ENT	

**OBSTETRICS & GYNECOLOGY (CODE: OG)**



Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>OBSTETRICS &amp; GYNAECOLOGY</b>									
<b>Topic: Demographic and Vital Statistics</b>		<b>Number of competencies: (03)</b>			<b>Number of procedures that require certification : (NIL)</b>				
OG1.1	Define and discuss birth rate, maternal mortality and morbidity	K	KH	Y	Lecture, Small group discussion	Short notes		Community Medicine	
OG1.2	Define and discuss perinatal mortality and morbidity including perinatal and neonatal mortality and morbidity audit	K	KH	Y	Lecture, Small group discussion	Short notes		Community Medicine	Pediatrics
OG1.3	Define and discuss still birth and abortion	K	KH	Y	Lecture, Small group discussion	Short notes		Forensic Medicine & Toxicology	
<b>Topic: Anatomy of the female reproductive tract (Basic anatomy and embryology)</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification : (NIL)</b>				
OG2.1	Describe and discuss the development and anatomy of the female reproductive tract, relationship to other pelvic organs, applied anatomy as related to Obstetrics and Gynaecology.	K	KH	Y	Lecture, Small group discussion	Theory/ Skill station		Human Anatomy	
<b>Topic: Physiology of conception</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification : (NIL)</b>				
OG3.1	Describe the physiology of ovulation, menstruation, fertilization, implantation and gametogenesis.	K	K	Y	Lecture, seminars	Theory		Physiology	
<b>Topic: Development of the fetus and the placenta</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification : (NIL)</b>				
OG4.1	Describe and discuss the basic embryology of fetus, factors influencing fetal growth and development, anatomy and physiology of placenta, and teratogenesis	K	K	Y	Lecture, Small group discussion	Theory		Human Anatomy	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Preconception counselling</b> <span style="float: right;">Number of competencies:(02)      Number of procedures that require certification : (NIL)</span>									
OG5.1	Describe, discuss and identify pre-existing medical disorders and discuss their management; discuss evidence-based intrapartum care	K/S	SH	Y	Lecture, Bedside clinics	Theory/ clinical assessment			
OG5.2	Determine maternal high risk factors and verify immunization status	K/S	SH	Y	Lecture, Bedside clinics	Theory/ clinical assessment			
<b>Topic: Diagnosis of pregnancy</b> <span style="float: right;">Number of competencies:(01)      Number of procedures that require certification : (NIL)</span>									
OG6.1	Describe, discuss and demonstrate the clinical features of pregnancy, derive and discuss its differential diagnosis, elaborate the principles underlying and interpret pregnancy tests.	S	SH	Y	Lecture, Small group discussion, Bedside clinics	Theory/ Clinical assessment/ Viva voce			
<b>Topic: Maternal Changes in pregnancy</b> <span style="float: right;">Number of competencies: (01)      Number of procedures that require certification : (NIL)</span>									
OG7.1	Describe and discuss the changes in the genital tract, cardiovascular system, respiratory, haematology, renal and gastrointestinal system in pregnancy	K	KH	Y	Lecture, seminars	Theory		Physiology	
<b>Topic: Antenatal Care</b> <span style="float: right;">Number of competencies: (08)      Number of procedures that require certification : (NIL)</span>									
OG8.1	Enumerate, describe and discuss the objectives of antenatal care, assessment of period of gestation; screening for high-risk factors.	K	KH	Y	Small group discussion, Bedside clinics, Lecture	Written/ Viva voce/ Skill assessment		Community Medicine	
OG8.2	Elicit document and present an obstetric history including menstrual history, last menstrual period, previous obstetric history, comorbid conditions, past medical history and surgical history	K/S	SH	Y	Small group discussion, Bedside clinics, Lecture	Written/ Viva voce/ Skill assessment			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OG8.3	Describe, demonstrate, document and perform an obstetrical examination including a general and abdominal examination and clinical monitoring of maternal and fetal well-being;	K/S	SH	Y	Bed side clinic, DOAP session	Skill assessment			
OG8.4	Describe and demonstrate clinical monitoring of maternal and fetal well-being	K/S	SH	Y	Bedside clinic, DOAP session, Small group discussion	Skill assessment/ Written/ Viva voce			
OG8.5	Describe and demonstrate pelvic assessment in a model	K/S	SH	Y	DOAP session	Skill assessment			
OG8.6	Assess and counsel a patient in a simulated environment regarding appropriate nutrition in pregnancy	K/S	SH	Y	DOAP session, Bedside clinic	Skill assessment			
OG8.7	Enumerate the indications for and types of vaccination in pregnancy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OG8.8	Enumerate the indications and describe the investigations including the use of ultrasound in the initial assessment and monitoring in pregnancy	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Complications in early pregnancy</b> <span style="margin-left: 200px;"><b>Number of competencies: (05)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
OG9.1	Classify, define and discuss the aetiology and management of abortions including threatened, incomplete, inevitable, missed and septic	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OG9.2	Describe the steps and observe/ assist in the performance of an MTP evacuation	S	SH	Y	DOAP session, Bedside clinic	Viva voce		Forensic Medicine	
OG9.3	Discuss the aetiology, clinical features, differential diagnosis of acute abdomen in early pregnancy (with a focus on ectopic pregnancy) and enumerate the principles of medical and surgical management	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OG9.4	Discuss the clinical features, laboratory investigations, ultrasonography, differential diagnosis, principles of management and follow up of gestational trophoblastic neoplasms	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Radiodiagnosis
OG9.5	Describe the etiopathology, impact on maternal and fetal health and principles of management of hyperemesis gravidarum	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Antepartum haemorrhage</b>		<b>Number of competencies: (02)</b>			<b>Number of competencies that require certification: (NIL)</b>				
OG10.1	Define, classify and describe the aetiology, pathogenesis, clinical features, ultrasonography, differential diagnosis and management of antepartum haemorrhage in pregnancy	K	KH	Y	Lecture, Small group discussion, Bedside clinic				
OG10.2	Enumerate the indications and describe the appropriate use of blood and blood products, their complications and management.	K	KH	Y	Lecture, Small group discussion			Pathology	
<b>Topic: Multiple pregnancies</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification : (NIL)</b>				
OG11.1	Describe the etiopathology, clinical features; diagnosis and investigations, complications, principles of management of multiple pregnancies	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Theory/ OSCE/ Clinical assessment/ Viva voce			
<b>Topic: Medical Disorders in pregnancy</b>		<b>Number of competencies: ( 08)</b>			<b>Number of procedures that require certification : (NIL)</b>				
OG12.1	Define, classify and describe the etiology and pathophysiology, early detection, investigations; principles of management of hypertensive disorders of pregnancy and eclampsia, complications of eclampsia.	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Medicine

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OG12.2	Define, classify and describe the etiology, pathophysiology, diagnosis, investigations, adverse effects on the mother and foetus and the management during pregnancy and labor, and complications of anemia in pregnancy	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Medicine
OG12.3	Define, classify and describe the etiology, pathophysiology, diagnosis, investigations, criteria, adverse effects on the mother and foetus and the management during pregnancy and labor, and complications of diabetes in pregnancy	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Medicine
OG12.4	Define, classify and describe the etiology, pathophysiology, diagnosis, investigations, criteria, adverse effects on the mother and foetus and the management during pregnancy and labor, and complications of heart diseases in pregnancy	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Medicine
OG12.5	Describe the clinical features, detection, effect of pregnancy on the disease and impact of the disease on pregnancy complications and management of urinary tract infections in pregnancy	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Medicine
OG12.6	Describe the clinical features, detection, effect of pregnancy on the disease and impact of the disease on pregnancy complications and management of liver disease in pregnancy	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Medicine
OG12.7	Describe and discuss screening, risk factors, management of mother and newborn with HIV	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Medicine
OG12.8	Describe the mechanism, prophylaxis, fetal complications, diagnosis and management of isoimmunization in pregnancy	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Labour</b> <span style="margin-left: 200px;"><b>Number of competencies: (05)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (01)</b></span>									
OG13.1	Enumerate and discuss the physiology of normal labor, mechanism of labor in occipito-anterior presentation; monitoring of labor including partogram; conduct of labor, pain relief; principles of induction and acceleration of labor; management of third stage of labor.	K/S	KH	Y	Lecture, Small group discussion (with models/ videos/ AV aids, etc.)	Theory/Clinical assessment/ Viva voce			
OG13.2	Define, describe the causes, pathophysiology, diagnosis, investigations and management of preterm labor, PROM and postdated pregnancy	K/S	KH	Y	Lecture, Small group discussion, Bedside clinics	Theory/ OSCE/ Clinical assessment/ Viva voce			
OG13.3	Observe/ assist in the performance of an artificial rupture of membranes	S	SH	N	DOAP session, Bedside clinic	Skill assessment			
OG13.4	Demonstrate the stages of normal labor in a simulated environment / mannequin and counsel on methods of safe abortion.	S	SH	Y	DOAP session	Skill assessment			
OG13.5	Observe and assist the conduct of a normal vaginal delivery	S	P	Y	DOAP session	Log book	10		
<b>Topic: Abnormal Lie and Presentation; Maternal Pelvis</b> <span style="margin-left: 200px;"><b>Number of competencies: (04)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that need certification : (NIL)</b></span>									
OG14.1	Enumerate and discuss the diameters of maternal pelvis and types	K	KH	Y	Lecture, Small group discussion DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment		Human Anatomy	
OG14.2	Discuss the mechanism of normal labor, Define and describe obstructed labor, its clinical features; prevention; and management	K	KH	Y	Lecture, Small group discussion DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OG14.3	Describe and discuss rupture uterus, causes, diagnosis and management.	K	KH	Y	Lecture, Small group discussion DOAP session, Bedside clinic	Written/ Viva voce/ Skill assessment			
OG14.4	Describe and discuss the classification; diagnosis; management of abnormal labor	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ skill assessment			
<b>Topic: Operative obstetrics</b> <span style="float: right;">Number of competencies: (02)</span> <span style="float: right;">Number of procedures that require certification : (NIL)</span>									
OG15.1	Enumerate and describe the indications and steps of common obstetric procedures, technique and complications: Episiotomy, vacuum extraction; low forceps; Caesarean section, assisted breech delivery; external cephalic version; cervical cerclage	S	KH	Y	Lecture, Small group discussion, seminars	Written/ skill assessment			
OG15.2	Observe and assist in the performance of an episiotomy and demonstrate the correct suturing technique of an episiotomy in a simulated environment. Observe/Assist in operative obstetrics cases – including - CS, Forceps, vacuum extraction, and breech delivery	S	SH	Y	DOAP session, Bedside clinic	Skill assessment			
<b>Topic: Complications of the third stage</b> <span style="float: right;">Number of competencies: (03)</span> <span style="float: right;">Number of procedures that require certification : (NIL)</span>									
OG16.1	Enumerate and discuss causes, prevention, diagnosis, management, appropriate use of blood and blood products in postpartum haemorrhage	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ skill assessment			
OG16.2	Describe and discuss uterine inversion – causes, prevention, diagnosis and management.	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OG16.3	Describe and discuss causes, clinical features, diagnosis, investigations; monitoring of fetal well-being, including ultrasound and fetal Doppler; principles of management; prevention and counselling in intrauterine growth retardation	K/S	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ skill assessment/ Viva voce			
<b>Topic: Lactation</b> <span style="margin-left: 200px;"><b>Number of competencies: (03)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
OG17.1	Describe and discuss the physiology of lactation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OG17.2	Counsel in a simulated environment, care of the breast, importance and the technique of breast feeding	S/A/C	SH	Y	DOAP session	Skill assessment			
OG17.3	Describe and discuss the clinical features, diagnosis and management of mastitis and breast abscess	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Care of the new born</b> <span style="margin-left: 200px;"><b>Number of competencies: (04)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
OG18.1	Describe and discuss the assessment of maturity of the newborn, diagnosis of birth asphyxia, principles of resuscitation, common problems.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Pediatrics
OG18.2	Demonstrate the steps of neonatal resuscitation in a simulated environment	S	SH	Y	DOAP session	Skill assessment			Pediatrics
OG18.3	Describe and discuss the diagnosis of birth asphyxia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Pediatrics
OG18.4	Describe the principles of resuscitation of the newborn and enumerate the common problems encountered	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Pediatrics



Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Contraception</b> <span style="float: right;">Number of competencies: (02)      Number of procedures that require certification : (NIL)</span>									
OG21.1	Describe and discuss the temporary and permanent methods of contraception, indications, technique and complications; selection of patients, side effects and failure rate including Ocs, male contraception, emergency contraception and IUCD	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment		Community medicine	
OG21.2	Describe & discuss PPIUCD programme	K	K/KH	Y	Lecture, Small group discussion	Written/Viva voce			
<b>Topic: Vaginal discharge</b> <span style="float: right;">Number of competencies: (02)      Number of procedures that require certification :(NIL)</span>									
OG22.1	Describe the clinical characteristics of physiological vaginal discharge.	K	KH	Y	Lecture	Theory			
OG22.2	Describe and discuss the etiology (with special emphasis on Candida, T. vaginalis, bacterial vaginosis), characteristics, clinical diagnosis, investigations, genital hygiene, management of common causes and the syndromic management	K	KH	Y	Lecture, Bedside clinics	Written/ Viva voce/ Skill assessment			
<b>Topic: Normal and abnormal puberty</b> <span style="float: right;">Number of competencies: (03)      Number of procedures that require certification : (NIL)</span>									
OG23.1	Describe and discuss the physiology of puberty, features of abnormal puberty, common problems and their management	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce			
OG23.2	Enumerate the causes of delayed puberty. Describe the investigation and management of common causes	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OG23.3	Enumerate the causes of precocious puberty	K	K	N	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Abnormal uterine bleeding</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification: (NIL)</b>				
OG24.1	Define, classify and discuss abnormal uterine bleeding, its aetiology, clinical features, investigations, diagnosis and management	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Amenorrhea</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification : (NIL)</b>				
OG25.1	Describe and discuss the causes of primary and secondary amenorrhea, its investigation and the principles of management.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Genital injuries and fistulae</b>		<b>Number of competencies: (02)</b>			<b>Number of procedures that require certification : (NIL)</b>				
OG26.1	Describe and discuss the etiopathogenesis, clinical features; investigation and implications on health and fertility and management of endometriosis and adenomyosis	K/S	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OG26.2	Describe the causes, prevention, clinical features, principles of management of genital injuries and fistulae	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			General Surgery
<b>Topic: Genital infections</b>		<b>Number of competencies: (04)</b>			<b>Number of procedures that require certification : (NIL)</b>				
OG27.1	Describe and discuss the etiology, pathology, clinical features, differential diagnosis, investigations, management and long term implications of sexually transmitted infections	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OG27.2	Describe and discuss the etiology, pathology, clinical features, differential diagnosis, investigations, management and long term implications of genital tuberculosis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
OG27.3	Describe and discuss the etiology, pathology, clinical features, differential diagnosis, investigations, management and long term implications of HIV	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OG27.4	Describe and discuss the etiology, pathology, clinical features, differential diagnosis, investigations, management and long term implications of Pelvic Inflammatory Disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
<b>Topic: Infertility</b> <span style="float: right;"><b>Number of competencies:(04)</b> <b>Number of procedures that require certification : (NIL)</b></span>									
OG28.1	Describe and discuss the common causes, pathogenesis, clinical features, differential diagnosis; investigations; principles of management of infertility – methods of tubal patency, ovulation induction, assisted reproductive techniques	K	KH	Y	Lecture, seminars, Bedside clinics	Written/ Viva voce			
OG28.2	Enumerate the assessment and restoration of tubal latency	K	K	N	Lecture, seminars, Bedside clinics	Written/ Viva voce			
OG28.3	Describe the principles of ovulation induction	K	KH	Y	Lecture, seminars, Bedside clinics	Written/ Viva voce			
OG28.4	Enumerate the various Assisted Reproduction Techniques	K	K	N	Lecture, seminars, Bedside clinics	Written/ Viva voce			
<b>Topic: Uterine fibroids</b> <span style="float: right;"><b>Number of competencies: (01)</b> <b>Number of procedures that require certification : (NIL)</b></span>									
OG29.1	Describe and discuss the etiology; pathology; clinical features; differential diagnosis; investigations; principles of management, complications of fibroid uterus	K/A/C	KH	Y	Lecture, Bedside clinics	Theory/ OSCE/ Clinical Assessment/ Viva voce			
<b>Topic: PCOS and hirsutism</b> <span style="float: right;"><b>Number of competencies: (02)</b> <b>Number of procedures that require certification : (NIL)</b></span>									
OG30.1	Describe and discuss the etiopathogenesis; clinical features; differential diagnosis; investigations; management, complications of PCOS	K/A/C	KH	Y	Lecture	Theory/ OSCE/ Clinical Assessment/ Viva voce			
OG30.2	Enumerate the causes and describe the investigations and management of hyperandrogenism	K	KH	N		Theory/ OSCE/ Clinical Assessment/ Viva voce			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Uterine prolapse</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification :(NIL)</b>				
OG31.1	Describe and discuss the etiology, classification, clinical features, diagnosis, investigations, principles of management and preventive aspects of prolapse of uterus	K/S	KH	Y	Lecture, small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			
<b>Topic: Menopause</b>		<b>Number of competencies: (02)</b>			<b>Number of procedures that require certification : (NIL)</b>				
OG32.1	Describe and discuss the physiology of menopause, symptoms, prevention, management and the role of hormone replacement therapy.	K	KH	Y	Lecture, small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			
OG32.2	Enumerate the causes of postmenopausal bleeding and describe its management	K	KH	Y	Lecture, small group discussion Bedside clinics	Written/ Viva voce			
<b>Topic: Benign, Pre-malignant (CIN) and Malignant Lesions of the Cervix</b>		<b>Number of competencies: (04)</b>			<b>Number of procedures that require certification : (NIL)</b>				
OG33.1	Classify, describe and discuss the etiology, pathology, clinical features, differential diagnosis, investigations and staging of cervical cancer	K/S	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			
OG33.2	Describe the principles of management including surgery and radiotherapy of Benign, Pre-malignant (CIN) and Malignant Lesions of the Cervix	K	KH	Y	Lecture, Small group discussion, Bedside clinics	Written/ Viva voce/ Skill assessment			General Surgery
OG33.3	Describe and demonstrate the screening for cervical cancer in a simulated environment	K/S	SH	Y	DOAP session	Skill assessment		Community Medicine	
OG33.4	Enumerate the methods to prevent cancer of cervix including visual inspection with acetic acid (VIA), visual inspection of cervix with Lugol's iodine (VILI), pap smear and colposcopy	K	K	Y	Lecture, Small group discussion, Bedside clinics	Viva voce/ Written			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Benign and malignant diseases of the uterus and the ovaries</b> <b>Number of competencies: (04)</b> <b>Number of procedures that require certification : (NIL)</b>									
OG34.1	Describe and discuss aetiology, pathology, staging clinical features, differential diagnosis, investigations, staging laparotomy and principles of management of endometrial cancer	K	KH	Y	Lecture, Bedside clinics	Viva voce/ Written/ skill assessment			
OG34.2	Describe and discuss the etiology, pathology, classification, staging of ovarian cancer, clinical features, differential diagnosis, investigations, principal of management including staging laparotomy	K/S	KH	Y	Lecture	Theory/ OSCE/ clinical assessment/ Viva voce			
OG34.3	Describe and discuss the etiology, pathology, classification, staging, clinical features, differential diagnosis, investigations and management of gestational trophoblastic disease	K/S	KH	Y	Lecture	Theory/ OSCE/ clinical assessment/			
OG34.4	Operative Gynaecology : Understand and describe the technique and complications: Dilatation & Curettage (D&C); EA-ECC; cervical biopsy; abdominal hysterectomy; myomectomy; surgery for ovarian tumours; staging laparotomy; vaginal hysterectomy including pelvic floor repair; Fothergill's operation, Laparoscopy; hysteroscopy; management of postoperative complications	K/S	SH	Y	Videos, on manikins, observe procedures and surgeries in OR	Viva voce			
<b>Topic: Obstetrics &amp; Gynecological skills - I</b> <b>Number of competencies: (17)</b> <b>Number of procedures that require certification : (NIL)</b>									
OG35.1	Obtain a logical sequence of history, and perform a humane and thorough clinical examination, excluding internal examinations (per-rectal and per-vaginal)	K/S	SH	Y	Bedside clinics	Clinical assessment/ Viva voce			
OG35.2	Arrive at a logical provisional diagnosis after examination.	K/S	SH	Y	Bedside clinics	Clinical assessment/ Viva voce			
OG35.3	Recognize situations, which call for urgent or early treatment at secondary and tertiary centres and make a prompt referral of such patients after giving first aid or emergency treatment.	K/S	SH	Y	Bedside clinics	Clinical assessment/ Viva voce			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OG35.4	Demonstrate interpersonal and communication skills befitting a physician in order to discuss illness and its outcome with patient and family	A/C	SH	Y	Bedside clinics	Clinical assessment/ Viva voce			
OG35.5	Determine gestational age, EDD and obstetric formula	K/S	SH	Y	Bedside clinics	Clinical assessment/ Viva voce			
OG35.6	Demonstrate ethical behavior in all aspects of medical practice.	A/C	SH	Y	Bedside clinics	Clinical assessment/ Viva voce			
OG35.7	Obtain informed consent for any examination / procedure	S	SH	Y	Bedside clinics	Clinical assessment/ Viva voce			
OG35.8	Write a complete case record with all necessary details	S	SH	Y	Bedside clinics	Clinical assessment/ Viva voce			
OG35.9	Write a proper discharge summary with all relevant information	S	SH	Y	Bedside clinics	Clinical assessment			
OG35.10	Write a proper referral note to secondary or tertiary centres or to other physicians with all necessary details.	S	SH	Y	Bedside clinics	Clinical assessment/ Viva voce			
OG35.11	Demonstrate the correct use of appropriate universal precautions for self-protection against HIV and hepatitis and counsel patients	S	SH	Y	DOAP session	Skill assessment			
OG35.12	Obtain a PAP smear in a stimulated environment	S	SH	Y	DOAP session	Skill assessment			
OG35.13	Demonstrate the correct technique to perform artificial rupture of membranes in a simulated / supervised environment	S	SH	Y	DOAP session	Skill assessment			
OG35.14	Demonstrate the correct technique to perform and suture episiotomies in a simulated/ supervised environment	S	SH	Y	DOAP session	Skill assessment			
OG35.15	Demonstrate the correct technique to insert and remove an IUD in a simulated/ supervised environment	S	SH	Y	DOAP session	Skill assessment			

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OG35.16	Diagnose and provide emergency management of antepartum and postpartum hemorrhage in a simulated / guided environment	K/S	SH	Y	DOAP session	Skill assessment			
OG35.17	Demonstrate the correct technique of urinary catheterisation in a simulated/ supervised environment	S	SH	Y	DOAP session	Skill assessment			
<b>Topic: Obstetrics &amp; Gynecological skills - II</b> <span style="margin-left: 200px;"><b>Number of competencies: (03)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
OG36.1	Plan and institute a line of treatment, which is need based, cost effective and appropriate for common conditions taking into consideration (a) Patient (b) Disease (c) Socio-economic status (d) Institution/ Governmental guidelines.	K/S	SH	Y	Bedside clinics, Small group discussion	Clinical assessment/ Viva voce			
OG36.2	Organise antenatal, postnatal, well-baby and family welfare clinics	K/S	KH	Y	Bedside clinics	Clinical assessment/ Viva voce			
OG36.3	Demonstrate the correct technique of punch biopsy of uterus in a simulated/ supervised environment	S	SH	Y	Bedside clinics	Clinical assessment/ Viva voce			
<b>Topic: Obstetrics &amp; Gynecological skills - III</b> <span style="margin-left: 200px;"><b>Number of competencies: (07)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
OG37.1	Observe and assist in the performance of a Caesarean section	K/S/A/C	SH	Y	Bedside clinics, Small group discussion	Log book			
OG37.2	Observe and assist in the performance of Laparotomy	K/S/A/C	SH	Y	Bedside clinics, Small group discussion	Clinical assessment/ Viva voce			
OG37.3	Observe and assist in the performance of Hysterectomy – abdominal/vaginal	K/S/A/C	SH	Y	Bedside clinics, Small group discussion	Clinical assessment/ Viva voce			



Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Integration</b>									
<b>Human Anatomy</b>									
AN48.8	Mention the structures palpable during Vaginal & Rectal examination	K	KH	N	Lecture	Written		Obstetrics & Gynaecology, General Surgery	
AN49.1	Describe & demonstrate the Superficial & Deep perineal pouch (boundaries and contents)	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ skill assessment		Obstetrics & Gynaecology	
AN49.2	Describe & identify Perineal body	K/S	SH	Y	Lecture, Small group discussion, DOAP session	Viva voce/ skill assessment		Obstetrics & Gynaecology	
AN49.5	Explain the anatomical basis of Perineal tear, Episiotomy, Perianal abscess and Anal fissure	K	KH	N	Lecture	Written		Obstetrics & Gynaecology	
AN52.8	Describe the development of male & female reproductive system	K	KH	Y	Lecture	Written/ Viva voce		Obstetrics & Gynaecology	
AN53.1	Identify & hold the bone in the anatomical position, Describe the salient features, articulations & demonstrate the attachments of muscle groups	K/S	SH	Y	Lecture, DOAP session	Viva voce/ skill assessment		General Surgery, Obstetrics & Gynaecology	
AN53.2	Demonstrate anatomical position of bony pelvis & show boundaries of pelvic inlet, pelvic cavity, pelvic outlet	K/S	SH	Y	Lecture, DOAP session	Viva voce/ skill assessment		Obstetrics & Gynaecology	
AN53.3	Define true pelvis and false pelvis and demonstrate sex determination in male & female bony pelvis	K/S	SH	Y	Lecture, DOAP session	Viva voce/ skill assessment		Obstetrics & Gynaecology	
AN64.3	Describe various types of open neural tube defects with its embryological basis	K	KH	N	Lecture	Written/ Viva voce		Obstetrics & Gynaecology, Pediatrics	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN75.5	Describe the principles of genetic counselling	K	KH	Y	Lecture	Written		Pediatrics, Obstetrics & Gynaecology	
AN77.1	Describe the uterine changes occurring during the menstrual cycle	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN77.2	Describe the synchrony between the ovarian and menstrual cycles	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN77.3	Describe spermatogenesis and oogenesis along with diagrams	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN77.4	Describe stages and consequences of fertilisation	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN77.5	Enumerate and describe the anatomical principles underlying contraception	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN77.6	Describe teratogenic influences; fertility and sterility, surrogate motherhood, social significance of "sex-ratio".	K	KH	N	Lecture	Written		Obstetrics & Gynaecology	
AN78.3	Describe the process of implantation & common abnormal sites of implantation	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN78.5	Describe in brief abortion: decidual reaction, pregnancy test	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN79.4	Describe the development of somites and intra-embryonic coelom	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN79.5	Explain embryological basis of congenital malformations, nucleus pulposus, sacrococcygeal teratomas, neural tube defects	K	KH	N	Lecture	Written		Obstetrics & Gynaecology	
AN79.6	Describe the diagnosis of pregnancy in first trimester and role of teratogens, alpha-fetoprotein	K	KH	N	Lecture	Written		Obstetrics & Gynaecology	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN80.3	Describe formation of placenta, its physiological functions, foetomaternal circulation & placental barrier	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN80.4	Describe embryological basis of twinning in monozygotic & dizygotic twins	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN80.5	Describe role of placental hormones in uterine growth & parturition	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN80.6	Explain embryological basis of estimation of fetal age.	K	KH	N	Lecture	Written		Obstetrics & Gynaecology	
AN80.7	Describe various types of umbilical cord attachments	K	KH	N	Lecture	Written		Obstetrics & Gynaecology	
AN81.1	Describe various methods of prenatal diagnosis	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN81.2	Describe indications, process and disadvantages of amniocentesis	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
AN81.3	Describe indications, process and disadvantages of chorion villus biopsy	K	KH	Y	Lecture	Written		Obstetrics & Gynaecology	
<b>Physiology</b>									
PY9.6	Enumerate the contraceptive methods for male and female. Discuss their advantages & disadvantages	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, Community Medicine	
PY9.8	Describe and discuss the physiology of pregnancy, parturition & lactation and outline the psychology and psychiatry-disorders associated with it.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PY9.10	Discuss the physiological basis of various pregnancy tests	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PY9.11	Discuss the hormonal changes and their effects during perimenopause and menopause	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PY9.12	Discuss the common causes of infertility in a couple and role of IVF in managing a case of infertility.	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
<b>Biochemistry</b>									
BI10.1	Describe cancer initiation, promotion, oncogenes & oncogene activation.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, General Surgery, Pathology	
BI10.2	Describe various biochemical tumor markers and the biochemical basis of cancer therapy.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, General Surgery, Pathology	
BI10.3	Describe the cellular and humoral components of the immune system & describe the types and structure of antibody	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, General Surgery, Pathology	
<b>Pathology</b>									
PA22.2	Enumerate the indications describe the principles enumerate and demonstrate the steps of compatibility testing	S	SH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PA30.1	Describe the epidemiology, pathogenesis, etiology, pathology, screening, diagnosis and progression of carcinoma of the cervix	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PA30.2	Describe the pathogenesis, etiology, pathology, diagnosis and progression and spread of carcinoma of the endometrium	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PA30.3	Describe the pathogenesis, etiology, pathology, diagnosis and progression and spread of carcinoma of the leiomyomas and leiomyosarcomas	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PA30.4	Classify and describe the etiology, pathogenesis, pathology, morphology, clinical course, spread and complications of ovarian tumors	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PA30.5	Describe the etiology, pathogenesis, pathology, morphology, clinical course, spread and complications of gestational trophoblastic neoplasms	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PA30.6	Describe the etiology and morphologic features of cervicitis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PA30.7	Describe the etiology, hormonal dependence, features and morphology of endometriosis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PA30.8	Describe the etiology and morphologic features of adenomyosis	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
PA30.9	Describe the etiology, hormonal dependence and morphology of endometrial hyperplasia	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
<b>Pharmacology</b>									
PH1.39	Describe mechanism of action, types, doses, side effects, indications and contraindications of the drugs used for contraception	K	KH	Y	Lecture	Written/ Viva voce		<b>Obstetrics &amp; Gynaecology</b>	
PH1.40	Describe mechanism of action, types, doses, side effects, indications and contraindications of 1. Drugs used in the treatment of infertility, and 2. Drugs used in erectile dysfunction	K	KH	Y	Lecture	Written/ Viva voce		Obstetrics & Gynaecology	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PH1.41	Describe the mechanisms of action, types, doses, side effects, indications and contraindications of uterine relaxants and stimulants	K	KH	Y	Lecture	Written/ Viva voce		Obstetrics & Gynaecology	
<b>Community Medicine</b>									
CM9.2	Define, calculate and interpret demographic indices including birth rate, death rate, fertility rates	S	SH	Y	Lecture, Small group discussion, DOAP sessions	Skill assessment		Obstetrics & Gynaecology, Pediatrics	
CM9.5	Describe the methods of population control	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		Obstetrics & Gynaecology	
CM10.1	Describe the current status of Reproductive, maternal, newborn and Child Health	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		Obstetrics & Gynaecology, Pediatrics	
CM10.2	Enumerate and describe the methods of screening high risk groups and common health problems	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		Obstetrics & Gynaecology, Pediatrics	
CM10.3	Describe local customs and practices during pregnancy, childbirth, lactation and child feeding practices	K	KH	Y	Small group discussion, Lecture	Written/ Viva voce		Obstetrics & Gynaecology, Pediatrics	
CM10.4	Describe the reproductive, maternal, newborn & child health (RMCH); child survival and safe motherhood interventions	K	KH	Y	Small group discussion, Lecture	Written / Viva voce		Obstetrics & Gynaecology, Pediatrics	
<b>Forensic Medicine &amp; Toxicology</b>									
FM3.13	Describe different types of sexual offences. Describe various sections of IPC regarding rape including definition of rape (Section 375 IPC), Punishment for Rape (Section 376 IPC) and recent amendments notified till date.	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM3.14	SEXUAL OFFENCES Describe and discuss the examination of the victim of an alleged case of rape, and the preparation of report, framing the opinion and preservation and despatch of trace evidences in such cases.	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, DOAP session	Written/ Viva voce/ OSCE		Obstetrics & Gynaecology, Psychiatry	
FM3.15	SEXUAL OFFENCES Describe and discuss examination of accused and victim of sodomy, preparation of report, framing of opinion, preservation and despatch of trace evidences in such cases	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic, DOAP session	Written/ Viva voce/ OSCE		Obstetrics & Gynaecology, Psychiatry	
FM3.16	SEXUAL OFFENCES Describe and discuss adultery and unnatural sexual offences - sodomy, incest, lesbianism, buccal coitus, bestiality, indecent assault and preparation of report, framing the opinion and preservation and despatch of trace evidences in such cases.	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
FM3.17	Describe and discuss the sexual perversions fetishism, transvestism, voyeurism, sadism, necrophagia, masochism, exhibitionism, frotteurism, Necrophilia.	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, Psychiatry	
FM3.18	Describe anatomy of male and female genitalia, hymen and its types. Discuss the medico-legal importance of hymen. Define virginity, defloration, legitimacy and its medicolegal importance.	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
FM3.19	Discuss the medicolegal aspects of pregnancy and delivery, signs of pregnancy, precipitate labour superfoetation, superfecundation and signs of recent and remote delivery in living and dead	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
FM3.20	Discuss disputed paternity and maternity	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
FM3.21	Discuss Pre-conception and Pre Natal Diagnostic Techniques (PCPNDT)- Prohibition of Sex Selection Act 2003 and Domestic Violence Act 2005	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, AETCOM	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM3.22	Define and discuss impotence, sterility, frigidity, sexual dysfunction, premature ejaculation. Discuss the causes of impotence and sterility in male and female	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology, General Medicine	
FM3.23	Discuss Sterilization of male and female, artificial insemination, Test Tube Baby, surrogate mother, hormonal replacement therapy with respect to appropriate national and state laws	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
FM3.24	Discuss the relative importance of surgical methods of contraception (vasectomy and tubectomy) as methods of contraception in the national family Planning Programme	K	K/KH	N	Lecture, Small group discussion	Written		Obstetrics & Gynaecology	
FM3.25	Discuss the major results of the National Family Health Survey	K	K/KH	N	Lecture	Written		Obstetrics & Gynaecology	
FM3.26	Discuss the National Guidelines for accreditation, supervision & regulation of ART Clinics in India	K	K/KH	Y	Lecture, Small group discussion	Written		Obstetrics & Gynaecology	
FM3.27	Define, classify and discuss abortion, methods of procuring MTP and criminal abortion and complication of abortion: MTP Act 1971	K	K/KH	Y	Lecture, Small group discussion	Written/Viva voce		Obstetrics & Gynaecology, AETCOM	
FM3.28	Describe evidences of abortion - living and dead, duties of doctor in cases of abortion, investigations of death due to criminal abortion	K	K/KH	Y	Lecture, Small group discussion	Written/Viva voce		Obstetrics & Gynaecology, AETCOM	
<b>Dermatology &amp; Venereology</b>									
DR10.11	Describe the etiology, diagnostic and clinical features and management of vaginal discharge	K	KH	Y	Lecture, Small group discussion	Written / Viva voce		Obstetrics & Gynaecology	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>General Medicine</b>									
IM26.43	Identify, discuss and defend medicolegal, sociocultural, economic and ethical issues as they pertain to in vitro fertilisation donor insemination and surrogate motherhood	K	KH	N	Small group discussion	Written/ Viva voce		Obstetrics & Gynaecology	
<b>Radiodiagnosis</b>									
RD1.13	Describe the components of the PC & PNDT Act and its medicolegal implications	K	KH	Y	Lecture, Small group discussion			Obstetrics & Gynaecology, Forensic Medicine	
<b>Pediatrics</b>									
PE7.1	Awareness on the cultural beliefs and practices of breast feeding	K	K	N	Lecture, Small group discussion	Viva voce			Obstetrics & Gynaecology
PE7.7	Perform breast examination and identify common problems during lactation such as retracted nipples, cracked nipples, breast engorgement, breast abscess	S	SH	Y	Bed side clinics Skill Lab	Skill Assessment			Obstetrics & Gynaecology
PE7.8	Educate mothers on ante natal breast care and prepare mothers for lactation	A/C	SH	Y	DOAP session	Document in Log Book			Obstetrics & Gynaecology, AETCOM
PE7.9	Educate and counsel mothers for best practices in breast feeding	A/C	SH	Y	DOAP session	Document in Log Book			Obstetrics & Gynaecology, AETCOM
PE18.1	List and explain the components, plans , outcomes of Reproductive Child Health (RCH) program and appraise the monitoring and evaluation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	Obstetrics & Gynaecology
PE18.2	Explain preventive interventions for Child survival and safe motherhood	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Community Medicine	Obstetrics & Gynaecology

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PE18.3	Conduct Antenatal examination of women independently and apply at-risk approach in antenatal care	S	SH	Y	Bed side clinics	Skill station		Community Medicine	Obstetrics & Gynaecology
PE18.4	Provide intra-natal care and conduct a normal Delivery in a simulated environment	S	SH	Y	DOAP session, Skills lab	Document in Log Book		Community Medicine	Obstetrics & Gynaecology
PE18.5	Provide intra-natal care and observe the conduct of a normal delivery	S	SH	Y	DOAP session	Document in Log Book			Obstetrics & Gynaecology
PE18.6	Perform Postnatal assessment of newborn and mother, provide advice on breast feeding, weaning and on family planning	S	SH	Y	Bed side clinics, Skill Lab	Skill Assessment		Community Medicine	Obstetrics & Gynaecology
PE18.8	Observe the implementation of the program by visiting the Rural Health Centre	S	KH	Y	Bed side clinics, Skill Lab	Document in log book		Community Medicine	Obstetrics & Gynaecology
PE20.6	Explain the follow up care for neonates including Breast feeding, temperature maintenance, immunization, importance of growth monitoring and red flags	S	SH	Y	DOAP session	Log book entry			Obstetrics & Gynaecology
PE32.6	Discuss the genetic basis, risk factors, clinical features, complications, prenatal diagnosis, management and genetic counselling in Turner's Syndrome	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			General Medicine, Obstetrics & Gynaecology
PE32.8	Interpret normal Karyotype and recognize the Turner Karyotype	S	SH	N	Bed Side clinics, Skill lab	Log book			General Medicine, Obstetrics & Gynaecology
PE32.9	Discuss the referral criteria and multidisciplinary approach to management of Turner Syndrome	K	KH	N	Lecture, Small group discussion	Written/ Viva voce			General Medicine, Obstetrics & Gynaecology

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Radiotherapy</b>									
RT4.5	Describe and discuss role of radiation in management of common malignancies in India (region specific)	K	KH	Y	Lecture, Bed side clinic	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology
RT4.6	Describe and discuss radiotherapy for benign disease	K	KH	Y	Lecture	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology
RT4.7	Counsel patients regarding acute and late effects of radiation and supportive care	K/A/S	KH	Y	Bed side clinic, group discussion	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology
RT4.8	Describe oncological emergencies and palliative care	K/A/S	K/KH	Y	Lecture and group discussion	Written/ Viva voce			General Surgery, Obstetrics & Gynaecology
RT5.1	Describe and discuss cancer prevention, screening, vaccination, cancer registry	K	K	Y	Group discussion	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology

**ORTHOPÆDICS (CODE: OR)**

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>ORTHOPEDICS</b>									
<b>Topic: Skeletal Trauma, Poly trauma</b>		<b>Number of competencies : (06)</b>			<b>Number of procedures that require certification: (NIL)</b>				
OR1.1	Describe and discuss the Principles of pre-hospital care and Casualty management of a trauma victim including principles of triage	K/S/A/C	K/KH	Y	Lecture with video, Small group discussion	Written/ Viva voce/ OSCE/ Simulation			General Surgery, Anaesthesiology
OR1.2	Describe and discuss the aetiopathogenesis, clinical features, investigations, and principles of management of shock	K/S	K/KH	Y	Lecture	Written/ Viva voce/ OSCE/ Simulation			General Surgery
OR1.3	Describe and discuss the aetiopathogenesis, clinical features, investigations, and principles of management of soft tissue injuries	K	KH/SH	Y	Lecture, Small group discussion	Written/ OSCE			General Surgery
OR1.4	Describe and discuss the Principles of management of soft tissue injuries	K	K/KH	Y	Lecture, Small group discussion	Written/ Assesment/ Viva voce			General Surgery
OR1.5	Describe and discuss the aetiopathogenesis, clinical features, investigations, and principles of management of dislocation of major joints, shoulder, knee, hip	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic	Written/ Viva voce/ OSCE/ Simulation			
OR1.6	Participate as a member in the team for closed reduction of shoulder dislocation / hip dislocation / knee dislocation	K/S/A/C	SH	Y	Simulation, DOAP session	OSCE/ Simulation			
<b>Topic: Fractures</b>		<b>Number of competencies : (16)</b>			<b>Number of procedures that require certification: (NIL)</b>				
OR2.1	Describe and discuss the mechanism of Injury, clinical features, investigations and plan management of fracture of clavicle	K/S	KH/SH	Y	Lecture, Small group discussion, Bed side clinic	Written/ Viva voce/ OSCE		Human Anatomy	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OR2.2	Describe and discuss the mechanism of Injury, clinical features, investigations and plan management of fractures of proximal humerus	K	K/KH/ SH	Y	Lecture, Small group discussion, Bed side clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.3	Select, prescribe and communicate appropriate medications for relief of joint pain	K	KH/SH	Y	Lecture, Small group discussion, Bed side clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.4	Describe and discuss the mechanism of injury, clinical features, investigations and principles of management of fracture of shaft of humerus and intercondylar fracture humerus with emphasis on neurovascular deficit	K/S	K/KH	Y	Lecture, Small group discussion, Bed side clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.5	Describe and discuss the aetiopathogenesis, clinical features, mechanism of injury, investigation & principles of management of fractures of both bones forearm and Galeazzi and Monteggia injury	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.6	Describe and discuss the aetiopathogenesis, mechanism of injury, clinical features, investigations and principles of management of fractures of distal radius	K	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.7	Describe and discuss the aetiopathogenesis, mechanism of injury, clinical features, investigations and principles of management of pelvic injuries with emphasis on hemodynamic instability	K	K/KH/ SH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.8	Describe and discuss the aetiopathogenesis, mechanism of injury, clinical features, investigations and principles of management of spine injuries with emphasis on mobilisation of the patient	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.9	Describe and discuss the mechanism of injury, Clinical features, investigations and principle of management of acetabular fracture	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	

Number	<b>COMPETENCY</b> The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OR2.10	Describe and discuss the aetiopathogenesis, mechanism of injury, clinical features, investigations and principles of management of fractures of proximal femur	K/S/A/C	KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.11	Describe and discuss the aetiopathogenesis, mechanism of injury, clinical features, investigations and principles of management of (a) Fracture patella (b) Fracture distal femur (c) Fracture proximal tibia with special focus on neurovascular injury and compartment syndrome	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.12	Describe and discuss the aetiopathogenesis, clinical features, investigations and principles of management of Fracture shaft of femur in all age groups and the recognition and management of fat embolism as a complication	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.13	Describe and discuss the aetiopathogenesis, clinical features, Investigation and principles of management of: (a) Fracture both bones leg (b) Calcaneus (c) Small bones of foot	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.14	Describe and discuss the aetiopathogenesis, clinical features, Investigation and principles of management of ankle fractures	K/S/C	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.15	Plan and interpret the investigations to diagnose complications of fractures like malunion, non-union, infection, compartmental syndrome	K/S	SH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	
OR2.16	Describe and discuss the mechanism of injury, clinical features, investigations and principles of management of open fractures with focus on secondary infection prevention and management	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE		Human Anatomy	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Musculoskeletal Infection</b> <span style="float: right;">Number of competencies : (03)</span> <span style="float: right;">Number of Procedures that require certification: (NIL)</span>									
OR3.1	Describe and discuss the aetiopathogenesis, clinical features, investigations and principles of management of Bone and Joint infections a) Acute Osteomyelitis b) Subacute osteomyelitis c) Acute Suppurative arthritis d) Septic arthritis & HIV infection e) Spirochaetal infection f) Skeletal Tuberculosis	K/S	K/KH/ SH	Y	Lecture, Small group discussion, Video assisted lecture	Written/ Viva voce/ OSCE		Pathology, Microbiology	General surgery
OR3.2	Participate as a member in team for aspiration of joints under supervision	K/S/A/C	SH	Y	Small group Discussion. DOAP session	Viva voce/ OSCE/ Skills assessment		–	
OR3.3	Participate as a member in team for procedures like drainage of abscess, sequestrectomy/ saucerisation and arthrotomy	K/S/A/C	SH	Y	DOAP session, Video demonstration	Viva voce/ OSCE/ Skills assessment			General Surgery
<b>Topic: Skeletal Tuberculosis</b> <span style="float: right;">Number of competencies : (01)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
OR4.1	Describe and discuss the clinical features, Investigation and principles of management of Tuberculosis affecting major joints (Hip, Knee) including cold abscess and caries spine	K	K/KH	Y	Lecture, Small group discussion, Case discussion	Written/ Viva voce/ OSCE		Pathology	General surgery
<b>Topic: Rheumatoid Arthritis and associated inflammatory disorders</b> <span style="float: right;">Number of competencies : (01)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OR5.1	Describe and discuss the aetiopathogenesis, clinical features, investigations and principles of management of various inflammatory disorder of joints	K	K/KH	Y	Lecture, Small group discussion, Bedside clinic	Written/ Viva voce/ OSCE			General Medicine
<b>Topic: Degenerative disorders</b> <span style="float: right;">Number of competencies : (01)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
OR6.1	Describe and discuss the clinical features, investigations and principles of management of degenerative condition of spine (Cervical Spondylosis, Lumbar Spondylosis, PID)	K	K/KH	Y	Lecture, Small group discussion, Case discussion	Written/ Viva voce/ OSCE			
<b>Topic: Metabolic bone disorders</b> <span style="float: right;">Number of competencies : (01)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
OR7.1	Describe and discuss the aetiopathogenesis, clinical features, investigation and principles of management of metabolic bone disorders in particular osteoporosis, osteomalacia, rickets, Paget's disease	K	K/KH	Y	Lecture, Small group discussion, Case discussion	Written/ Viva voce/ OSCE			
<b>Topic: Poliomyelitis</b> <span style="float: right;">Number of competencies : (01)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
OR8.1	Describe and discuss the aetiopathogenesis, clinical features, assessment and principles of management a patient with Post Polio Residual Paralysis	K	K/KH	Y	Lecture, Small group discussion, Case discussion	Written/ Viva voce/ OSCE			
<b>Topic: Cerebral Palsy</b> <span style="float: right;">Number of competencies : (01)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OR9.1	Describe and discuss the aetiopathogenesis, clinical features, assessment and principles of management of Cerebral palsy patient	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce/ OSCE			
<b>Topic: Bone Tumors</b> <span style="float: right;">Number of competencies : (01)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
OR10.1	Describe and discuss the aetiopathogenesis, clinical features, investigations and principles of management of benign and malignant bone tumours and pathological fractures	K	K/KH	Y	Lecture, Small group discussion, Video assisted interactive lecture	Written/ Viva voce/ OSCE		Pathology	General surgery, Radiotherapy
<b>Topic: Peripheral nerve injuries</b> <span style="float: right;">Number of competencies : (01)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
OR11.1	Describe and discuss the aetiopathogenesis, clinical features, investigations and principles of management of peripheral nerve injuries in diseases like foot drop, wrist drop, claw hand, palsies of Radial, Ulnar, Median, Lateral Popliteal and Sciatic Nerves	K	K/H	Y	Lecture, Small group discussion, case discussion	Written/ Viva voce/ OSCE		Human Anatomy	General Medicine, General surgery
<b>Topic: Congenital lesions</b> <span style="float: right;">Number of competencies : (01)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
OR12.1	Describe and discuss the clinical features, investigations and principles of management of Congenital and acquired malformations and deformities of: a. limbs and spine - Scoliosis and spinal bifida b. Congenital dislocation of Hip, Torticollis, c. congenital talipes equino varus	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce/ OSCE		Human Anatomy	
<b>Topic: Procedural Skills</b> <span style="float: right;">Number of competencies : (02)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									

Number	<b>COMPETENCY</b> The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OR13.1	Participate in a team for procedures in patients and demonstrating the ability to perform on mannequins / simulated patients in the following: i. Above elbow plaster ii. Below knee plaster iii. Above knee plaster iv. Thomas splint v. splinting for long bone fractures vi. Strapping for shoulder and clavicle trauma	S/A	KH / SH	Y	Case discussion, Video assisted Lecture, Small group discussion, Teaching, Skill lab sessions	OSCE with Simulation based assessment			
OR13.2	Participate as a member in team for Resuscitation of Polytrauma victim by doing all of the following : (a) I.V. access central - peripheral (b) Bladder catheterization (c) Endotracheal intubation (d) Splintage	S/A	KH / SH	Y	Case discussion, Video assisted Lecture, Small group discussion, Teaching, Skill lab sessions	OSCE with Simulation based assessment			Anaesthesiology
<b>Topic: Counselling Skills</b> <span style="margin-left: 200px;"><b>Number of competencies : (03)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
OR14.1	Demonstrate the ability to counsel patients regarding prognosis in patients with various orthopedic illnesses like a. fractures with disabilities b. fractures that require prolonged bed stay c. bone tumours d. congenital disabilities	K/S/A/C	KH / SH	Y	Case discussion, Video assisted lecture, Small group discussion, Teaching, Skills lab sessions	OSCE with Simulation based assessment			AETCOM
OR14.2	Demonstrate the ability to counsel patients to obtain consent for various orthopedic procedures like limp amputation, permanent fixations etc..	K/S/A/C	KH / SH	Y	Case discussion, Video assisted Lecture, Small group discussion, Teaching, Skills lab sessions	OSCE with Simulation based assessment			AETCOM

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
OR14.3	Demonstrate the ability to convince the patient for referral to a higher centre in various orthopedic illnesses, based on the detection of warning signals and need for sophisticated management	K/S/A/C	KH / SH	Y	Case discussion, Video assisted Lecture, Small group discussion, Teaching, Skills lab sessions	OSCE with Simulation based assessment			AETCOM
<p><b>Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.</b>  <b>Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,</b>  <b>Column F: DOAP session – Demonstrate, Observe, Assess, Perform.</b>  <b>Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation</b></p>									
<b>Integration</b>									
<b>Human Anatomy</b>									
AN2.4	Describe various types of cartilage with its structure & distribution in body	K	KH	Y	Lecture	Written/ Viva voce		Orthopedics	
AN2.5	Describe various joints with subtypes and examples	K	KH	Y	Lecture	Written/ Viva voce		Orthopedics	
AN8.4	Demonstrate important muscle attachment on the given bone	K/S	SH	Y	Practical, DOAP session, Small group teaching	Viva voce/ Practicals		Orthopedics	
AN8.6	Describe scaphoid fracture and explain the anatomical basis of avascular necrosis	K	KH	N	DOAP session	Viva voce		Orthopedics	

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN10.12	Describe and demonstrate Shoulder joint for– type, articular surfaces, capsule, synovial membrane, ligaments, relations, movements, muscles involved, blood supply, nerve supply and applied anatomy	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skills assessment		Orthopedics	
AN11.4	Describe the anatomical basis of Saturday night paralysis	K	KH	Y	Practical, Lecture	Written/ Viva voce		Orthopedics	
AN17.2	Describe anatomical basis of complications of fracture neck of femur.	K	KH	N	Lecture	Written/ Viva voce		Orthopedics	
AN17.3	Describe dislocation of hip joint and surgical hip replacement	K	KH	N	Lecture	Written/ Viva voce		Orthopedics	
AN18.6	Describe knee joint injuries with its applied anatomy	K	KH	N	Lecture	Written/ Viva voce		Orthopedics	
AN18.7	Explain anatomical basis of Osteoarthritis	K	KH	N	Lecture	Written/ Viva voce		Orthopedics	
AN19.4	Explain the anatomical basis of rupture of calcaneal tendon	K	KH	N	Lecture	Written/ Viva voce		Orthopedics	
AN19.6	Explain the anatomical basis of Flat foot & Club foot	K	KH	N	Lecture	Written/ Viva voce		Orthopedics	
AN19.7	Explain the anatomical basis of Metatarsalgia & Plantar fasciitis	K	KH	N	Lecture	Written/ Viva voce		Orthopedics	
AN50.4	Explain the anatomical basis of Scoliosis, Lordosis, Prolapsed disc, Spondylolisthesis & Spina bifida	K	KH	N	Lecture	Written		Orthopedics	
<b>Pathology</b>									

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PA33.1	Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications of osteomyelitis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy, Orthopedics	Microbiology
PA33.2	Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications and metastases of bone tumors	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Orthopedics	
PA33.3	Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications and metastases of soft tissue tumors	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Orthopedics	
PA33.4	Classify and describe the etiology, pathogenesis, manifestations, radiologic and morphologic features and complications of Paget's disease of the bone	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Orthopedics	
<b>Microbiology</b>									
MI4.2	Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of bone & joint infections.	K	KH	Y	Lecture	Written/ Viva voce		Orthopedics	
<b>Forensic Medicine &amp; Toxicology</b>									
FM3.7	Describe factors influencing infliction of injuries and healing, examination and certification of wounds and wound as a cause of death: Primary and Secondary.	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		Forensic medicine, Orthopaedics	
FM3.8	Mechanical injuries and wounds: Describe and discuss different types of weapons including dangerous weapons and their examination.	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery, Orthopaedics	

Number	<b>COMPETENCY</b> The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
FM3.9	Firearm injuries: Describe different types of firearms including structure and components. Along with description of ammunition propellant charge and mechanism of fire-arms, different types of cartridges and bullets and various terminology in relation of firearm – caliber, range, choking.	K	K/KH	Y	Lecture, Small group discussion	Written/ Viva voce		General Surgery, Orthopaedics	
FM3.10	Firearm injuries: Describe and discuss wound ballistics-different types of firearm injuries, blast injuries and their interpretation, preservation and dispatch of trace evidences in cases of firearm and blast injuries, various tests related to confirmation of use of firearms	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic DOAP session	Written/ Viva voce / OSCE		General Surgery, Orthopaedics	
FM3.11	Regional Injuries: Describe and discuss regional injuries to head (Scalp wounds, fracture skull, intracranial haemorrhages, coup and contrecoup injuries), neck, chest, abdomen, limbs, genital organs, spinal cord and skeleton	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic or autopsy, DOAP session	Written/ Viva voce / OSCE/ OSPE		General Surgery, Orthopaedics	
FM3.12	Regional Injuries Describe and discuss injuries related to fall from height and vehicular injuries – Primary and Secondary impact, Secondary injuries, crush syndrome, railway spine.	K	K/KH	Y	Lecture, Small group discussion, Bed side clinic or autopsy, DOAP session	Written/ Viva voce / OSCE/ OSPE		General Surgery, Orthopaedics	
<b>General Medicine</b>									
IM7.5	Develop a systematic clinical approach to joint pain based on the pathophysiology	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
IM7.6	Describe and discriminate acute, subacute and chronic causes of joint pain	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
IM7.7	Discriminate, describe and discuss arthralgia from arthritis and mechanical from inflammatory causes of joint pain	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics

Number	<b>COMPETENCY</b> The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM7.8	Discriminate, describe and discuss distinguishing articular from periarticular complaints	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
IM7.9	Determine the potential causes of join pain based on the presenting features of joint involvement	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
IM7.10	Describe the common signs and symptoms of articular and periarticular diseases	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
IM7.13	Perform a systematic examination of all joints, muscle and skin that will establish the diagnosis and severity of disease	S	SH	Y	Bed side clinic, DOAP session	Skill assessment			Orthopedics
IM7.17	Enumerate the indications for arthrocentesis	K	K	Y	small group discussion, Lecture	Written/ Viva voce			Orthopedics
IM7.18	Enumerate the indications and interpret plain radiographs of joints	K	SH	Y	Bed side clinic, small group discussion	Skill assessment/ Written		Radiodiagnosis	Orthopedics
IM7.21	Select, prescribe and communicate appropriate medications for relief of joint pain	K/C	SH	Y	DOAP session	Skill assessment/ Written		Pharmacology	Orthopedics
IM24.12	Describe and discuss the aetiopathogenesis, clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of degenerative joint disease	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
IM24.13	Describe and discuss the aetiopathogenesis, clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of falls in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics, Physical Medicine & Rehabilitation
IM24.14	Describe and discuss the aetiopathogenesis, clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of common fractures in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics

Number	COMPETENCY The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM24.16	Describe and discuss the principles of physical and social rehabilitation, functional assessment, role of physiotherapy and occupational therapy in the management of disability in the elderly	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics, Physical Medicine & Rehabilitation
<b>Physical Medicine &amp; Rehabilitation</b>									
PM1.2	Define and describe disability, its cause, and magnitude, identification and prevention of disability	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine Orthopedics
PM1.3	Define and describe the methods to identify and prevent disability	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine Orthopedics
PM1.4	Enumerate the rights and entitlements of differently abled persons	K	K	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine, Orthopedics
PM4.1	Describe the common patterns, clinical features, investigations, diagnosis and treatment of common causes of arthritis	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine Orthopedics
PM4.3	Observe in a mannequin or equivalent the administration of an intra-articular injection	S	KH	N	DOAP session	Skill assessment			Orthopedics
PM4.5	Demonstrate correct assessment of muscle strength and range of movements	S	SH	Y	DOAP session, Bedside clinic	Skill assessment			General Medicine Orthopedics
PM5.1	Enumerate the indications and describe the principles of amputation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics General Surgery
PM5.2	Describe the principles of early mobilization, evaluation of the residual limb, contralateral limb and the influence of co-morbidities	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics

Number	<b>COMPETENCY</b> The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PM5.3	Demonstrate the correct use of crutches in ambulation and postures to correct contractures and deformities	S	SH	Y	DOAP session, Bedside clinic discussion	Skill assessment			Orthopedics
PM5.4	Identify the correct prosthesis for common amputations	S	SH	Y	DOAP session	Skill assessment / written			Orthopedics
PM6.3	Describe the principles of skin traction, serial casts and surgical treatment including contracture release, tendon transfer, osteotomies and arthrodesis.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
PM6.4	Describe the principles of orthosis for ambulation in PPRP	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
PM7.1	Describe and discuss the clinical features, diagnostic work up, work up diagnosis and management of spinal cord injury	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Orthopedics
PM7.2	Describe and demonstrate process of transfer, applications of collar restraints while maintaining airway and prevention of secondary injury in a mannequin/model	S	SH	Y	DOAP session, Small group discussion	Skill assessment			Orthopedics
PM7.3	Perform and demonstrate a correct neurological examination in a patient with spinal injury and determine the neurologic level of injury	S	SH	Y	Bed side clinic	Skill assessment			Orthopedics
PM7.4	Assess bowel and bladder function and identify common patterns of bladder dysfunction	S	KH	Y	Small group discussion	Written/ Viva voce			General Medicine, Orthopedics
PM7.5	Enumerate the indications and identify the common mobility aids and appliances, wheel chairs	S	S	Y	DOAP session	Skill assessment/ Viva voce			Orthopedics

Number	<b>COMPETENCY</b> The student should be able to:	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PM7.7	Enumerate and describe common life threatening complications following SCI like Deep vein Thrombosis, Aspiration Pneumonia, Autonomic dysreflexia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Medicine, Orthopedics
PM8.1	Describe the clinical features, evaluation, diagnosis and management of disability following traumatic brain injury	K	KH	Y	Lecture, Small group discussion	Written / Viva voce			General Medicine, Orthopedics, General Surgery

**ANAESTHESIOLOGY (CODE: AS)**



Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal integration
AS3.1	Describe the principles of preoperative evaluation	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			General Surgery, General Medicine
AS3.2	Elicit, present and document an appropriate history including medication history in a patient undergoing Surgery as it pertains to a preoperative anaesthetic evaluation	S	SH	Y	DOAP session, Bedside clinic	Skill station			General Surgery, General Medicine
AS3.3	Demonstrate and document an appropriate clinical examination in a patient undergoing General Surgery	S	SH	Y	DOAP session, Bedside clinic	Skill station			General Surgery, General Medicine
AS3.4	Choose and interpret appropriate testing for patients undergoing Surgery	S	SH	Y	DOAP session, Bedside clinic	Skill station			General Surgery, General Medicine
AS3.5	Determine the readiness for General Surgery in a patient based on the preoperative evaluation	S	SH	Y	DOAP session, Bedside clinic	Skill station			General Surgery, General Medicine
AS3.6	Choose and write a prescription for appropriate premedications for patients undergoing surgery	S	SH	Y	DOAP session, Bedside clinic	Skill station		Pharmacology	
<b>Topic: General Anaesthesia</b> <span style="margin-left: 200px;"><b>Number of competencies: (07)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification : (NIL)</b></span>									
AS4.1	Describe and discuss the pharmacology of drugs used in induction and maintenance of general anaesthesia (including intravenous and inhalation induction agents, opiate and non-opiate analgesics, depolarising and non depolarising muscle relaxants, anticholinesterases)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Pharmacology	
AS4.2	Describe the anatomy of the airway and its implications for general anaesthesia	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	
AS4.3	Observe and describe the principles and the practical aspects of induction and maintenance of anesthesia	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Pharmacology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal integration
AS4.4	Observe and describe the principles and the steps/ techniques in maintenance of vital organ functions in patients undergoing surgical procedures	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			
AS4.5	Observe and describe the principles and the steps/ techniques in monitoring patients during anaesthesia	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			
AS4.6	Observe and describe the principles and the steps/ techniques involved in day care anaesthesia	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			
AS4.7	Observe and describe the principles and the steps/ techniques involved in anaesthesia outside the operating room	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			
<b>Topic: Regional anaesthesia</b> <span style="margin-left: 200px;"><b>Number of competencies: (06)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
AS5.1	Enumerate the indications for and describe the principles of regional anaesthesia (including spinal, epidural and combined)	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			
AS5.2	Describe the correlative anatomy of the brachial plexus, subarachnoid and epidural spaces	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Human Anatomy	
AS5.3	Observe and describe the principles and steps/ techniques involved in peripheral nerve blocks	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Human Anatomy	
AS5.4	Observe and describe the pharmacology and correct use of commonly used drugs and adjuvant agents in regional anaesthesia	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Pharmacology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal integration
AS5.5	Observe and describe the principles and steps/ techniques involved in caudal epidural in adults and children	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			
AS5.6	Observe and describe the principles and steps/ techniques involved in common blocks used in surgery (including brachial plexus blocks)	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			General Surgery
<b>Topic: Post-anaesthesia recovery</b> <span style="float: right;">Number of competencies: (03)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
AS6.1	Describe the principles of monitoring and resuscitation in the recovery room	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			
AS6.2	Observe and enumerate the contents of the crash cart and describe the equipment used in the recovery room	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			
AS6.3	Describe the common complications encountered by patients in the recovery room, their recognition and principles of management	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			General Surgery
<b>Topic: Intensive Care Management</b> <span style="float: right;">Number of competencies: (05)</span> <span style="float: right;">Number of procedures that require certification: (NIL)</span>									
AS7.1	Visit, enumerate and describe the functions of an Intensive Care Unit	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			
AS7.2	Enumerate and describe the criteria for admission and discharge of a patient to an ICU	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			General Medicine
AS7.3	Observe and describe the management of an unconscious patient	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Physiology	General Medicine

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal integration
AS7.4	Observe and describe the basic setup process of a ventilator	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Physiology	General Medicine
AS7.5	Observe and describe the principles of monitoring in an ICU	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			General Medicine
<b>Topic: Pain and its management</b> <span style="float: right;"><b>Number of competencies: (05)</b> <b>Number of procedures that require certification: (NIL)</b></span>									
AS8.1	Describe the anatomical correlates and physiologic principles of pain	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Human Anatomy, Physiology	
AS8.2	Elicit and determine the level, quality and quantity of pain and its tolerance in patient or surrogate	S	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Physiology	
AS8.3	Describe the pharmacology and use of drugs in the management of pain	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Pharmacology	
AS8.4	Describe the principles of pain management in palliative care	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Pharmacology	General Medicine
AS8.5	Describe the principles of pain management in the terminally ill	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Pharmacology	General Medicine
<b>Topic: Fluids</b> <span style="float: right;"><b>Number of competencies: (04)</b> <b>Number of procedures that require certification: (NIL)</b></span>									

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal integration
AS9.1	Establish intravenous access in a simulated environment	S	KH	Y	Small group discussion, DOAP session	Skill assessment			
AS9.2	Establish central venous access in a simulated environment	S	KH	Y	Small group discussion, DOAP session	Skill assessment			
AS9.3	Describe the principles of fluid therapy in the preoperative period	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			General Surgery
AS9.4	Enumerate blood products and describe the use of blood products in the preoperative period	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Pathology	General Surgery
<b>Topic: Patient safety</b> <span style="margin-left: 200px;"><b>Number of competencies: (04)</b></span> <span style="margin-left: 200px;"><b>Number of procedures that require certification: (NIL)</b></span>									
AS10.1	Enumerate the hazards of incorrect patient positioning	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			
AS10.2	Enumerate the hazards encountered in the perioperative period and steps/techniques taken to prevent them	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce			
AS10.3	Describe the role of communication in patient safety	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		AETCOM	General Surgery
AS10.4	Define and describe common medical and medication errors in anaesthesia	K	KH	Y	Lecture, Small group discussion, DOAP session	Written/ Viva voce		Pharmacology	General Medicine

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal integration
<p><b>Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.</b>  <b>Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,</b>  <b>Column F: DOAP session – Demonstrate, Observe, Assess, Perform.</b>  <b>Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation</b></p>									
<b>Integration</b>									
<b>Physiology</b>									
PY3.4	Describe the structure of neuro-muscular junction and transmission of impulses	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Anaesthesiology	
PY3.5	Discuss the action of neuro-muscular blocking agents	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Anaesthesiology Pharmacology	
PY11.14	Demonstrate Basic Life Support in a simulated environment	S	SH	Y	DOAP sessions	OSCE		General Medicine Anaesthesiology	
<b>Pharmacology</b>									
PH1.15	Describe mechanism/s of action, types, doses, side effects, indications and contraindications of skeletal muscle relaxants	K	KH	Y	Lecture	Written/ Viva voce		Anesthesiology, Physiology	
PH1.17	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of local anaesthetics	K	KH	Y	Lecture	Written/ Viva voce		Anesthesiology	
PH1.18	Describe the mechanism/s of action, types, doses, side effects, indications and contraindications of general anaesthetics, and pre-anaesthetic medications	K	KH	Y	Lecture	Written/ Viva voce		Anesthesiology	
<b>Forensic Medicine &amp; Toxicology</b>									

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal integration
FM2.19	Investigation of anaesthetic, operative deaths: Describe and discuss special protocols for conduction of autopsy and for collection, preservation and dispatch of related material evidences	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce		Anesthesiology, General Surgery	
<b>General Medicine</b>									
IM13.17	Describe and enumerate the indications, use, side effects of narcotics in pain alleviation in patients with cancer	K	KB	Y	Bedside clinic, small group discussion	short note/ Viva voce		Pharmacology	Anesthesiology
IM24.11	Describe and discuss the aetiopathogenesis, clinical presentation, identification, functional changes, acute care, stabilization, management and rehabilitation of the elderly undergoing surgery	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Anesthesiology General Surgery
<b>General Surgery</b>									
SU11.1	Describe principles of Preoperative assessment.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Anesthesiology
SU11.2	Enumerate the principles of general, regional, and local Anaesthesia.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Anesthesiology
SU11.3	Demonstrate maintenance of an airway in a mannequin or equivalent	S	SH	Y	DOAP session	Skill Assessment			Anesthesiology
SU11.5	Describe principles of providing post-operative pain relief and management of chronic pain.	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Anesthesiology
SU17.2	Demonstrate the steps in Basic Life Support. Transport of injured patient in a simulated environment	S	SH	Y	DOAP session	Skill assessment			Anesthesiology

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical integration	Horizontal integration
SU17.10	Demonstrate Airway maintenance and recognize and management of tension pneumothorax, hemothorax and flail chest in simulated environment	S	SH	Y	DOAP session	Skill Assessment/ Log book			Anesthesiology
<b>Orthopaedics</b>									
OR1.1	Describe and discuss the Principles of Pre hospital care and Casualty management of a trauma victim including principles of triage,	K/S/A/C	K, KH	Y	Lecture with video, Small group Discussion	Written/ Viva voce/ OSCE/ Simulation			General Surgery Anaesthesiology
OR13.2	Participate as a member in team for Resuscitation of Polytrauma victim by doing all of the following : (a) IV. access central - peripheral (b) Bladder catheterization (c) Endotracheal intubation (d) Splintage	S/A	KH / SH	Y	Case discussion, Video assisted Lecture, Small group discussion, Teaching, Skill lab sessions	OSCE with Simulation based assessment			Anaesthesiology

## **RADIODIAGNOSIS (CODE: RD)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>RADIODIAGNOSIS</b>									
<b>Topic: Radiological investigations and Radiation safety</b>		<b>Number of competencies: (13)</b>			<b>Number of procedures that require certification: (NIL)</b>				
RD1.1	Define radiation and the interaction of radiation and importance of radiation protection	K	KH	Y	Lecture, Demonstration				
RD1.2	Describe the evolution of Radiodiagnosis. Identify various radiological equipments In the current era	S	SH	Y	Lecture, Demonstration				
RD1.3	Enumerate indications for various common radiological investigations, choose the most appropriate and cost effective method and interpret findings in common conditions pertaining to disorder of ENT	K/S	SH	Y	Lecture, Demonstration				
RD1.4	Enumerate indications for various common radiological investigations, choose the most appropriate and cost effective method and interpret findings in common conditions pertaining to disorder in Ob & Gy	K/S	SH	Y	Lecture, Demonstration				
RD1.5	Enumerate indications for various common radiological investigations, choose the most appropriate and cost effective method and interpret findings in common conditions pertaining to disorder in internal medicine	K/S	SH	Y	Lecture, Demonstration				
RD1.6	Enumerate indications for various common radiological investigations, choose the most appropriate and cost effective method and interpret findings in common conditions pertaining to disorders in surgery	K/S	SH	Y	Lecture, Demonstration				
RD1.7	Enumerate indications for various common radiological investigations, choose the most appropriate and cost effective method and interpret findings in common conditions pertaining to disorder in Pediatrics	K/S	SH	Y	Lecture, Demonstration				

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
RD1.8	Enumerate indications for various common radiological investigations, choose the most appropriate and cost effective method and interpret findings in common conditions pertaining to common malignancies	K/S	SH	Y	Lecture, Demonstration				
RD1.9	Describe the role of Interventional Radiology in common clinical conditions	K	KH	Y	Lecture, Demonstration				
RD1.10	Describe the role of Emergency Radiology, miscellaneous & applied aspects, interaction with clinical departments	K	KH	Y	Lecture, Demonstration				
RD1.11	Describe preparation of patient for common imaging procedures	K	KH	Y	Lecture, Demonstration				
RD1.12	Describe the effects of radiation in pregnancy and the methods of prevention/ minimization of radiation exposure	K	KH	Y	Lecture, Demonstration				
RD1.13	Describe the components of the PC & PNDT Act and its medicolegal implications	K	KH	Y	Lecture, Small group discussion			Obstetrics & Gynaecology, Forensic Medicine & Toxicology	
<p><b>Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.</b>  <b>Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,</b>  <b>Column F: DOAP session – Demonstrate, Observe, Assess, Perform.</b>  <b>Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation</b></p>									
<b>Integration</b>									
<b>Human Anatomy</b>									
AN13.4	Identify the bones and joints of upper limb seen in anteroposterior and lateral view radiographs of shoulder region, arm, elbow, forearm and hand	K/S	SH	Y	Practical, Small group discussion, DOAP session	Viva voce/ Skill assessment		Radiodiagnosis	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN20.6	Identify the bones and joints of lower limb seen in anteroposterior and lateral view radiographs of various regions of lower limb	K/S	SH	Y	Lecture, Small group discussion, DOAP session	Viva voce/ Skill assessment		Radiodiagnosis	
AN25.7	Identify structures seen on a plain x-ray chest (PA view)	K/S	SH	Y	Practical, DOAP session	Written/ Viva voce		Radiodiagnosis, General Medicine	
AN25.8	Identify and describe in brief a barium swallow	K/S	SH	N	Practical, DOAP session	Written/ Viva voce		Radiodiagnosis, General Medicine	
AN43.7	Identify the anatomical structures in 1) Plain x ray skull, 2) AP view and lateral view 3) Plain x ray cervical spine - AP and lateral view 4) Plain x ray of paranasal sinuses	K/S	SH	Y	Practical	Viva voce/ Skill assessment		Radiodiagnosis	
AN43.8	Describe the anatomical route used for carotid angiogram and vertebral angiogram	K/S	SH	N	Practical	Viva voce/ Skill assessment		Radiodiagnosis	
AN43.9	Identify anatomical structures in carotid angiogram and vertebral angiogram	K/S	SH	N	Practical	Viva voce/ Skill assessment		Radiodiagnosis	
AN51.1	Describe & identify the cross-section at the level of T8, T10 and L1 (transpyloric plane)	K/S	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		Radiodiagnosis	
AN51.2	Describe & identify the midsagittal section of male and female pelvis	K	SH	Y	Practical, Lecture, Small group discussion, DOAP session	Written/ Viva voce/ Skill assessment		Radiodiagnosis	
AN541.	Describe & identify features of plain X ray abdomen	K/S	SH	Y	Lecture, DOAP session	Viva voce/ Skill assessment		Radiodiagnosis	
AN54.2	Describe & identify the special radiographs of abdominopelvic region (contrast X ray Barium swallow, Barium meal, Barium enema, Cholecystography, Intravenous pyelography &Hysterosalpingography)	K/S	SH	Y	Lecture, DOAP session	Viva voce/ Skill assessment		Radiodiagnosis	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
AN54.3	Describe role of ERCP, CT abdomen, MRI, Arteriography in radiodiagnosis of abdomen	K	KH	N	Lecture	Viva voce		Radiodiagnosis	
<b>Forensic Medicine &amp; Toxicology</b>									
FM1.9	Describe the importance of documentation in medical practice in regard to medicolegal examinations, Medical Certificates and medicolegal reports especially: – maintenance of patient case records, discharge summary, prescribed registers to be maintained in Health Centres. -- maintenance of medico-legal register like accident register. -- documents of issuance of wound certificate -- documents of issuance of drunkenness certificate. -- documents of issuance of sickness and fitness certificate. -- documents for issuance of death certificate. -- documents of Medical Certification of Cause of Death - Form Number4 and 4A -- documents for estimation of age by physical, dental and radiological examination and issuance of certificate	K	KH	Y	Lecture/ Small group discussion	Written/ Viva voce		Radiodiagnosis, General Surgery, General Medicine, Pediatrics	
<b>General Medicine</b>									
IM1.19	Enumerate the indications for and describe the findings of heart failure with the following conditions including: 2D echocardiography, brain natriuretic peptide, exercise testing, nuclear medicine testing and coronary angiogram	S	KH	N	Lecture, Small group discussion, Bedside clinic	Skill assessment		Radiodiagnosis	
IM3.7	Order and interpret diagnostic tests based on the clinical presentation including: CBC, Chest X ray PA view, Mantoux, sputum gram stain, sputum culture and sensitivity, pleural fluid examination and culture, HIV testing and ABG	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Radiodiagnosis, Microbiology	
IM3.11	Describe and enumerate the indications for further testing including HRCT, Viral cultures, PCR and specialised testing	S	SH	Y	Bedside clinic, DOAP session	Skill assessment		Radiodiagnosis, Microbiology	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
IM5.13	Enumerate the indications for ultrasound and other imaging studies including MRCP and ERCP and describe the findings in liver disease	K	K	Y	Bedside clinic, Small group discussion	Viva voce/ Written		Radiodiagnosis	General Surgery
IM6.12	Enumerate the indications and describe the findings for CT of the chest and brain and MRI	K	K	N	Small group discussion, Lecture, Bedside clinic	Written/ Viva voce		Radiodiagnosis	
IM7.18	Enumerate the indications and interpret plain radiographs of joints	K	SH	Y	Bedside clinic, Small group discussion	Skill assessment/ Written		Radiodiagnosis	Orthopedics
IM10.19	Enumerate the indications and describe the findings in renal ultrasound	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Radiodiagnosis	
IM13.12	Describe the indications and interpret the results of Chest X Ray, mammogram, skin and tissue biopsies and tumor markers used in common cancers	K	KH	Y	Bedside clinic, Small group discussion	Short note/ Viva voce		Radiodiagnosis	
IM18.9	Choose and interpret the appropriate diagnostic and imaging test that will delineate the anatomy and underlying cause of the lesion	S	KH	Y	Bedside clinic, DOAP session, Small group discussion	Written/ Viva voce/ Skill assessment		Radiodiagnosis	
IM19.7	Choose and interpret diagnostic and imaging tests in the diagnosis of movement disorders	S	SH	Y	Bedside clinic, Small group discussion	Skill assessment/ Small group session/ Written/ Viva voce		Radiodiagnosis	
<b>Obstetrics &amp; Gynaecology</b>									
OG9.4	Discuss the clinical features, laboratory investigations ultrasonography, differential diagnosis, principles of management and follow up of gestational trophoblastic neoplasms	K	KH	Y	Lecture, Small group discussion	Written/ Viva voce			Radiodiagnosis
<b>Pediatrics</b>									
PE21.12	Interpret report of Plain radiograph of KUB	S	SH	Y	Bedside clinics, Skills lab	Log book		Radiodiagnosis	

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
PE21.13	Enumerate the indications for and Interpret the written report of Ultra sonogram of KUB	S	SH	Y	Bedside clinics, Skills lab	Log book		Radiodiagnosis	
PE23.13	Interpret a chest radiograph and recognize Cardiomegaly	S	SH	Y	Bedside clinics, Skills lab	Log book entry		Radiodiagnosis	
PE23.16	Use the ECHO reports in management of cases	S	SH	Y	Bedside clinics	Log book entry		Radiodiagnosis	
PE28.17	Interpret X-ray of the paranasal sinuses and mastoid; and /or use written report in case of management Interpret CXR in foreign body aspiration and lower respiratory tract infection, understand the significance of thymic shadow in Pediatric chest X-rays	S	P	Y	Bedside clinics, Small group discussion	Skills Assessment	3	ENT, Radiodiagnosis	
PE30.23	Interpret the reports of EEG, CT, MRI	S	SH	Y	Bedside clinics, Skill lab	Log book		Radiodiagnosis	
PE34.8	Interpret a Chest radiograph	S	SH	Y	Bedside clinics, Skill lab	Skill assessment		Radiodiagnosis	Respiratory Medicine
<b>General Surgery</b>									
SU25.3	Describe the etiopathogenesis, clinical features, Investigations and principles of treatment of benign and malignant tumours of breast.	K	KH	Y	Lecture, Small group discussion, Demonstration	Written/ Viva voce Skill assessment		Radiodiagnosis	

**RADIOTHERAPY (CODE: RT)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested teaching learning method	Suggested assessment method	Number required to certify P	Vertical integration	Horizontal integration
<b>RADIOTHERAPY</b>									
<b>Topic: Principles of Radiation Oncology (Radiotherapy)</b>		<b>Number of competencies: (03)</b>			<b>Number of procedures that require certification : (NIL)</b>				
RT1.1	Describe and discuss definition of radiation, mechanism of action of radiation, types of radiation	K	KH	Y	Lecture	Written/ Viva voce			General Surgery, Anaesthesiology
RT1.2	Describe and discuss interaction of radiation with matter & measurement of radiation	K	KH	Y	Lecture	Written/ Viva voce			
RT1.3	Enumerate, describe and discuss classification and staging of cancer (AJCC, FIGO etc.)	K	KH	Y	Lecture	Written/ Viva voce		Pathology	General Surgery, General Medicine
<b>Topic: Radiation Protection</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification : (NIL)</b>				
RT2.1	Describe and discuss radiation protection and personnel monitoring during radiation treatment	K	KH	Y	Lecture	Written/ Viva voce			
<b>Topic: Radiobiology &amp; Chemoradiation</b>		<b>Number of competencies: (02)</b>			<b>Number of procedures that require certification : (NIL)</b>				
RT3.1	Describe and discuss cell cycle and cell survival curve, principles of radiobiology	K	KH	Y	Lecture	Written/ Viva voce			
RT3.2	Describe and discuss synergism of radiation and chemotherapy	K	KH	Y	Lecture	Written/ Viva voce			
<b>Topic: Radiation Treatment Delivery &amp; outcome</b>		<b>Number of competencies: (09)</b>			<b>Number of procedures that require certification : (NIL)</b>				
RT4.1	Describe and discuss teletherapy machine (Co60/LINAC)	K	KH	Y	DOAP session	Written/ Viva voce			
RT4.2	Enumerate, describe and discuss types of treatment plan, basic workflow of 2D/3DCRT/IMRT/IGRT	K	KH	Y	DOAP session	Written/ Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested teaching learning method	Suggested assessment method	Number required to certify P	Vertical integration	Horizontal integration
RT4.3	Describe and discuss Brachytherapy machine (remote after loading)	K	KH	Y	DOAP session	Written/ Viva voce			
RT4.4	Describe and discuss different radioactive isotopes and their use in cancer patients	K	KH	Y	Lecture	Written/ Viva voce			
RT4.5	Describe and discuss role of radiation in management of common malignancies in India (region specific)	K	KH	Y	Lecture and Bed side clinics	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology
RT4.6	Describe and discuss radiotherapy for benign disease	K	KH	Y	Lecture	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology
RT4.7	Counsel patients regarding acute and late effects of radiation and supportive care	K/A/S	KH	Y	Bed side clinic, group discussion	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology
RT4.8	Describe oncological emergencies and palliative care	K/A/S	K/KH	Y	Lecture, group discussion	Written/ Viva voce			General Surgery, Obstetrics & Gynaecology
RT4.9	Display empathy in the care of patients with cancer	A	SH	N				AETCOM	
<b>Topic: Cancer Prevention &amp; Registries</b>		<b>Number of competencies: (01)</b>			<b>Number of procedures that require certification : (NIL)</b>				
RT5.1	Describe and discuss cancer prevention, screening, vaccination, cancer registry	K	K	Y	Group discussion	Written/ Viva voce		Pathology	General Surgery, Obstetrics & Gynaecology

Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.

Column D: K – Knows, KH - Knows How, SH- Shows how, P- performs independently,

Column F: DOAP session – Demonstrate, Observe, Assess, Perform.

Column H: If entry is P: indicate how many procedures must be done independently for certification/ graduation

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core Y/N	Suggested teaching learning method	Suggested assessment method	Number required to certify P	Vertical integration	Horizontal integration
<b>Orthopaedics</b>									
OR10.1	Describe and discuss the aetiopathogenesis, Clinical features, Investigations and principles of management of benign and malignant bone tumours and pathological fractures	K	K/KH	Y	Lecture, Small group discussion, Video assisted interactive lecture	Written/ Viva voce/ OSCE		Pathology	General Surgery, Radiotherapy

**DENTISTRY (CODE: DE)**

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>DENTISTRY</b>									
<b>Topic: Dental Caries</b>		<b>Number of competencies: (05)</b>			<b>Number of procedures that require certification (NIL)</b>				
DE1.1	Enumerate the parts of the tooth	K	K	N	Lecture, Small group discussion	Viva voce		Human Anatomy	
DE1.2	Discuss the role of causative microorganisms in the aetio-pathogenesis of dental caries	K	KH	Y	Lecture, Small group discussion	Viva voce		Microbiology	
DE1.3	Identify Dental caries	S	SH	N	Observation, Bed side clinics	Skill assessment			
DE1.4	Discuss the role of dental caries as a focus of sepsis	K	KH	Y	Lecture, Small group discussion	Viva voce		Microbiology, General Medicine	
DE1.5	Counsel patients with respect to oral hygiene, diet and the direct bearing on systemic health	A/C	SH	Y	DOAP session	Document in Log book			
<b>Topic: Edentulous state</b>		<b>Number of competencies: (05)</b>			<b>Number of procedures that require certification (NIL)</b>				
DE2.1	Discuss the various causes for partial /complete loss of teeth and associated structures	K	K	N	Lecture, Small group discussion	Viva voce			
DE2.2	Discuss the local and systemic sequelae of the above	K	KH	Y	Lecture, Small group discussion	Viva voce			
DE2.3	Identify complete complement of teeth and identify missing teeth	S	SH	N	Observation, Bed side clinics	Skill assessment			
DE2.4	Enumerate common ways of restoring the edentulous state	K	KH	Y	Lecture, Small group discussion	Viva voce			
DE2.5	Counsel patients on the importance of restoring missing teeth/tissues with respect to the benefits on oral and systemic health.	A/C	SH	Y	DOAP session	Document in Log book			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
<b>Topic: Malocclusion</b>		<b>Number of competencies: (04)</b>			<b>Number of procedures that require certification: (NIL)</b>				
DE3.1	Aware of malocclusion and the tissues that cause it	K	K	N	Lecture, Small group discussion	Viva voce			
DE3.2	Enumerate the impact of malocclusion on aesthetics, health	K	KH	Y	Lecture, Small group discussion	Viva voce			
DE3.3	Identify malocclusion	S	SH	N	Observation, Bedside clinics	Skill assessment			
DE3.4	Counsel patients with respect to correction of malocclusion and the role it might have on oral health specifically on the TMJ	A/C	SH	Y	DOAP session	Document in Log book			
<b>Topic: Oral cancer</b>		<b>Number of competencies: (04)</b>			<b>Number of procedures that require certification: (NIL)</b>				
DE4.1	Discuss the prevalence of oral cancer and enumerate the common types of cancer that can affect tissues of the oral cavity	K	K	N	Lecture, Small group discussion	Viva voce		Pathology	ENT
DE4.2	Discuss the role of etiological factors in the formation of precancerous /cancerous lesions	K	KH	Y	Lecture, Small group discussion	Viva voce		Pathology	ENT
DE4.3	Identify potential pre-cancerous /cancerous lesions	S	SH	N	Observation, Bed side clinics	Skill assessment		Pathology	ENT
DE4.4	Counsel patients to risks of oral cancer with respect to tobacco, smoking, alcohol and other causative factors.	A/C	SH	Y	DOAP session	Document in Log book		Pathology	ENT
<b>Topic: Periodontal disease</b>		<b>Number of competencies: (05)</b>			<b>Number of procedures that require certification: (NIL)</b>				
DE5.1	Enumerate the parts of the tooth and supporting structures	K	K	N	Lecture, Small group discussion	Viva voce		Human Anatomy	
DE5.2	Enumerate the common diseases that affect the periodontium and identify local and systemic causative factors	K	KH	Y	Lecture, Small group discussion	Viva voce			

Number	COMPETENCY The student should be able to	Domain K/S/A/C	Level K/KH/ SH/P	Core (Y/N)	Suggested Teaching Learning method	Suggested Assessment method	Number required to certify P	Vertical Integration	Horizontal Integration
DE5.3	Identify Periodontal disease	S	SH	N	Observation, Bedside clinics	Skill assessment			
DE5.4	Discuss the role of Periodontal disease as a focus of sepsis	K	KH	Y	Lecture, Small group discussion	Viva voce			
DE5.5	Counsel patients with respect to oral hygiene, diet and the direct bearing on systemic health and vice versa	A/C	SH	Y	DOAP session	Document in Log book			

**Column C: K- Knowledge, S – Skill, A - Attitude / professionalism, C- Communication.**

**Column D: K – Knows, KH - Knows How, SH - Shows how, P- performs independently,**

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<b>Integration</b>									
<b>Pathology</b>									
PA24.1	Describe the etiology, pathogenesis, pathology and clinical features of oral cancers	K	KH	N	Lecture, Small group discussion	Written/ Viva voce		Dentistry	

## List of contributing subject Experts

### 1. Human Anatomy

- Dr. Praveen R Singh, Professor & Head, Department of Anatomy, Pramukhswami Medical College, Karamsad, Gujarat
- Dr. Nachiket Shankar, Associate Professor, Department of Anatomy, St. John's Medical College & Hospital, Bangalore

### 2. Physiology

- Dr. Mario Vaz, Professor, Department of Physiology, St. John's Medical College & Hospital, Bangalore
- Dr. Jayashree Sengupta, Former Professor & Head, Department of Physiology, All India Institute of Medical Sciences, New Delhi.
- Dr Hasmukh D Shah, Professor & Head, Department of Physiology, Pramukhswami Medical College, Karamsad, Gujarat

### 3. Biochemistry

- Dr. Nibhriti Das, Professor, Department of Biochemistry, All India Institute of Medical Sciences, New Delhi
- Dr. S. P. Singh, Professor, Department of Biochemistry, Maharani Laxmi Bai Medical College, Jhansi, Uttar Pradesh
- Dr. Hitesh N Shah, Professor & Head, Department of Biochemistry, Pramukhswami Medical College, Karamsad, Gujarat

### 4. Pharmacology

- Dr. S. K. Maulik, Professor, Department of Pharmacology, All India Institute of Medical Sciences, New Delhi
- Dr. Vandana Roy, Professor, Department of Pharmacology, Maulana Azad Medical College, New Delhi

## **5. Pathology**

- Dr. S. Datta Gupta, Professor, Department of Pathology, All India Institute of Medical Sciences, New Delhi
- Dr. Uma Chaturvedi, Professor, C-1303, Freedom Park Life, Sector- 57, Gurugram

## **6. Microbiology**

- Dr. S. Geetalakshmi, Dean, Professor, Department of Microbiology, Stanley Medical College, Chennai, Tamil Nadu.
- Dr. Padma Srikanth, Professor, Department of Microbiology, Sri Ramachandra Medical College & Research Institute, Chennai
- Dr. Suman Singh, Professor, Department of Microbiology, Pramukhswami Medical College, Karamsad, Gujarat

## **7. Forensic Medicine & Toxicology**

- Dr. Sanjeev Lalwani, Professor & Registrar (Academics), Department of Forensic Medicine, All India Institute of Medical Sciences, New Delhi
- Dr. T. D. Dogra, Former Director & Former Head, Department of Forensic Medicine, All India Institute of Medical Sciences, New Delhi; currently, Vice Chancellor, SGT University, Gurugram
- Col. Ravi Rautji, Professor & Head, Department of Forensic Medicine, Commanding Officer, Directorate General of Medical Services (Army), New Delhi
- Dr. S.D. Nanandkar, Professor & Head, Department of Forensic Medicine, Grant Government Medical College & Sir J.J. Group of Hospitals, Mumbai
- Dr. Indrajit L. Khandekar, In-charge CFMU and Associate Professor, Department of Forensic Medicine & Toxicology, MGIMS and Kasturba Hospital, Sewagram, Wardha.
- Dr. S. B. Punpale, Professor & Head, Department of Forensic Medicine, B. J. Medical College, Pune, Maharashtra

## **8. Community Medicine**

- Dr. B. S. Garg, Professor & Head, Department of Community Medicine, Mahatama Gandhi Institute of Medical Sciences, Wardha, Sewagram, Maharashtra
- Dr. Umesh Kapil, Professor, Department of Community Medicine, All India Institute of Medical Sciences, New Delhi
- Dr. Sanjay Zodpey, Director, Public Health Foundation of India, Isid Campus, 4 Institutional Area, Vasant Kunj, New Delhi
- Dr. Saudan Singh, Professor, Department of Community Medicine, Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi
- Dr. Dinesh Kumar, Professor, Department of Community Medicine, Pramukhswami Medical College, Karamsad, Gujarat
- Dr. Pankaj B. Shah, Professor, Department of Community Medicine, Sri Ramachandra Medical College & Research Institute, Chennai.

## **9. General Medicine & Respiratory Medicine**

- Dr. Krishna G. Seshadri, Visiting Professor, Endocrinology & Metabolism, Balaji Vidyapeeth, Puducherry
- Dr. M. K. Bhatnagar, Director Professor, Department of General Medicine, Lady Hardinge Medical College, New Delhi
- Dr. Aparna Agarwal, Director Professor of Medicine, Lady Hardinge Medical College, New Delhi
- Dr. Anil Gurtoo, Director Professor of Medicine, Lady Hardinge Medical College, New Delhi

## **10. Pediatrics**

- Dr. Harish Chellani, Professor of Pediatrics, Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi
- Dr. A. K. Dutta, Former Head, Kalawati Saran Children's Hospital, New Delhi

- Dr. S. Aneja, Director Professor & Head, Department of Pediatrics, Kalawati Saran Children's Hospital, New Delhi
- Dr. Latha Ravichandran, Professor, Department of Paediatrics, Sri Ramachandra Medical College & Research Institute, Chennai.

#### **11. Psychiatry**

- Dr. Rakesh Kumar Chadda, Department of Psychiatry, All India Institute of Medical Sciences, New Delhi
- Dr. N. M. Patil, Professor, Department of Psychiatry, Jawaharlal Nehru Medical College, Belagavi
- Dr. Rajesh Rastogi, Consultant & Head Department of Psychiatry, Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi.
- Dr. Jagdish R Varma, Associate Professor, Department of Psychiatry, Pramukhswami Medical College, Karamsad, Gujarat

#### **12. Dermatology, Venereology & Leprosy**

- Dr. R. K. Gautam, Professor, Department of Dermatology, Venereology & Leprosy, Dr. Ram Manohar Lohia Hospital, New Delhi.
- Dr. Sujay Khandpur, Professor, Department of Dermatology, Venereology & Leprosy, All India Institute of Medical Sciences, New Delhi
- Dr. S. Murugan, Associate Professor of Dermatology, Sri Ramachandra Medical College & Research Institute, Chennai

#### **13. Physical Medicine and Rehabilitation**

- Dr. Sanjay Wadhwa, Professor, Department of Physical Medicine & Rehabilitation, All India Institute of Medical Sciences, New Delhi
- Dr. George Tharion, Head, Department of Physical Medicine & Rehabilitation, Christian Medical College, Vellore, Tamil Nadu

- Dr. Jagdish Menon, Professor & Head, Department of Orthopaedics and Dept. of Physical & Rehabilitative Medicine, Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry

#### **14. General Surgery**

- Dr. N Ananthkrishnan, 2A Vairam Enclave, Siddhananda Nagar, Pondicherry -605005.
- Dr. P. V. Chalam, Former Professor, Department of Surgery, Gandhi Medical College, Secunderabad, Telengana.
- Dr. Dinesh Bhatnagar, Professor, Department of General Surgery, North Delhi Municipal Corporation Medical College, Hindu Rao Hospital, Malka Ganj, Delhi

#### **15. Ophthalmology**

- Dr. Smita Singh, Professor, Department of Ophthalmology, Mahatma Gandhi Institute of Medical Sciences, Wardha

#### **16. Oto-rhino-laryngology**

- Dr. Achal Gulati, Director Professor, Department of ENT, Maulana Azad Medical College, New Delhi
- Dr. Ravi Kumar, Professor & Head, Department of ENT, Sri Ramachandra Medical College & Research Institute, Chennai
- Dr. Suma Mathew, Professor, Department of ENT, Christian Medical College, Vellore, Tamil Nadu

#### **17. Obstetrics and Gynaecology**

- Dr. Neerja Bhatla, Professor, Department of Obstetrics & Gynecology, All India Institute of Medical Sciences, New Delhi
- Dr. Annie Regi, Professor & Head, Department of Obstetrics & Gynecology, Christian Medical College, Vellore, Tamil Nadu
- Dr. Usha Vishwanath, Professor, Department of Obstetrics & Gynecology, Sri Ramachandra Medical College & Research Institute, Chennai

## **18. Orthopaedics**

- Dr. P.V. Vijayaraghavan, Vice Chancellor & Professor of Orthopedics, Sri Ramachandra Medical College & Research Institute, Chennai
- Dr. Raj Bahadur, Professor & Head, Department of Orthopaedics, Postgraduate Institute of Medical Sciences, Chandigarh
- Dr. SC. Goel, Professor, Department of Orthopaedics, Institute of Medical Sciences, BHU, Varanasi, Uttar Pradesh

## **19. Anaesthesiology**

- Dr. Baljit Singh, Director Professor of Anaesthesia, G. B. Pant Hospital, Delhi
- Dr. Ramesh Keshav, Department of Anaesthesia, Dr. Ram Manohar Lohia Hospital, New Delhi
- Dr. Mridula Pawar, Consultant & Head, Department of Anaesthesia, Vardhman Mahavir Medical College & Safdarjung Hospital, New Delhi

## **20. Radio- Diagnosis**

- Dr. Kishor Taori (late), Professor & Head, Department of Radiodiagnosis, Government Medical College, Nagpur

## **21. Radiotherapy**

- Dr. P. K. Jhulka, Dean & Professor of Radiotherapy, All India Institute of Medical Sciences, New Delhi.
- Dr. Shyam Shrivastava, Head, Department of Radiation, Tata Memorial Hospital, Mumbai

## **22. Dentistry**

- Dr. Sridevi Padmanabhan, Professor, Department of Orthodontics, Faculty of Dental Sciences, Sri Ramchandra Medical College & Research Institute, Chennai

# Medical Council of India

## A E T C O M

ATTITUDE, ETHICS & COMMUNICATION

Communication

Reliability

Patient centered

Professionalism

Personal growth

Leadership

Respect



Teamwork

Accountability

Responsiveness

Lifelong learning

Attitude

System based learning

Responsibility

Social Commitment

Values



2018

**Attitude, Ethics and Communication  
(AETCOM)**

**Competencies for the  
Indian Medical Graduate**

**2018**



**Medical Council of India  
Pocket-14, Sector-8, Dwarka,  
New Delhi 110 077**



## **FOREWORD**

Medical education has its deep rooted relevance with reference to creation of trained health manpower in the country capable of shouldering the onus and responsibility ensuring an effective health care delivery system. It is the prime concern upper most in the minds of all concerned as to whether the said dispensation is mitigated adequately or otherwise? Attainment on this count in my opinion is a 'minimum must' and therefore all 'initiatives' with concrete cause are warranted towards realistic and meaningful actualization of the same.

The crystallization of objectives ensuring corresponding curriculum with appropriate teaching learning strategies, tools, techniques and technology and commensurate mode of assessment are the parts of the core model for providing quality based undergraduate medical education.

It gives me great satisfaction that the 'competency based curriculum' that has been proposed by the Medical Council of India would definitely serve a larger cause in the domain of 'quality centricity'.

The "Conative domain" which hitherto was not appropriately incorporated and structured in the curriculum has been specifically dispensed of by providing a definitive model for the same titled AETCOM "Attitude, Ethics and Communication Model".

Structuring them into competencies, placing them appropriately in the curriculum design ensuring its incorporation through desired teaching and learning would definitely ensure enrichment of the learner with desired communicative and

altruistic skills with proper orientation pertaining to ethics, professionalism, leadership skills and also the attribute that shall inculcate in him/her the essence of lifelong learning.

This definitely would go a long way in creating an 'Indian Medical Graduate' to realistically turn out to be an 'International Medical Graduate' capable of catering to the cause and requirement of health care delivery across the boundaries all over the Globe.

I record my appreciation for Dr. Ved Prakash Mishra, Chairman, Academic Committee and his team for venturing into the said much desired exercise and giving it the required shape out of committed painstaking labour. I am sure that this is going to change the 'shape' and 'face' of undergraduate medical education to make it timely relevant, purposive, need based, consequential and impactful.

(Dr. Jayshree Mehta)



**Dr. Vedprakash Mishra**  
**Chairman**  
**Academic Committee**  
**Medical Council of India**

Date : 15.09.2017

## **FOREWORD**

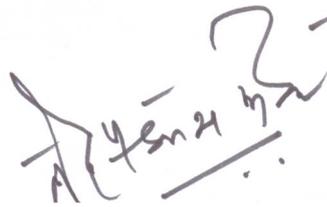
Health Professions and practice is a complex interplay of Knowledge, Clinical Skills & Acumen, Communication, Attitude, Inter- Professional behavior and is largely dependent on strong Ethical values. India, as one of the major stakeholders towards contribution of world's health care, offers a major share of health professionals across the globe. Hence; more so than ever; it needs a curriculum which is better aligned with Health professional attributes that are locally relevant and globally adaptive. This realization; though has struck every health professional of our country; the efforts to effectively deal with the issue was sparsely articulated in its entirety. Teaching and learning of medical ethics, behavioral science, communication skills, and managerial skills have not received due attention in the existing medical curriculum. The proposed AETCOM module is a manifestation of this realization that endeavors to strike a balance between the five identified roles of an 'Indian Medical Graduate (IMG)' viz; Clinician, Leader & Member of health care team, Communicator, Life- long learner and Professional; right from the 1st professional year of training.

The entire concept of AETCOM module lies on the fundamental principle that changing a person's attitude can change his or her behavior. The Cognitive components of attitudes are more fundamental and constant over time and more closely connected to basic values. Behavioural attitudes are manifestations of underlying cognitive and affective attitudes. Ethical dimensions play a crucial role in behavioral evolution and the basic building block of good communication is the feeling that every human being is unique and of value.

There are many new key areas recommended in the AETCOM module that are identified for implementation across the entire duration of the course. It is hoped that

the successful implementation of the AETCOM modules will be forerunner of the transition to competency based undergraduate medical education program envisaged by the Medical Council of India. This booklet and other electronic resources provide background concept, session guidelines and other resources for these sessions that will be useful for all faculty involved in conducting these sessions. These are conceptual frameworks only and Institutions and faculty are at liberty to make modifications while implementing the same at their own settings.

It is genuinely expected that this module plays a vital role in providing a coherent picture of how Attitude, Communication and Bioethics can be integrated within medical curriculum and also inspire medical teachers to make it more meaningful and consequential. The effort is surely a new vista to Medical education making it more comprehensive and relevant to health needs of the society.



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### **FOREWORD**

Medical education today has recognized the need to teach and evaluate professionalism as a formal concept due to increasing concerns about physicians' conflict of interest with patients and relatives and possible loss of licensure. The need of the hour is to train medical professionals in this important area of clinical practice but is often ignored. The diagnostic capability of a doctor is greatly enhanced if the doctor is able to effectively communicate with the patient and his/her relatives decreasing frustration of the doctor and patient or relatives. It has been aptly stated that "Medicine is an art whose magic and creative ability have long been recognized as residing in the interpersonal aspects of patient-physician relationship" (Hall, Roter & Rand, 1981).

Having recognized the pivotal role of effective interpersonal communication between doctor and patient in clinical training and practice, the Medical Council of India has embarked on an ambitious and robust Faculty Development Programme in which medical college teachers are trained to acquire theoretical and practical skills in teaching. The Council has also revised and remodeled the Graduate Medical Education Regulations, 1997 with emphasis on curricular reforms. Teaching curricula in various disciplines would be based on a competency based format with emphasis on domains of attitude, ethics and communication, as envisaged in the AETCOM (Attitude, Ethics and Communication) module.

The AETCOM (Attitude, Ethics and Communication) module was prepared by the Academic Cell of the Council under the inspiring leadership of Dr. Ved Prakash Mishra, Chairman, Academic Committee and ably supported by Dr. M. Rajalakshmi, Academic Cell and the members of the Reconciliation Board headed by Dr. Avinash Supe to guide medical institutions and faculty to acquire the much needed competencies in the attitude, ethics and communication domains. I am extremely grateful to all of them for their painstaking efforts in giving shape to such a well structured document and congratulate them for the same. I am sure effective implementation of the revised Graduate Medical Education Regulations would go a long way in improving the standards of medical education in the country.

**Dr. Reena Nayyar**

**Attitude, Ethics &  
Communication (AETCOM)  
competencies**

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## **PREFACE**

The Medical Council of India has prepared revised Graduate Medical Education Regulations 2017 and competency based UG curricula, accompanied by guidance for its implementation. In response to this, every medical college needs to develop the capacity to adapt to the requirements of the new guidelines. Earlier experience with implementation of curricular changes suggests that a carefully managed, sustainable approach is necessary to ensure that every college has access to these new skills and knowledge. Faculty development has been seen to play a key role in the implementation and sustenance of any curricular reforms.

The Medical Council of India has decided to implement Attitude, Ethics and Communication module (AETCOM) in all medical schools across the country over the next two years. It is against this backdrop that the AETCOM module is prepared along with facilitators guide. This activity has been supported wholeheartedly by the President of Medical Council of India, Dr. Jayshree Mehta and under the inspiring guidance of Dr. Ved Prakash Mishra, Chairman, Academic Committee and whole hearted support of Dr. Reena Nayyar, Secretary-in-charge, Medical Council of India. There are many new key areas recommended in the AETCOM module that were identified for implementation across the entire duration of the course. It is hoped that the successful implementation of the AETCOM module would be the forerunner of the transition to competency based undergraduate medical education program envisaged by the Medical Council of India.

This booklet and other electronic resources provide background concept, session guidelines and other resources for these sessions. These will be useful for all faculty involved in conducting these sessions. These are conceptual frameworks only and institutions and faculty are at liberty to make modifications while implementing the same at their own settings.

It is proposed that the existing network of MCI Nodal and Regional Centers and Medical Education Units of all medical colleges will be the torchbearers of this transformational change. We hope that such a change will significantly impact the quality of community health and patient care in our country.

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**Attitude, Ethics and Communication (AETCOM) Competencies**  
**for the**  
**Indian Medical Graduate**  
**Preamble/Concept**

The overall goal of undergraduate medical education program as envisaged in the revised Graduate Medical Education Regulations - 2017 is to create an “Indian Medical Graduate” (IMG) possessing requisite knowledge, skills, attitudes, values and responsiveness, so that she or he may function appropriately and effectively as a physician of first contact of the community while being globally relevant. In order to fulfill this goal, the IMG must be able to function appropriately, ethically and effectively in her/his roles as clinician, leader and member of the health care team and system, communicator, lifelong learner and as a professional. In order to effectively fulfill the above mentioned roles, the IMG must obtain a set of competencies at the time of graduation. In order to ensure that training is in alignment with the goals and competencies, Medical Council of India has proposed new teaching learning approaches including a structured longitudinal programme on attitude, ethics and communication.

Role modelling and mentoring associated with classical approach to professional apprenticeship has long been a powerful tool. This approach alone is no longer sufficient for the development of a medical professional. The domains of attitude and communications with emphasis on ethics therefore need to be taught directly and explicitly throughout the undergraduate curriculum. The two major aspects of teaching professionalism include explicit teaching of cognitive base and stage appropriate opportunities for experiential learning and reflection throughout the curriculum.

AETCOM module has been prepared as a guide to facilitate institutions and faculty in implementing a longitudinal program that will help students acquire necessary competence in the attitudinal, ethical and communication domains. It offers framework of competencies that students must achieve. It also offers approaches to teaching learning methods. However, it is a suggested format and institutions can develop their own approaches to impart these competencies.

## How to use this document

This document is a guide to facilitate institutions and faculty in implementing a longitudinal program that will help students acquire necessary competence in the attitude, ethics and communication domains. The purpose of this program is to allow the graduate to function in roles envisaged in the revised Graduate Medical Education Regulations, 2017 (GMR 2017). The revised GMR 2017 document creates roles for the graduate that goes beyond the traditional knowledge and skill components. In particular, it adds four roles – leader and member of the health care team, communicator, life-long learner and professional - which call for learning and skills not addressed by the traditional syllabi.

The document is divided into the following:

1. **Section I:** contains an extract of the goals, roles and universal competencies as envisaged in the GMR 2017 document. This is the base document upon which all learning in the undergraduate years must be based and lists the final competencies that all students must achieve.
2. **Section II:** contains suggested teaching modules for each professional year including resources cases and methods to teach.
3. **Section III:** contains a list of additional non-core competencies that form a desirable set of learning.
4. **Section IV:** is a competency log that contains a list of skills that may be acquired prior to graduation. These skills are best imparted in a simulated setting (usually involving standardized patients). They are also best done progressing in complexity over time. For example, a skill on communicating treatment options may be acquired at different levels of complexities spread over phases before finally being certified.
5. **Section V:** contains formative elements that are observable by tutors/mentors/guides and marked over time with appropriate feedback in a non-punitive fashion.
6. **Appendix 1:** consists of the entire set of competencies as approved by the Academic Committee of the Medical Council of India.
7. **Appendix 2:** provides a modified communication skill rating tool adapted from the Kalamazoo consensus.

## Definitions

- 1. Goal:** A projected state of affairs that a person or system plans to achieve.

In other words: Where do you want to go? or What do you want to become?

- 2. Competency:** The habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and community being served.

In other words: What should you have? or What should have changed?

- 3. Objective:** Statement of what a learner should be able to do at the end of a specific learning experience.

In other words: What the Indian Medical Graduate should know, do, or behave.

### Action Verbs used in this document

Knowledge	Skill	Attitude/communicate
Enumerate	Identify	Counsel
List	Demonstrate	Inform
Describe	Perform under supervision	Demonstrate understanding of
Discuss	Perform independently	
Differentiate	Document	
Define	Present	
Classify	Record	
Choose	Interpret	
Elicit		
Report		

### **Note:**

- Specified essential competencies only will be required to be performed independently at the end of the final year MBBS.
- The word 'perform' or 'do' is used ONLY if the task has to be done on patients or in laboratory practicals in the pre/para- clinical phases.
- Most tasks that require performance during undergraduate years will be performed under supervision.
- If a certification to perform independently has been done, then the number of times the task has to be performed under supervision will be indicated in the last column.

**Explanation of terms used in this document**

Lecture	Any instructional large group method including traditional lecture and interactive lecture
Small group discussion	Any instructional method involving small groups of students in an appropriate learning context
DOAP (Demonstration- Observation - Assistance - Performance)	A practical session that allows the student to observe a demonstration, assist the performer, perform in a simulated environment, perform under supervision or perform independently
Skill assessment	A session that assesses the skill of the student including those in the practical laboratory, skills lab, skills station that uses mannequins/ paper case/simulated patients/real patients as the context demands
Core	A competency that is necessary in order to complete the requirements of the subject (traditional must know)
Non-Core	A competency that is optional in order to complete the requirements of the subject (traditional nice (good) to know/ desirable to know)
National Guidelines	Health programs as relevant to the competency that are part of the National Health Program

**Domains of learning**

K	Knowledge
S	Skill
A	Attitude
C	Communication

### Levels of competency

K	Knows	A knowledge attribute - Usually enumerates or describes
KH	Knows how	A higher level of knowledge - is able to discuss or analyse
S	Shows	A skill attribute: is able to identify or demonstrate the steps
SH	Shows how	A skill attribute: is able to interpret/ demonstrate a complex procedure requiring thought, knowledge and behavior
P	Performs (under supervision or independently)	Mastery for the level of competence - When done independently under supervision a pre-specified number of times - certification or capacity to perform independently results

**Note:**

In the table of competency - the highest level of competency acquired is specified and implies that the lower levels have been acquired already. Therefore, when a student is able to SH - Show how - an informed consent is obtained - it is presumed that the preceding steps - the knowledge, the analytical skills, the skill of communicating have all been obtained.

It may also be noted that attainment of the highest level of competency may be obtained through steps spread over several subjects or phases and not necessarily in the subject or the phase in which the competency has been identified.

## Teaching Learning Methods recommended

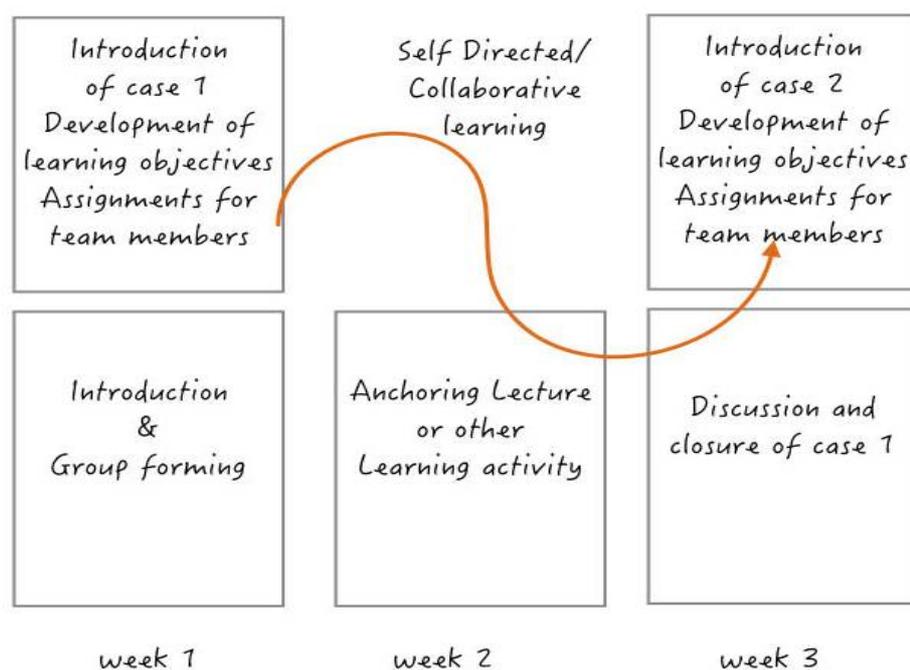
### Guidelines for Case Discussion

A hybrid problem-oriented approach is one of the most effective ways for students to explore the various facets of “real life issues” that will confront them in their careers. In addition to problem solving skills, case discussions promote collaborative learning, team work, reflection and self-directed learning. The cases presented in this booklet represent competencies that lend themselves best to this form of learning.

The figure on the following page explains the suggested format of the hybrid problem-based learning method:

1. Two or more learning sessions are recommended for each session with ample time for self-directed learning and other learning activities between each session.
2. A case is introduced into a small group and the facilitator facilitates a small group discussion where,
  - a. initial reactions of the group to the case is obtained
  - b. the underlying ethical, legal and societal principles of the case are elicited
  - c. learning objectives for the case are developed
  - d. learning tasks are assigned for members of the learning groups
  - e. learning resources are identified
    - The suggested location for such a session is a small group discussion area which requires a small table with seating for 8 - 10 students
    - Suggested duration for such a session is 1 hour
    - A board with chalk or marker is also required
3. Learning occurs in between sessions by the learners through following:
  - Self-directed learning by study of identified learning resources
  - Self-directed learning through study of online learning resources
  - Identification of legal, ethical and social precedents for the given settings
  - Obtaining opinion from seniors in the profession on their impressions on the setting
4. Reinforcement of the fundamental concepts underlying the case can be done through a large group learning session (lecture or equivalent) in between the small group sessions.

5. In the second session, the small group discussion is focussed on closure of the case (or the part of the case) for which learning objectives were identified for in the first session. The facilitators may guide the discussion based on the ethical, legal, societal and communication aspects of the case. The group discusses the case, based on the learning done in between the session and provides suggestions and alternatives on the approach for doctors to follow. It must be reiterated that there may not be one correct way to resolve a case. The approach will be to allow students to reflect, make a choice and defend their choice, based on their values and learning.



*The Hybrid PBL model suggested for ATCOM Cases*

### **Student narrative**

The student narrative is a learning method that focuses on the following skills:

- a. Elicit, observe and record data.
- b. Reflect on the data at a higher level of thinking and derive opinions and conclusions.
- c. Communicate the observations and conclusions in a written and verbal form and expand on and defend the conclusions with colleagues and teachers.
- d. Form new experiences and conclusions based on this discussion.

# Section I

## **Extract from the Graduate Medical Education Regulations, 2017**

1. The undergraduate medical education program is designed with a **goal** to create an “**Indian Medical Graduate**” (IMG) possessing requisite knowledge, skills, attitudes, values and responsiveness, so that he or she may function appropriately and effectively *as a doctor of first contact of the community* while being globally relevant.
2. In order to fulfill this goal, the IMG must be able to function in the following **ROLES** appropriately and effectively:
  - 2.1. **Clinician** who understands and provides preventive, promotive, curative, palliative and holistic care with compassion.
  - 2.2. **Leader and member of the health care team and system** with capabilities to collect, analyze, synthesize and communicate health data appropriately.
  - 2.3. **Communicator** with patients, families, colleagues and community.
  - 2.4. **Lifelong learner** committed to continuous improvement of skills and knowledge.
  - 2.5. **Professional**, who is committed to excellence, is ethical, responsive and accountable to patients, community and profession.

### **Global Attitude, Ethics and Communication Competencies addressed in the roles of an Indian Medical Graduate**

3. **Competencies:** Competency based learning would include designing and implementing medical education curriculum that focuses on the desired and observable ability in real life situations. In order to effectively fulfill the roles as listed in item 2 above, the Indian Medical Graduate would have obtained the following set of competencies at the time of graduation:
  - 3.1. ***Clinician, who understands and provides preventive, promotive, curative, palliative and holistic care with compassion***
    - 3.1.1. Demonstrate knowledge of normal human structure, function and development from a molecular, cellular, biologic, clinical, behavioral and social perspective.
    - 3.1.2. Demonstrate knowledge of abnormal human structure, function and development from a molecular, cellular, biological, clinical, behavioural and social perspective.
    - 3.1.3. Demonstrate knowledge of medico-legal, societal, ethical and humanitarian

principles that influence health care.

- 3.1.4. Demonstrate knowledge of national and regional health care policies including the National Health Mission (NHM), frameworks, economics and systems that influence health promotion, health care delivery, disease prevention, effectiveness, responsiveness, quality and patient safety.
- 3.1.5. Demonstrate ability to elicit and record from the patient, and other relevant sources including relatives and caregivers, a history that is complete and relevant to disease identification, disease prevention and health promotion.
- 3.1.6. Demonstrate ability to elicit and record from the patient, and other relevant sources including relatives and caregivers, a history that is contextual to gender, age, vulnerability, social and economic status, patient preferences, beliefs and values.
- 3.1.7. Demonstrate ability to perform a physical examination that is complete and relevant to disease identification, disease prevention and health promotion.
- 3.1.8. Demonstrate ability to perform a physical examination that is contextual to gender, social and economic status, patient preferences and values.
- 3.1.9. Demonstrate effective clinical problem solving, judgment and ability to interpret and integrate available data in order to address patient problems, generate differential diagnoses and develop individualized management plans that include preventive, promotive and therapeutic goals.
- 3.1.10. Maintain accurate, clear and appropriate records of the patient in conformation with legal and administrative frameworks.
- 3.1.11. Demonstrate ability to choose the appropriate diagnostic tests and interpret these tests based on scientific validity, cost effectiveness and clinical context.
- 3.1.12. Demonstrate ability to prescribe and safely administer appropriate therapies including nutritional interventions, pharmacotherapy and interventions based on the principles of rational drug therapy, scientific validity, evidence and cost that conform to established national and regional health programs and policies for the following:
  - a. Disease prevention,
  - b. Health promotion and cure,
  - c. Pain and distress alleviation, and
  - d. Rehabilitation and palliation.

- 3.1.13 Demonstrate ability to provide a continuum of care at the primary and/or secondary level that addresses chronicity, mental and physical disability.
- 3.1.14 Demonstrate ability to appropriately identify and refer patients who may require specialized or advanced tertiary care.
- 3.1.15 Demonstrate familiarity with basic, clinical and translational research as it applies to the care of the patient.

**3.2. *Leader and member of the health care team and system***

- 3.2.1 Work effectively and appropriately with colleagues in an inter-professional health care team respecting diversity of roles, responsibilities and competencies of other professionals.
- 3.2.2 Recognize and function effectively, responsibly and appropriately as a health care team leader in primary and secondary health care settings.
- 3.2.3 Educate and motivate other members of the team and work in a collaborative and collegial fashion that will help maximize the health care delivery potential of the team.
- 3.2.4 Access and utilize components of the health care system and health delivery in a manner that is appropriate, cost effective, fair and in compliance with the national health care priorities and policies, as well as be able to collect, analyze and utilize health data.
- 3.2.5 Participate appropriately and effectively in measures that will advance quality of health care and patient safety within the health care system
- 3.2.6 Recognise and advocate health promotion, disease prevention and health care quality improvement through prevention and early recognition: in a) life style diseases, and b) cancer in collaboration with other members of the health care team.

**3.3. *Communicator with patients, families, colleagues and community***

- 3.3.1 Demonstrate ability to communicate adequately, sensitively, effectively and respectfully with patients in a language that the patient understands and in a manner that will improve patient satisfaction and health care outcomes.
- 3.3.2 Demonstrate ability to establish professional relationships with patients and families that are positive, understanding, humane, ethical, empathetic, and

trustworthy.

3.3.3 Demonstrate ability to communicate with patients in a manner respectful of patient's preferences, values, prior experience, beliefs, confidentiality and privacy.

3.3.4 Demonstrate ability to communicate with patients, colleagues and families in a manner that encourages participation and shared decision-making.

**3.4. *Lifelong learner committed to continuous improvement of skills and knowledge***

3.4.1 Demonstrate ability to perform an objective self-assessment of knowledge and skills, continue learning, refine existing skills and acquire new skills.

3.4.2 Demonstrate ability to apply newly gained knowledge or skills to the care of the patient.

3.4.3 Demonstrate ability to introspect and utilize experiences, to enhance personal and professional growth and learning.

3.4.4 Demonstrate ability to search (including through electronic means), and critically evaluate the medical literature and apply the information in the care of the patient.

3.4.5 Be able to identify and select an appropriate career pathway that is professionally rewarding and personally fulfilling.

**3.5. *Professional who is committed to excellence, is ethical, responsive and accountable to patients, community and the profession***

3.5.1 Practice selflessness, integrity, responsibility, accountability and respect.

3.5.2 Respect and maintain professional boundaries between patients, colleagues and society.

3.5.3 Demonstrate ability to recognize and manage ethical and professional conflicts.

3.5.4 Abide by prescribed ethical and legal codes of conduct and practice.

3.5.5 Demonstrate a commitment to the growth of the medical profession as a whole.

## **Assessment of skills related to Attitude, Ethics and Communication**

Assessment is a vital component of competency based education. In addition to making the pass/fail decisions, a very important role of assessment is to provide feedback to the learner and help him/her to improve learning. The assessment in AETCOM module has been designed with this purpose. The teachers should use this opportunity to observe the performance and provide feedback based on their observations. In case a student has demonstrated a performance, which is considered below expectation, corrective action including counseling should be initiated. Many of the tools in this module may appear subjective but coupled with the experience of the assessor, they will serve a very useful purpose.

## **Section II**

## **Learning modules for Professional year I**

**Number of modules: 5**

**Number of hours: 34**

## Module 1.1: What does it mean to be a doctor?

### Background

It is important for new entrants to get a holistic view of their profession, its ups and downs, its responsibilities and its privileges. It is important to start this discussion early in their careers when their minds are still fresh with the thrill of joining medical school. Such a discussion will help them remember the big picture through the program and remind them why they have chosen to be doctors.

### Competencies addressed

The student should be able to:	Level
1. Enumerate and describe professional qualities and roles of a physician	KH
2. Describe and discuss the commitment to lifelong learning as an important part of physician growth	KH
3. Describe and discuss the role of a physician in health care system	KH
4. Identify and discuss physician's role and responsibility to society and the community that she/ he serves	KH

### Learning Experience

**Year of study:** Professional year 1

**Hours:** 8 (6 hours + 2 hours self-directed learning)

- i. Exploratory session- 1 hour
  - ii. Facilitated panel discussion – 2 hours
  - iii. Self-directed learning - 2 hours
  - iv. Introductory visit to the hospital – 2 hours
  - v. Discussion and closure of case - 1 hour
1. An exploratory session with the students to find out (a) why they chose to become doctors, (b) what do they think are the privileges and the responsibilities of the profession, (c) what do they expect from society and what do they think society expects from them, and (d) what will they have to do and give up in order to meet their own and society's expectations. This is preferably done in a small group discussion.

## AETCOM competencies for IMG

2. A facilitated panel discussion involving doctors who are at different stages of their careers (senior, midlevel, young) during which these doctors share their experiences and also answer questions from the students.
3. Self-directed learning where students write a report from reflections based on sessions 1 & 2 and on other reading materials, TV series, movies etc. that they have chosen from the lay press about doctors' experiences.
4. Introductory visit to the hospital / community medical centres
5. A closure session with students to share their reflections based on 1, 2, 3 and 4 that includes their plans for the next 5 years in order to fulfill their professional and personal roles as doctors.
6. A coat ceremony in the Foundation Course may be considered. A white coat ceremony is held in many institutions, as a symbolic transition of the medical student prior to their first day of exposure to clinical teaching, in order to emphasize the importance of their new role as budding doctors.

### **Assessment**

1. **Formative:** not required
2. **Summative:** not required

### **Resources**

1. Whitcomb ME. What does it mean to be a physician? Acad Med.2007; 82: 917-8.
2. Eisenberg C. It is still a privilege to be a doctor? N Engl J Med 1986; 314:1113-1114.
3. Ofri D. Neuron overload and the juggling doctor. The Lancet 2010; 376: 1820 – 21.

## Module 1.2: What does it mean to be a patient?

### Background

Doctors deal with human suffering throughout their professional careers. A balanced approach to the patient care experience requires an understanding of patients, illnesses, their concepts of suffering, coping mechanisms, the role of the doctor, an exploration of empathy vs equanimity and the difference between healing and curing. An introduction to this fundamental but complex field is important in the first Professional year. An introductory experience will allow students to keep the patient experience in perspective during their learning.

### Competencies addressed

The student should be able to:	Level
1.Enumerate and describe professional qualities and roles of a physician	KH
2. Demonstrate empathy in patient encounters	SH

### Learning Experience

**Year of study:** Professional year 1

**Hours:** 8 (6 hours + 2 hours self-directed learning)

- i. Exploratory session - 2 hours
  - ii. Hospital visit - 2 hours
  - iii. Self-directed learning - 2 hours
  - iv. Discussion and closure of case - 2 hours
1. An exploratory session with the students enquiring from them about their views on health, disease and suffering. Discussion could involve their personal ill health or involving someone they know among their families and friends. How did that experience affect them? What do they believe patients feel and go through? How does it affect patient's behaviour, outlook and expectations?
  2. Students are assigned to patients in the hospital, interview them about their experiences, reactions, emotions, outlook and expectations.
  3. Self-directed learning where students write a report from reflections based on sessions 1 & 2 and on other readings, TV series movies etc.
  4. A closure session with students to share their reflections based on 1, 2 and 3.

**Assessment**

1. **Formative:** The student may be assessed based on their active participation and presentation (written and oral).
2. **Summative:** SAQ

## Module 1.3: The doctor-patient relationship

### Background

The doctor-patient relationship is the cornerstone to effective patient care. This session builds on the previous two sessions which address doctors and patients and attempts to explore the fundamental basis of the doctor-patient contract, its rules, boundaries and duties. It provides an introduction to the nature of relationship, importance of communication, honesty, transparency, shared responsibility, equality and vulnerability. This introductory session, though complex, will provide an overview for the student to provide them with a perspective on the doctor-patient relationship throughout their years of study.

### Competencies addressed

<b>The student should be able to:</b>	<b>Level</b>
1.Enumerate and describe professional qualities and roles of a physician	KH
2. Demonstrate empathy in patient encounters	SH

### Learning Experience

**Year of study:** Professional year 1

**Hours:** 7 hours (5 hours + 2 hours of self-directed learning)

- i. Large group session- 1 hour
  - ii. Self-directed learning - 2 hours
  - iii. Interactive discussions – 2 hours
  - iv. Discussion and closure – 2 hours
1. Anchoring a large group session emphasising the fundamentals of the doctor- patient relationship (1 hour).
  2. Self-directed/Guided learning by students on the doctor-patient relationship that includes learning from resources, lay press, media and movies (2 hours).
  3. An interactive discussion in a small group, based on session 1, with illustrative cases. Examples of cases that can be used are provided in the resources section (2 hours) (or) a patient-doctor encounter observation with checklist may be used.
  4. A closure session with reflection by the students, based on items 1, 2 and 3.

### **Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions. A written critique of the situations discussed in item 2 may be used for formative assessment.
2. **Summative:** Short questions for example a) rights of patients, b) responsibilities of patients, c) duties of doctors, and d) boundaries of the doctor-patient relationship.

### **Resources**

1. <http://www.cpsso.on.ca/policies-publications/the-practice-guide-medical-professionalism-and-col/principles-of-practice-and-duties-of-physicians>

#### **Case for discussion 1:**

A 53 year old man is seen by a cardiologist for chest pain lasting for a few minutes on accustomed exercise for the past 3 weeks. After a detailed history and physical examination, the doctor orders an ECG which was normal. He further orders an exercise stress test which showed reversible ischemia. The doctor orders an angiogram. At the time, the patient requests that he would like to have a second opinion. The cardiologist explains that he has done everything correctly and that the patient indeed requires an angiogram. The patient tells him that he cannot make a decision unless he talks to his family doctor of 20 years. The cardiologist is offended and tells the patient that he does not wish to see the patient any longer.

#### **Points for discussion:**

1. Trust in the doctor-patient relationship.
2. Rights of a patient, Duties of a doctor.
3. Does the request for a second opinion provide sufficient grounds to terminate the doctor-patient relationship?

#### **Case for discussion 2:**

A young doctor has been taking care of an 86 year old woman for the past 2 years. She had a fall 2 years ago and has been mostly bed ridden. She lives alone with just a care taker and her children are abroad. She requires preventive care mostly and the doctor makes house visits once a week. The doctor spends time talking to her during each

visit and makes her feel comfortable. One day during such a visit, the patient expresses the view that her children have been ungrateful to her and that she intends to call her lawyer today and divide her assets between the doctor and the caretaker after her death. What should the doctor do?

**Points for discussion:**

1. Boundaries in the doctor-patient relationship.
2. Trust and vulnerability in doctor-patient relationship.

**Resources:**

1. AMA Code of Medical Ethics: <https://www.ama-assn.org/delivering-care/ama-code-medical-ethics> (for case 1)
2. <https://www.dovepress.com/getfile.php?fileID=1351> (for case 2)

## Module 1.4: The foundations of communication - 1

### Background

Communication is a fundamental prerequisite in the medical profession and bedside clinical skills is crucial in ensuring professional success for doctors. This module provides students with an introduction to doctor-patient communication. The Kalamazoo consensus statement<sup>1</sup> provides a working model of teaching communication skills and may be used to impart communication skills. The five ‘A’s elements of behaviour change model may also be used. Effective listening, verbal and nonverbal communication and creating respect in patient encounters would be the skills that would be introduced.

### Competency addressed

The student should be able to:	Level
Demonstrate ability to communicate to patients in a patient, respectful, non-threatening, non- judgmental and empathetic manner	SH

### Learning Experience

**Year of study:** Professional Year 1

**Hours:** 7 hours (5 hours + 2 hours self-directed learning)

- i. Large group session- 2 hours
- ii. Self-directed learning - 2 hours
- iii. Small group discussions – 2 hours
- iv. Discussion and closure – 1 hour

#### Contents:

This module includes 3 interdependent learning sessions:

1. Introductory large group sessions on the principles of communication.
2. Self-directed/Guided learning by students on the importance and techniques of effective communication.
3. Small group sessions on improving communication. These sessions can include either videos or role play highlighting common mistakes in patient - doctor communication and allowing students to identify these mistakes and discussing on how to correct them. Situations that can be used include: a) a noisy ambience with a distracted doctor

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who is multitasking, b) lack of eye contact, c) doctor who keeps on interrupting patients and not listening, d) doctor who talks down to patients etc.

4. Closure session with reflection by students in a small group based on sessions 1, 2 and 3 and with emphasis on learning done and future directions.

### **Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions. A written critique of the situations discussed in item 3 may be used for formative assessment.
2. **Summative:** may be deferred for later phases.

### **Resource:**

1. Makoul G. Essential elements of communication in medical encounters: the Kalamazoo consensus statement. Acad Med. 2001; Apr; 76(4): 390-3.

## Module 1.5: The cadaver as our first teacher

### Background

Medical students enter college and their first and lasting encounter is with the cadaver. Respect for cadaver as a teacher translates later into respect for human beings as teachers and a lifelong respect for learning. Throughout the world the emphasis on “humanizing” the cadaver with respect as first patient or first teacher has gained momentum.

### Competency addressed

The student should be able to:	Level
Demonstrate respect and follows the correct procedure when handling cadavers and other biologic tissues	SH

### Learning Experience

**Year of study:** Beginning and end of Professional year 1

**Hours:** 4 (2+2) hours

- i. Opening session- 2 hours
- ii. Closing session - 2 hours

#### Contents:

1. An initial introductory session (large or small group) should be on the importance of biologic tissues and cadavers in their learning. The discussion should focus on the fact that some of these cadavers were unclaimed but also many of them are an anatomic gift by families; respect for donor families, cadavers and tissues is important and must be respected. The session should include safe and clean handling and disposal of biologic tissues (2 hours).
2. A session at the end of phase is a small group or large group discussion with reflective presentations by students on how the cadaver helped them to learn, their experience with dissection etc. These sessions should allow the students to display their creativity and may include prose, poetry, sketches etc. An example of such a project is found in the resources section (2 hours).

**Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions. The respect and the manner in which students handle biologic tissues throughout the phase may be part of the overall formative assessment of the student.
2. **Summative:** may not be required.

**Resource:** <http://medicine.yale.edu/education/donation/reflections/> (An example of the project is found here).

## **Learning modules for Professional Year II**

**Number of modules: 8**

**Number of hours: 37**

## Module 2.1: The foundations of communication - 2

### Background

Communication is a fundamental prerequisite of the medical profession and bedside skills is crucial in ensuring professional success for doctors. This module continues to provide an emphasis on effective communication skills. During professional year II, the emphasis is on active listening and data gathering.

### Competency addressed

The student should be able to:	Level
Demonstrate ability to communicate to patients in a patient, respectful, non-threatening, non-judgmental and empathetic manner	SH

### Learning Experience:

**Year of study:** Professional year 2

**Hours:** 5 (1 + 2 +1+1)

- i. Introductory small group session - 1 hour
- ii. Focused small group session - 2 hours
- iii. Skills lab session – 1 hour
- iv. Discussion and closure – 1 hour

### Contents:

This module includes 2 interdependent learning sessions:

1. Introductory small group session on the principles of communication with focus on opening the discussion, listening and gathering data.
2. Focused small group session with role play or videos where the students have an opportunity to observe, criticise and discuss common mistakes in opening the discussion, listening and data gathering.
3. Skills lab sessions where students can perform tasks on standardised or regular patients with opportunity for self critique, critique by patient and by the facilitator.

**Assessment**

1. **Formative:** Participation in session 2 and performance in session 3 may be used as part of formative assessment.
2. **Summative:** may be deferred.

**Resources:**

1. Makoul G. Essential elements of communication in medical encounters: the Kalamazoo consensus statement. *Acad Med.* 2001; Apr; 76(4): 390-3.
2. Hausberg M. Enhancing medical students' communication skills: development and evaluation of an undergraduate training program. *BMC Medical Education* 2012; 12:16.

## Module 2.2 The foundations of bioethics

### Background

An introductory session in a large group that provides an overview of the evolution and the fundamental principles of bioethics including the cardinal pillars of ethics viz., autonomy, beneficence, non-maleficence and justice.

### Competencies addressed

The student should be able to:	Level
1. Describe and discuss the role of non-maleficence as a guiding principle in patient care	KH
2. Describe and discuss the role of autonomy and shared responsibility as a guiding principle in patient care	KH
3. Describe and discuss the role of beneficence of a guiding principle in patient care	KH
4. Describe and discuss the role of a physician in health care system	KH
5. Describe and discuss the role of justice as a guiding principle in patient care	KH

### Learning Experience

**Year of study:** Professional year 2

**Hours:** 2 large group session - 2 hours

**Contents:**

This module is a large group learning session that can be made interactive by illustrative examples.

### Assessment

**Summative:** Short notes on a) Autonomy b) Beneficence c) Non-maleficence

### Resource:

A review of the four principles of bioethics is found here: <http://archive.journalchirohumanities.com/Vol%2014/JChiroprHumanit 2007 v14 34-40.pdf>

## Module 2.3: Health care as a right

### Background

This session is aimed at introducing students to health care systems, their access, equity in access, the impact of socio-economic situations in determining health care access and the role of doctors as key players in the health care system.

### Competency addressed

The student should be able to:	Level
Describe and discuss the role of justice as a guiding principle in patient care	KH

### Learning Experience

**Year of study:** Professional year 2

**Hours:** 2

- i. Participatory student seminar - 2 hours

#### Contents:

This module may be done as a participatory student seminar with debates on the more controversial issues to increase a reflective process.

Focus may be on:

1. Is health care a right?
2. What are the implications of health care as a right?
3. What are the social and economic implications of health care as a right?
4. What are the missing links? (see resource 2 for a brief overview) and
5. What are the implications for doctors?

### Assessment

**Summative:** Short note on barriers to implementation of health care as a universal right.

### Resources

1. The Universal Declaration of Human Rights. <http://www.un.org/en/documents/udhr/>
2. Missing links in universal health care. <http://www.thehindu.com/opinion/lead/missing-links-in-universal-health-care/article6618667.ece>

## Module 2.4: Working in a health care team

### Background

This session is aimed at introducing students to health care systems and their functioning. It allows students to “tag along” with members of health care teams, observe their work and gain experience about their perspectives. It is hoped that this experience will help students to understand the need for collaborative work in health care, how each member of the health care team is important and also develop respect.

### Competencies addressed

The student should be able to:	Level
1. Demonstrate ability to work in a team of peers and superiors	SH
2. Demonstrate respect in relationship with patients, fellow team members, superiors and other health care workers	SH

### Learning Experience

**Year of study:** Professional year 2

**Hours:** 6 hours (4 hours “tag along” + 2 hours discussion)

- i. “Tag along” session in hospital- 2 x 2 hours
- ii. Small group discussion session - 2 hours

### Contents:

This module may be done as two interdependent sessions:

1. A “tag along” session where students spend time with other health care workers including nurses, technicians and others, observe their work, their interactions, conduct a small interview with them and write a narrative based on this interview.
2. A small group discussion which is based on the students’ observations, experiences, reflections and inferences and what must be done by them to work as an integral part of the health care team.

### Assessment

**Formative:** Student participation in session 2 with assessment of submitted narrative.

## Module 2.5: Bioethics continued – Case studies on patient autonomy and decision making

### Background

The important parts of ethical care of the patient are best learnt in a hybrid problem-based format with additional lectures and other sessions that allow students to learn collaboratively with different learning styles. A guide for case discussion is provided in the resources section of this module and may be used as a guide for other modules. The key element is that students remain in the same group with the same facilitator since groups mature in their learning over time.

### Competency addressed

The student should be able to:	Level
Identify, discuss and defend medico-legal, socio-cultural and ethical issues as it pertains to patient autonomy, patient rights and shared responsibility in health care	KH

### Learning Experience

**Year of study:** Professional year 2

**Hours:** 6

- i. Introduction and group formation - 1 hour
- ii. Case introduction - 1 hour
- iii. Self-directed learning - 2 hours
- iv. Anchoring lecture - 1 hour
- v. Case Resolution - 1 hour

#### **Case: The Cover Up**

You evaluate Mrs. Lakshmi Srinivasan who is a 48 year old woman presenting with lymphadenopathy. She had been complaining of mild fever and weight loss for the past 4 -5 months. Examination of the neck shows large rubbery lymph nodes that are present also in the axilla and the groin. There is a palpable spleen. She is accompanied by her caring husband.

Lakshmi undergoes a lymph node biopsy and the pathologist calls you and tells you that she has a lymphoma. That evening Mr. Srinivasan comes in first into your office and leaves the report on your table. As you read the description you realise that the final diagnosis has been altered to Tuberculosis by whitening out the pathologist's report. When you look up he tells you –“Sir, I googled lymphoma - it is almost like a cancer. My wife can't handle that diagnosis. She has always been a worried frightened person. I want you to tell my wife that she had TB. She is waiting outside, doctor. I thought I will call her in after I had a chat about this with you”.

**Points for discussion:**

1. Does the patient have a right to know their diagnosis?
2. What should the patient be told about their diagnosis, therapy and prognosis?
3. How much should be told to a patient about their illness?
4. Are there exceptions to full disclosure? Can family members request withholding of information from patient?

**Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions.
2. **Summative:** Short questions on: 1) Define patient autonomy, 2) Contrast autonomy and paternalism, 3) What are the responsibilities of patients and doctors in shared decision making? 4) What is full and reasonable disclosure?

The suggested location, duration and requirements are as in item 2.

Once the case (or part of the case) is resolved, the next case (or the next part of the case) is introduced.

## Module 2.6: Bioethics continued: Case studies on autonomy and decision making

### Background

This introduces the student to further issues in autonomy including competence and capacity to make decisions (also see module 2.5).

### Competency addressed

The student should be able to:	Level
Identify, discuss and defend medico-legal, socio-cultural and ethical issues as they pertain to refusal of care including do not resuscitate and withdrawal of life support	KH

### Learning Experience

**Year of study:** Professional year 2

**Hours:** 5

- i. Introduction of case - 1 hour
- ii. Self-directed learning - 2 hours
- iii. Anchoring lecture - 1 hour
- iv. Discussion and closure of case - 1 hour

#### Case: Life on a machine

You are taking care of 78-year-old Mrs. Mythili who was living all alone in an apartment with only a live-in caretaker, 3 streets away from your clinic. She is a widow and her only son emigrated to the US 32 years ago. He visits her once a year. One year ago, she had a fall with a hip fracture that healed badly. She has hypertension which is reasonably controlled on medications. She continues to come to your clinic once a month. Four months ago, she spent some time talking about her sister who recently died following metastatic breast cancer. “My sister suffered a lot, Doctor - they put a tube down her throat to breathe. Even when her heart stopped they kept thumping her chest - it was awful. If I ever fall sick I don't want to go through all this. Promise me, doctor, that you won't do all of this to me. I have lived all alone since my husband died but I have lived independently - now I don't want to depend on a machine to live”. You had reassured her that she would be ok and this was just the recent death of her sister affecting her. On subsequent visits she would still bring up this issue and

state that there was no use of her living as a burden to anyone and that no one should endure what her sister had undergone.

One day you get a call from the Emergency Room of the local hospital stating that Mrs. Mythili has been admitted by the caretaker. She had developed fever and shortness of breath. She was brought hypoxic to the emergency room and they had intubated her. Chest X ray revealed a large pneumonic patch. Laboratory testing revealed hyponatremia.

When you visited her she is somewhat drowsy, intubated and restrained. The nurse tells you that she is sometimes lucid; at other times not even able to recognise her son who was there since this morning. She points out at the ET and makes a pleading gesture to remove it. Her son accosts you in the hallway. He tells you that he got a call while he was traveling in Singapore and took the first flight out to be with his mom. He was very distressed at his mother's health and that he wants "everything" possible done for her. You ask him if she had ever indicated what she wanted to be done if she were to require hospitalization and intubation - he says that he used to speak to her every month on the phone and she was always cheerful and enquiring about her grandchildren but did not talk about her health.

**Points for discussion:**

1. Extent of patient autonomy.
2. Elements in decision making: Competency vs Capacity.
3. Surrogacy in decision making.
4. Autonomy vs beneficence.
5. How much does family wishes count?
6. Legal, ethical and social aspects of 'Do not resuscitate'.

**Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions.
2. **Summative:** Short questions on:
  - a) What determines decision making capacity and competency.
  - b) Who has the right to make decisions for a patient who cannot determine for himself.

**Resources:** See Module 2.5

## Module 2.7: Bioethics continued: Case studies on autonomy and decision making

### Background

This introduces the student to further issues in autonomy including informed consent and refusal (also see module 2.5).

### Competency addressed

The student should be able to:	Level
Identify, discuss and defend, medico-legal, socio-cultural and ethical issues as they pertain to consent for surgical procedures	KH

### Learning Experience

**Year of study:** Professional year 2

**Hours:** 5

- i. Introduction of case - 1 hour
- ii. Self-directed learning - 2 hours
- iii. Anchoring lecture - 1 hour
- iv. Discussion and closure of case - 1 hour

#### Case: Who is the doctor?

A 54 year old man named Mr. Surendra Patel is admitted for acute chest pain in a medical centre. His father had died of a myocardial infarction at the age of 60. Two years ago, his brother had been admitted to a hospital with a myocardial infarction and had died after complications following an angioplasty. Mr. Patel is a diabetic and is on multiple oral hypoglycemic agents with moderate control. He is a businessman with his own small industry. After initial stabilization, the patient is comfortable and pain-free after analgesics, nitrates and statins. Preliminary blood tests and ECG confirm an acute coronary event. The next morning, the senior cardiologist makes rounds and reviews the patient. “You have unstable angina, Mr. Patel and require an angiogram. You may also require either a stent or coronary bypass after the procedure. The nurse will provide you with the necessary paperwork. Please sign it and I will plan the procedure for 4.35 AM tomorrow morning.”. “Doctor sahib”, asked Mr. Patel, “I am not comfortable with the idea of an angiogram; my brother died on the table when an angioplasty was being done. Aren’t there other tests that

you can do? I am not happy with this option”. “Your brother would have had it with someone else, Mr. Patel - I have the best hands in town; nothing will happen when I do it” retorted the cardiologist. “But aren’t there any other options to see what I have? Is this the only test? I have read somewhere that you can do a CT angiogram”, persisted Mr. Patel. “Are you the doctor or am I the doctor?” retorted the cardiologist angrily. “If you are ready to do as I say, sign the papers and I will see you in the Cath lab tomorrow. Otherwise you are free to get discharged”. He stomped out.

**Points for discussion:**

1. Extent of patient autonomy.
2. Informed consent and informed refusal.
3. Conflict between autonomy and beneficence.
4. What should the patient be told about a procedure?
5. What must the informed consent include?

**Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions.
2. **Summative:** Short questions on 1) What is informed consent? 2) What is informed refusal?

**Resources**

See module 2.5

## Module 2.8: What does it mean to be family member of a sick patient?

### Background

Doctors deal with human suffering throughout their professional careers. A balanced approach to the patient care experience requires an understanding of support systems of patients, priorities coping and emotions of families, the role of the doctor, an exploration of empathy vs equanimity and the difference between healing and curing and support.

### Competency addressed

The student should be able to:	Level
Demonstrate empathy in patient encounters	SH

### Learning Experience

**Year of study:** Professional year 2

**Hours:** 6 (includes 2 hours of SDL)

- i. Hospital visit & interviews - 2 hours
  - ii. Large Group Discussions with patients' relatives - 1 hour
  - iii. Self-directed Learning - 2 hours
  - iv. Discussion and closure - 1 hour
1. Students are assigned to patients in the hospital, interview their family about their illnesses, experience, reactions, emotions, outlook and expectations (or can be done in a controlled environment with standardised patients).
  2. Family members of patients with different illnesses may be brought to a large group discussion with permission and an interactive discussion (based on the items outlined in option A. Can use standardised patients)
  3. Self-directed learning where students write a report from reflection based on sessions 1 & 2 and on other readings, TV series, movies etc.
  4. A closure session with students to share their reflections based on 1, 2 and 3 so that it includes how they intend to incorporate the lessons learnt in patient care.

**Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions and submission of the written narrative.
2. **Summative:** Short questions on the role of doctors in the community and expectations of society form doctors.  
e.g. 1. What is empathy? What is the role of empathy in the care of patients?

## **Learning modules for Professional Year III**

**Number of modules: 5**

**Number of hours: 25**

## Module 3.1: The foundations of communication - 3

### Background

Communication is a fundamental prerequisite of the medical profession and bedside skills is crucial in ensuring professional success for doctors. This module builds on the listening skills developed in professional year II. The Kalamazoo consensus statement provides a working model of teaching communication skills and may be used to impart communication skills. Skills, that will be introduced, should include “dealing with emotion”.

### Competency addressed

The student should be able to:	Level
Demonstrate ability to communicate to patients in a patient, respectful, non-threatening, non-judgmental and empathetic manner	SH

### Learning Experience

**Year of study:** Professional year 3

**Hours:** 5 (1 + 2 +2)

- i. Introductory small group session - 1 hour
- ii. Focused small group session - 2 hours
- iii. Skills Lab session - 2 hour

#### Contents:

1. Introductory small group session on the principles of communication with focus on dealing with emotions.
2. Focused small group session with role play or video where students have an opportunity to observe, critique and discuss common mistakes when dealing with emotion.
3. Skills lab sessions where students can perform tasks on standardised or regular patients with opportunity for self critique, critique by patient and by facilitator.

### Assessment

1. **Formative:** Participation in session 2 and performance in session 3 may be used as part of formative assessment.

2. **Summative:** may be deferred.

### **Resources**

1. Makoul G. Essential elements of communication in medical encounters: the Kalamazoo consensus statement. *Acad Med.* 2001; Apr; 76(4): 390-3.
2. Hausberg M. Enhancing medical students' communication skills: development and evaluation of an undergraduate training program. *BMC Medical Education* 2012; 12:16.

## Module 3.2: Case studies in bioethics - Disclosure of medical errors

### Background

This introduces the student to further issues in autonomy including full disclosure of mistakes (also see module 2.5).

### Competency addressed

The student should be able to:	Level
Demonstrate an understanding of the implications and the appropriate procedure and response to be followed in the event of medical errors	SH

### Learning Experience

**Year of study:** Professional year - 3

**Hours:** 5

- i. Introduction of case – 1 hour
- ii. Self-directed learning – 2 hours
- iii. Anchoring lecture – 1 hour
- iv. Discussion and closure of case – 1 hour

#### **Case: Seeking immunity**

It was a busy clinic day and getting worse. Patients were getting impatient. Time was marching and details were becoming a casualty. Five year old Madhumita comes in with her mother. She has asthma and is under your care. You examine her and adjust your prescriptions and start your good byes. At that time, her mother reminds you that she is due for her booster shots. Oh that, you frown - and tell her to wait for a few minutes and that you will have the nurse load the injection and come to the adjoining room and give the injection. You ask the nurse to load the injection and keep it for you over the intercom.

You continue to see patients. After a couple of patients, the mother knocks indicating that she is getting late. You get up and go to the next room. The nurse is not there but you find a loaded syringe. You quickly administer the injection to the child and get back to seeing patients.

A few minutes later, the nurse calls back saying that she has loaded Madhumita's injections. You drop everything and go into the injection room and confront the nurse "But doctor that was gentamicin I had loaded for Mrs. Asif" she says.

**Points for discussion:**

1. Medical errors in clinical care.
2. The correct approach to disclosure of medical errors.
3. Consequence of failure to disclosure of medical errors including medico-legal, social and loss of trust.

**Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions including role play on disclosure of errors.
2. **Summative:** Short questions on 1) What is the ethical standard in dealing with medical errors?

## Module 3.3: The foundations of communication - 4

### Background

Communication is a fundamental prerequisite of the medical profession and bedside skills is crucial in ensuring professional success for doctors. This module continues to provide an emphasis on effective communication skills. The emphasis is on administering informed consent during professional year III.

### Competencies addressed

<b>The student should be able to:</b>	<b>Level</b>
1. Demonstrate ability to communicate to patients in a patient, respectful, non-threatening, non-judgmental and empathetic manner	SH
2. Identify, discuss and defend, medico-legal, socio-cultural and ethical issues as they pertain to consent for surgical procedures	KH
3. Administer informed consent and appropriately address patient queries to a patient undergoing a surgical procedure in a simulated environment	SH

### Learning Experience

**Year of study:** Professional year 3

**Hours:** 5 (1 + 2 +2)

- i. Introductory small group session - 1 hour
- ii. Focused small group session - 2 hours
- iii. Skills Lab session - 2 hour

#### **Contents:**

1. Introductory small group session on the principles of communication with focus on administering informed consent.
2. Focused small group session with role play or video where students have an opportunity to observe, criticise and discuss common mistakes in administering informed consent.
3. Skills lab sessions where students can perform tasks on standardised or regular patients with opportunity for self critique, critique by patient and by facilitator.

### **Assessment**

1. **Formative:** Participation in session 2 and performance in session 3 may be used as part of formative assessment.
2. **Summative:** A skill station in which the student may administer informed consent to a standardized patient.

### **Resources**

1. Makoul G. Essential elements of communication in medical encounters: the Kalamazoo consensus statement. *Acad Med.* 2001; Apr; 76(4): 390-3.
2. Hausberg M. Enhancing medical students' communication skills: development and evaluation of an undergraduate training program. *BMC Medical Education* 2012; 12:16.

## Module 3.4: Case studies in bioethics - Confidentiality

### Background

This introduces the student to confidentiality and its limits (also see module 2.5).

### Competency addressed

The student should be able to:	Level
Identify, discuss and defend medico-legal, socio-cultural and ethical issues as it pertains to confidentiality in patient care	KH

### Learning Experience

**Year of study:** Professional year 3

**Hours:** 5

- i. Introduction of case – 1 hour
- ii. Self-directed learning – 2 hours
- iii. Anchoring lecture – 1 hour
- iv. Discussion and closure of case – 1 hour

#### **Case: Do not tell my wife**

Ramratan was in tears. “How is it possible doctor? We are expecting our son soon. He will not have a father”. Ramratan had seen you with vague aches, fever, weight loss and cough with expectoration not responsive to antibiotics for the past three months. He had a right mid zone lung shadow on X-ray and the sputum was positive for AFB. On being questioned, he had revealed that he had unprotected sexual intercourse with multiple partners 3 years ago. “But I stopped after I married Danno, doctor - I am faithful to her”. An informed consent was obtained and HIV screening test was ordered and it was positive. A confirmatory test was subsequently obtained and it was also positive. The CDC count was < 100. Ramratan had come to discuss the results of his HIV test. After consoling him and writing out prescriptions for TB and HIV, you mention to him that he must bring his wife for testing. “This is important, Ramratan”, you add - “especially since she is pregnant.”

“Absolutely not, sir!” he explosively retorts. “That is not possible. I will be humiliated. Danno will leave me and go. I will never be able to see my son. I will become

an outcast in our community. I can't live without my wife, doctor. I urge you, doctor - don't do this. I forbid you..."

**Points for discussion:**

1. The primacy of confidentiality in patient care.
2. What does confidentiality entail?
3. When can confidence be breached with whom and how?
4. Confidentiality and diseases that may engender patients and society.

**Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions.
2. **Summative:** Short questions on 1) What are the instances in which confidentiality of patient information may be breached?

## Module 3.5: Case studies in bioethics - Fiduciary duty

### Background

This module discusses doctor's duty including fiduciary duty (also see module 2.5)

### Competencies addressed

The student should be able to	Level
1. Identify, discuss and defend medico-legal, socio-cultural, professional and ethical issues as it pertains to the physician - patient relationship (including fiduciary duty)	KH
2. Identify and discuss physician's role and responsibility to society and the community that she/ he serves	KH

### Learning Experience

**Year of study:** Professional year 3

**Hours:** 5

- i. Introduction of case – 1 hour
- ii. Self-directed learning – 2 hours
- iii. Anchoring lecture – 1 hour
- iv. Discussion and closure of case – 1 hour

#### **Case: Is he a human being or a machine?**

It was a long day and the surgeon has finished four surgeries. Two of these were complicated surgeries requiring all his experience and skills. But it was gratifying. After that he had seen 40 outpatients. He was the most successful doctor in that small community and had provided service for the past 25 years. He had finished his outpatient, ate his meal and went to bed. The night duty doctor who usually comes around 10 pm to sit in the clinic and answer calls from inpatients had taken the night off - he had entrance exams next day. Praying it would be a quiet night he told his wife - I am very very tired; make sure that I am not disturbed.

He woke up at 1AM with the sounds of commotion downstairs. He could hear signs of arguing - Call the doctor, he must come down. He could hear his wife - "please take her to the nearest government hospital. This is a surgical nursing home and doctor is very tired - I cannot wake him up." He could hear irate patient attendants - "but your board

says open 24 hours for emergency. The town hospital is 15 km. away. I don't know if my daughter will make it. By the time the venom will reach the brain. Call your husband now madam. This is not correct". His wife retorted "He has worked from 4AM this morning - he has gone to sleep very tired asking me not to wake him up. Is he the only doctor in town? Is he a human being or a machine? Why are you being unreasonable?" The surgeon reached out for his clothes...

**Points for discussion:**

1. Duty of a doctor.
2. The concept of fiduciary duty.
3. Balancing personal and professional life.
4. Where to draw the line!

**Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions.
2. **Summative:** Short questions on: What is fiduciary duty?

## **Learning modules for Professional Year IV**

**Number of modules: 9**

**Number of hours: 44**

## Module 4.1: The foundations of communication - 5

### Background

Communication is a fundamental prerequisite of the medical profession and beside skills is crucial in ensuring professional success for doctors. This module continues to provide an emphasis on effective communication skills. During professional year phase III part II (year four), the emphasis is on communicating, diagnosis, prognosis and therapy effectively.

### Competencies addressed

The student should be able to:	Level
1. Demonstrate ability to communicate to patients in a patient, respectful, non-threatening, non-judgmental and empathetic manner	SH
2. Communicate diagnostic and therapeutic options to patient and family in a simulated environment	SH

### Learning Experience

**Year of study:** Professional year 4

**Hours:** 5 (1 + 2 + 2)

- i. Introductory small group session - 1 hour
- ii. Focused small group session - 2 hours
- iii. Skills Lab session - 2 hour

#### Contents:

This module includes 3 inter-dependent learning sessions:

1. Introductory small group session on the principles of communication with focus on administering communication, of diagnosis, prognosis and therapy.
2. Focused small group session with role play or video where students have an opportunity to observe critique and discuss common mistakes in communicating diagnosis, prognosis and therapy.
3. Skills lab sessions where students can perform tasks on standardised or regular patients with opportunity for self critique, critique by patient and by facilitator.

**Assessment**

1. **Formative:** Participation in session 2 and performance in session 3 mentioned above may be used as part of formative assessment.
2. **Summative:** A skills station in which the student may communicate a diagnosis management plan and prognosis to a patient.

**Resources**

**Same as Module 3.1**

## Module 4.2: Case studies in medico-legal and ethical situations

### Background

This module discusses the medico-legal and ethical conflicts in adolescents (also see module 2.5).

### Competency addressed

The student should be able to:	Level
Identify, discuss and defend medico-legal, socioeconomic and ethical issues as it pertains to abortion / Medical Termination of Pregnancy and reproductive rights	KH

### Learning Experience

**Year of study:** Professional year 4

**Hours:** 5

- i. Introduction of case – 1 hour
- ii. Self-directed learning – 2 hours
- iii. Anchoring lecture – 1 hour
- iv. Discussion and closure of case – 1 hour

### Case: The Child's Child

You are the family doctor of Mr. Ravikiran for the past 10 years. One evening toward the end of a busy clinic Mr. Ravikiran, his wife and daughter come in. The usual smiles were absent. There was silence for a few minutes and when you asked what is the matter, Mr. Ravikiran points out to his wife and tells her that you tell him.

Reluctantly and with tears bursting in her eyes she tells you that her only daughter Sapna who is 16 years old had amenorrhea for 4 months. She had taken her to the gynecologist, who after examining her ordered an ultrasound scan of the abdomen which showed a 16 week fetus. After much argument and discussion, the family requested the gynecologist to perform a Medical Termination of Pregnancy (MTP). Sapna, however refuses to undergo an MTP - claiming that the child is her expression of love and that she believes that taking away her baby's life will be tantamount to murder.

The parents are embarrassed to face society and feel that continuing the pregnancy will harm the daughter. As parents, they feel that they have a right to determine if their daughter should undergo a Medical Termination of Pregnancy or not. The daughter feels that she is old enough. As their family doctor, they would like you to help them through this nightmare.

**Points for discussion:**

1. Who makes health care decisions for adolescents?
2. What are the medical implications of the MTP act?
3. Are there provisions for emancipated minors?
4. Should adolescents be included in the decision making process?

**Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions.
2. **Summative:** Short questions on the Medical Termination of Pregnancy Act

## Module 4.3: Case studies in medico-legal and ethical situations

### Background

This module discusses the medico-legal and ethical conflicts in organ transplantation (also see module 2.5).

### Competency addressed

The student should be able to:	Level
Identify and discuss medico-legal, socio-economic and ethical issues as it pertains to organ donation	KH

### Learning Experience

**Year of study:** Professional year 4

**Hours:** 5

- i. Introduction of case – 1 hour
- ii. Self-directed learning – 2 hours
- iii. Anchoring lecture – 1 hour
- iv. Discussion and closure of case – 1 hour

#### **Case: The angry brick kiln owner**

68 year old Muthukumar is your patient for the past 8 years. You are his family doctor and he seldom does anything without consulting you first. A self made man with no formal education he is a successful brick kiln owner in the suburbs of the city. He has hypertension and diabetes even before the time he has been under your care. Today he enters your office distraught and angry and unable to speak. You calm him down...

Muthukumar is a known diabetic and hypertensive for the past 23 years and has been on multiple medications in the past. Six years ago, he was diagnosed with chronic renal failure. For the past one year, his renal function has been worsening. The nephrologist that you had recommended had suggested dialysis and he has been on hemodialysis thrice a week for the past 6 months. At the last visit, he was suggested renal transplantation.

Muthukumar continues “I saw that kidney doctor today, Doctor. He said that I can get a new kidney instead of my old one. He told me that I need someone to donate a kidney to me. I told him that I don't need anyone's charity and I can buy one donor. That doctor laughed at me, sir - he told me that I cannot buy any kidney and that one of my relatives must donate it to me - He even said that my younger brother is probably the best person to donate the kidney. How dare he, Sir - my younger brother who is dearer to me than a son. I have so many employees in my factory who will line up to give me a kidney. Why is this doctor talking like this?

**Points for discussion:**

1. Can a kidney be bought?
2. What are the health economic outcomes of selling a kidney?
3. What are the medico-legal and ethical implications of the Human Organ Transplantation Act?

**Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions.
2. **Summative:** Short questions on the Human Organ Transplantation Act.

## Module 4.4: Case studies in ethics empathy and the doctor-patient relationship

### Background

This module discusses some nuances in the doctor-patient relationship including - failure of therapy, termination of relationships etc. (also see module 2.5).

### Competencies addressed

The student should be able to:	Level
1. Demonstrate empathy in patient encounters	SH
2. Communicate care options to patient and family with a terminal illness in a simulated environment	SH

### Learning Experience

**Year of study:** Professional year 4

**Hours:** 5

- i. Introduction of case – 1 hour
- ii. Self-directed learning – 2 hours
- iii. Anchoring lecture – 1 hour
- iv. Discussion and closure of case – 1 hour

#### Case: A letter from the grave

Respected doctor:

I am writing this letter with extreme sadness. As you may know that it has been three months since my wife and your patient Mrs. Alka Chaturvedi has passed away. I am writing this letter not with anger or with spite; I am writing this only with the intent that my wife's death not be in vain and that the lessons that can be learned from the way you took care of her may be valuable to other patients in your care and that they will receive the compassion and care from you that Alka never received.

As you may recall, Alka was diagnosed with breast cancer 5 years ago. We rushed to you knowing your reputation as a talented oncologist and we were not disappointed. Your aggressive approach to the disease made all the difference. Surgery and aggressive chemotherapy, while distressing, helped Alka beat the disease and she lived disease-free for 2 years. We were very happy and were and still are very grateful to you. But fate had

ordained that our joy will be short-lived. The disease came back with a vengeance. Even at this time you did not give up hope and took on the disease like a warrior but then there came a time that it was clear that the disease had won. We were devastated.

Alka looked up to you as a doctor to provide her with support but it looked like that you were unable to confront the failure. While you did prescribe pain medications and your office helped us find a home nurse you were reluctant to meet Alka or talk to her. When we called for appointments, your office would tell us to contact our family doctor for pain medications. When we did get to see you would not even look at Alka's eyes. You would distractedly talk to her, refill her pain medications and dismiss us quickly. It was as if we were seeing a different doctor than the one we had seen when all was well. And when Alka was admitted to the hospital where she breathed her last you would not even come and see her. We made so many requests for you to come and visit with her. I even called and told you that it would mean so much for her to see you before she departs but you did not.

Would it have been too much for you to come and hold her hand for a minute or say a kind word? Doctor - I am not as learned as you are but patients come to you and repose their faith in you to help them through their illness. We come to you not with the expectation that a cure is always possible but always with the expectation that you will support us in coping with the disease and the tremendous effects it has on our lives. We don't always expect you to succeed but we always expect you to show us care and compassion. I hate to point to out, doctor, that you abandoned Alka when it was clear that she will not be a trophy that you can parade as a success. You abandoned Alka and us at the time we needed you most. You sir, abandoned us when we were most vulnerable.

I write this to you not to fault your knowledge and skills which are considerable. I bear you no ill will. I am grateful that you gave Alka and our family a few more years of togetherness. I only write to remind you that knowledge and skills are not sufficient for a doctor. Compassion, empathy and non-abandonment are superior virtues. I can only hope that Alka's experience with you will help you take care of your other patients who may not all be successes, as you seem to define it. If only you provided patients empathy, all your patients will be your successes, irrespective of outcome.

Sincerely

**Points for discussion:**

1. The role of a doctor as a healer.
2. Failure of treatment and its implications for the doctor-patient relationship.
3. Empathy and patient care.
4. Can the doctor-patient relationship be terminated?
5. Hospice care.

**Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions.
2. **Summative:** Short questions on 1) Empathy 2) Doctor's responsibilities in the doctor-patient relationship 3) Doctor's responsibilities in the care of the terminally ill patient.

## Module 4.5: Case studies in ethics: the doctor-industry relationship

### Background

This module discusses some nuances in the doctor-industry relationship (also see module 2.5).

### Competency addressed

The student should be able to:	Level
Identify and discuss and defend medico-legal, socio-cultural, professional and ethical issues in physician - industry relationships	KH

### Learning Experience

**Year of study:** Professional year 4

**Hours:** 5

- i. Introduction of case – 1 hour
- ii. Self-directed learning – 2 hours
- iii. Anchoring lecture – 1 hour
- iv. Discussion and closure of case – 1 hour

#### Case: The Launch

It was the end of the morning session in your clinic. You were getting ready to have lunch when you are told that a drug company representative wants to meet you. You let him in and he tells you. “Sir - we are launching a new combination drug next month. We are planning a one hour meeting to introduce you to the product. The meeting will be held in Singapore and we will fly you and your spouse business class. All expenses will be borne by us. You can stay there for 3 days, sir. The meeting will be held in a cruise ship. The meeting will be only for one hour, sir. After that there will be a gala dinner and entertainment, Sir. Also, to compensate you for losing your practice for those three days we will pay you an honorarium of Rs. 25000 for each day that you are there. This is our way of saying thank you for all the support in the past and the support that you are going to provide in making this new molecule a success.”

**Points for discussion:**

1. The influence of pharmaceutical industry on doctor's prescription behavior.
2. The limits of doctor - industry engagement.

**Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions.
2. **Summative:** Short questions on 1) Can doctors accept gifts from pharmaceutical industry? Explain your choice.

**Resources**

The MCI &AMA Code of Medical Ethics.

## Module 4.6: Case studies in ethics and the doctor - industry relationship

### Background

This module discusses some nuances in the professional relationships and conflicts there of (also see module 2.5).

### Competency addressed

The student should be able to:	Level
Identify conflicts of interest in patient care and professional relationships and describe the correct response to these conflicts	SH

### Learning Experience

**Year of study:** Professional year 4

**Hours:** 5

- i. Introduction of case – 1 hour
- ii. Self-directed learning – 2 hours
- iii. Anchoring lecture – 1 hour
- iv. Discussion and closure of case – 1 hour

### Case: The Offer

You get a call from the secretary of the promoter of the largest and most successful corporate hospital in the city asking for an appointment for you with him. You are perplexed but make it to the appointment. You enter a large well appointed room. The owner of the hospital gets up from his chair, welcomes you and asks you to sit down.

“Welcome to our hospital, doctor.” After a few minutes of empty banter, he says – “My marketing executives tell me that you are the most successful practitioner in this area. As you know, we are a growing organisation; we are eager to partner with you. Doctor, I know that you use the services of another hospital here but we can make it worth your while to consider”. You look enquiringly. He continues. “In addition to your professional charges that you can determine, we can provide you with 20% of the hospital’s collections from your patient including radiology and laboratory charges. If you send us your

outpatients for consultations, laboratory or radiology we will give you back 30% of our collections. We hope that you will consider this, doctor and become part of our extended family.”

**Points for discussion:**

1. Fee splitting and other practices.
2. Can doctors become entrepreneurs?
3. Can doctors own pharmacies or hold stock in pharmaceutical companies?
4. What comprises professional conflict of interest?

**Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions.
2. **Summative:** Short questions on:
  - 1) Fee splitting and its implications for patient care,
  - 2) Conflicts in professional relationships.

## Module 4.7: Case studies in ethics and patient autonomy

### Background

This module discusses ethical issues in care of children (also see module 2.5).

### Competency addressed

The student should be able to:	Level
Identify conflicts of interest in patient care and professional relationships and describe the correct response to these conflicts	SH

### Learning Experience

**Year of study:** Professional year 4

**Hours:** 5

- i. Introduction of case – 1 hour
- ii. Self-directed learning – 2 hours
- iii. Anchoring lecture – 1 hour
- iv. Discussion and closure of case – 1 hour

### Case: The “Cruel” Parents

A six year old boy is brought to the emergency room with a single episode of generalised tonic clonic convulsions. The child is stabilised on IV anti-epileptics and an oral anti-epileptic is started. There are no further episodes during the hospitalisation. The child is scheduled for an EEG and an MRI. Through this time the family had been cooperative with the treatment. The parents appear to be educated and appeared to care for their son deeply. When further investigations are suggested, the parents come back to you and say - “doctor, thank you for helping us at a time of need but we feel that it is against our faith to continue allopathic care. We have decided to go back to our ancestral village and our family shrine where we have scheduled a ritual tomorrow. Our priest has promised us that the child will be disease-free, if we perform the rites required. This convulsion is a result of the curse of our ancestors and if we do the requisite rituals to please them the

child will be cured of the disease. Please do not do anymore tests or treatments. We are stopping the medications tomorrow and will get discharged. Thank you.”

**Points for discussion:**

1. Who has the right to decide for children?
2. Can parents refuse treatment even in life threatening situations?
3. What if there is a conflict?

**Assessment**

1. **Formative:** The student may be assessed based on their active participation in the sessions.
2. **Summative:** Short questions on parental consent.

## Module 4.8: Dealing with death

### Background

Thanatology is a branch of science that deals with death. Death is an event that any medical student will inevitably face during the course of their professional career. Dealing with death empathetically and at the same time not being overwhelmed by it is an important coping skill for doctors.

### Competencies addressed

The student should be able to:	Level
1. Identify conflicts of interest in patient care and professional relationships and describe the correct response to these conflicts.	SH
2. Demonstrate empathy to patient and family with a terminal illness in a simulated environment.	SH

### Learning Experience

**Year of study:** Professional year 4

**Hours:** 5

- i. Introduction of case – 1 hour
- ii. Self-directed learning – 2 hours
- iii. Anchoring lecture – 1 hour
- iv. Discussion and closure of case – 1 hour

### Case: The Empty Bed

You are a house surgeon in the night shift of the ICU. A 19 year old girl Sharmila is wheeled into the ICU. She has a complicated history. She had surgery for cyanotic congenital heart disease at age 8. She has a history of severe asthma often requiring admission for steroids. She lives in a home near a construction site and recently the attacks have flared up. She now has frequent admissions for asthma exacerbations. She is now constantly on steroids. In the last month, she has had 3 admissions. But she fights it bravely. She carries her books with her when she comes in and after the attack settles down she sits quietly reading. Despite the struggle you noticed that the staff nurses liked her. She was positive and charming. Today was no different but the attack seemed worse.

In the ER, the FEV1 was horrible. They had pumped her with steroids, put her on continuous nebulization, an aminophylline infusion was in place when you received her. The smile was smaller but there. The face was cushingoid with all the steroids and the body looked tired. She was moved to her usual bed number 9. Your shift was getting over at 7 a.m. but you stayed on an hour. She looked better, the smile was back you reassured her and said I'll be back in the evening and left.

That evening you report for duty and as you look through the patients, bed number 9 is empty. "Have you discharged Sharmila?" you asked the nurse. No doctor – she developed a sudden cardiac arrest at 12 noon – we could not revive her.

**Points for discussion:**

1. How should doctors deal with the emotions of patients and family facing death?
2. What does the patient experience when he/she is dying? Can physicians make the process of death comfortable?
3. What are the emotions faced by doctors when confronting death in patients? Is death a defeat for the doctor? Should the doctor be emotionally detached from a dying patient?
4. What are the cultural aspects of dying?

**Alternate Case: I have decided to die**

You are a physician in a community care practice for over 20 years and caring for various patients. Mr. Bhaskara Rao is a patient in your care for the past 14 years. He is 76 years old and has diabetes for the past 30 years. He had renal failure for the past 10 years and is CKD stage V requiring dialysis for 3 years. While he is following up with the nephrologist he values your position in his family as a family doctor and regularly visits you to check if his treatment is correct and more often to seek reassurance. He has invited you to all his family events – the last being one month ago for his grandson's wedding.

This morning you get a call from him. "Doctor! He says in his usual cheerful voice. Can I meet you tomorrow? I have fulfilled all my responsibilities in life. I am not sad. My children are all settled; my grandson is married; my wife as you know is no more. I have decided to stop my dialysis and say goodbye to this world. I thought I'll talk to you about how to prepare for my death!"

## **Learning Experience**

**Year of study:** Professional year 4

**Hours:** 5

- i. Introduction of case – 1 hour
- ii. Self-directed learning – 2 hours
- iii. Anchoring lecture – 1 hour
- iv. Discussion and closure of case – 1 hour

### **Points for discussion:**

1. Can patients choose to die? Is there a role for doctors in the death of patients? Can doctors assist death?
2. How should doctors deal with the emotions of patients and family facing death?
3. What does the patient experience when he/she is dying? Can physicians make the process of death comfortable?
4. What are the emotions faced by doctors when confronting death in patients? Is death a defeat for the doctor? Should the doctor be emotionally detached from a dying patient?
5. What are the cultural aspects of dying?

### **Assessment**

1. **Formative:** Participation in sessions may be used as part of formative assessment. Submitted narrative on the socio cultural aspects of death may be used as assessment.
2. **Summative:** Short question on assisted dying.

## Module 4.9: Medical Negligence

### Background

This introductory session allows students to be familiar with the legal aspects of care including negligence and malpractice and ways to protect themselves from such issues.

### Competencies addressed

<b>The student should be able to:</b>	<b>Level</b>
1. Identify, discuss and defend medico-legal, socio-cultural, professional and ethical issues pertaining to medical negligence	KH
2. Identify, discuss and defend medico-legal, socio-cultural, professional and ethical issues pertaining to malpractice	KH

### Learning Experience

**Year of study:** Professional year 4

**Hours:** 4

- i. Introduction of case – 1 hour
- ii. Self-directed learning – 2 hours
- iii. Discussion and closure of case – 1 hour

### Learning Method

This is an interactive panel discussion by students with legal experts and senior members of the medical profession. A written summary of learning may be provided by the student based on the learning.

### Assessment

1. **Formative:** Submitted summary may be used as assessment.
2. **Summative:** Short question on medical negligence

## **Section III**

**Competency Acquisition: Suggested Log Book pattern**

Name of student	Roll number	Year of joining
Specific competency no.		
Competency required to graduate	Universal competency no.	
Administer informed consent to a patient undergoing surgery in a simulated environment (Dreyfus level advanced beginner)		
Competency must be acquired at the end of professional year	IV	
Is the acquisition of this competency a prerequisite to advancement to the next phase	Yes/ No	
Does this competency require performance in a patient	Yes/ No	
Number of times the student must have performed the skill		
	<b>Date Completed</b>	<b>Supervisor</b>
Certified by Faculty: Name, Date and UID		
Student's descriptive narrative of skill acquired		
Faculty only: If the student has not completed the competency, write down the reasons and remedial measures suggested		

## **Section IV**

### Formative Elements to be marked by Tutor

(Desirable competencies in attitude, ethics and communication skills that may be included in whole or part of the formative assessment of the student)

	<b>Competency</b>	<b>PY1</b>	<b>PY2</b>	<b>PY3</b>	<b>PY4</b>
	<b>Indicate as appropriate to the level of training</b> DME: Does not meet expectations; ME - Meets Expectations; N/A: Not applicable				
1.	demonstrate ability to work in a team of peers and superiors				
2.	demonstrates respect to patient privacy				
3.	demonstrate ability to maintain confidentiality in patient care				
4.	demonstrate a commitment to continued learning				
5.	demonstrate responsibility and work ethics while working in the health care team				
6.	demonstrate respect in relationship with patients, fellow team members, superiors and other health care workers				
7.	demonstrates ability to maintain required documentation in health care (including correct use of medical records)				
8.	demonstrates personal grooming that is adequate and appropriate for health care responsibilities				
9.	demonstrates adequate knowledge and use of information technology that permits appropriate patient care and continued learning				
10.	demonstrates respect and follows the correct procedure when handling cadavers and other biologic tissues				
11.	demonstrates awareness of limitations and seeks help and consultations appropriately				
12.	demonstrates appropriate respect to colleagues in the profession				
	Feedback provided to student (Y/N)				
	Signed by Mentor/tutor Name:                      Faculty ID	Initial/ Date	Initial/ Date	Initial/ Date	Initial/ Date

## Appendix 1

### List of competencies in Attitude, Ethics and Communication

**Note:** Competencies from 1 - 39 are core competencies. Competencies 40 -54 are non-core (desirable) competencies that be assessed formatively

No	<b>COMPETENCY</b> The student should be able to:	Domain	K/KH/ SH/P
1	Enumerate and describe professional qualities and roles of a physician	K	KH
2	Describe and discuss the commitment to lifelong learning as an important part of physician growth	K	KH
3	Describe and discuss the role of non-maleficence as a guiding principle in patient care	K	KH
4	Describe and discuss the role of autonomy and shared responsibility as a guiding principle in patient care	K	KH
5	Describe and discuss the role of beneficence of a guiding principle in patient care	K	KH
6	Describe and discuss the role of a physician in health care system	K	KH
7	Describe and discuss the role of justice as a guiding principle in patient care	K	KH
8	Identify and discuss medico-legal, socioeconomic and ethical issues as it pertains to organ donation	K	KH
9	Identify and discuss and defend medico-legal, socioeconomic and ethical issues as it pertains to abortion / medical termination of pregnancy and reproductive rights	K	KH
10	Identify, discuss and defend medico-legal, socio-cultural economic and ethical issues as it pertains to rights, equity and justice in access to health care	K	KH

No	<b>COMPETENCY</b> <b>The student should be able to:</b>	Domain	K/KH/ SH/P
11	Identify, discuss and defend medico-legal, socio-cultural and ethical issues as it pertains to confidentiality in patient care	K	KH
12	Identify, discuss and defend medico-legal, socio-cultural and ethical issues as it pertains to patient autonomy, patient rights and shared responsibility in health care	K	KH
13	Identify, discuss and defend medico-legal, socio-cultural and ethical issues as it pertains to decision making in health care including advanced directives and surrogate decision making	K	KH
14	Identify, discuss and defend medico-legal, socio-cultural and ethical issues as it pertains to decision making in emergency care including situations where patients do not have the capability or capacity to give consent	K	KH
15	Identify, discuss and defend medico-legal, socio-cultural and ethical issues as it pertains to research in human subjects	K	KH
16	Identify, discuss and defend medico-legal, socio-cultural and ethical issues as they pertain to health care in children (including parental right to refuse treatment)	K	KH
17	Identify, discuss and defend medico-legal, socio-cultural and ethical issues as they pertain to health care in children including parental rights	K	KH
18	Identify, discuss and defend, medico-legal, socio-cultural and ethical issues as they pertain to consent for surgical procedures	K	KH
19	Identify, discuss and defend medico-legal, socio-cultural, professional and ethical issues as it pertains to the physician patient relationship (including fiduciary duty)	K	KH

AETCOM competencies for IMG

No	<b>COMPETENCY</b> <b>The student should be able to:</b>	Domain	K/KH/ SH/P
20	Identify and discuss physician's role and responsibility to society and the community that she/ he serves	K	KH
21	Identify, discuss and defend medico-legal, socio-cultural, professional and ethical issues in physician industry relationships	K	KH
22	Demonstrate ability to work in a team of peers and superiors	S	SH
23	Demonstrate ability to communicate to patients in a patient, respectful, non-threatening, non-judgemental and empathetic manner	S	SH
24	Demonstrate respect to patient privacy	S	SH
25	Demonstrate ability to maintain confidentiality in patient care	S	SH
26	Demonstrate a commitment to continued learning	S	SH
27	Demonstrate respect in relationship with patients, fellow team members, superiors and other health care workers	S	SH
28	Demonstrate responsibility and work ethics while working in the health care team	S	SH
29	Demonstrate ability to maintain required documentation in health care (including correct use of medical records)	S	SH
30	Demonstrate personal grooming that is adequate and appropriate for health care responsibilities	S	SH
31	Demonstrate adequate knowledge and use of information technology that permits appropriate patient care and continued learning	S	SH

No	<b>COMPETENCY</b> <b>The student should be able to:</b>	Domain	K/KH/ SH/P
32	Demonstrate respect and follows the correct procedure when handling cadavers and other biologic tissues	S	SH
33	Administer informed consent and appropriately address patient queries to a patient undergoing a surgical procedure in a simulated environment	S	SH
34	Communicate diagnostic and therapeutic options to patient and family in a simulated environment	S	SH
35	Communicate care options to patient and family with a terminal illness in a simulated environment	S	SH
36	Demonstrate awareness of limitations and seeks help and consultations appropriately	S	SH
37	Demonstrate appropriate respect to colleagues in the profession	S	SH
38	Demonstrate an understanding of the implications and the appropriate procedure and response to be followed in the event of medical errors	S	SH
39	Identify conflicts of interest in patient care and professional relationships and describes the correct response to these conflicts	S	SH
40	Demonstrate empathy in patient encounters	S	SH
41	Demonstrate ability to balance personal professional priorities	S	SH
42	Demonstrate ability to manage time appropriately	S	SH
43	Demonstrate ability to form and function in appropriate professional networks	S	SH

AETCOM competencies for IMG

No	<b>COMPETENCY</b> <b>The student should be able to:</b>	Domain	K/KH/ SH/P
44	Demonstrate ability to pursue and seek career advancement	S	SH
45	Demonstrate ability to follow risk management and medical error reduction practices where appropriate	S	SH
46	Demonstrate ability to work in a mentoring relationship with junior colleagues	S	SH
47	Demonstrate commitment to learning and scholarship	S	SH
48	Identify, discuss and defend medico-legal, socio-cultural, economic and ethical issues as they pertain to in vitro fertilisation donor insemination and surrogate motherhood	K	KH
49	Identify, discuss and defend medico-legal, socio-cultural professional and ethical issues pertaining to medical negligence	K	KH
50	Identify, discuss and defend medico-legal, socio-cultural professional and ethical issues pertaining to malpractice	K	KH
51	Identify, discuss and defend medico-legal, socio-cultural professional and ethical issues in dealing with impaired physicians	K	KH
52	Identify, discuss and defend medico-legal, socio-cultural and ethical issues as they pertain to refusal of care including do not resuscitate and withdrawal of life support	K	KH
53	Demonstrate altruism	S	SH
54	Administer informed consent and appropriately address patient queries to a patient being enrolled in a research protocol in a simulated environment	S	SH

**Additional list of desirable competencies in attitude, ethics and communication but listed as non-core**

<b>Competency</b>	<b>Domain</b>	<b>Level</b>
Identify, discuss, and defend medico-legal, socio-cultural and ethical issues as they pertain to refusal of care including do not resuscitate and withdrawal of life support	K	KH
Identify, discuss and defend medico-legal, socio-cultural, professional and ethical issues in dealing with impaired doctors	K	KH
Demonstrate altruism	S	KH
Administer informed consent and appropriately addresses patient queries to a patient being enrolled in a research protocol in a simulated environment	S	KH
Demonstrate appropriate respect to colleagues in the profession	S	SH
Identify, discuss and defend medico-legal, socio-cultural, professional and ethical issues pertaining to medical negligence	K	KH
Identify, discuss and defend medico-legal, socio-cultural, professional and ethical issues pertaining to malpractice	K	KH
Demonstrate ability to balance personal professional priorities	S	SH
Demonstrate ability to manage time appropriately	S	SH
Demonstrate ability to form and function in appropriate professional networks	S	SH
Demonstrate ability to pursue and seek career advancement	S	SH
Demonstrate ability to follow risk management and medical error reduction practices where appropriate	S	SH
Demonstrate ability to work in a mentoring relationship with junior colleagues	S	SH

AETCOM competencies for IMG

<b>Competency</b>	<b>Domain</b>	<b>Level</b>
Demonstrate commitment to learning and scholarship	S	SH

## Appendix 2

Communication skills rating scale adapted from Kalamazoo consensus statement

Rating 1-3 - Poor, 4 -6 Satisfactory, 6 -10 Superior

<b>Criteria</b>	<b>Score</b>
Builds relationship	
Opens the discussion	
Gathers information	
Understands the patient's perspective	
Shares information	
Manages flow	
Overall rating	



# BOARD of GOVERNORS in supersession of Medical Council of India

## COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR THE INDIAN MEDICAL GRADUATE

Knows    Knows how    Shows    Shows how    Performs

Observe

Demonstrate

Enumerate

Assist

Counsel

Describe

Prescribe

Analyse

Integrate

Guide

Communicate

Correlate

Interpret

Module 1

Critique

# Foundation Course

Collaborate

Clinician

Communicator

Team Leader

Professional

Lifelong Learner

Knowledge

Skills

Attitude

Values

Responsiveness

Communication

## Curriculum Implementation Support Program

**Foundation Course for the Undergraduate  
Medical Education Program**

**2019**



**Medical Council of India  
Pocket-14, Sector-8, Dwarka,  
New Delhi 110 077**

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## FOREWORD

Medical education and educators have the responsibility of training the custodians of the health of the nation. The MBBS program is the foundation of the health delivery system in the country creating health care providers who need to provide not only adequate, appropriate and cost effective care but also need to be leaders of their community. Through the program it is expected that students will be able to fulfill their professional and personal goals and aspirations in addition to the expectations of the profession, society and nation. The course can be demanding and requires the learner to respond to the challenges of continued learning and improvement. Besides acquisition of new skills, learner is required to provide leadership in challenging situations and demonstrate exemplary professional and humanistic attributes. Medical students come from varied backgrounds and require a bridge that will transition from school to a professional course.

The Board of Governors in supersession of Medical Council of India has therefore created a Foundation Course that will not only serve as a bridge for the student into the MBBS program but will also orient the student to the knowledge, skills and attitude required of him or her during the program. The Foundation Course is envisaged to be a month long program with continued support provided through the year for students to acquire language, communication and computer skills. Particular emphasis on professional and ethical behaviour is placed in the Foundation Course; this dovetails into the AETCOM module - one of the flagship programs of the MBBS curriculum.

This booklet has been developed by experts and is meant to be used as a program guide for the Foundation Course. It outlines the outcomes that are intended to be achieved; it also incorporates examples of the Foundation Course program derived from best practices from around the country. Institutions are encouraged to develop their own Foundation Course that addresses local needs and brings out the institutional flavour while aligning the whole program to the outcomes identified in the booklet. The Medical Council of India also welcomes institutions to share their learning feedback and best practices that will enhance the value and structure of the program in the coming years.

The Council is grateful to the experts who have developed this booklet for their time and effort. Appreciation is also due to the Academic Cell and the members of expert group headed by Dr. Avinash Supe under whose guidance the course and the competency based curriculum has been developed and is being progressively rolled out in the country.

(Dr. V. K. Paul)



डॉ. राकेश कुमार वत्स

महासचिव

**Dr. R.K. Vats**

Secretary General



सत्यमेव जयते

भारतीय आयुर्विज्ञान परिषद

के अधिक्रमण में शासी बोर्ड

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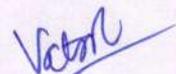
## Foreword



India has the unique distinction of having the largest number of medical schools since it has taken the responsibility to create a large pool of health educators who would be responsible to train the young Indian Medical Graduate joining the undergraduate medical education program. The MBBS program is the foundation of the health delivery system in the country, creating health care providers who need to provide not only adequate, appropriate and cost effective health care but also need to be leaders of their community, in due course. Medical students in India come from diverse backgrounds in terms of geography, culture, language, economy, social construct, medium of instruction and education Boards. The MBBS course is a highly challenging program which prepares the student for a lifetime of altruistic care, continued learning, discipline, professional and ethical behavior and respect for human interactions, systems and processes. It is therefore necessary that a smooth transition of the high school student to this challenging learning stream is ensured and to achieve this, a Foundation Course at the beginning of the MBBS program was considered necessary.

This booklet has been developed by Council-nominated experts and is meant to be used as a program guide for the Foundation Course; institutions are encouraged to develop their own format of the Foundation Course that addresses local needs while aligning the whole program to the outcomes identified in the booklet. The Foundation Course is the forerunner to the roll out of the competency based UG curriculum across the country under the aegis of the Medical Council of India & Board of Governors.

The Council is grateful to the Expert group who have developed this booklet for their valuable time, knowledge, expertise and effort ably supported by the Academic Cell of the Council.

  
Secretary General

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# **Curriculum Implementation Support Program**

## **Module – 1**

# **FOUNDATION COURSE**

# FOUNDATION COURSE

## Objective of the document

The objective of this document is to facilitate institutions and faculty in implementing a **Foundation Course** of one-month duration at the beginning of the MBBS course that will sensitise the fresh medical student with the required knowledge and skills that will assist him/her in acclimatising to the new professional environment which would be his/her milieu for a life-long career in the medical profession. The Foundation Course will also provide a sound foundation for learning in the MBBS course and later in their professional career. While the institutions are expected to abide by the general guidelines, local changes can be made depending on the context and requirements.

## 1. Glossary of terms used in the document

**Orientation:** Refers to the awareness created in new students with respect to place (learning environment and facility), time, teaching schedules and timetables, processes (Rules, Regulations, policies and procedures), personnel (faculty, staff, and mentors), patients and their relatives.

**Skills Module:** Refers to basic skills that are considered important for all health care personnel who deal with patients and requires students to be trained in prior to entering patient care areas.

**Enhancement skills:** Refers to those skills which are needed to enable students from diverse backgrounds (including different Boards, language of instruction, culture and varied degrees of technological exposure) to appreciate and accommodate the similarities and differences in medical practice and to feel at par with each other.

**Sports and extra-curricular activities:** Refers to sports and extra - curricular activities permitted within the time schedule.

**Professionalism and ethics:** Professionalism defines a set of values and behaviour that build the trust that a patient has in his/ her doctor. Ethics are principles that govern the behaviour of doctors. Professional competence, effective communication and ethics are the three founding principles of Professionalism.



## **2. Introduction**

Medical education in India requires training in a wide spectrum of domains that involves exposure to human interactions and interpersonal relationships in various settings including hospital, community, clinics etc. The training is intense and demands great commitment, resilience and lifelong learning. Students enter a new environment in medical college at around 17 years of age directly from school which can be challenging. Therefore, it is desirable to create a period of acclimatisation and familiarization to the new environment. This would include an introduction to the course structure, learning methods, technology usage, and peer interactions which would facilitate their smooth transition from high school to medical college.

This is proposed to be achieved through a dedicated one month exclusive “Foundation Course”, at the beginning of the MBBS course, to orient and sensitize the student to the various identified areas. Many of these identified areas will need to be followed up by more focused outcome-based sessions at various stages in the MBBS course. This will be achieved through activities/small courses integrated throughout the course which will be like the thread running through a garland. At appropriate stages throughout the course, emphasis will be laid on the various essential roles of the “Indian Medical Graduate”.

## **3. Purpose**

The purpose of the Foundation Course include:

- a) Orienting the students to all aspects of the medical college environment.
- b) Equipping them with certain basic, but important, skills required for patient care and enhancing their communication, language, computer and learning skills.
- c) Providing opportunity for peer and faculty interactions and an overall sensitisation to the various learning methodologies.

#### **4. Context from proposed GMER 2019 (Graduate Medical Education Regulations)**

##### 9.1. Foundation Course

**Goal:** The goal of the Foundation Course is to prepare a learner to study Medicine effectively. It will be of one-month duration after admission (see Table 1).

9.1.1 **Objectives:** The objectives are to:

**(i) Orient the learner to:**

- a. The medical profession and the physician's role in society
- b. The MBBS programme
- c. Alternate health systems in the country and history of medicine
- d. Medical ethics, attitudes and professionalism
- e. Health care system and its delivery
- f. National health priorities and policies
- g. Universal precautions and vaccinations
- h. Patient safety and biohazard safety
- i. Principles of primary care (general and community-based care)
- j. The academic ambience

**(ii) Enable the learner to acquire enhanced skills in:**

- a. Language
- b. Interpersonal relationships
- c. Communication
- d. Learning including self-directed learning
- e. Time management
- f. Stress management
- g. Use of information technology

**(iii) Train the learner to provide:**

- a. First-aid
- b. Basic life support

9.1.2 In addition to the above, learners may be enrolled in one of the following programmes which will be run concurrently:

- (i) Local language programme
- (ii) English language programme

(iii) Computer skills

These may be done in the last hours of the day for the duration of the Foundation Course.

9.1.3 These sessions must be as interactive as possible.

## 5. Major Components

The major components of the Foundation Course include:

- **Orientation Program:** This includes orienting students to all the components mentioned in GMER 9.1 and should be completed as one block in the first week.
- **Skills Module (Basic):** This involves skill sessions such as Basic Life Support, First Aid, Universal precautions and biomedical waste and safety management that students need to be trained prior to entering the patient care areas.
- **Field visit to Community and Primary Health Centre:** These visits provide orientation to the care delivery through community and primary health centres, and include interaction with health care workers, patients and their families.
- **Professional development including Ethics:** This is an introduction to the concept of Professionalism and Ethics. This component will provide students with understanding that clinical competence, communication skills and sound ethical principles are the foundation of professionalism. It will also provide understanding of the consequences of unethical and unprofessional behaviour, value of honesty, integrity and respect in all interactions. Professional attributes such as accountability, altruism, pursuit of excellence, empathy, compassion and humanism will be addressed. It should inculcate respect and sensitivity for gender, background, culture, regional and language diversities. It should also include respect towards the differently abled persons. It introduces the students to the basic concept of compassionate care and functioning as a part of a health care team. It sensitises students to “learning” as a behaviour and to the appropriate methods of learning.

Orientation to Professionalism and Ethics will continue as the AETCOM module after the first month of the MBBS course and throughout the first year, with reinforcement of the various components introduced.

- **Sports and Extracurricular activities:** These have been included, in order to demonstrate the importance of work-life balance in a demanding profession, and provide an opportunity for students to have compulsory physical activity and to showcase their talents. The Foundation Course should have compulsory 4 hours

per week for sports and 2 hours per week for extracurricular activities, adding up to 22 hours.

- **Enhancement of Language / Computer skills / Learning Skills:** These are sessions to provide opportunity for the students from diverse background and language competence to undergo training for speaking and writing English, fluency in local language and basic computer skills. The students should be sensitized to various learning methodologies such as small group discussions, skills lab, simulations, documentation and concept of Self-Directed learning.

### **Structure of the program for students**

Table.1

Subjects/ Contents	Total Teaching hours
Orientation <sup>1</sup>	30
Skills Module <sup>2</sup>	35
Field visit to Community Health Centre	8
Professional Development including ethics	40
Sports and Extracurricular activities	22
Enhancement of language/ computer skills <sup>3</sup>	40
Total teaching hours	175

1. Orientation course will be completed as single block in first week and will contain elements outlined in the section 9.1.1 of the GMR
2. Skills modules will contain elements outlined in the section 9.1.1 of the GMR
3. Based on perceived needs the students may choose any or both of language enhancements (English or local spoken or both) and computer skills. This should be available longitudinally throughout the duration of the Foundation Course and afterwards.

**Foundation Course will be organized by co-ordinator appointed by Dean of the college and will be under supervision by the heads of preclinical departments.**

## Foundation Course Modules

<b>1. Orientation Module</b>	<b>Total hours: 30</b>
1A. Orientation Module: Introduction to institution / campus / facilities	
1B. Orientation Module: Role of doctors in the society	
1C. Orientation Module: History of Medicine and alternate systems	
1D. Orientation Module: IMG roles / overview MBBS curriculum various career pathways	
1E. Orientation Module : Principles of family practice	
<b>2. Skills Module:</b>	<b>Total hours: 35</b>
2A.Skills Module: First Aid	
2B.Skills Module: BLS	
2C.Skills Module: Universal precautions	
2D.Skills Module: Waste management	
2E.Skills Module: Immunization	
2F.Skills Module: Documentation	
<b>3. Community orientation module</b>	<b>Total hours: 8</b>
3A. Community Orientation Module: National Health goals and policies/ health Care systems/ community health	
3B. Community Orientation Module: Interactions with patients and families, Communities.	
<b>4. Professional Development and Ethics Module (P&amp;E)</b>	<b>Total hours: 40</b>
4A. (P&E): Concept of Professionalism and Ethics	
4B. (P&E): White coat Ceremony	
4C. (P&E): Professional behaviour and altruistic behaviour	
4D. (P&E): Working in a health care team	
4E. (P&E): Disability competencies	
4F. (P&E): Cultural competence	
4G. (P&E): Stress management	
4H. (P&E): Time management	
4I. (P&E): Interpersonal relationship	
4J. (P&E): Learning	
<b>5. Enhancement of Language and Computer Skills Module</b>	<b>Total hours:40</b>
5A.Enhancement of Language and Computer Skills Module: Communication	
5B.Enhancement of Language and Computer Skills Module: Local Language training	
5C. Enhancement of Language and Computer Skills Module: English Language training	
5D.Enhancement of Language and Computer Skills Module: Computer Skills training	
<b>6. Sports and extracurricular activities:</b>	<b>Total hours: 22</b>

Sports should be for a mandatory 4 hours per week and extra-curricular activities 2 hours per week, subject to a total of 22 hours.

## 6. Learning outcomes

Code	COMPETENCY The student should be able to:	Domain	K/KH/ SH/P
1.	Topic : ORIENTATION		
FC 1.1	Demonstrate understanding of the role of doctors in the society and their impact	A	KH
FC 1.2	Demonstrate understanding of the Roles of an Indian Medical Graduate and relate it to the societal impact	A	KH
FC 1.3	Discuss and appreciate the expectations of the students from the Nation, society, Institution, peers, colleagues and patients and vice versa	A	KH
FC 1.4	Demonstrate understanding of the rules and regulations of the institution	A	SH
FC 1.5	Orient themselves to the college campus, facilities, faculty, administrative structure, support systems and processes of the institution	A	KH
FC 1.6	Discuss the various career pathways and opportunities for personal growth	A	KH
FC 1.7	Demonstrate understanding of the overview of MBBS curriculum, its structure and outcomes and its relation to the career pathways	K	KH
FC 1.8	Demonstrate understanding the role of physician at various levels of Health care delivery	K	KH
FC 1.9	Discuss the principles of family practice	K	KH
FC 1.10	Demonstrate awareness of the History of Medicine and alternate systems of Medicine	K	K
2	<b>Topic : Skills</b>		
FC 2.1	Perform Basic Life support in Skills lab	S	SH
FC 2.2	Perform First Aid in a simulated environment	S	SH
FC 2.3	Follow bio-safety and universal precautions	S	SH
FC 2.4	Demonstrate handling and safe disposal of Biohazardous materials in a simulated environment	S	SH
FC 2.5	Demonstrate proper hand washing and use of personal protective equipment	S	SH

FC 2.6	Demonstrate appropriate response to needle stick injuries	S	SH
FC 2.7	Demonstrate Biomedical Waste segregation (BMW), observe and explain the process of management of BMW in accordance with National Regulations	S	SH
FC 2.8	Discuss the Immunization requirements of Health care professionals	K	KH
FC 2.9	Demonstrate awareness of significance of documentation in patient care and the proper method of documentation	S	SH
<b>3</b>	<b>Community Orientation and field visits</b>		
FC 3.1	Demonstrate understanding of the National Health Goals and Policies	K	KH
FC 3.2	Discuss the national health scenario, demographic, socio-cultural and epidemiological issues	K	KH
FC 3.3	Demonstrate understanding of the health care systems in India with reference to primary, secondary and tertiary level care	K	KH
FC 3.4	Discuss the basic principles of community health and its impact on health and disease	S	SH
FC 3.5	Demonstrate understanding of the structure and functioning of the community health center	K	KH
FC 3.6	Demonstrate ability to obtain patient experiences through patient and family interactions and relate these experiences to impact of environment and diseases.	S	SH
<b>4</b>	<b>Professional Development including Ethics</b>		
FC 4.1	Demonstrate understanding of the concept of Professionalism and ethics among health care professionals and discuss the consequences of unprofessional and unethical behavior	S	KH
FC 4.2	Demonstrate understanding that compassion, altruism, integrity, duty, responsibility and trust are the core values that defines the nature of the physician's work	K	KH
FC 4.3	Discuss the value, honesty and respect during interaction with peers, seniors, faculty, other health care workers and patients	S	KH

FC 4.4	Discuss the significance of working in a health care team	S	KH
FC 4.5	Discuss disability competencies	K	KH
FC 4.6	Demonstrate understanding and respect of cultural diversities and interact with those with different cultural values	K/A	KH
FC 4.7	Discuss the significance and methods of stress management and risk taking behavior.	K	KH
FC 4.8	Understand the role of Yoga and meditation in personal health	S	S
FC 4.9	Discuss the significance and appropriate ways of Time management	K	KH
FC 4.10	Demonstrate understanding of importance of interpersonal relationship while working in a health care team	S	KH
FC 4.11	Understand the role of mentoring	S	KH
FC 4.12	Demonstrates understanding of the process of group learning and group dynamics	S	KH
FC 4.13	Comprehend the learning pedagogy and its role in learning skills	S	KH
FC 4.14	Demonstrates understanding of different methods of self-directed learning	S	KH
FC 4.15	Understand collaborative learning	S	KH
<b>5</b>	<b>Enhancement skills - Communication and language skills</b>		
FC 5.1	Demonstrate ability to communicate with patient and families, be aware of barriers to communication and appropriate ways to respond	C	SH
FC 5.2	Demonstrate use of local language in patient and peer interactions	C	SH
FC 5.3	Demonstrate ability to communicate and learn in English	C	SH
FC 5.4	Demonstrate basic computer skills	S	SH
FC 5.5	Demonstrate ability for accessing online resources	S	SH

## 7. Formative and Internal Assessment

- Foundation Course is compulsory and an attendance of 75% will be mandatory
- Feedback, comments and/or grades about the student's performance by the faculty mentor can be documented particularly for the skills training
- The performance of the students in the Foundation Course will **NOT** contribute towards internal assessment marks.
- Student's feedback about the Foundation Course also needs to be documented in a structured format. This will help in gathering student's perceptions about various aspects of Foundation Course and help in program evaluation and refinement.

## 8. Capacity Building for Faculty

The components of the Foundation Course are multifarious and will require resource faculty from various disciplines. Many of these identified areas of the Foundation Course will need to be followed up by more focused outcome-based sessions at various stages in the course of MBBS through activities spirally integrated throughout the course. The objectives of each of the sessions in the Foundation Course are specific and the resource faculty need to understand not only the content, context and specific objectives of these sessions but also the approach and need for an interactive teaching learning methodology. The Dean/Principal of every medical college will ensure that adequate faculty training and resources are made available for implementation of the Foundation Course.

## 9. Curricular Governance and Evaluation

The Dean/ Principal in each medical college will identify **a faculty coordinator from preclinical departments** for conduct of the Foundation Course.

The faculty coordinator will identify resource faculty for the various sessions from within and outside the institution and coordinate the training of the resource faculty, the implementation of the program and the evaluation of the program.

Program evaluation report from faculty and students will be submitted to curriculum committee within four weeks of completion of Foundation Course.

## Annexures

(The following are examples of schedules and lesson plans that may be used for Foundation Course. Institutions are encouraged to make their own plan tailored to their local needs and aligned to proposed outcomes)

		Mon	Tue	Wed	Thu	Fri	Sat	Sun
Week 1	Morning	1A	1B	1C	1D	1E	2F	
	After noon	1A	1B 6A	1C 6A	1D 6A	1E 6A		
Week 2	Morning	2B	2A	2C	2D	2E	6B	
	After noon	2B	2A 6A	2C 6A	2D 6A	2E 6A		
Week 3	Morning	3A	4A	4C	4D	4G	4F 6B	
	After noon	3B	4A 6A	4C 6A	4D 6A	4E 6A		
Week 4	Morning	4H	4J	5A	5D	5D	5B 6B	
	After noon	4I	5B 6A	5B 6A	5B 6A	5B 6A		
Week 5	Morning	5D	5C	5C				
	After noon	5B	5C	4B				

## Sample lesson plans

## 1. Orientation

The purpose of the Orientation Module is to provide the new MBBS student a greater understanding of the medical profession in a historical, local and national context, a knowledge of the institution in which he/she will spend the next six years, and an idea of his/her role as an MBBS student.

### 1A Orientation Module: Introduction to institution / campus / facilities

The medical students at the very beginning of their course should have a clear understanding of the goals of their training, the expectations of the nation, the vision and mission of the institution, Rules and Regulations of the organisation. They must also be provided an orientation to the campus and the facilities available.

FC 1.2	Demonstrate understanding of the Roles of an Indian Medical Graduate and relate it to the societal impact	A	KH
FC 1.3	Discuss and appreciate the expectations of the students from the nation, society, Institution, peers, colleagues and patients and vice versa	A	KH
FC 1.4	Demonstrate understanding of the rules and regulations of the institution	A	SH
FC 1.5	Orient themselves to the college campus, facilities, faculty, administrative structure, support systems and processes of the institution	A	KH

#### Objectives:

**At the end of the session the students should be able to:**

- Explain the Roles of the Indian Medical Graduate
- Discuss their expectations from the Nation, institution, society, colleagues and peers and vice versa
- Understand the Rules and Regulations of the Institution

- Familiarise themselves with the college campus, facilities, administrative structure, support systems and processes of the institution

### Methodology

No.	Content area	Methodology	Time
1	Welcome and Introduction by institutional heads	Inspiring talk... to the new MBBS graduates and their parents	2 hours
2	Vision / Mission of the institution		
3	Roles of an Indian Medical Graduate		
4	Expectation of the students from Nation, Society, Institutions, colleagues and peers	Overview lecture/ interactive discussion	1 hour
4	Rules and Regulations of the institution	Overview lecture/ interactive discussion	1 hour
5	Orientation to the college / campus / facilities	<ul style="list-style-type: none"> <li>▪ Walk through the college including lecture halls, common rooms, preclinical departments, office of the Dean and administration, library, food facilities, security facilities, auditorium –</li> <li>▪ mini talks at important facilities regarding Rules and Regulations</li> </ul>	4 hours
6	Introduction to faculty / mentors	Interactive session with faculty mentors and peers	2 hours

**Assessment:** Open feedback at the end of the Foundation Course

## 1B. Orientation Module: Role of doctors in the society

It is important for new entrants to the new MBBS program to have a clear understanding of the roles and responsibilities of a doctor in society and the expectations from society, patients and the profession. It is important to sensitise and inspire students to the wider roles of physicians in society beyond patient-doctor interaction.

FC 1.1	Demonstrate understanding of the role of the doctors in the society and their impact	A	KH
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### Objectives:

#### At the end of this session, the student will be able to:

1. Appreciate the wider role of physicians in society beyond the physician – patient interaction
2. Reflection their own potential roles in society

#### At the end of this session, the moderators will be able to:

1. Better understand the attitude of students who join the medical course regarding their perceptions of the social role of physicians
2. Review the session and make plans for:
  - a. Further sessions
  - b. The session next year

## Methodology

No	Sub session	Methods	Requirements	Time
1	<b>Introduction</b>	Moderators, observers and other participants		10 minutes
2	Role of doctors buzz groups	<ul style="list-style-type: none"> <li>• Create buzz groups of 10 students each</li> <li>• Ask each group to list, discuss and note down on separate cards the various roles of doctors</li> <li>• After 10 minutes, ask one student from each batch to bring up their cards to put on four different posters which will be labelled at the back as – diagnostic role, treating role, physician-patient interactive roles, societal role.</li> <li>▪ The students will be blinded to labels at the back of poster. The moderator will help them separate and place their cards.</li> <li>• At the end, the entire group will view the posters – the moderator will turn the posters around to show the poster titles at the back</li> </ul> <p>The discussion that follows will be based on the</p>	<p>10 cards per group i.e. 150 cards</p> <p>Felt pens</p> <p>04 large black poster sheets</p> <p>A4 white paper – for notes and observations</p>	30 minutes

		<p>nature of responses:</p> <ul style="list-style-type: none"> <li>• Do the students see the doctor within a constrained role?</li> <li>• Is there a societal role for doctors in all conditions? – is there an even greater relevance in a diverse, unequal society like India</li> <li>• Is there a possibility that doctors remove themselves from society – us (ivory tower) AND them – the concept of isolationism and the ‘urban citadel’</li> </ul>		
3	Short film	<p><b>Short film: In Silence – maternal mortality in India</b></p> <p>Discussion:</p> <ul style="list-style-type: none"> <li>• Is this a medical problem or are there wider problems?</li> <li>• If there are wider problems, what are they?</li> <li>• What can doctors do to address wider problems?</li> <li>• Do doctors have privileged roles in society</li> </ul>	LCD projector with adequate sound facilities	30 minutes

		that they can exploit for greater common good?		
4	Meet the doctor	<p><b>Meet the doctor:</b></p> <p>Three doctors with diverse backgrounds who have chosen wider roles in society:</p> <p>They introduce themselves and their work</p> <p><b>Interview them:</b></p> <ul style="list-style-type: none"> <li>• Why did they choose this option?</li> <li>• What were the choices that they had to make?</li> <li>• What challenges did they face?</li> <li>• What advice, if any, would they give to these students?</li> </ul>	Arrange chairs for visitors to face the students	60 minutes
5	Wrap up	<p>Wrap up:</p> <p>Each student gets one card.</p> <ul style="list-style-type: none"> <li>• Think of one social issue in your own local area.</li> <li>• What could you do to help address that issue?</li> </ul>	<p>150 cards</p> <p>4 black poster sheets</p> <p>60 brief feedback questionnaires</p>	30 minutes

		<p>Students stick it on a poster entitled –</p> <ul style="list-style-type: none"><li>• I AM PART OF SOCIETY – I CAN CONTRIBUTE TO IT</li><li>• Time for entire batch to review what has been put up-</li><li>• Which of the sessions did you like the most &amp; why?</li></ul>		
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### Alternative method

No	Sub Session	Methods	Requirements	Time
1	Introduction	<p>An interactive lecture to discuss</p> <ul style="list-style-type: none"> <li>the roles of a physician and the expectation from the patient, families and society.</li> </ul> <p>followed by small group discussion</p> <p>Videos / clippings relating to the roles of the doctor could also be used as a trigger for discussion</p>	<p>LCD projector, audio output for video, Appropriate Video clips, Flip charts, Marker pens</p>	1 hour
2	Shadowing the physician	<p>Students asked to shadow Physicians and</p> <ul style="list-style-type: none"> <li>observe patient- physician interaction and their expectations from doctors</li> </ul>		2 hours
3	Reflection	Small group discussion and reflection		2 hours
4	Wrap up	Summarize salient points		10 minutes

**Assessment: Formative:** May be assessed by active discussion in the small group session or by Reflective writing in log book.

### 1C.Orientation Module: History of Medicine and alternate systems

Students at the time of entry into MBBS must be introduced to the evolution of the system of medicine which they will be learning and appreciate the great men and women behind many of the seemingly mundane practices and concepts in modern medicine. The students should also be introduced to the alternative systems that are available and how they can impact patient preferences and choices.

FC 1.10	Demonstrate awareness of the History of Medicine and alternate systems of Medicine	K	K
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#### Objectives

**At the end of the session, the students should be able to:**

1. Discuss the History of Medicine
2. Distinguish Alternative Medicine, Complementary Medicine and Evidence based Medicine
3. Discuss the various Alternative Medicine practices in India and its practice impact

#### Methodology

No	Sub Session	Methods	Requirements	Time
1	Overview	lecture/ interactive discussion	LCD projector, Flip charts, Marker pens	30 minutes
2	Group work	Students, split into groups, are given a structured task on <ul style="list-style-type: none"><li>• obtaining information on one important aspect of the History of Medicine (example – evolution of the germ</li></ul>	History of Medicine hand outs	3 hours

		<p>theory of medicine, discovery of vaccines,...etc)</p> <p>Small group discussion and reflection</p> <p>Presentation by groups and discussion</p>		
3	Alternate systems of Medicine	<p>lecture/ interactive discussion to address the following questions</p> <ul style="list-style-type: none"> <li>• What is Alternative Medicine?</li> <li>• What is Complementary Medicine?</li> <li>• What is Evidence Based Medicine?</li> <li>• What is the difference between Modern Medicine and Complementary and Alternative Medicine (CAM)?</li> <li>• What is the practice impact?</li> </ul>	LCD projector, Flip charts, Marker pens	1 hour
3	Wrap up	Summation and learning points		10 minutes

**Assessment:** General feedback about the usefulness of the session for future planning

### 1D. Orientation Module: IMG roles / overview of MBBS curriculum and various career pathways

It is important for medical students at entry to have an overview of the curricular frame work and the expected learning outcomes from them. It is very important for them to know their career path and the road ahead.

FC 1.2	Demonstrate understanding of the Roles of an Indian Medical Graduate and relate it to the societal impact	A	KH
FC 1.7	Demonstrate understanding of the overview of MBBS curriculum, its structure and outcomes and its relation to the career pathways	K	KH
FC 1.6	Discuss the various career pathways and opportunities for personal growth	A	KH

#### The objectives

At the end of the session, the students should be able to:

- Comprehend the overall Goal and outcomes of the MBBS program
- Reflect on the various Roles of the Indian Medical Graduate
- Discuss the structure of the MBBS program
- Recognise the various career pathways that are available for their Career growth

## Methodology

No	Sub Session	Methods	Requirements	Time
1	GMR 2019	Lecture/ interactive discussion about the salient features of the GMR 2019 <ul style="list-style-type: none"><li>• Explain the MBBS curriculum, its structure, outcomes and curricular requirements for course completion and program certification</li></ul>	LCD projector, Flip charts, Marker pens GMR 2019 handouts	1 hour
2	Panel discussion	A panel of specialists and physicians from diverse career pathways <ul style="list-style-type: none"><li>• Discuss the opportunities for the students followed by a question answer session.</li></ul> This could be done by the Alumni from various career back grounds		2 hour
3	Wrap up	Summation and learning points		10 minutes

**Assessment:** General feedback about the usefulness of the session for future planning

## 1E Orientation Module: Principles of family practice

The students need to be provided a basic understanding of the concept of family practice and holistic care. It is also important for the student to understand the role of the family practitioner in the health system, the role they could play at the various levels of health care.

FC1.8	Demonstrate understanding the role of physician at various levels of Health care delivery	K	KH
FC 1.9	Discuss the principles of family practice	K	KH

### Objectives:

**At the end of this session, the student will be able to:**

1. Discuss the principles of family practice and holistic care
2. Describe the role of the physician in the health care system

### Methodology

No	Sub Session	Methods	Requirements	Time
1	Principles of family practice and holistic care	Lecture/ interactive discussion about the ten principles of family practice: <ul style="list-style-type: none"><li>▪ Caring</li><li>▪ Clinical Competence</li><li>▪ Cost-effectiveness</li><li>▪ Continuity of care</li><li>▪ Comprehensive care</li><li>▪ Common problems management expertise</li></ul>	LCD projector, Flip charts, Marker pens Case vignette or a visit to a family practitioner	1 hour

		<ul style="list-style-type: none"> <li>▪ Co-ordination of Care</li> <li>▪ Community based care and research</li> <li>▪ Counselling and Communication skills</li> <li>▪ Continuing Medical Education (CME)</li> </ul> <p>Depending on available time the session may be preceded by either an appropriate case vignette or a visit to a family practitioner</p>		
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**Assessment:** Formative: Reflective writing

## 2. Skills

The fresh undergraduate student should be aware of some basic principles of Hospital safety and trained in certain basic skills that are mandated before they enter patient care areas. These are a part of quality initiatives to ensure patient and physician safety.

### 2A and 2B Skills module 1 and 2: BLS and First Aid

New entrants into medical fraternity should have a basic understanding of resuscitation and first aid skills.

**The Basic Life Support (BLS):** CPR provider training is designed to provide the students with foundational knowledge and skills needed to perform cardiopulmonary resuscitation (CPR) and other lifesaving skills. The first-aid component of this course addresses additional circumstances and diseases that may require intervention and assistance before the patient is transferred to emergency medical services.

FC 2.1	Perform Basic Life support in Skills lab	S	SH
FC 2.2	Perform First Aid in a simulated environment	S	SH

**Objectives:**

At the end of this session, the student will be able to:

1. Perform adequate chest compressions, deliver adequate ventilations in adults and children and appropriately use of an Automated External Defibrillator (AED).
2. Recognize and initiate first aid for several life threatening emergencies.

150 students can be divided into two groups of 75 each. Each group should be engaged by facilitators for a three hour session inclusive of break and subsequently groups should be rotated.

### Group 1: Basic Life Support

No	Sub Session	Methods	Requirements	Time
1	Introduction	Introduction to Basic Life Support. Its importance and need.		15 minutes
2	Demonstration with appropriate videos followed by Hands on training	<p>15 groups of 5 students each = 75 Total</p> <p>Demonstrate individual skills of basic life support followed by hands on practice of each skill and finally integration of all the skills in a patient scenario.</p> <ul style="list-style-type: none"> <li>• Introduce them to C-A-B algorithm</li> <li>• Recognition of cardiac and respiratory arrest</li> <li>• Pulse check</li> <li>• Chest compression</li> <li>• Delivering effective breaths</li> <li>• Use of an AED</li> <li>• Integration of all skill sets into a single scenario.</li> </ul> <p>These skills will be taught for both adults and children (including infants)</p>	<p>Space/Area to accommodate 75 students, Adult, child and infant Basic Life support mannequins.</p> <p>LCD projector with adequate sound facilities to show appropriate videos.</p>	2.5 hours (150 minutes)
3	Wrap up	Feedback from students and guidance for future learning		15 minutes

## Group 2: First Aid

No	Sub Session	Methods	Requirements	Time
1	Introduction	Introduction to several life threatening emergencies, the importance of first aid and its benefits.		15 minutes
2	Appropriate videos followed by discussion and hands on training when required.	<p>75 students: Table top discussion</p> <p>Initial videos to demonstrate emergency scenarios followed by appropriate first aid.</p> <ul style="list-style-type: none"> <li>• First Aid Basics (Approach)</li> <li>• Medical emergencies (Breathing problems, Choking, Allergic reactions)</li> <li>• Injury Emergencies (Bleeding, Bandaging, Burns, Electrical Injuries)</li> <li>• Environmental Emergencies (Bites and stings, heat cramps)</li> </ul> <p>Emphasis on Do's and Don'ts in each category.</p>	<p>Space/Area to accommodate 75 students,</p> <p>adult, child and infant Basic Life support mannequins.</p> <p>LCD projector with adequate sound facilities to show appropriate videos.</p>	2.5 hours (150 minutes)
3	<b>Wrap up</b>	Feedback from students and guidance for future learning		15 minutes

**Assessment:** Assessment of skill performance as a part of the formative assessment

## 2C Skills Module: Universal Precautions (UP)

FC 2.3	Follow biosafety and universal precautions	S	SH
FC 2.4	Demonstrate handling and safe disposal of Bio hazardous materials in a simulated environment	S	SH
FC 2.5	Demonstrate proper hand washing and use of personal protective equipment	S	SH
FC 2.6	Demonstrate appropriate response to needle stick injuries	S	SH

### Objectives:

At the end of this session, the student will be able to:

1. Define Universal Precautions
2. List essential components of Universal Precautions
3. List infective and non- infective body fluids
4. Demonstrate correct techniques of Hand washing, gloving/degloving, disinfection, handling sharps, waste disposal

## Methodology

No	Sub Session	Methods	Requirements	Time
1	Definition of Universal Precautions (UP)	<p>Interactive lecture about:</p> <ul style="list-style-type: none"><li>▪ Definition of UP</li><li>▪ Essential components of UP</li><li>▪ Infective and non-infective body fluids (may use a drill to recap)</li></ul>	LCD projector, Flip charts, Marker pens	1 hour
2	Interactive practical demonstration	<ul style="list-style-type: none"><li>▪ Divide the students into groups of not more than 10 per group.</li></ul> <p>There should be one faculty per group who will conduct an interactive practical demo about</p> <ul style="list-style-type: none"><li>▪ Use of hand rub</li><li>▪ Gloving and de-gloving</li></ul> <p>The students will be then allowed to demonstrate the correct method and receive feedback</p>		2 hour
3	Wrap up	Summation and learning points		10 minutes

**Assessment:** Formative assessment, OSCE

## 2D Skills Module: Waste management

FC 2.7	Demonstrate Biomedical Waste (BMW) segregation, observe and reflect on the process of management of BMW in accordance with National regulation	S	SH
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### Objectives:

At the end of this session, the student will be able to:

1. Define biomedical waste
2. Explain the hazards of improper disposal of biomedical wastes
3. Describe the different types of waste generated in a health care facility
4. Explain how one should segregate waste
5. Explain how one should dispose biomedical wastes
6. Methodology

No	Sub session	Methods	Requirements	Time
1	Definition of BMW	Interactive lecture about: <ul style="list-style-type: none"><li>▪ Definition of biomedical wastes</li><li>▪ Different types of waste generated in a health care facility)</li><li>▪ Segregation and disposal of waste</li></ul>	LCD projector, Flip charts, Marker pens	1 hour

**Assessment:** Students may present a reflection of their observation, OSCE on BMW segregation

## 2E Skills Module: Immunization

The students should be sensitised to the occupational exposure and the need for protection and safety. During this session, it's important to review the immunisation status of the students and also ensure compliance to the requirements.

FC 2.8	Discuss the Immunization requirements of Health care professionals	K	KH
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### Objectives:

**At the end of this session, the student will be able to:**

1. List the vaccine-preventable diseases (VPD)
2. Explain why vaccination is important for staff and students
3. Describe the vaccination recommendation for health care personnel (Hepatitis B, Chicken pox etc.)

### Methodology

No	Sub Session	Methods	Requirements	Time
1	Vaccine-preventable diseases and recommendations for health care personnel	Interactive lecture about: <ul style="list-style-type: none"><li>• What are vaccine-preventable diseases (VPD)?</li><li>• Why is vaccination important for staff?</li><li>• VPDs in healthcare</li><li>• Recommendation for health care personnel (Hepatitis B, Chicken pox)</li></ul>	LCD projector, Flip charts, Marker pens	1 hour

**Assessment:** Formative assessment, short notes, Viva in summative assessments

## 2F Skills Module: Documentation

The students in the first year should be introduced to the importance of “Documentation” in patient care. They should learn the method of appropriate documentation and understand its significance in patient and employee safety.

FC 2.9	Demonstrate awareness of significance of documentation in patient care and the proper method of documentation	S	SH
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### Objectives

**At the end of the session, the students should be able to:**

- Explain the importance of documentation as a physician responsibility
- Discuss the consequences of appropriate and inappropriate documentation on patient and employee safety
- Observe the correct method of documentation in patient record
- Reflect on the process

**Method:** Large group session that gives an overview and demonstrates the documentation process and explains the right and wrong ways.

- The students can be asked to do mock audit and discuss on patient records (dummy records) with a check list .Small group sessions with peer interaction to guide the new students on the process

**Assessment: Formative assessment**

### 3. Community Orientation Module

#### 3A. Community Orientation Module: National Health goals and policies/ health care systems / community health

The medical student should be exposed from the beginning to the community in order to get a bird's eye view of the social, demographic, environmental and cultural factors that influence health and the system of health care delivery at the primary level of health care.

FC 3.1	Demonstrate understanding of the National Health Goals and Policies	K	KH
FC 3.2	Discuss the national health scenario, demographic, socio cultural and epidemiological issues	K	KH
FC 3.3	Demonstrate understanding of the health care systems in India with reference to primary, secondary and tertiary level care	K	KH
FC 3.4	Discuss the basic principles of community health and its impact on health and disease	S	SH
FC 3.5	Demonstrate understanding of the structure and functioning of the community health center	K	KH

#### Objectives:

#### At the end of this session, the student will be able to:

1. Explain the National Health goals and policies
2. Discuss the National health scenario, demographic, socio-cultural and epidemiological issues
3. Discuss the health care systems in India with reference to primary, secondary and tertiary level care
4. Describe the basic principles of community health and its impact on Health and disease
5. Observe the structure and functioning of the community health centre
6. Reflect on the observation

## Methodology

No	Sub Session	Methods	Requirements	Time
1	National Health: goals and policies	Interactive lecture on National health goals and policies	LCD projector, Flip charts, Marker pens	1 hour
2	National health scenario	Interactive lecture on National health goals and policies	LCD projector, Flip charts, Marker pens	1 hour
3	Health care systems in India	Community Health Centre visit and reflection on the experience with particular reference to:	Logistics for community visit	4 hours
4	Principles of community health	A) Levels of health care in a community setting B) Interaction with families in the community setting and the impact of health		
5	Community Health Center	C) Functioning of the Community Health Centre and health care team  Community visit followed by a discussion back in the college		

**Assessment:** Formative: Reflection writing / discussion of the experience

### 3B. Community Orientation Module: Interactions with patients and families and communities.

Exposure to the community in the beginning of their profession will sensitize the students to the actual community living of people, the disease impact in the community and its impact on the patient's families and health workers.

FC 3.6	Demonstrate ability to obtain patient experiences through patient and family interactions and relate these experiences to impact of environment and diseases.	S	SH
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#### Objectives:

**At the end of this session, the student will be able to demonstrate an understanding of:**

1. The effect of family and social environment in the aetiology of diseases
2. Community beliefs and practices related to health and illnesses
3. The environmental health problems in the community
4. Patient experiences to diseases treatment-seeking practice

#### Methodology

No	Sub Session	Methods	Requirements	Time
1	Interaction with patients and families and communities.	<ul style="list-style-type: none"> <li>• Community Health centre visit and reflection on the experience with particular reference to:</li> <li>• The effect of family and social environment in the aetiology of diseases</li> <li>• Community beliefs and practices related to</li> </ul>	Logistics for community visit  LCD projector, Flip charts, Marker pens	1 hour  (The time for community visit is factored in in the previous session)

		<p>health and illnesses</p> <ul style="list-style-type: none"><li>• The environmental health problems in the community</li><li>• Patient experiences to diseases treatment-seeking practice</li><li>• Community visit followed by a discussion back in the college</li></ul>		
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**Assessment:** Formative: Reflective writing of their observations

#### 4. Professional Development and Ethics

##### 4A. Professional Development and Ethics Module: Concept of Professionalism and Ethics

The students should be introduced to the concept of professionalism and ethics as an important domain in their learning and practice. They should be made aware of the code of conduct and its significance in life and career.

FC 4.1	Demonstrate understanding of the concept of Professionalism and ethics among health care professionals and discuss the consequences of unprofessional and unethical behavior	S	KH
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##### Objectives:

**At the end of this session, the student will be able to:**

1. Explain the concept of professionalism and ethics among health care professionals
2. Describe the consequences of unprofessional and unethical behavior

##### Methodology

No	Sub Session	Methods	Requirements	Time
1	Professionalism and Ethics – the concept	<ul style="list-style-type: none"><li>• Interactive lecture about using case vignettes and video</li><li>• Could use a drill with various scenarios depicting professional and unprofessional behaviour</li></ul>	LCD projector, Flip charts, Marker pens	1 hour
2	Consequences of unprofessional and unethical behavior	<ul style="list-style-type: none"><li>• Group work using case vignettes / video</li><li>• Group presentation and discussion with reference to consequences of unprofessional and unethical behavior</li></ul>		1 hour

**Assessment:** Formative assessment

#### 4B. Professionalism and Ethics Module: White coat ceremony

FC 4.2	Demonstrate understanding that compassion, altruism, integrity, duty, responsibility and trust are the core values that defines the nature of the physician's work	K	KH
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#### Objective:

At the end of the session, the student is able to:

#### 1. Appreciate the significance of White Coat Ceremony

The white coat reminds physicians of their professional duties, as prescribed by Hippocrates, to lead their lives and practice their art in uprightness and honour. The white coat is a symbol of our profession.

The White Coat Ceremony is a rite of passage, welcoming the new medical students into the medical profession. As medical students, they are bound by the same professional commitments that bind all physicians. This ceremony will join the symbol of the white coat with the virtues of altruism, responsibility, duty, honour, respect, and compassion.

**Assessment:** Reflections

#### 4C Professionalism and Ethics Module 3: Professional and altruistic behaviour

FC 4.2	Demonstrate understanding that compassion, altruism, integrity duty, responsibility and trust are the core values that defines the nature of the Physician work	K	KH
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#### Objective

At the end of the session, the student should be able to:

- Describe Altruism
- Discuss Altruism as an important professional virtue of a physician

1	Altruism as a virtue of a Physician	<ul style="list-style-type: none"><li>• Guest lecture / Address by the dean or director</li><li>• Case based interactive lecture</li></ul>	LCD projector, Flip charts, Marker pens	1 hour
2	Case discussion	<ul style="list-style-type: none"><li>• The students will discuss case in groups</li></ul>		1 hour

**Assessment:** Formative assessment while discussing in groups

#### 4D Professionalism and Ethics Module: Working in a health care team

One of the major roles of the Indian Medical Graduate is that of being a member of a health care team. While the MBBS program is structured to build this competence during its course, an introduction to the concept of working in a team is essential at the beginning.

FC 4.3	Discuss the value of honesty and respect during interaction with peers, seniors, faculty, other health care workers and patients	S	KH
FC 4.4	Discuss the significance of working in a health care team	S	KH

#### Objectives:

**At the end of this session, the student will be able to:**

1. Describe the significance of working in a health care team
2. Discuss the role of honesty, respect and trust

#### Methodology

No	Sub Session	Methods	Requirements	Time
1	Working in a health care team	<ol style="list-style-type: none"><li>1. The students visit several patient care area and observe functioning of the Multidisciplinary teams, such as the emergency OPD, or OT, or labour room</li><li>2. The students may be posted in small groups to observe and reflect with regard to the 5</li></ol>	LCD projector, Flip charts, Marker pens	1 hour

		<p>important aspects of working in a team:</p> <ul style="list-style-type: none"><li>a. Shared goals</li><li>b. Communication</li><li>c. Leadership</li><li>d. Role clarity</li><li>e. Trust / respect</li></ul> <p>3. Group presentation and discussion</p>		
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3. **Assessment** : Formative assessment during group discussions / presentations

#### **4E Professionalism and ethics Module 5: Disability competencies**

As newly joined medical students, they need to recognize the importance of various deviations from majority that are happening in human life. Disability is part of human diversity. Differently abled individuals need to be understood and recognized by any stream that deals with human life.

India was one of the first major country who ratified the greatest human rights instrument of 21st Century, the United Nations Convention on the Rights of Persons with Disabilities (CRPD) and accordingly amended its disability legislation incorporating human rights approach to Rights of Persons with Disabilities (RPDA) Act, 2016. The Act mandates inducting disability content into all professional courses including medical field.

#### **Educational Strategy**

An Indian Medical Graduate is expected to have disability competence which is the skills and attributes essential to provide quality health care to patients with disabilities. It is the social responsibility of medical institutions to be empathetic towards the marginalized section. Disability competencies and suggested teaching-learning methods are provided in table 2.

**Table 2. Disability Competencies under the Five Roles of the Indian Medical Graduate (IMG)**

<b>IMG Role</b>	<b>FC 4.5</b>	<b>Domain</b>	<b>Level</b>	<b>Suggested TLM</b>	<b>Duration</b>
	<b>Competencies addressed</b>				
	<b>The student should be able to:</b>				

Clinician	<b>4.5.1</b> Describe disability as per United Nations Convention on the Rights of Persons with Disabilities while demonstrating respect for the differences and capacities of persons with disabilities as part of human diversity and humanity.	K	KH	Lecture/or panel discussion involving person with disability	1 hour
Clinician	<b>4.5.2</b> Compare and contrast medical and social model of disability.	K	KH	Patient narratives in small groups followed by sharing amongst groups	
Communicator	<b>4.5.3</b> Build an understanding on the disability etiquettes while addressing people with disabilities	S/A	SH	Standardized patient with disabilities in small groups followed by sharing amongst groups	1 hour
Lifelong learner	<b>4.5.4</b> Demonstrate awareness of the disabilities included in the Rights of Persons with Disabilities Act, 2016.	K	KH	Case histories, incidental reports in small groups followed by sharing amongst groups	
Communicator	<b>4.5.5</b> Demonstrate the use of verbal and non-verbal empathetic communication techniques while communicating with people with disabilities	S/A	SH	Clinical patient encounter with guidance in small groups followed by sharing amongst groups	1 hour

Professional	<b>4.5.6</b> Demonstrate a non-discriminatory behaviour towards patients or caregivers with disabilities	A	SH	Video or simulated encounters or Forum Theatre (Theatre of the Oppressed) Class room Session	
Lifelong learner	<b>4.5.7</b> Have an understanding of accessible healthcare setting for patients with disabilities, including universal design	K	KH	Functioning of NGO or accessible Disability Unit	Visit or SGD-2 hours
Leader	<b>4.5.8</b> Advocate social inclusion by raising awareness of the human rights of persons with disabilities.	K	KH	Self-reflection paper/blog SDL	SDL- 2 hours

Modified-from Disability-inclusive Compassionate Care: Core Competencies on Disability for Health Professions Education by Medical Humanities Group, UCMS, Delhi

#### 4F. Professionalism and Ethics Module: Cultural competence

Cultural competence is the ability to interact respectfully with colleagues from any culture and requires critical consciousness. It is a congruent set of behaviours, attitudes, skills, policy and procedures that come together in a system, agency, or among individual professionals to enable them to work effectively in cross cultural situations. This is relevant for the medical students as they are joining MBBS in medical colleges throughout all states in India and students from outside India are also joining medical colleges in India. Therefore, the cross cultural component will help students a lot as the cultural diversity is unique and vast in the country.

FC 4.6	Demonstrate understanding and respect of cultural diversities and interact with those with different cultural values	K/A	KH
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#### Objectives:

**At the end of this session, the student will be able to:**

1. Describe components of cultural competence

#### Methodology

No	Sub Session	Methods	Requirements	Time
1	Components of cultural competence	<ul style="list-style-type: none"><li>An interactive lecture on the components</li></ul>	LCD projector, Flip charts, Marker pens	1 hour

## Professionalism and Ethics Module: Stress management

The first year students are challenged with many changes including the new place,peers, atmosphere, environment and a major leap in the learning styles and contents. This induces stress making them vulnerable. Hence, it is important to address the role of stress during their learning period and methods to enhance their resilience.

FC 4.7	Discuss the significance and methods of stress management and risk taking behaviour.	K	KH
FC 4.8	Understand the role of yoga and meditation in personal health	S	S

### Objectives

**At the end of the session, the student should be able to:**

- Describe the situation that may cause stress during their learning period
- Discuss the health impact of stress
- Appreciate the various stress management techniques including yoga and meditation
- Discuss the spectrum of risk - taking behaviour, consequences and ways to manage

Case based discussion to be held in small groups on stressful situations such, academic stress, examination stress, peer pressure, family pressure, gender issues, discrimination, dealing with emotions. Various risk taking behaviours such as violence, drug abuse, rash driving, bullying etc. should be addressed.

A Yoga / Meditation demonstration by an expert followed by reflection on the experience may be done.

#### 4 H Professional Development and Ethics Module: Time management

Good time management is essential for a Professional. Many deadlines for college work occur at the same time, and unless the student plans ahead, he/she will find it difficult to manage. Learning how to manage time will help them maintain academic performance as well as a life outside of school.

FC 4.9	Discuss the significance and appropriate ways of time management	S	SH
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#### Objectives:

**At the end of this session, the student will be able to:**

1. Describe the importance of time management
2. Prioritize their activities in order to manage time better
3. Identify and handle their own distractions and interruptions

#### Methodology

No	Sub Session	Methods	Requirements	Time
1	Importance of time management	<ul style="list-style-type: none"><li>• An interactive lecture</li></ul>	LCD projector, Flip charts, Marker pens	1/2 hour
2	Prioritization	<ul style="list-style-type: none"><li>• Group work using the “action priority matrix”</li><li>• Discussion</li></ul>		1 hour

3	Distractions and Interruptions	<ul style="list-style-type: none"> <li>• Administer the time management skills questionnaire</li> <li>• Students to reflect their own strengths</li> <li>• Ask students to work in groups and write down what they think are the main distractions / interruptions that a MBBS student will face.</li> <li>• Ask the groups to discuss and present the solutions to the above</li> </ul>		1 hour
4	Wrap up	Summarize and take general feedback about the session		5 minutes

**Assessment:** Formative

#### 4I Professional Development and Ethics Module: Interpersonal relationship

The students should understand the role of interpersonal relationship while interacting with the patients, families, peers, superiors and health care personnel. They should understand the significance of these interactions and professional boundaries. They should understand and experience the role of mentoring in personal and professional growth.

FC 4.10	Demonstrate understanding of importance of interpersonal relationship while working in a health care team	S	KH
FC 4.11	Understand the role of mentoring	S	KH

#### Learning method:

- (1) Role plays to understand the significance of interpersonal relationship and group discussion
- (2) Interactive lecture on Mentoring followed by allotment of mentors to the new batch
- (3) Mentor-Mentee interaction and road ahead

#### 4J Professionalism and Ethics: Learning

After years of formal schooling, students enter the MBBS course often without having mastered the fundamental skills of learning. When they begin their course and are propelled into a more active learner mode, understanding of these fundamentals becomes vital. Students will learn how to learn through many avenues, such as modelling, curiosity, and situational need. This session on learning is included in the Foundation Course as a way to help them understand the process learning.

FC 4.12	Demonstrate understanding of the process of group learning and group dynamics	S	KH
FC 4.13	Comprehend the learning pedagogy and its role in learning skills	S	KH

FC 4.14	Demonstrate understanding of different methods of self-directed learning	S	KH
FC 4.15	Understand collaborative learning	S	KH

**Objectives:**

1. To recognize the need to learn
2. To identify and maximize one's learning style
3. To describe how people learn
4. Experience collaborative and group learning
5. Discuss the methods of SDL and its application in their routine learning

**Learning method**

- Students are subjected learning style evaluation and asked to reflect
- Students are exposed to various methods through self -experience and role play and asked to reflect

**Assessment:** Nil

## 5 Enhancement of Language and Computer Skills:

### 5A Enhancement of Language and Computer Skills Module: Communication

Good communication skills are essential for an optimal doctor-patient relationship, relationship between peers/colleagues and also colleagues in a team which ultimately also contributes to improved health outcomes. Training in communication skills needs approaches which are different from that of teaching other clinical subjects.

FC5.1	Demonstrate ability to communicate with patient and families, be aware of barriers to communication and appropriate ways to respond	C	SH
-------	---	---	----

#### Objectives:

At the end of this session, the student will be able to:

1. Describe the basic elements of communication skills
2. Explain the importance of listening and empathy in communication
3. Explain the importance of good communication skills in medicine
4. Recognise the common barriers to communication
5. Observe patient and family interactions ( Videos , Role plays )
6. Reflect on the appropriate ways to respond

#### Methodology

No	Sub Session	Methods	Requirements	Time
1	Basic communication skills	<ul style="list-style-type: none"><li>• Lectures (PPT), role plays, group</li></ul>	LCD projector, Flip charts,	3 hours

2	Listening skills	discussions, brainstorming	Marker pens	
3	Importance of empathy in communication skills			
4	Importance of good communication in medicine			
5	Observe patient and family interactions	<ul style="list-style-type: none"> <li>• Video demo / Role play of patient and family interaction</li> <li>• Ask students to reflect on appropriate and inappropriate responses</li> </ul>	Video	

Assessment: Formative during group discussions

### 5B Enhancement Skills Module 8: Local Language skills

The local language skills training will be conducted as per the felt need and may continue beyond the Foundation Course.

FC 5.2	Demonstrate use of local language in patient and peer interactions	C	SH
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Sessions will be organised in small groups and rotated between enhancement skills

## 5C Enhancement Skills Module 8: English Language skills

The English language skills training will be conducted as per the felt need and may continue beyond the Foundation Course.

FC 5.3	Demonstrate ability to communicate and learn in English	C	SH
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Sessions will be organised in small groups and rotated between enhancement skills

## Enhancement of Language and computer skills Module: Basic computer skills

The students should be competent in the use of ICT in teaching and learning. The students should be introduced to the basic use of word and power point, familiar with search engines, in performing a literature search and accessing online resources.

FC 5.4	Demonstrate basic computer skills	S	SH
FC 5.5	Demonstrate ability for accessing online resources	S	SH

The students are posted to the computer / Active learning centre for the training and it will continue as per need of the students beyond Foundation Course

## 6 Sports and extracurricular activities

Should be for a mandatory 4 hours per week and extra-curricular activities 2 hours per week, subject to a maximum of 22 hours

### 1. Further Reading link

<https://www.mciindia.org/CMS/wp-content/uploads/2019/01/UG-Curriculum-Vol-I.pdf>

<https://www.mciindia.org/CMS/wp-content/uploads/2019/01/UG-Curriculum-Vol-II.pdf>

<https://www.mciindia.org/CMS/wp-content/uploads/2019/01/UG-Curriculum-Vol-III.pdf>

[https://www.mciindia.org/CMS/wp-content/uploads/2019/01/AETCOM\\_book.pdf](https://www.mciindia.org/CMS/wp-content/uploads/2019/01/AETCOM_book.pdf)



# BOARD of GOVERNORS in supersession of Medical Council of India

## COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR THE INDIAN MEDICAL GRADUATE

Knows Knows how Shows Shows how Performs

Observe

Demonstrate

Enumerate

Assist

Counsel

Describe

Prescribe

Analyse

Integrate

Guide

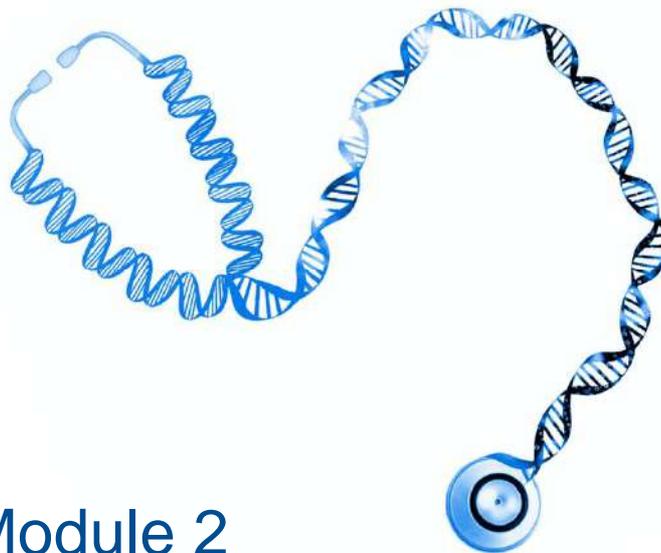
Communicate

Correlate

Interpret

Critique

Collaborate



### Module 2

# Early Clinical Exposure

Clinician Communicator Team Leader Professional Lifelong Learner

Knowledge

Skills

Attitude

Values

Responsiveness

Communication

Curriculum Implementation Support Program

**Early Clinical Exposure for  
Undergraduate Medical Education  
Program  
2019**



**Medical Council of India  
Pocket-14, Sector-8, Dwarka,  
New Delhi 110 077**

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**अध्यक्ष**

**भारतीय आयुर्विज्ञान परिषद के**

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## **Foreword**

### **Early Clinical Exposure**

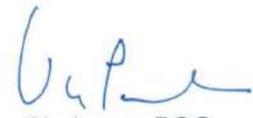
The primary objective of medical education is to prepare students for a lifetime of patient care. The students must not lose this perspective through their years of study. One of the key requisites of a curriculum is providing relevance to learning. The competency driven curriculum developed for the MBBS program has several unique features that guides student learning by maintaining a focus on patients.

Early Clinical Exposure introduces some aspects of clinical and social contexts of patient care into the first year of undergraduate teaching program. The purpose of this program is to provide a reference to basic science learning so that students can understand the applicative aspects of learning. Importantly it helps to reinforce comprehension of normal and its altered expression and disease states.

Early patient contact by the student is desirable because it introduces the learner to the most important stakeholder in his or her career at a nascent time; this will hopefully provide the stimulus and encouragement required for the learner to focus on the task ahead. Simple designed programs - allowing patient interaction/context in a supervised setting - will facilitate the student to learn from patient's perception of illness, its effect on health, its impact on family relationships and well-being and professional activity. Providing such opportunities for "immersive learning" early in the curriculum will shape the learner's commitment to care, empathy, altruism and service, the guiding principles enshrined in the new curriculum.

Introduction of Early Clinical Exposure in the undergraduate curriculum fulfills a long standing request of educators. This booklet incorporates some ideas and best practices gleaned from experts and institutions across the country. We are confident that each institution will add to this corpus of experience, their own lessons, cases and modules and hopefully share them with other institutions.

The Early Clinical Exposure program is designed to enrich the learning experience of the student and provide him or her tools that will not only strengthen the foundation laid in the first phase, but also bring to focus the larger import of learning done in that phase to future phases and career. We are grateful to the members of the Expert Group and the Academic Cell for painstakingly putting this booklet together. We hope that teachers and institutions will benefit from the suggestions provided herein and can successfully adapt and apply them into their own environment.

  
Chairman, BOG

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**MEDICAL COUNCIL OF INDIA**  
BOARD OF GOVERNORS  
IN SUPERSESSION OF MEDICAL COUNCIL OF INDIA

## Foreword

### Early Clinical Exposure

This booklet provides a suggested pattern for the Early Clinical Exposure component for the MBBS program commencing 2019. The Early Clinical Exposure component allows students to understand basic science from an applicative perspective. The ability to learn concepts with their future application will generate interest and provide for greater retention and comprehension in the learner. One key aspect of this component is provision of authentic human contact. Exposure to patients and their families early will be a great influence on the professional and personal development of students and provide a stimulus to improved learning.

This booklet has been developed by experts invited by the Board of Governors in super session of the MCI and incorporates their vast expertise and experience. The time and effort spent in creating this guide that can be used by institutions to develop their own learning process and content is gratefully acknowledged. Appreciation is also due to the efforts of the Academic Cell and of the faculty at various Regional and Nodal centers who worked tirelessly to ensure that the new competency driven curriculum and its various unique components are implemented fully and flawlessly across the medical colleges in the country.

Secretary General

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# **Curriculum Implementation Support Program**

## **Module – 2**

# **EARLY CLINICAL EXPOSURE**

# Early Clinical Exposure

## Guidelines for Universities, Curricular Committees and Faculty

Early Clinical Exposure (ECE) provides a clinical context and relevance to basic sciences learning. It also facilitates early involvement in the healthcare environment that serves as motivation and reference point for students, leading to their professional growth & development.

### 1. Objectives of the Document are to:

- Describe the modalities of applications of ECE in a medical college
- Facilitate the development of modules of ECE for students
- Facilitate Implementation of ECE in their medical college

### 2. Introduction:

Students require context to understand basic sciences. They also require grounding in human and social aspects of the practice of medicine. Early clinical correlation and exposure to clinical environment will provide a point of reference and relevance to the novice learner. The ECE program in the MBBS curriculum tries to create an opportunity for students to correlate learning in Phase I subjects with their clinical application. Learning of basic sciences with respect to a clinical context can improve student's motivation to learn and also improve retention. It also provides authentic human context and early introduction to immersion into the clinical environment.

The MBBS curriculum has therefore been modified such that clinical exposure can be introduced earlier along with the basic sciences. Students will be able to learn the basic and clinical sciences by means of integrating learning activities, like early clinical contact, clinical skills, communication skills or task-based learning sessions.

Students can be exposed to clinical experiences in various forms and in a variety of settings which are outlined in this booklet. This does not reduce the

importance of traditional basic science instruction, but enriches and contextualizes the learning for the students.

### **3. Objectives of Early Clinical Exposure:**

The objectives of early clinical exposure of the first-year medical learners are to enable the learner to:

- (a) Recognize the relevance of basic sciences in diagnosis, patient care and treatment
- (b) Provide a context that will enhance basic science learning
- (c) Relate to experience of patients as a motivation to learn.
- (d) Recognize attitude, ethics and professionalism as integral to the doctor-patient relationship
- (e) Understand the socio-cultural context of diseases through the study of humanities

### **4. Elements of ECE:**

The three elements of ECE are:

1. Provision of clinical correlation to basic sciences learning.
2. Provision of authentic human contact in a social or clinical context that enhances learning in the early/pre-clinical years of undergraduate education.
3. Introduction to humanities in medicine

#### **Salient Principles:**

The key principles underlying early clinical exposure are providing a clinical context and ensuring patient centricity. Early clinical exposure provides for the three key elements listed above. The clinical context can include case scenario, videos, actual patient, simulated patient etc. The presence of actual patients in every sessions of ECE, though not essential, is preferred. Therefore, ECE is exposure to the relevant clinical context in earlier years. It must be noted

that purpose of ECE is not to prepone the conventional clinical teaching but to provide better understanding of basic sciences through a clinical context.

## 5. Context from proposed GMER 2019:

### 9.2.1 Objectives:

The objectives of early clinical exposure of the first-year medical learners are to enable the learner to:

- (a) Recognize the relevance of basic sciences in diagnosis, patient care and treatment
- (b) Provide a context that will enhance basic science learning
- (c) Relate to experience of patients as a motivation to learn
- (d) Recognize attitude, ethics and professionalism as integral to the doctor-patient relationship
- (e) Understand the socio-cultural context of diseases through the study of humanities

### 9.2.2 Elements:

- a) **Basic science correlation:** To apply and correlate principles of basic sciences as they relate to the care of the patient (this will also become part of integrated modules).
- b) **Clinical skills:** To include basic skills in interviewing patients, doctor-patient communication, ethics and professionalism, critical thinking and analysis and self-learning (this training will be imparted in the time allotted for early clinical exposure).
- c) **Humanities:** To introduce learners to a broader understanding of the socio-economic framework and cultural context within which health is delivered through the study of humanities and social sciences.

## 6. Structure of the program for students:

### Planning of activities & its distribution

**It would be desirable to plan all teaching learning sessions in basic sciences around a clinical scenario so that students understand its relevance.** But the clinical scenario in ECE should not be restricted to just the initial part of the teaching sessions, but form a framework around which learning will occur.

The time allotted for ECE in first year (as per GMR, 2019) is 90 hours which has to be equally divided among the three preclinical subjects. So the time available for each subject is 30 hours. It is suggested that, it can be further divided as follows:

- 1. Basic sciences correlation (18 hours):** One three hour session per month for 6 months may be allotted. The clinical context can be introduced using actual patient contact or by use of paper based cases, charts (e.g. use of spirogram, electromyogram with its clinical correlation), graphics (e.g. using photos of gigantism/hypothyroidism/ Cushing's syndrome in endocrinology), videos (e.g. videos depicting normal & abnormal respiratory movements, embryology, endoscopy, laryngoscopy etc.), reports (e.g. blood/urine reports indicating biochemical markers), field visits etc. in community/ hospital laboratories.
- 2. Clinical skills (experience and human context) (12 hours):** Three hour session per month for 4 months per department may be allotted. Cases may be demonstrated by preclinical faculty or clinicians, in out-patient departments/ wards/ demonstration rooms, as feasible, in small groups.

Each 3-hour session of clinical experience can follow the guidelines below:

- Introduction to the module & instruction by preclinical faculty: 30 minutes

- Clinical experience (in groups at different places like wards/OPDs/classrooms with guided observation/checklist): 1 hour 30 minutes
- Summary & conclusion (with learning points): 30 minutes
- Reflection (with guidance & monitoring) on what was learnt: 30 minutes

Examples of clinical context and related learning outcomes are provided in **Annexure I**.

Examples of deviations from normal to be observed and noted by student when exposed to clinical context are given in **Annexure II**. These can be used while preparing observation guides.

It is important to finalise a detailed observation guide for students and instruct them, before the actual interaction, regarding what he/she is supposed to observe during the ECE session. In observation guide, list out clinical features the student has to focus in the particular context. You may refer to the sample modules for ECE given in **Annexure III**.

3. **Humanities:** This will be merged with AETCOM module and therefore no additional time is allotted.

A sample for Humanities module is attached in **Annexure IV**

## 7. Formative & Internal Assessment:

Formative assessment will have a major role in the teaching of Early Clinical Exposure. The assessment must focus on students' activities during ECE. Students will participate in various activities such as case based scenarios, live patient's interactions, simulated patients, videos etc. A record of these activities should be maintained and assessed periodically.

Elements from ECE should be included as appropriate in formative and summative assessments of the respective subjects.

### **A) Internal Assessment:**

Early Clinical Exposure should be part of internal assessment for the respective subject. During assessment, questions should test clinical correlation in basic sciences.

### **B) University Examinations:**

It is suggested that examinations should include elements from ECE to test the ability of the student to apply basic science knowledge in clinical context.

The Modified Essay Questions (Problem based long answer questions), Clinical vignette based Short Answers Questions (SAQ), objective type questions (e.g. Multiple Choice Questions - MCQs) and OSPE can include parts of ECE. **Annexure V** gives examples of clinical vignette based short answer questions.

## **8. Capacity Building for Faculty:**

### **Faculty Development:**

Faculty need to be reoriented to the principles and practice of early clinical exposure. Preclinical and clinical faculty need to coordinate and involve in the activities related to hospital visits. Clinical faculty may be involved in the planning of ECE sessions. Faculty should be trained to develop, implement and assess ECE which is relevant to their subjects and phases including setting question papers, use of case based questions, assessing clinical context in earlier years and applications of the ECE.

## **9. Implementation, Monitoring / Curricular Governance:**

Planning, Implementation and oversight of ECE is the responsibility of the Curriculum Committee of the college. The Curriculum Committee (CC) will work

in collaboration with phase-wise curriculum subcommittee (CSC), and Heads of departments to plan the ECE sessions and coordinate hospital visits.

### **Responsibilities of Principal/Dean**

- Hold regular meetings of the Curriculum Committee and Heads of Departments
- Ensure implementation of ECE & monitor its activities.

### **Responsibilities of Head of Departments**

- Function as Coordinator of ECE program in their disciplines

### **Responsibilities of Curriculum Committee**

- To review regularly and record ECE activities & make necessary changes /adjustments as required from time to time.
- To help in scheduling ECE sessions for class-room, hospital & community visit
- To ensure that the competency based UG curriculum is implemented by all departments as per MCI guidelines.

### **Responsibilities of MEU**

- To arrange the sensitization programs for all faculty members (including the Principal/Dean, Heads of departments of pre-clinical & related clinical departments)
- To train and orient the resource persons

## **10. Further Reading:**

### **List of resources**

### **Must read**

1. Başak O, Yaphe J, Spiegel W, Wilm S, Carelli F, Metsemakers JFM. Early clinical exposure in medical curricula across Europe: An overview. *Eur J Gen Pract.* 2009 Jan 1;15(1):4–10.

### **Additional reading**

2. Dornan T, Littlewood S, Margolis SA, Scherpbier A, Spencer J, Ypinazar V. How can experience in clinical and community settings contribute to early medical education? A BEME systematic review. *Med Teach.* 2006 Feb; 28(1):3–18.
3. McLean M. Sometimes we do get it right! Early clinical contact is a rewarding experience. *Educ Health Abingdon Engl.* 2004 Mar; 17(1):42–52.
4. Abramovitch H, Shenkman L, Schlank E, Shoham S, Borkan J. A tale of two exposures: a comparison of two approaches to early clinical exposure. *Educ Health Abingdon Engl.* 2002;15(3):386–90.
5. Kachur EK. Observation during early clinical exposure – an effective instructional tool or a bore? *Med Educ.* 2003; 37(2):88–9.
6. MacLeod RD, Parkin C, Pullon S, Robertson G. Early clinical exposure to people who are dying: learning to care at the end of life. *Med Educ.* 2003; 37(1):51–8.
7. Duque G, Gold S, Bergman H. Early Clinical Exposure to Geriatric Medicine in Second-Year Medical School Students—The McGill Experience. *J Am Geriatr Soc.* 2003; 51(4):544–8.
8. Johnson AK, Scott CS. Relationship between early clinical exposure and first-year students' attitudes toward medical education. *Acad Med J Assoc Am Med Coll.* 1998 Apr; 73(4):430–2.
9. Vyas R, Jacob M, Faith M, Isaac B, Rabi S, Sathishkumar S, et al. An effective integrated learning programme in the first year of the medical course. *Natl Med J India.* 2008; 21(1):21–6.
10. Sathishkumar S, Thomas N, Tharion E, Neelakantan N, Vyas R. Attitude of medical students towards Early Clinical Exposure in learning endocrine physiology. *BMC Med Educ.* 2007 Sep 5; 7:30.

11. Badyal DK and Singh T. Teaching of the basic sciences in medicine: Changing trends. –The changing trends. National Medical Journal of India. 2015; 28(3):137-40.

## Annexure I

### Examples of clinical context and related learning outcome

Clinical Context	Outcome
<p><b>Parkinson's disease</b>  <b>(Neurophysiology)</b>  <i>Patient/video/simulated patient/role play</i></p>	<ol style="list-style-type: none"> <li>1. Demonstrate understanding of alterations in normal functions of Basal ganglia and their clinical expression.</li> <li>2. Explain anatomical and physiological basis of signs &amp; symptoms of Parkinson's disease</li> <li>3. Observe examination of Motor system (Tone of the muscles) in a patient with Parkinson's disease</li> </ol>
<p><b>COPD</b>  <b>(Respiratory Physiology)</b>  <i>Patient/video/investigations</i></p>	<ol style="list-style-type: none"> <li>1. Demonstrate understanding of alterations in normal respiratory physiology and anatomy in chronic obstructive lung disease and their clinical expression.</li> <li>2. Explain the concept of restrictive and obstructive lung disease</li> </ol>
<p><b>Ascites</b>  <b>(Abdominal system)</b>  <i>Patient/video/USG</i></p>	<ol style="list-style-type: none"> <li>1. Demonstrate understanding of alterations in normal physiology and anatomy in portal system and their clinical expression.</li> <li>2. Observe tests for eliciting presence of fluid in abdomen</li> </ol>

<p><b>Claw hand, Foot drop, Carpal tunnel syndrome</b>  <b>(Peripheral nerve injuries)</b>  Patient/ video</p>	<ol style="list-style-type: none"> <li>1. Demonstrate understanding of alterations in normal anatomy &amp; function of these nerves and their clinical expression.</li> <li>2. Observe tests for eliciting normal function of these nerves</li> </ol>
<p align="center"><b>Clinical Context</b></p>	<p align="center"><b>Outcome</b></p>
<p><b>Varicose veins</b>  <b>(Venous drainage of the lower limbs)</b>  <i>patient/video</i></p>	<ol style="list-style-type: none"> <li>1. Demonstrate understanding of alterations in normal anatomy and physiology in peripheral venous system and their clinical expression</li> <li>2. Demonstrate understanding of principles behind clinical examination of varicose veins</li> </ol>
<p><b>Type 2 Diabetes mellitus (T2DM)</b>  (Nutrition &amp; Biochemical Lab tests)  <i>patient/ Lab investigations</i></p>	<ol style="list-style-type: none"> <li>1. Demonstrate understanding of alterations in metabolism and physiology in diabetes mellitus and its clinical expression</li> <li>2. Explain the basis and rationale of biochemical tests done in diabetes mellitus</li> </ol>
<p><b>Obesity</b>  (Nutrition)  <i>Video/Clinical parameters</i></p>	<ol style="list-style-type: none"> <li>1. Demonstrate understanding of alterations in Metabolism and physiology in over nutrition and its clinical expression</li> <li>2. Explain to the population the health risks associated with being overweight/obesity</li> <li>3. Describe the metabolic and endocrine consequences of obesity.</li> </ol>

## Annexure II

Examples of deviations from normal, to be observed and noted by the student, when exposed to clinical context.

<b>Example of the Disease / Disorder</b>	<b>Deviations from normal, to be observed and noted by student, when exposed to clinical context. The students should be able to compare abnormal and normal</b>
Cerebellar dysfunction	Tremor, abnormalities of coordination, tone of muscles, findings on elicitation of knee jerk, ocular signs, abnormality in performing alternate rapid movements
Pneumonia	Presence of adventitious sounds on auscultation
Pleural Effusion	Position of mediastinum, findings on percussion, abnormalities of breath sounds
Arthritis	Swelling / Oedema & tenderness in the affected joint, restricted & painful joint movements
Jaundice/Anaemia	Examination for icterus /Pallor- site and colour
Cushing's syndrome	Moon face, hirsutism, striae, buffalo hump

## **Annexure III**

### **Sample Modules for ECE**

#### **ECE Module 1: Acute Myocardial Infarction (AMI)**

**Setting:** Class room

**Topic of Basic Science:** Coronary Circulation

**ECE through-** Acute Myocardial Infarction case(Paper based case / Role play)

**Goal:**

The student must be able recognize the relevance of coronary circulation in diagnosis, patient care and treatment of Acute MI

**Expected Competency:**

1. Demonstrate understanding of alterations in normal anatomy and physiology of coronary circulation and its clinical expression.
2. Correlate the clinical manifestation in myocardial infarction with altered coronary circulation
3. Explain the basis and rationale of biochemical tests done in myocardial infarction.

**Objectives:**

**At the end of the ECE module I MBBS student shall be able to:**

- 1) Describe the mechanism of regulation of coronary circulation.
- 2) Describe the role of lipoproteins in derangement of coronary circulation.
- 3) Explain the biochemical changes occurring in acute myocardial infarction
- 4) Identify the clinical manifestation secondary to decreased coronary circulation.
- 5) Explain the basis of treatment of acute myocardial infarction

**Learning Experiences:**

**Total time: 3 hours**

- Introduction and instruction to students: 20 mins.

- Exposure to clinical context and discussion:90 mins
- Summary and conclusion: 10 mins
- Reflection: 30 mins
- Assignment: 30 mins

**ECE: Classroom setting: 3 hours**

**Clinical Context:**

A 48 year old company executive experienced a sudden, crushing chest pain, after he returned from his morning walk. His wife noticed that he was pale, sweating profusely and was in distress. She rushed him to the ICU of a nearby hospital immediately. He told the attending physician that on previous occasions too he had felt such pain but he it had subsided with rest. He is known smoker. He also suffers from diabetes, dyslipidemia and hypertension. ECG was taken & it showed ST elevation in leads II, III and AVF. He was admitted in the ICU.

*\*This clinical scenario can be either used as a paper based case or be performed as a role play if feasible.*

**Facilitator's guide:**

- *What is the probable reason for the severe pain in chest?*
- *Why did the regulatory mechanisms fail to meet increased demand of Oxygen ?*
- *How are diabetes Mellitus, hypertension and cardiac ischemia related?*
- *What do the changes in ECG indicate?*

**Lab report:**

Various investigations carried out 4 hours after the onset showed

- Raised cardiac specific troponin T & I
- Raised CK-MB
- Raised Cholesterol (Total, LDL and Triglycerides)

*\* get an actual lab report copy of a patient of Acute Myocardial infarction admitted at your hospital and use the same taking care not to disclose the identity.*

**Facilitator's guide:**

- Why are the cardiac Biomarkers raised?
- *What do the serum lipid levels indicate?*
- *What is the role of dyslipidemia in disruption of coronary circulation?*
- *What will be the next steps to manage acute MI?*

**Formative assessment:**

Submit assignment on the topic anatomical and physiological basis of treatment of acute myocardial infarction.

**Reflections can be structured using the following guiding questions**

- What happened? (What did you learn from this experience)
- So what? (What are the applications of this learning)
- What next? (What knowledge or skills do you need to develop so that you can handle this type of situation?)

**Program Evaluation:**

- ✓ Feedback from students to evaluate for improvements in the module
  1. How helpful has the ECE module been in improving your knowledge about coronary circulation?
  2. Which components of the program helped you to learn?

3. Did the ECE module make learning basic science subjects more interesting?
  4. Are you motivated to read further on this topic as a result of participating in ECE?
  5. Suggest changes in the program that will help you learn still better.
- ✓ Written feedback from the faculty regarding their opinion as to whether outcomes were achieved and suggestions to improve the program

### **Resources**

Appropriate text resources to be identified by the institutional subject experts.

## **ECE Module 2: Post - Myocardial Infarction Counseling**

**Setting:** OPD

**Topic:** Coronary Circulation

**ECE through-** Post -Myocardial Infarction Counseling (**OPD visit**)

### **Goal:**

The student must realize the relevance of basic sciences in patient care and relate to experience of patients as a motivation to learn

### **Expected Competency:**

1. Demonstrate knowledge of process of counseling and communicating to patients with empathy, the dietary modifications and lifestyle changes in post coronary syndromes

### **Objectives:**

**At the end of the ECE module I MBBS student shall be able to:**

1. Explain the basis of necessary dietary and life style modification to be undertaken in a patient recovering from Acute MI
2. Identify the salient features of effective communication between doctor and patient
3. Realize the impact of illness on patient's life

### **Learning Experiences:**

- Introduction and instruction to students: 20 mins
- Exposure to clinical context: 45 mins
- Discussion: 45 mins
- Summary and conclusion: 10 mins
- Reflections: 30 mins
- Assignment: 30 mins

### **Part I - OPD setting: 45 mins**

The Preclinical departments should arrange rotation of students to the OPD in collaboration with Medicine/ Cardiology / Cardiac Rehabilitation departments. Visits should be arranged in small groups so as to offer a better clinical experience. The clinicians should be made aware of the objectives of module. Patients recovering from Acute Myocardial infarction either treated with medications or interventions can be the focus for learning.

#### **Observation Guide:**

Students can be divided to observe different aspects of the doctor patient interaction and share ideas in post-clinic discussion.

**Instructions to the students:** During the consultation with a post-myocardial infarction patient, observe the interaction carefully.

#### **Observation Guide to group A**

Note down the lifestyle and dietary modifications advised by the doctor to prevent reoccurrence of MI.

#### **Observation guide to group B**

Observe the communication between the doctor and patient and list all the points in this interaction that helped the patient understand the information being shared. Also list the points that could be done to help the patient further.

#### **Patient Interview:**

Encourage one of the students in the group to interview the patient regarding how this illness has impacted his/her life.

### **Part II: Post clinic discussion: 45 mins**

#### **In small groups**

- Students observing different aspects will share ideas.
- Facilitator must take care to give an opportunity to all students to voice their observations.

- All points emerging must be noted down on black board/ whiteboard during discussion.
- Facilitator to encourage the students to discuss the reasons for the dietary and life style modification to be undertaken in a patient recovering from Acute MI.
- Facilitator will also discuss the points of effective communication between doctor and patient, focusing on the importance of explaining in a way the patient understands.

*This can be linked with module 1.4 of AETCOM - the foundations of Communication-1 and used for introducing or reinforcing the principles of effective communication.*

For discussing points of effective communication, the Kalamazoo consensus statement which provides a working model for teaching communication skills can be used.

1. Builds relationship
2. Opens the discussion
3. Gathers information
4. Understands the patient's perspective
5. Shares information
6. Manages flow

The other option is to use the Five A's behavior change model for health behavior change counseling to improve chronic illness care- Assess, Advise, Agree, Assist, Arrange.

- Discuss about how this illness affects the patient's life.
- At the end the student is asked to reflect on the experience and write it down in the log book.

**Formative assessment:**

- **Clinical skills:** Doctor patient communication can be assessed using Log book to record the patient details in the clinical experience. Reflections about

this patient encounter in the OPD is to be written down by the student and reviewed by teacher-in-charge of ECE.

**Reflections can be structured using the following guiding questions**

- What happened? (What did you learn from this experience)
- So what? (What are the applications of this learning)
- What next? (What knowledge or skills do you need to develop so that you can handle this type of situation?)

**Program Evaluation:**

- ✓ Feedback from students to evaluate for improvements in the module:
  1. How helpful has the ECE module been in improving your knowledge about lifestyle changes post myocardial infarction?
  2. Which components of the program helped you to learn?
  3. Did the ECE module make learning basic science subjects more interesting?
  4. Are you motivated to read further on this topic as a result of participating in ECE?
  5. Suggest changes in the program that will help you learn still better.
- ✓ Written feedback from the faculty regarding their opinion as to whether outcomes were achieved and suggestions to improve the program

**Resources:**

1. Makoul G. Essential elements of communication in medical encounters: the Kalamazoo consensus statement. Acad Med. 2001; Apr; 76(4): 390-3.
2. Vallis, Michael et al. "Clinical review: modified 5 As: minimal intervention for obesity counseling in primary care" Canadian family physician Medecin de famille canadien vol. 59, 1 (2013): 27-31.

## **ECE Module 3: Parkinson's disease**

**Setting:** OPD/ Classroom

**Topic:** Role of Basal Ganglia in Voluntary control of posture and movement

**ECE through:** Parkinson's disease (actual patient/ video)

### **Goal:**

The student must realize the relevance of basic sciences in patient care and relate to experience of patients as a motivation to learn.

### **Expected Competency:**

1. Demonstrate understanding of alterations in normal functions of Basal ganglia and its clinical expression.

### **Objectives:**

**At the end of the ECE module I MBBS student shall be able to:**

1. Explain anatomical, biochemical and physiological basis of symptoms and signs of Parkinson's disease
2. Explain the difference between pyramidal and extrapyramidal lesions
3. Observe the examination of motor system

\*Please note that teaching-learning of the clinical skills must be supplemented by a DOAP session (Demonstrate Observe Assist Perform) on examination of Motor system or preceded by it, as feasible, so that the student is able to demonstrate the correct clinical examination of the motor system ultimately.

### **Learning Experiences:**

- Introduction and instruction to students: 20 mins
- Exposure to clinical context and Discussion: 90 mins
- Summary and conclusion: 10 mins
- Reflections: 30 mins
- Assignment: 30 mins

**ECE: Classroom setting: 3 hours**

Actual patient/simulated patient with Parkinson's disease can be invited to the classroom or a video recording of the history and physical examination can be shown to the students as per feasibility.

**Observation Guide:**

Instructions to the students:

- During the consultation, listen carefully to the patient's complaints. Note the onset, duration and progress of these symptoms.
- Observe the physical examination carried out and note down the salient features of the examination.
- Try to find an explanation for his/her symptoms and signs.

**Part II: Post clinic discussion: 1 hr**

In small groups:

- Students will share their observations
- Facilitator must take care to give an opportunity to all students to voice their observations.
- All points emerging must be noted down on black board/ whiteboard during discussion
- Facilitator discusses the patient's history –onset of tremors and parts affected history of falls, poor balance, muscle stiffness, drooling of saliva, difficulty in writing, loss of memory along with change in voice and the basis of signs like: mask-like face, pill rolling movement, festinant gait and cog wheel rigidity.
- Facilitator also discusses the technique of examination of tone in the patient.
- At the end, the student is asked to reflect on the experience and write it down in the log book.

**Formative assessment:**

Basic Science correlation: To be assessed on the basis of assignment on 'Treatment options for the Shaking Palsy'

**Reflections can be structured using the following guiding questions:**

- What happened? (What did you learn from this experience)
- So what? (What are the applications of this learning)
- What next? (What knowledge or skills do you need to develop so that you can handle this type of situation?)

**Program Evaluation:**

- ✓ Feedback from students to evaluate for improvements in the module
  1. How helpful has the ECE module been in improving your knowledge about Parkinson's disease?
  2. Which components of the program helped you to learn?
  3. Did the ECE module make learning basic science subjects more interesting?
  4. Are you motivated to read further on this topic as a result of participating in ECE?
  5. Suggest changes in the program that will help you learn still better.
- ✓ Written feedback from the faculty regarding their opinion as to whether outcomes were achieved and suggestions to improve the program

**Resources:**

Appropriate text resources to be identified by the institutional subject experts.

## **ECE Module4: Varicose Veins**

**Setting:** Classroom & OPD

**Topic of Basic Science: Front of Thigh / Veins of Lower limb**

**ECE through-** Varicose vein case (Video / Patient)

### **Goal:**

The student must be able recognize the clinical manifestations of altered anatomy of venous system.

### **Expected Competency:**

1. Demonstrate understanding of alterations in normal anatomy and physiology in peripheral venous system and its clinical expression
2. Demonstrate understanding of principles behind clinical examination of Varicose veins

### **Objectives**

1. Discuss the clinical manifestation of impaired venous drainage in Lower limb
2. Explain the basis of treatment of Varicose veins

### **Learning Experiences:**

- Introduction and Instruction to students: 20 mins
- Exposure to clinical context and discussion: 90 mins
- Summary and conclusion: 10 mins
- Reflections: 30 mins
- Assignment: 30 mins

**ECE: Classroom setting: 3  
hours**

A 40-year old male, bus conductor noted dilated engorged tubular structures over his calf and thigh region. These were becoming prominent after a long time standing posture.

**\*\*This clinical scenario can be used as either, a paper based case supplemented by video or on actual patient if feasible.**

***Facilitators guide:***

- *What are these dilated engorged tubular structures?*
- *Why do these develop in lower limb only?*

**Clinical Examination:**

Trendelenburg's test and other clinical tests

**\*\*Perform Trendelenburg's test on actual patient, if available.**

***Facilitators guide:***

- *What are the steps to perform Trendelenburg's test? What is anatomical basis for these tests?*
- *Which veins can be tested by this method and why?*
- *What will be the steps to manage varicose veins?*

**Formative assessment:**

- Structured Long answer question on veins of lower limb
- OSCE for demonstration of Trendelenburg's test
- Submit assignment on the topic medical and surgical basis of treatment of varicose veins.

**Reflections can be structured using the following guiding questions:**

- What happened? (What did you learn from this experience)

- So what? ( What are the applications of this learning)
- What next? (What knowledge or skills do you need to develop so that you can handle this type of situation?)

### **Program Evaluation:**

- ✓ Feedback from students to evaluate for improvements in the module
  1. How helpful has the ECE module been in improving your knowledge about varicose veins?
  2. Which components of the program helped you to learn?
  3. Did the ECE module make learning basic science subjects more interesting?
  4. Are you motivated to read further on this topic as a result of participating in ECE?
  5. Suggest changes in the program that will help you learn still better.
- ✓ Written feedback from the faculty regarding their opinion as to whether outcomes were achieved and suggestions to improve the program

### **Resources**

Appropriate text resources to be identified by the institutional subject experts.

## **ECE Module 5: Type 2 Diabetes mellitus (T2DM)**

**Setting:** Class room /OPD

**Topic of Basic Science:** Carbohydrate Metabolism

**ECE through:** Type 2 Diabetes Mellitus Case (Role play/ Paper based case/ actual Patient)

**Goal:** The student must be able recognize the clinical manifestations of altered carbohydrate metabolism

### **Expected Competency**

1. Demonstrate understanding of alterations in metabolism and physiology in diabetes mellitus and its clinical expression
2. Explain the basis and rationale of biochemical tests done in diabetes mellitus

### **At the end of the ECE module I MBBS student shall be able to:**

1. Explain the significance of estimating Blood glucose level, urine glucose and ketone bodies and HbA1c
2. Discuss the role of HbA1c in management of diabetes mellitus
3. List the guidelines to collect blood sample for glucose estimation
4. Interpret the results of the Blood glucose test, Urine glucose,urine ketones and HbA1c
5. Demonstrate the use of glucometer to estimate blood glucose level

### **Learning Experience:**

Total 3 hours

1. Introduction & Instruction 20 mins
2. Exposure to clinical content and discussion in small groups 60 mins
3. DOAP - use of glucometer for estimating blood sugar level 30 mins
4. Summary & Conclusion 10 mins
5. Reflection &Assignment 30 mins

## ECE Classroom setting:3 hours

Mr. Shukla, a 45 year old businessman was happy that he had lost 4 kg weight in last 2 months. He felt he was losing weight as he had started drinking more water than usual though he kept feeling hungry all the time. Maybe getting up at night too to empty his bladder was disturbing his sleep and made him feel tired all through the day.

His physical examination and lab investigations carried out as part of the yearly health checkup showed the following significant findings:

BMI: 28

Fasting Plasma Sugar: 180 mg/dl

Urine Sugar: absent

Postprandial Plasma Sugar: 230 mg/dl

Urine Sugar: +

Urine ketones: absent

HbA1c: 7.9 %

He was asked to follow up with a physician so he has come to your OPD.

*\*Perform this clinical scenario as a role play. You may distribute copies of a mock lab report to aid discussion.*

### Facilitator's Guide:

- *Explain what is happening with Mr.Shukla. What are alterations in normal physiology/ biochemistry that can explain clinical presentation of Mr. Shukla?*
- *Why is urine sugar absent in fasting sample?*
- *Explain the significance of raised HbA1c and high BMI in a patient of Type 2 DM*
- *Why should the blood sample for glucose be collected in fluoride -EDTA bulb or tube (grey).*

**The facilitator will then have a DOAP session (Demonstrate Observe Assist Perform) on use of glucometer to estimate blood glucose levels**

### Formative assessment:

**Basic Science correlation:** To be assessed on the basis of assignment on 'Diabetes - A metabolic disorder'

**Reflections can be structured using the following guiding questions:**

- What happened? (What did you learn from this experience)
- So what? (What are the applications of this learning)
- What next? (What knowledge or skills do you need to develop so that you can handle this type of situation?)

**Program Evaluation:**

- ✓ Feedback from students to evaluate for improvements in the module
- ✓
  1. How helpful has the ECE module been in improving your knowledge about disorders of carbohydrate metabolism?
  2. Which components of the program helped you to learn?
  3. Did the ECE module make learning basic science subjects more interesting?
  4. Are you motivated to read further on this topic as a result of participating in ECE?
  5. Suggest changes in the program that will help you learn still better.
- ✓ Written feedback from the faculty regarding their opinion as to whether outcomes were achieved and suggestions to improve the program

## **ECE Module 6: Acid -Base Disorder**

**Setting:** Class room & Clinical Biochemistry Laboratory

**Topic of Basic Science:** Acid -Base Balance

**ECE through:** Acid -Base Balance Disorder Case (paper based case)

**Goal:** The student must be able recognize the clinical manifestations of altered acid base balance

### **Expected Competency:**

1. Describe the processes involved in maintenance of normal pH of body fluids and the derangements associated with these.
2. Discuss and interpret results of Arterial Blood Gas (ABG) analysis in various disorders.
3. Observe use of ABG analyzer.

### **At the end of the ECE module I MBBS student shall be able to:**

1. Explain the basis of the biochemical changes noted due to compensatory mechanisms in various acid base disorders.
2. Describe the use of ABG analysis and Serum electrolyte values in diagnosis of acid base disorders.
3. Describe and interpret the results of the ABG analysis in the different types of Acidosis and Alkalosis.
4. Describe the Principle of Arterial Blood Gas (ABG) analyzer

### **Learning Experience:**

Total 3 hours

- |  |             |
|--|-------------|
| 1. Introduction & Instruction -                | 15 mins     |
| 2. Exposure to clinical content and Discussion | 1hr 30 mins |
| 3. Demonstration of working of ABG analyzer    | 30 mins     |

- |                         |         |
|-------------------------|---------|
| 4. Summary & Conclusion | 15 mins |
| 5. Assignment           | 30 mins |

**ECE Classroom setting:** Objectives 1-3 can be achieved with the help of the following case and Objective 4 can be demonstrated in the Clinical Biochemistry Laboratory.

Part 1:

Mrs. Rajashree is a 45 year old teacher. She was suffering from severe diarrhea for the last 5 days. The stools were watery and copious. She also complained of fatigue and shortness of breath since morning.

**Facilitator's Guide:**

- *What is the critical course of events that will alter her acid base status?*
- *What acid base abnormalities would you expect in her based on above information?*
- *What physical findings would you expect from this acid base disturbance?*

Part 2:

Her blood reports were as follows:

Fasting Blood Sugar: 100 mg/dl	PaCO <sub>2</sub> : 30 mmHg	
pH: 7.24	Cl <sup>-</sup> : 106 meq/L	Na <sup>+</sup> 134 meq/L
HCO <sub>3</sub> <sup>-</sup> : 15 meq/L	K <sup>+</sup> : 4.2 meq/L	

**Facilitator's Guide:**

- *Review the Biochemical report. What is the primary abnormality? How did you decide that?*
- *What are alterations in normal physiology/ biochemistry that can explain clinical presentation of Mrs. Rajashree ?*
- *Is the compensatory response observed?*
- *Calculate the anion gap and interpret the findings.*

### **Part 3:**

#### **Laboratory Visit:**

The students to observe the working of an ABG analyser in the Laboratory

#### **Facilitator's Guide:**

- Facilitator will demonstrate the working of an ABG analyzer and explain its principle.

#### **Formative Assessment:**

Students can be given various ABG reports to interpret and explain the compensatory response that would occur.

#### **Reflections can be structured using the following guiding questions:**

- What happened? (What did you learn from this experience)
- So what? (What are the applications of this learning)
- What next? (What knowledge or skills do you need to develop so that you can handle this type of situation?)

#### **Programme Evaluation:**

- ✓ Feedback from students to evaluate and modify program
  1. How helpful has the ECE module been in improving your knowledge about Acid- Base disorders?
  2. Which components of the program helped you to learn?
  3. Did the ECE module make the basic science subjects learning more interesting?
  4. Are you motivated to read further on this topic as a result of participating in ECE?
  5. Provide suggestions to improve leaning further.
- ✓ Written feedback from the faculty regarding their opinion as to whether outcomes were achieved and suggestions to improve the program

# **Annexure IV**

## **Humanities Module**

Study of medical humanities plays a pivotal role in preparing students to practice in the community. It develops the students' capacity to listen, interpret and communicate with patients. Appreciating the subjective aspects of a person's health and illness will enable them to offer individualised care. It will also provide a channel to the students to express themselves through creative mediums of literature, music and arts.

### **Literature and Medicine**

#### **Background**

Medicine is an integral part of literature - classic popular and science fiction. A whole genre of medical fiction exists which reflects the community's view of the medicine, its system and health care workers. Literature also portrays human suffering and gives learners perspectives quite different from that obtained from teachers. Many doctors are prolific writers and have written about personal suffering as well as the impact of medicine. The module allows the learner to explore medicine and human suffering from a literary perspective.

#### **Competency addressed**

The learner must explore, discuss and reflect on human illness suffering and medicine as portrayed in literature (classic/contemporary)

#### **Learning Session**

**Year of Study:** 1

**Hours:** 8 hours

Exploratory session: 2 hours

Self-directed Learning: 4 hours

Research / Task / Report

Discussion and closure: 2 hours

**Description:**

1. An exploratory session is created where either in small groups or an interactive large group, students are allowed to speak about the portrayal of suffering illness and health care workers and the system as portrayed in classic and contemporary literature. Evoke questions about regional literature in particular. Explore differences in portrayal of doctors in classic vs. contemporary literature. Evoke a discussion about doctors accounts of their own suffering
2. Students, individually or in groups, are asked to choose and read and report on a book that has affected their view of the illness, suffering or the medical profession
3. **Discussion and closure:** A closure session where students share their reflection based on their tasks and learnings and their implications

**Assessment**

Submitted Narrative and reflections

## Annexure V

### Clinical vignettes for short answer questions

#### Sample 1

A 55 year old man complained to his general practitioner that he felt tired easily. He also complained of dizziness, sweating and palpitations after meals. He had undergone partial gastrectomy seven years ago involving removal of major part of body and fundus of the stomach. Since last 2.5 years he had stopped taking Vit B<sub>12</sub> injections.

Q. Explain the physiological basis of:

- a. Need of Vit B<sub>12</sub> injections after partial gastrectomy involving fundus and body of stomach.
- b. Symptoms of dizziness, sweating and palpitations observed after a meal in this patient.

#### Sample 2

A 35 year old male patient reports to the out-patient department with complaints of increasing stretch marks and muscular atrophy. He also complained of increased weight gain especially on the upper back area.

Q.a. Explain the biochemical features **expected** in this patient.

Q.b. Explain the biochemical basis of the tests used to confirm and further evaluate the cause of this condition.

#### Sample 3

A patient with a diagnosis of leprosy came to the hospital with complaints of absence of sensation in right hand. Clinical examination showed sensory loss in medial one and half finger & medial side of palmar-dorsal aspects of right hand. There was also flattening of hypothenar eminence & difficulty in holding paper tightly between the affected fingers on right side.

- Q.a. Mention the affected structure.
- Q.b. Describe branches and area of distribution of the affected structure in hand.
- Q.c. Explain the anatomical basis of flattening of hypothenar eminence.
- Q.d. Explain the difficulty in holding of paper tightly between fingers on right side.



# BOARD of GOVERNORS in supersession of Medical Council of India

## COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR THE INDIAN MEDICAL GRADUATE

Knows Knows how Shows Shows how Performs

Observe

Demonstrate

Enumerate

Assist

Counsel

Describe

Prescribe

Analyse

Integrate

Guide

Communicate

Correlate

Interpret

Module 3

Critique

# Assessment

Collaborate

Clinician

Communicator

Team Leader

Professional

Lifelong Learner

Knowledge

Skills

Attitude

Values

Responsiveness

Communication

## Curriculum Implementation Support Program

**Assessment Module for  
Undergraduate Medical Education  
2019**



**Medical Council of India  
Pocket-14, Sector-8, Dwarka,  
New Delhi 110 077**

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## **Foreword**

A popular maxim in education is - if it is not assessed it is not learnt. The introduction of a competency based curriculum makes assessment a crucial element of learning. Indeed, the emphasis on competencies makes assessment of its attainment and maintenance a prerequisite. Assessment must serve both to provide the continued input on the progress of the learner that will allow him or her to calibrate and improve and also to ensure that only the learner with the right set of knowledge, skills and attitude is allowed to be admitted into the profession and to provide patient care.

The introduction of a competency based curriculum necessitates structured formative assessment, periodic internal assessment and end of phase summative assessment with appropriate and effective feedback built in. In addition, a mechanism to assess and document competency and skill acquisition needs to be in place. Workplace based assessments need to be introduced to the extent possible keeping in mind the roll out of the student doctor program.

The task at hand is complex and requires extraordinary collaboration between teachers, institutions and Universities. This booklet attempts to align the needs of institutions, Universities, learners and teachers with assessment of competencies in the new MBBS curriculum. It has been prepared by invited experts who have worked along with the Expert group for curriculum appointed by the Board of Governors in supersession of the Medical Council of India.

The booklet provides clarity and guidelines that will be useful in the development and implementation of assessment in the competency based environment. There is an increased emphasis on assessment of outcomes through alignment with objectives. Also provided are ideas and strategies for meaningful formative and summative assessment. Summative assessment is the domain of the Universities; however, this booklet provides some principles that Universities can adopt while aligning the examinations to the curriculum that the learners will undergo.

I am grateful to the authors and the expert group who have made this booklet possible. Suggestions for improvement are most welcome. Institutions and Universities are encouraged to share their best practices so that we can all learn together and help bring out better doctors who will be an asset to the community that they serve and to the nation as a whole.

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## भारतीय आयुर्विज्ञान परिषद् MEDICAL COUNCIL OF INDIA

BOARD OF GOVERNORS  
IN SUPERSESSION OF MEDICAL COUNCIL OF INDIA

### Foreword

This booklet provides a suggested pattern for Competency Based Assessment for the MBBS program commencing 2019. Summative assessment is the domain of the Universities to whom medical colleges are affiliated. Some changes will be required in the way that learners are tested to meet the requirements in the competency based curriculum. In addition, Competency Based Assessment places increased emphasis on formative and internal assessment. This booklet addresses the needs of institutions, Universities and teachers and is aimed at recalibrating the approach to assessment under the auspices of the new curriculum. The booklet is in alignment with the Regulations in Graduate Medical Education, 2019 Part II document.

This booklet has been developed by experts invited by the Board of Governors in supersession of the Medical Council of India and incorporates their vast expertise and experience. The Board of Governors in supersession of the Medical Council of India acknowledges their time and effort in creating this guide that can be used by institutions to develop their own learning process and content. Appreciation is also due to the efforts of the Academic Cell and faculty at the various Regional and Nodal centres who continue to work tirelessly to ensure that the new competency based curriculum and its various unique components are implemented faithfully and flawlessly across the medical colleges in this country. This will best serve the needs of the country and the cause of medical education.

(Dr. R.K. Vats)  
Secretary General

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# **Curriculum Implementation Support Program**

## **Module - 3**

### **Assessment**

# Guidelines for Assessment in Competency Based UG Curriculum

## 1. Objectives of the Document

To help the reader to:

- Understand the role and place of assessment in new competency based curriculum
- Understand the changes in assessment as per new curriculum.
- Understand the differences between the traditional assessment and Competency Based Assessment (CBA).
- Understand the components of competency based assessment.
- Understand the tools for competency based assessment.
- Understand the role of feedback in assessment.
- Plan, develop and implement CBA in the colleges and universities.

## 2. Glossary of terms used in the document

Summative assessment (University examination)	An assessment conducted at the <i>end of instruction</i> to check how much the student has learnt.
Formative assessment	An assessment conducted <i>during</i> the instruction with the primary purpose of providing feedback for improving learning.
Internal assessment	Range of assessments conducted by the teachers teaching a particular subject with the express purpose of knowing what is learnt and how it is learnt. Internal assessment can have both formative and summative functions.
Validity	Degree to which the inferences drawn from assessment are supported by empirical evidence or theoretical rationale.

Reliability	Degree of confidence that can be placed in the results. Depending on the context, it can be in terms of precision, consistency or reproducibility.
Competency	An observable activity of the health professional with a judicious and consistent mix of knowledge, skills, attitudes and communication.

### 3. Introduction

Competency based education has been defined as an outcome-based approach to the design, implementation, assessment and evaluation of a medical education program using an organizing framework of competencies<sup>1</sup>. Much more than a different style of teaching, competency based curriculum obligates a vastly different perspective on assessment. It mandates greater emphasis on setting up an ongoing and longitudinal assessment so that teachers can identify the stage of the learner and decide whether they need further or different learning opportunities to acquire competency. Assessment in competency based curriculum plays a crucial role in its implementation.

Competency is not an all or none phenomenon. Rather it is incremental. The role of teachers is to help the learner acquire and improve upon the competencies. Competency based curriculum moves away from time bound education and looks at competency as the end point. Consequently, we are no longer interested in demonstration of discrete behaviours by the learners; rather we are interested in application of these in each patient context. Thus, it is more about integration of the required knowledge, skills and attitudes rather than anyone of them in isolation. Therefore, assessment in competency based curriculum should incorporate integration to the extent feasible while maintaining subject identity.

### 4. Purpose of assessment in competency based curriculum

While an obvious purpose of assessment in competency based curriculum is to help the teachers decide if the students have acquired the desired competencies, an equally important purpose is to help the students acquire and improve their competencies. Quality assurance also requires quality assessment.

Major characteristics of competency based assessment are their longitudinal nature, provision of developmental feedback and authentic settings, all of which result in lowering the stakes on individual assessments. This has other important implications also for assessment design. Since the stakes are low and purpose is to improve learning, high standardization and psychometric rigor is not required. Authenticity of assessment task is more important than its structure or objectivity. Expert subjective judgment plays a major role in assessment of competencies.

This difference in perspective stems from three important characteristics of competency based curriculum. First, that by definition, teaching and assessment has to be in the *context* of competencies. Second, that discrete assessment of knowledge, skills and attitudes may not always add up to a competency. Third and probably the most important, that there is a high context specificity in assessment. Performing competency 'A' well does not mean that the student can perform the competency 'B' also as well. Similarly, assessment in demonstration room may not be the same as assessment at the bedside. Moreover, many competencies like communication, team work, sincerity etc. may not be amenable to reliable assessment if done sparingly or only at summative examination. Therefore, all competencies need to be assessed multiple times and in different contexts. An implication of this is that only one summative or end of year examination is not suited for this purpose.

Utility of assessment is traditionally expressed as a notional concept represented as using a product of validity, reliability, acceptability, feasibility and educational impact.<sup>2</sup> For CBA, validity and educational impact are the major determinants of its utility. Despite subjective judgments being involved, their reliability can be improved by increasing the number of assessors, assessments, tasks and by involving all teachers of the department in CBA process. This is a simple intervention to not only take care of subjectivity but also to improve ownership of teaching-learning and assessment.<sup>3</sup>

## 5. How does CBA differ from traditional assessment?

Traditional assessments are easy to design, administer, score and analyse compared to CBA but may not be able to provide complete information about the stage of the student. Traditional assessments are snap shot observations of learning, are generally not linked to instructions or outcomes and *promote test taking behaviour*. They are fragmented and mainly focus on knowledge (sometimes skills). CBA, on the other hand, provides more comprehensive information about not only the current stage of the student but also about his progression and ascendancy. They are longitudinal, often with low stakes and help to reduce examination anxiety. CBA is based on direct observation and therefore helps in generation of authentic feedback, which helps the students to learn better. This process of *assessment for learning* is crucial for the acquisition of competencies.

Competency based assessment should help in collecting and analysing evidence to decide if a student is competent in relation to a required competency and in relation to his/her stage of training. The underlying concept of competency – i.e. the *habitual and consistent* use of knowledge, technical skills, clinical reasoning, communication, emotions, values and reflection in daily practice for the benefit of the individual and the community being served, again demands that the student should consistently demonstrate the desired behaviour rather than only during the final examination.

Competency based assessment aids in the process of learning. Effective feedback is paramount to helping learners improve. CBA is an ongoing process so that any deviation in learning can be recognized early and taken care of by providing formative feedback. This concept is crucial and aligns very well with the basic principles of competency based medical education viz. active involvement of the learner, creating an authentic environment for learning, direct observation and provision of formative feedback. CBA requires active participation of the student in the form of self-assessment and reflections.<sup>4</sup> The paradigm is reflected in figure 1.<sup>5</sup>

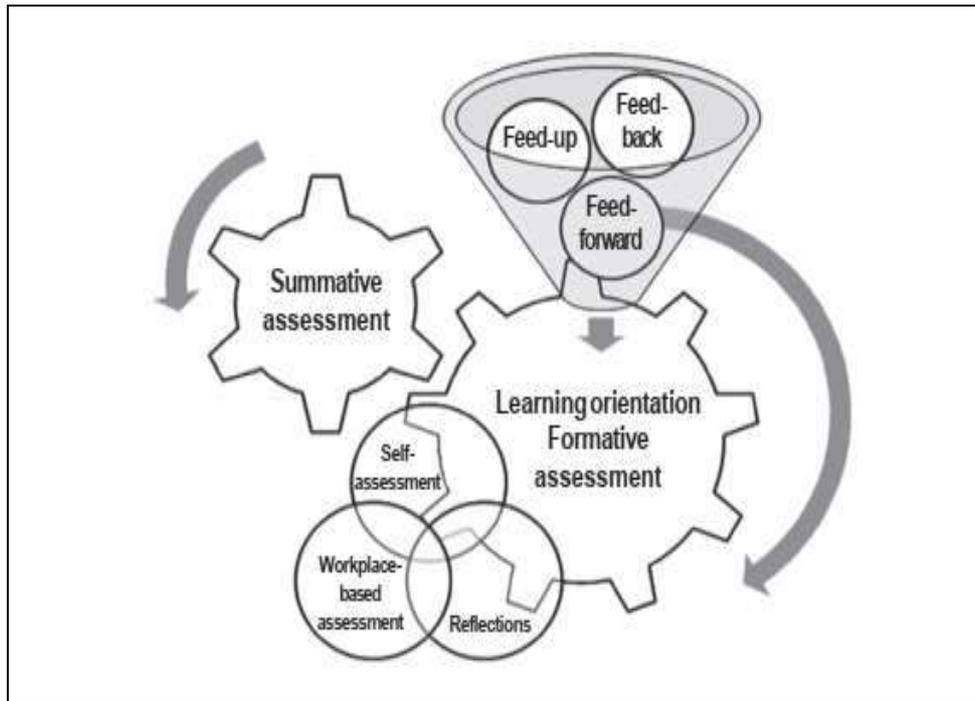


Figure 1. Paradigm of medical student assessment<sup>5</sup>

*(Reproduced with permission from National Medical Journal of India)*

Medical education literature distinguishes between competence (ability to do) and performance (actually doing). In terms of Miller's pyramid, competence would fall under the 'shows' category while performance falls under 'does'.<sup>6</sup> For the undergraduate students, most of the assessment would be up to 'shows' level. Since they are not authorized to independently take care of the patient or are not directly in charge of patient care, targeting the 'does' level will pose logistic difficulty.

## 6. What should be assessed?

Assessment requires specification of measurable and observable entities. This could be in the form of whole tasks that contribute to one or more competencies or assessment of a competency *per se*. Another approach is to break down the individual competency into learning objectives related to the domains of knowledge, skills, attitudes, communication etc. and then assess them individually. However, as stated earlier, using individual domain framework may not always result in making an accurate assessment of the specific competency. Therefore, efforts should be made to include competencies in the assessment process as much as possible. CBA is very useful to convey a message to the students to structure their learning around competency framework.

The assessment opportunities can be broadly divided into ongoing and term end. While the term end examinations (Summative assessment) will usually be conducted by the Universities, the ongoing assessments are conducted by the teachers teaching the subject and can be both formal and informal.

The summative assessment e.g. University examinations at the end of professional, are used for pass or fail decision. The purpose of such assessments is to sample the learning and ensure quality. Since all competencies should be assessed, summative assessments alone are not the option for CBA. For logistic reasons, competencies like communication, team work, ethics, professionalism and many procedural skills are also not assessable at term end examinations.

Ongoing assessment provides many options for this purpose. A blueprint may be needed to decide which competencies should be assessed during internal assessment and which should go to summative or University examinations. Informal assessments should happen during teaching learning activities with the express purpose of finding out the stage of the student and taking corrective action in teaching-learning methodology on an ongoing basis. During lectures, small groups or seminars, use of techniques like clickers, one-minute papers and muddiest point provide valuable information to check understanding and provide developmental feedback.<sup>7</sup> Same can be done during practical/clinical teaching using one-minute preceptor (OMP) or SNAPPS technique (Summarize history and findings, Narrow the differential; Analyze the differential; Probe preceptor about uncertainties; Plan management; Select case-related issues for self-study)<sup>8-10</sup>. Many of these do not need to be considered for pass / fail decisions but are useful to aid learning and acquire competencies. These can be planned by the teachers on a day to day basis and modified depending on the tasks at hand.

### **Features of Competency Based Assessment (CBA)**

- CBA operates within the framework of competencies. Assessment tools should align with competencies/objectives.
- CBA should help to acquire competencies/objectives (*assessment for learning*) and their certification (*assessment of learning*)
- CBA is continuous and ongoing process with opportunities for providing developmental feedback
- Direct observation of students improves utility of CBA and feedback
- Multiple assessors, multiple tools and multiple assessments improve the validity and reliability of CBA

## **7. Formative & Internal Assessment (IA)**

Formative assessment is an assessment conducted during the instruction with the primary purpose of providing feedback for improving learning. It also helps the teachers and learners to modify their teaching learning strategies. The feedback is central to formative assessment and is linked to deep learning, seeking to explore the educational literature and its pedagogical lessons for healthcare educational practice. It provides inputs to both students and teachers regarding adequacy of teaching-learning<sup>10</sup>. A variety of feedback principles and techniques can be used depending on the context.<sup>11, 12</sup>

Although there can be a debate on the summative or formative nature of IA, it still provides the best opportunities for formative purposes. IA is when assessment is done by the teachers who have taught the subject. It overcomes the limitations of day-to-day variability and allows larger sampling of topics, competencies and skills.

In competency based curriculum, IA provides useful avenues for both formative and summative assessment. IA focuses on the content and process of learning i.e. what and how students have learnt throughout the course. This assessment gives priority to psychomotor, communication and affective domains. These domains are usually not assessed by the traditional assessment methods. It should involve all faculty members of a department (Senior Residents upwards) and not just one or two senior teachers. This helps to build ownership of teaching-

learning and assessment as well as provide ‘hands-on’ experience in assessment to all teachers. IA can be a very useful tool for assessing all competencies in any competency based curriculum.

IA should not be considered as an assessment without external controls and can be utilized in a manner to overcome some of its perceived weaknesses. Utility of IA can be further improved by involving all teachers in the department and limiting the contribution of individual teacher, test or tool.<sup>12</sup>

## 8. Designing a system of assessment

While designing an internal assessment, all domains of learning i.e. cognitive, psychomotor and affective should be taken into account and weightage should be assigned to these domains for assessment.

Miller’s pyramid (figure 2) provides a simple way to select appropriate tool for assessment. Efforts should be made to climb higher in the pyramid.<sup>6, 13</sup>The following adapted example illustrates this:

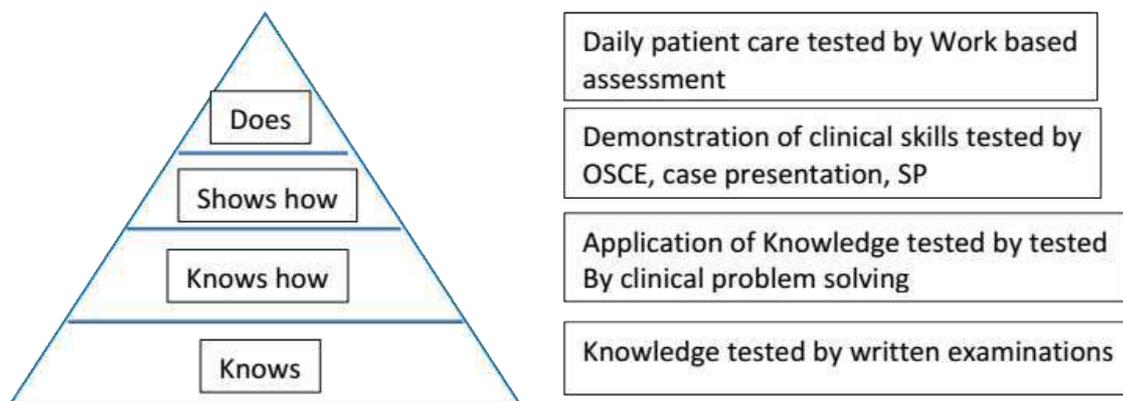


Figure 2. Assessment methods as per levels of competency (Adapted from Ramani)<sup>13</sup>

OSCE: Objective Structured Clinical Examination, SP: Standardised/ Simulated Patients

The key to building validity and making CBA assessment useful is its alignment with competencies/objectives. Including some aspects from competencies of other phases is useful to assess integration of concepts. Some examples of such alignment can be seen in the competency sheet given in Table 1.

Table 1. Deriving assessment methods from objectives

Competency: An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

PA42.3	Identify the etiology of meningitis based on given CSF parameters	K/S	SH	Y
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Objective: Statement of what a learner should be able to do at the end of a specific learning experience

PA42.3.1	At the end of the session the PII student must be able to enumerate the most common causes of meningitis correctly	Short note or part of structured essay: Enumerate 5 causes of meningitis based on their prevalence in India.
PA42.3.2	At the end of the session the PII student must be able to enumerate the components of a CSF analysis correctly	Short note or part of structured essay: Enumerate the components tested in a CSF analysis
PA4.3.3	At the end of the session the PII student must be able to describe the CSF features for a given etiologic of meningitis accurately	Short note or part of structured essay: Describe the CSF findings that are characteristic of tuberculous meningitis
PA4.3.4	At the end of the session the PII student must be able to identify the aetiology of meningitis correctly from a given set of CSF parameters	Short note / part of the structured essay/ Skill station/ Viva: Review the CSF findings in the following patient and identify (write or vocalise) the most likely ethology

A useful approach, especially for affective, psychomotor and communication domains, is to adopt the concept of *assessment toolbox*. A toolbox is a listing of available tools (and rating forms, if required), which are suggested for a particular competency or sub-competency and aims at improving the value of assessment data.<sup>14</sup> The listed tools are suggestions only and can be freely used either singly or in combination by teachers to suit particular requirements. Efforts should be made to use multiple tools for a given competency to improve validity and reliability of assessment.

*While assessment will continue to be subject based, efforts must be made to ensure that phase appropriate correlates are assessed to determine if the learner has internalised and integrated the concept and its application.*

## a. Internal Assessment logistics

### **Scheduling of IA**

A proposed schedule of tests for IA is given in Annexure 1. These are minimum required numbers but more tests can be scheduled by departments as required. An end of posting clinical assessment shall be conducted for each clinical posting in each professional year. Prior to University examinations, departments can conduct additional tests as and when required with the purpose of providing

formative feedback to the students. In subjects that are taught at more than one phase, proportionate weightage must be given for internal assessment for each Phase. For example, General Medicine must be assessed in second Professional, third Professional Part I and third Professional Part II, independently. A student who has not taken minimum required number of tests for IA each in theory and practical will not be eligible for university examinations. Proper records of the work should be maintained which will form the basis for the students' internal assessment and should be available to the assessors at the time of inspection of the college by the Medical Council of India.

### ***Components of IA***

- (i) **Theory IA can include:** Written tests, should have essay questions, short notes and creative writing experiences.
- (ii) **Practical / Clinical IA can include:** practical / clinical tests, Objective Structured Clinical Examination (OSCE) / Objective Structured Practical Examination (OSPE), Directly Observed Procedural Skills (DOPS), Mini Clinical Evaluation Exercise (mini-CEX), records maintenance and attitudinal assessment.
- (iii) **Assessment of Log-book.** Log book should record all activities like seminar, symposia, quizzes and other academic activities. Achievement of certifiable competencies should also be recorded in logbooks. It should be assessed regularly and submitted to the department. Up To twenty per cent IA marks (Theory and Practical) should be from Log book assessment.
- (iv) **Internal Assessment for Professional development programme (AETCOM) will include:**
  - a. Written tests comprising of short notes and creative writing experiences in each subject.
  - b. OSCE based clinical scenarios and/or viva voce. Skill competencies acquired during the Professional Development Programme must be tested during the clinical, practical and viva voce in every subject.

Colleges and teachers should try to build capacity to use a variety of assessment tools. A number of tools are available in the form of assessment toolbox.<sup>14</sup> The construct validity and predictive utility of internal assessment is high.<sup>15</sup> Many of the tools mentioned for IA may appear subjective. However, by virtue of being high on *validity* and by conveying a message to the students not to ignore skills, attitudes and communication (*educational impact*), they contribute to better learning. Since stakes at IA are low, the use of expert subjective assessments to cover areas which are not assessable by conventional objectivised assessment tools is appropriate. There is plenty of evidence in literature to suggest that expert subjective assessments can be as reliable as highly objective ones.<sup>16</sup>

The IA of broader specialties should also include marks from all the allied specialties e.g. General Medicine should include marks of Psychiatry, Dermatology, Venereology & Leprosy and Respiratory Medicine including tuberculosis, while General Surgery should include Orthopaedics, Dentistry, Anaesthesiology and Radio-diagnosis, so that students do not ignore these postings. The proportion of the marks for each allied specialty shall be proportionate to the time of instruction allotted to each. It may be noted that although very small contribution is being made by allied subjects, yet it serves as motivator to the students to not miss these postings. When subjects are taught in more than one phase, the assessment must be done in each phase and must contribute proportionally to final internal assessment.

Assessment of Foundation Course should be included in formative assessment of first phase. Assessment of ECE should be included in formative as well as in internal assessment in first phase subject wise. Assessment of electives should contribute to internal assessment in final phase part-II. *There should be at least one assessment based on direct observation of skills, attitudes and communication at all levels.* Communication and attitudinal assessment should also be built in to all assessments as far as possible. A log book must be used to record these components. **A sample format of log book is being published separately.**

### ***Feedback in IA***

Feedback should be provided to students throughout the course so that they are aware of their performance and remedial action can be initiated well in time. The

feedbacks need to be structured and the faculty and students must be sensitized to giving and receiving feedback.<sup>11,12</sup>

The results of IA should be displayed on notice board within two weeks of the test and an opportunity provided to the students to discuss the results and get feedback on making their performance better. Universities should guide the colleges regarding formulating policies for remedial measures for students who are either not able to score qualifying marks or have missed on some assessments due to any reason(s).

It is also recommended that students should sign with date whenever they are shown IA records in token of having seen and discussed the marks. **Internal assessment marks will not be added to University examination marks and will reflect as a separate head of passing at the summative examination.**

### ***Record keeping***

The peculiarities of CBA, particularly its longitudinal nature and its use as a measure of progression require a good record keeping. Such records can vary from manual to electronic. In whatever form they are used, the essential features should include regularity, availability to the students and a documentation of discussion on the results (present status, feedback and suggestions for improvement) between the student and the teacher(s). Many aspects can be covered in a group feedback while some will require one to one discussion. The formats for use in Indian settings have been published and can be suitably modified for local use.<sup>12</sup>

These concepts have been incorporated in the proposed GMER 2019 and are reproduced below.

## Excerpts from proposed GMER 2019

**11.1.1 (b) Internal Assessment:** Internal assessment shall be based on day-to-day assessment. It shall relate to different ways in which learners participate in learning process including assignments, preparation for seminar, clinical case presentation, preparation of clinical case for discussion, clinical case study/problem solving exercise, participation in project for health care in the community, proficiency in carrying out a practical or a skill in small research project, a written test etc.

1. Regular periodic examinations shall be conducted throughout the course. There shall be no less than three internal assessment examinations in each Preclinical / Para-clinical subject and no less than two examinations in each clinical subject in a professional year. An end of posting clinical assessment shall be conducted for each clinical posting in each professional year.
2. When subjects are taught in more than one phase, the internal assessment must be done in each phase and must contribute proportionately to final assessment. For example, General Medicine must be assessed in second Professional, third Professional Part I and third Professional Part II, independently.
3. Day to day records and log book (including required skill certifications) should be given importance in internal assessment. Internal assessment should be based on competencies and skills.
4. The final internal assessment in a broad clinical specialty (e.g. Surgery and allied specialties etc.) shall comprise of marks from all the constituent specialties. The proportion of the marks for each constituent specialty shall be determined by the time of instruction allotted to each.
5. Learners must secure at least 50% marks of the total marks (combined in theory and practical / clinical; not less than 40 % marks in theory and practical separately) assigned for internal assessment in a particular subject in order to be eligible for appearing at the final University examination of that subject. Internal assessment marks will reflect as separate head of passing at the summative examination.
6. The results of IA should be displayed on the notice board within a 1-2 week of the test. Universities shall guide the colleges regarding formulating policies for remedial measures for students who are either not able to score qualifying marks or have missed on some assessments due to any reason.
7. Learners must have completed the required certifiable competencies for that phase of training and completed the log book appropriate for that phase of training to be eligible for appearing at the final university examination of that subject.

## b. Summative assessment logistics (For Universities)

Summative assessment consists of University examinations. Each theory paper will have 100 marks. Marks distribution as per proposed GMER 2019 for various subjects is given in Table 2.

Table 2: Marks distribution for various subjects in University examinations

Phase of Course	Written-Theory – Total	Practicals / Orals/ Clinicals	Pass Criteria
<b>First Professional</b>			<u>Internal Assessment:</u> 50% combined in theory and practical (not less than 40% in each) for eligibility for appearing for University Examinations  <u>University Examination</u> Mandatory 50% marks in theory and practical (practical = practical/ clinical + viva) [theory=theory paper(s) only]  Internal assessment marks are not to be added to marks of the University examinations and should be shown separately in the grade card.
Human Anatomy - 2 papers	200	100	
Physiology - 2 papers	200	100	
Biochemistry - 2 papers	200	100	
<b>Second Professional</b>			
Pharmacology - 2 Papers	200	100	
Pathology - 2 papers	200	100	
Microbiology - 2 papers	200	100	
<b>Third Professional Part – I</b>			
Forensic Medicine & Toxicology - 1 paper	100	100	
Ophthalmology – 1 paper	100	100	
Otorhinolaryngology – 1 paper	100	100	
Community Medicine - 2 papers	200	100	
<b>Third Professional Part – II</b>			
General Medicine - 2 papers	200	200	
General Surgery - 2 papers	200	200	
Pediatrics – 1 paper	100	100	
Obstetrics & Gynaecology - 2 papers	200	200	

As per proposed GMER 2019, University examinations will be held in the month of September for first & second phase and October for final phase part 1. The examination for final phase part II will be held in the month of January (Table 3).

**Table 3: Examinations schedule**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
							Foundation Course	I MBBS			
I MBBS								Exam I MBBS	II MBBS		
II MBBS								Exam II MBBS	III MBBS		
III MBBS Part I								Exam III MBBS Part I	Electives & Skills		
III MBBS Part II											
Exam III MBBS Part II		Internship									
Internship											

### **Theory question paper (Knowledge part)-For Universities and colleges**

Universities should instruct paper setters to follow guidelines for paper setting as given below:

1. Follow MCI competencies for paper setting in the subject.
2. Designing of question paper should take into consideration all levels of knowledge domain e.g. Bloom's taxonomy of cognitive domain. Use appropriate verbs for the questions at each level to assess higher levels of learning.<sup>17</sup> An example is given below in Table 4. Use combination of various types of questions e.g. structured essays (Long Answer Questions - LAQ), Short Answers Questions (SAQ) and objective type questions (e.g. Multiple Choice Questions - MCQ). Marks for each part should be indicated separately. MCQs if

used, should not have more than 20% weightage. Example of theory paper and some examples of questions are given in Annexure 2.

- The question paper setter must sample the contents appropriately from competencies. The blueprinting grid can help the paper setters to balance the question papers in content related aspects as depicted below in Table 5. Blueprinting will add to the value and quality of these assessments. Moderation of theory question paper by subject expert must be arranged by Universities.

**Table 4: Verbs in various levels in Knowledge domain (Bloom’s taxonomy)<sup>17</sup>**

Level	Suggested Verbs
Knowledge	Define, Describe, Draw, Find, Enumerate, Cite, Name, Identify, List, label, Match, Sequence, Write, State
Comprehension	Discuss, Conclude, Articulate, Associate, Estimate, Rearrange, Demonstrate understanding, Explain, Generalise, Identify, Illustrate, Interpret, Review, Summarise
Application	Apply, Choose, Compute, Modify, Solve, Prepare, Produce, Select, Show, Transfer, Use
Analysis	Analyse, Characterise, Classify, Compare, Contrast, Debate, Diagram, Differentiate, Distinguish, Relate, Categorise
Synthesis	Compose, Construct, Create, Verify, Determine, Design, Develop, Integrate, Organise, Plan, Produce, Propose, rewrite
Evaluation	Appraise, Assess, Conclude, Critic, Decide, Evaluate, judge, Justify, Predict, Prioritise, Prove, Rank

**Table 5: Blueprinting in knowledge domain**

(Representative example only. Actual figures may vary with the subject and Phase)

Level	Topic A	Topic B	Topic C	Topic D	Total
Knowledge	1	2	1	1	5 (20%)
Comprehension	1	1	1	2	5(20%)
Application	2	1	1	1	5 (20%)
Analysis	1	1	2	2	6(24%)
Synthesis		1		1	2 (8%)
Evaluation	1		1		2 (8%)
Total	6(24%)	6(24%)	6(24%)	7(28%)	25 (100%)

## **Practical/Clinical examination**

This part should include assessment in psychomotor and affective domain. Assessment of clinical and procedural skills should be based on direct observations by the examiners. Avoid making this assessment mainly targeted to knowledge domain only. e.g. by asking a learner in a room away from actual patient, “how history was taken”. Instead, learner should be observed while he/she is taking history.

The competencies dealing mainly with skills and affective domains in each subject must be included. Many of the tools mentioned for formative assessment may not be usable / feasible at the University examinations e.g. mini-CEX. However, multiple tools like case presentations, OSCE and/or OSPE should be employed.<sup>11,14,18-22</sup> The value of conventional case presentation should be improved by having 1 or 2 longer (15 minutes or so) OSCE type stations, where examiners can observe and assess complete history taking (e.g. family history, present history etc.) and/or physical examination skill. This can be done either with check lists or using global ratings. Not only will this improve the validity of case presentations, but also provide an opportunity to assess attitudes and communication in context.

Pre- and para-clinical departments should make practical exercises application oriented. Objective Structured Practical Examination (OSPE), One-Minute Preceptor (OMP), Directly Observed Procedural Skills (DOPS) etc. can be suitably modified for this purpose. Practical tests should not become simply tests of knowledge.

Multiple teachers should be involved in assessment. This will help in not only taking care of subjectivity but also provide much needed training in assessment to senior residents and assistant professors.

The use of multiple methods, by multiple examiners in multiple settings to assess multiple competencies, blueprinting and longitudinal assessment help to improve the reliability and validity of assessment.<sup>6, 18,23</sup>

The relevant provisions from proposed GMER 2019 and are reproduced below:

## **Excerpts from proposed GMER 2019**

### **University Examinations**

- 11.2.1 University examinations are to be designed with a view to ascertain whether the candidate has acquired the necessary knowledge, minimal level of skills, ethical and professional values with clear concepts of the fundamentals which are necessary for him/her to function effectively and appropriately as a physician of first contact. Assessment shall be carried out on an objective basis to the extent possible.
- 11.2.2 Nature of questions will include different types such as structured essays (Long Answer Questions - LAQ), Short Answers Questions (SAQ) and objective type questions (e.g. Multiple Choice Questions - MCQ). Marks for each part should be indicated separately. MCQs shall be accorded a weightage of not more than 20% of the total theory marks. In subjects that have two papers, the learner must secure at least 40% marks in each of the papers with minimum 50% of marks in aggregate (both papers together) to pass.
- 11.2.3 Practical/clinical examinations will be conducted in the laboratories and /or hospital wards. The objective will be to assess proficiency and skills to conduct experiments, interpret data and form logical conclusion. Clinical cases kept in the examination must be common conditions that the learner may encounter as a physician of first contact in the community. Selection of rare syndromes and disorders as examination cases is to be discouraged. Emphasis should be on candidate's capability to elicit history, demonstrate physical signs, write a case record, analyze the case and develop a management plan.
- 11.2.4 Viva/oral examination should assess approach to patient management, emergencies, attitudinal, ethical and professional values. Candidate's skill in interpretation of common investigative data, X-rays, identification of specimens, ECG, etc. is to be also assessed.
- 11.2.5 There shall be one main examination in an academic year and a supplementary examination to be held not later than 90 days after the declaration of the results of the main examination.
- 11.2.6 A learner shall not be entitled to graduate after 10 years of his/her joining of the first part of the MBBS course.

11.2.7 University Examinations shall be held as under:

**(a) First Professional**

1. The first Professional examination shall be held at the end of first Professional training (1+12 months), in the subjects of Human Anatomy, Physiology and Biochemistry.
2. A maximum number of four permissible attempts would be available to clear the first Professional University examination, whereby the first Professional course will have to be cleared within 4 years of admission to the said course. Partial attendance at any University examination shall be counted as an availed attempt.

**(b) Second Professional**

1. The second Professional examination shall be held at the end of second professional training (11 months), in the subjects of Pathology, Microbiology, and Pharmacology.

**(c) Third Professional**

1. Third Professional Part I examination shall be held at end of third Professional part 1 of training (12 months) in the subjects of Ophthalmology, Otorhinolaryngology, Community Medicine and Forensic Medicine and Toxicology
2. Third Professional Part II - (Final Professional) examination shall be at the end of training (14 months including 2 months of electives) in the subjects of General Medicine, General Surgery, Obstetrics & Gynaecology and Pediatrics. The disciplines of Orthopaedics, Anaesthesiology, Dentistry and Radiodiagnosis will constitute 25% of the total theory marks incorporated as a separate section in paper II of General Surgery.
3. The discipline of Psychiatry and Dermatology, Venereology and Leprosy (DVL), Respiratory Medicine including Tuberculosis will constitute 25% of the total theory marks in General Medicine incorporated as a separate section in paper II of General Medicine.

## **9. Capacity building**

Considering the importance of CBA in making competency based curriculum a success, preparing the faculty to decide and use appropriate tools is crucial. Faculty needs to move beyond 'conventional' assessment methods. It is also important to remember that usefulness of many newer tools depends on the way they are used. Faculty also needs to be trained to develop their own toolbox depending on resources, expertise and contextual factors.

The revised Basic Course Workshop (rBCW) in Medical Education Technologies provides training in tools to be used for lower two levels of Miller's pyramid while the Advance Course in Medical Education (ACME) trains in those for higher two levels. In addition, the trained faculty and Medical Education Units should have in-house programs to build capacity for assessment. Involving junior faculty in IA is a useful step to provide hands-on training in assessment. Sensitization and training of all stakeholders at the University and Institutional level is required.

It is equally important to involve the student community and make them aware of these changes. Many changes require a variance from established practices. Foundation course and introductory sessions in each department should orient the students to the changes in assessment.

## **10. Implementation & Monitoring / Curricular Governance**

Internal assessment formats are to be developed by institutes as per proposed GMER 2019. The changes in summative assessment (university examination) are to be adopted by universities and details to be provided to the affiliated colleges. Quality assurance techniques in formative assessment (self / peer monitoring) and University examinations (question paper moderation by subject experts, external monitoring or posting external observers/examiners) should be employed to improve assessment.

## **11. Examples / Models**

The suggested formats are provided in annexures.

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## Annexure 1

### Suggested phase wise scheduling of tests for internal assessment for Colleges

(This is only a suggested sample plan. Local changes can be made if they conform to proposed GMER 2019)

Phase	Minimum Number of tests during the year	Remarks
1 <sup>st</sup>	Human Anatomy 3, Physiology 3, Biochemistry 3, Community Medicine 1	<ul style="list-style-type: none"> <li>•ECE assessment should be included subject wise</li> <li>•There should be at least one short question from AETCOM in each subject</li> <li>•One of the 3 tests in preclinical subjects should be prelim or pre-university examination</li> </ul>
2 <sup>nd</sup>	Pathology 3, Pharmacology 3, Microbiology 3,  Two tests for- General Medicine (Including Psychiatry, Dermatology, Venereology & Leprosy (DVL) and Respiratory Medicine including Tuberculosis), General Surgery (Including Orthopaedics, Dentistry, Anaesthesiology and Radiodiagnosis), Obstetrics & Gynaecology, Forensic Medicine & Toxicology and Community Medicine  End of posting (EOP) examination at each clinical posting including those of allied subjects	<ul style="list-style-type: none"> <li>•Clinical subjects should also be assessed at end of each posting (EOP) – Theory and Practical</li> <li>•There should be at least one short question from AETCOM in each subject</li> <li>•One of the 3 tests in Para-clinical subjects should be prelim or pre-university examination</li> </ul>

3 <sup>rd</sup>	<p>Forensic Medicine &amp; Toxicology 2, Community Medicine 2, Ophthalmology 2, Otorhinolaryngology 2</p> <p>Two tests for-</p> <p>General Medicine (Including Psychiatry, Dermatology, Venereology &amp; Leprosy (DVL) and Respiratory Medicine including Tuberculosis), General Surgery (Including Orthopaedics, Anaesthesiology and Radiodiagnosis), Pediatrics, Obstetrics &amp; Gynaecology</p> <p>EOP examination at each clinical posting including allied subjects</p>	<ul style="list-style-type: none"> <li>• Clinical subjects should also be tested at end of each posting (EOP)-Theory and Practical</li> <li>• There should be at least one short question from AETCOM in each subject</li> <li>• One of the tests in Ophthalmology, Otorhinolaryngology /Forensic Medicine &amp; Toxicology/ Community Medicine should be prelim or pre-university examination</li> </ul>
4 <sup>th</sup>	<p>Two Tests for-</p> <p>General Medicine (Including Psychiatry, Dermatology, Venereology &amp; Leprosy (DVL) and Respiratory Medicine including Tuberculosis), General Surgery (Including Orthopaedics, Anaesthesiology and Radiodiagnosis), Pediatrics, Obstetrics &amp; Gynaecology</p> <p>EOP examination at each clinical posting including that in allied subjects</p>	<ul style="list-style-type: none"> <li>• Clinical subjects should also be tested at end of each posting (EOP)-Theory and Practical</li> <li>• There should be at least one short question from AETCOM in each subject</li> <li>• One of the tests in General Medicine, General Surgery, Pediatrics and Obstetrics &amp; Gynaecology should be preliminary or pre-university examination</li> <li>• Assessment of electives to be included in IA</li> </ul>

AETCOM: Attitude, Ethics and Communication

The internal assessment marks for each subject will be out of 100 for theory and out of 100 for practical/clinical (except in General Medicine, General Surgery and Obstetrics & Gynaecology, in which theory and clinical will be of 200 marks each). Internal assessment marks will reflect as a separate head of passing at the summative examination and will not be added to the University marks.

Twenty five percent of weightage in theory tests in General Medicine and General Surgery should be given to allied subjects and there should be at least one question from each allied subject.

## Annexure 2

### Examples of theory questions

Sl. No.	Type	Explanation	Examples
1	Long essay question	<p>The question should pose a clinical/practical problem to the students and require them to apply knowledge and integrate it with disciplines. Avoid giving one liners as questions. The question stem should be structured and marking distribution should be provided. Use action verbs from higher domains as given in this document.</p> <p>Please avoid simple recall based questions. What is asked in the examination generally sets the agenda of what and how the students learn.</p>	<p>A 6 days old term neonate has presented with jaundice noted at 3 days of age. He is born out of normal delivery at home. On examination, he looks pale, has a liver of 5cms and spleen of 2 cms. Other systemic examination is normal.</p> <ol style="list-style-type: none"> <li>a. What is your provisional diagnosis?</li> <li>b. Which other conditions need to be considered?</li> <li>c. Enumerate the lab tests that you will order and their likely reports in each of the diagnosis that you considered.</li> <li>d. Explain the physical findings in the light of underlying derangements.</li> </ol> <p>- Describe the clinical features, complications and management of type 2 diabetes mellitus. (3+3+4=10)</p>

Sl. No.	Type	Explanation	Examples
2	Short notes	These provide opportunity to sample a wider content, albeit in a short time. The questions should be task oriented rather than Write a short note on xxx. (Two questions based on ECE in Phase 1 in internal assessment) (Two questions based on integration in Phase 2 & 3 in internal assessment)	<ol style="list-style-type: none"> <li>1. What are the various ways in which acute glomerulonephritis can present during childhood?</li> <li>2. What is the role of antibiotics in childhood diarrhoeas?</li> <li>3. What is the utility of routine vitamin K administration during newborn period?</li> <li>4. Compare and contrast the use of ramipril and amlodipine in treatment of hypertension.</li> </ol>
3	Reasoning Questions	These provide excellent opportunities for testing integration, clinical reasoning and analytic ability of the student.	<ol style="list-style-type: none"> <li>1. Which components of breast milk help in prevention of neonatal infections? How do they help in prevention of infection?</li> <li>2. Plan immunization for a 2 years old totally un-immunized child.</li> <li>3. What is the physiological basis of origin of respiratory sounds? How can they help us in making a diagnosis?</li> <li>4. Explain why adrenaline is the preferred medication in anaphylactic shock.</li> </ol>

Sl. No.	Type	Explanation	Examples
4	Short notes Applied aspects	(Pre- & Para-Clinical subjects: questions on applied aspect) (Clinical subjects: questions on preclinical basis)	<b>Pre &amp; Para-Clinical subjects:</b> Describe clinical significance of half-life of drugs. <b>Clinical subjects:</b> Explain patho-physiological basis of clinical features of heart failure
5	Short notes AETCOM	(one question on AETCOM in all subjects in all phases)	Pharmacovigilance program of India <b>AETCOM:</b> What are the rights of a patient in a hospital setting
6	MCQs	MCQs should be scenario based, single response with 4 options in answers. Avoid one liner and negative terms in stem of question. Avoid 'all of above' and 'none of above' in options.	<p>1. A 25 year old lady was using oral contraceptives successfully for last two years. She got tuberculosis and was prescribed Rifampicin. She became pregnant after 2 months of starting Rifampicin despite continuing the oral contraceptives. Which of the following effects of Rifampicin can be the reason for this?</p> <p>A. Induction of oral contraceptive metabolism B. Stimulation of ovulation C. Interruption of entero-hepatic circulation D. Increased excretion of oral contraceptives</p> <p style="text-align: right;">Key: A</p>

Sl. No.	Type	Explanation	Examples
	MCQs		<p>2. A 2 year old child presents with excessive weight gain over last 1 week. He has puffy eyes, pitting edema and normal blood pressure. Urine examination shows no RBCs but massive proteinuria. Which of the following biochemical parameters is likely to be elevated in this child?</p> <p>a. Urea b. Cholesterol c. Creatinine d. Uric acid</p> <p style="text-align: right;">Key B</p> <p>3. Which of the following term best describes the decreased effects of beta adrenergic agonists in bronchial asthma after long term use?</p> <p>A. Pharmacokinetic tolerance B. Pharmacodynamic tolerance C. Tachyphylaxis D. Drug dependence</p> <p style="text-align: right;">Key: B</p>

**Note:** AETCOM question should be based on competencies (primarily knowledge based) acquired during the AETCOM module training. At least one question in each paper of the clinical specialties should test knowledge - competencies acquired during the professional development programme (AETCOM module); Skills competencies acquired during the Professional Development programme (AETCOM module) must be tested during clinical, practical and viva.

**In subjects that have two papers, the learner must secure** at least 40% marks in each of the papers with minimum 50% of marks in aggregate (both papers together) to pass in the said subject.



# BOARD of GOVERNORS in supersession of Medical Council of India

## COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR THE INDIAN MEDICAL GRADUATE

Knows    Knows how    Shows    Shows how    Performs

Describe

Enumerate

Observe

Demonstrate

Assist

Counsel

Prescribe

Analyse

Integrate

Guide

Communicate

Correlate

Interpret

Critique

Collaborate

Module 4

# Alignment and Integration

Clinician

Communicator

Team Leader

Professional

Lifelong Learner

Knowledge

Skills

Attitude

Values

Responsiveness

Communication

Curriculum Implementation Support Program

**Alignment and Integration**  
**Module for**  
**Undergraduate Medical Education**  
**Program**  
**2019**



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**भारतीय आयुर्विज्ञान परिषद् के अधिक्रमण में शासी बोर्ड**  
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**Foreword**

**Alignment and Integration**

Subject based education has tremendous advantages. It provides learners with the opportunity to dwell deep into the learning matter and acquire strong fundamental concepts and the ability to build on it and attain scholarship. However, the unique needs of medical education necessitate both an understanding of "interconnectedness" between subjects and their ultimate application to the patient. In an attempt to address the need for enhancing the "wholesomeness" of education in the competency based curriculum while retaining the inherent strength and flavour of subject-based instruction, the Expert Group has recommended the use of two strategies: (a) alignment of related subject matter in a temporally coordinated fashion, and (b) use of three integration concepts that will enhance prior recall, application and emphasis of interconnectedness namely **sharing, nesting and correlation**.

This is a novel and challenging approach that has been suggested to further the goal of the competency driven curriculum that will require considerable planning, collaboration and team work amongst learners, teachers, planners and administrators in institutions. We believe that this investment is necessary to prepare learners to confront, adapt and be successful in the challenging environment of medical care. In addition to meeting the needs outlined, this approach will foster self - directed learning, team work, collaboration and inquiry. Importantly, the patient centricity that this approach will bring into the curriculum from year one will ensure that learners always have a connect with the ultimate goal of the MBBS program.

This booklet is intended to help institutions and teachers to design curriculum incorporating the approach suggested by the Expert Group. It is richly illustrated with examples on how to create an aligned and integrated timetable. We hope that this will be a useful guide.

We are grateful to the members of the Expert Group and the Academic Cell for painstakingly putting this booklet together. We hope that teachers and institutions will benefit from the suggestions provided herein and can successfully adapt and apply them into their own environment. We aspire to learn more and share with the nation the best practices that abound in all the medical colleges across the country. The ultimate aim of this exercise is to create a generation of doctors who will provide standard health care to the nation while becoming excellent scientists and scholars.

Chairman, Board of Governors

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## Foreword

### Alignment and Integration

This booklet provides a suggested pattern for alignment and integration of related competencies encapsulated in different subjects for teaching competency based MBBS program which commenced on August 1, 2019 across the country. Alignment of related topics to the extent feasible is a major thrust of the competency based curriculum. The Regulations in Graduate Medical Education 2019 (GMER 2019) also suggests integration to the extent of 20% of the subject-based curriculum through horizontal and vertical integration. This booklet is in alignment with the GMER 2019 part II document and provides institutions and curriculum planners a step by step approach to create a timetable for teaching, incorporating the principles of alignment and integration.

This booklet has been developed by experts invited by the Board of Governors in supersession of the Medical Council of India and incorporates their vast expertise and experience. The Council acknowledges their time and effort dedicated in creating this guide that can be used by institutions to develop their own learning process and content. Appreciation is also due to the efforts of the Academic Cell of the Council and faculty at the various Regional and Nodal Centres of MCI who worked tirelessly to ensure that the new competency driven curriculum and its various unique components are implemented faithfully and flawlessly across the medical colleges in this country from August 2019.

  
(Dr. R.K. Vats)  
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## Expert Group

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# **Curriculum Implementation Support Program**

## **Module – 4**

### **ALIGNMENT AND INTEGRATION**

# Alignment and Integration

## Introduction

The purpose of the MBBS program is to facilitate the medical student to become a primary caregiver to patients. Learning in the various basic and clinical science subjects is predominantly directed towards achieving this purpose. The volume and details required by the student to master each subject that comprises the overall MBBS program is considerable. Subject based instruction provides an opportunity for the student to acquire both vast and deep knowledge of each subject. This structure of instruction, however, may lead to lack of appreciation by the student of the interconnected nature of knowledge in the various subjects, their relatedness, and importantly their relevance to patient care. Additionally study in silos alone may lead to redundancy in instruction.

Several innovative methods have been developed over the years to address these challenges including various levels of integration of instruction that diminishes and removes boundaries within subjects both horizontally in a phase and vertically across phases. While appreciating the value of these approaches, the proposed Graduate Medical Education Regulations (GMER) 2019 has sought to strike a balance that will retain the strength of traditional subject-based teaching and the reality of subject based assessment while providing the relevance, opportunity to understand the interconnectedness and reduce redundancy in the subjects being taught.

In order to achieve this, the MBBS curriculum will become a) aligned to the extent possible - meaning that as much as possible topics in different subjects in the same phase that have similar threads will be grouped together in the timetable and b) integrated to a limited extent both vertically and horizontally. The purpose of horizontal integration (within a phase) is to remove redundancy and provide interconnectedness. In the earlier phases, the purpose of vertical integration (across phases) is to emphasise the applicative use of the basic science concept taught. In the later phases, its purpose is to utilise and build on prior knowledge and emphasise the foundations of clinical practice.

This document is meant to guide institutions, Curriculum Committee, MEU members, and teachers on how to create a timetable that incorporates the principles that have been laid down above reflecting the spirit of the proposed GMER document 2019.

## Objective

The participant must be able to:

Facilitate the development of an aligned and integrated curriculum in his/her institution as envisaged in the GMER 2019 document.

## Glossary of terms used

For the purposes of this document -

**Alignment** implies the teaching of subject material that occurs under a particular organ system/disease concept from the same phase in the same time frame i.e., temporally.

**Integration** implies that concepts in a topic/ organ system that are similar, overlapping or redundant are merged into a single teaching session in which subject based demarcations are removed. For the purpose of this document, topics from other phases that are brought into a particular phase for the purpose of reinforcement or introduction will also be considered as integrated topics. In the GMER 2019, time for integrated teaching is clearly demarcated.

**Linker** is a session that allows the learner to link the concepts presented in an aligned and integrated topic.

## Curricular element or Program addressed

### Alignment and Integration

#### Relevant Extracts from GMER 2019

**10.1 Preamble:** The salient feature of the revision of the medical curriculum in 2019 is the emphasis on learning which is competency-based, integrated and student-centered acquisition of skills and ethical & humanistic values.

Each of the competencies described below must be read in conjunction with the goals of the medical education as listed in items 2 and 3 of the GMER.

It is recommended that didactic teaching be restricted to less than one third of the total time allotted for that discipline. Greater emphasis is to be laid on hands-on training, symposia, seminars, small group discussions, problem-oriented and problem-based discussions and self-directed learning. Students must be encouraged to take active part in and shared responsibility for their learning.

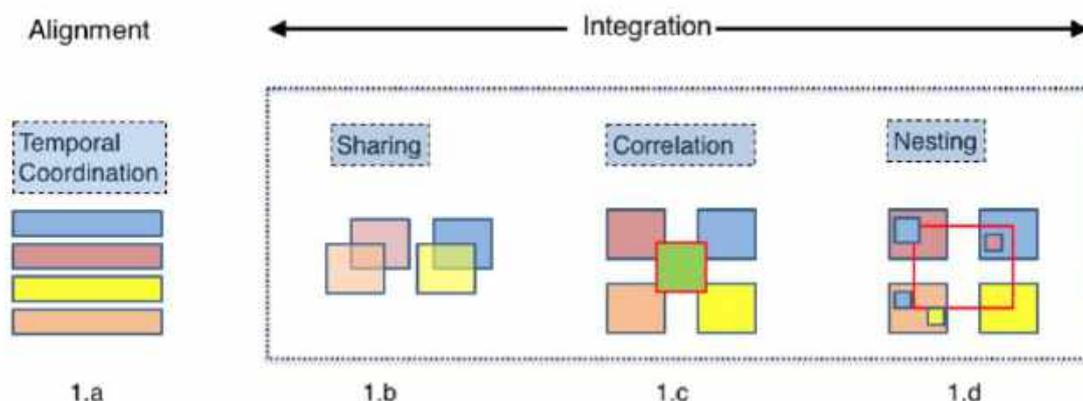
**10.2 Integration** must be horizontal (i.e. across disciplines in a given phase of the course) and vertical (across different phases of the course). As far as possible, it is desirable that teaching/learning occurs in each phase through study of organ systems or disease blocks in order to align the learning process. Clinical cases must be used to integrate and link learning across disciplines.

Subject specific competencies with appropriate alignment and integration are available in the new competency based UG Curriculum document uploaded in the Medical Council of India website.

# Description of the curricular program

## Alignment

Teaching related systems or topics from different subjects in the same phase is strongly recommended. This is the principal method to be followed while creating the phase-wise timetable or calendar and is called alignment (see figure 1).



**Figure 1: Integration concepts framed in the GMER 2019.** Coloured boxes represent subjects. **1a. Alignment - Temporal coordination:** The timetable is adjusted so that topics within the subjects or disciplines which are related, are scheduled at the same time. **1b. Sharing:** Two disciplines may agree to plan and jointly implement a teaching program. **1c. Correlation:** The emphasis remains on disciplines or subjects with subject-based courses taking up most of the curriculum time. Within this framework, an integrated teaching session or course is introduced in addition to the subject-based teaching (green box with red border). **1d. Nesting:** the teacher targets, within a subject-based course, skills relating to other subjects (*Adapted from Harden R Med Edu 2000. 34; 551*).

Alignment is recommended for the majority of the curriculum allowing similar systems or topics in different subjects to be learnt separately but during the same time frame.

Aligning could be done as organ system based (figure 2a) or topic/disease based (figure 2b) or both (figure 2c)

Example: Syllabi in Cardiovascular system or Respiratory system in anatomy, physiology and biochemistry can be scheduled simultaneously in the timetable (figure 2a).

Example: A topic such as acute myocardial infarction or Tuberculosis can be created with the relevant learnings that will lead to the understanding of these topics

If desired, the major alignment can be organ system based with incorporation of some specific topics that will lend itself to integration (see below).

For eg. – In CV organ system the major alignment is with two topics, Acute Myocardial Infarction and Heart failure.

These topics or organ systems that are going to be aligned should be identified by the Curriculum Committee of the teaching institution and must be taught in an aligned fashion in each phase.

The method to derive topic objectives and sessions from competencies is outlined further in this booklet.

Mon	Tues	Wed	Thurs	Fri	Sat
Intro	An	An	An	Bi	Ass
Ph	Ph	An	An/Rad	An	Ass
Bi	Ph	P	Ph	An	SDL
An	An	Ph/Bi	Ph	Ph	
Ph	Ph/Bi	An	Ph	An	
CM	Ph	Bi	AETCOM	An	

Mon	Tues	Wed	Thurs	Fri	Sat
An	An	An	An	Bi	Ass
Ph	Intro	Ph	Intro	An/Rad	Ass
Bi	Ph	An	Ph/Med	Ph	SDL
An	An	Sh Ph/Bi	Ph/Mic	Ass	
Ph	Ph/Bi	Ph/Bi	Ph/Pher	Ph	
CM	Ph	Bi	AETCOM	An	

	CV system
	Respiratory System
	Unaligned sessions
	Shared sessions
	Nested sessions
An	Anatomy
Ph	Physiology
Bi	Biochemistry
Rad	Radiology
Intro	Introduction
Ass	Assessment

Representative timetable using showing how alignment can be done using an organ system based timetable

**Figure 2a:** Creating an aligned timetable using organ systems (six hours per day basis)

Mon	Tues	Wed	Thurs	Fri	Sat
An	An	An	An	Bi	Ass
Ph	Intro	An	An/Rad	An	Ass
Bi	Ph	Ph/Bi	Ph/Med	An	SDL
An	An	Ph/Bi	Ph	Ph	
Ph	ECE	An	Ass	An	
CM	Ph	Bi	AETCOM	An	

Mon	Tues	Wed	Thurs	Fri	Sat
An	An	Intro	An	Bi	Ass
Ph	Intro	Ph	Intro	An/Rad	Ass
Bi	Ph	An	Ph/Med	Ph	SDL
An	An	Bi	Ph/Mic	Ass	
Ph	ECE	Ph	Ph/Phar	Ph	
CM	Bi	Bi	AETCOM	An	

AITO MI	
AITO Tuberculosis	
Unaligned sessions	
Shared sessions	
Nested sessions	
An	Anatomy
Ph	Physiology
Bi	Biochemistry
Rad	Radiology
Intro	Introduction
Ass	Assessment

Representative timetable using showing how alignment can be done using a Aligned and Integrated Topic Based timetable

**Figure 2b:** Creating an aligned timetable using Topics

Mon	Tues	Wed	Thurs	Fri	Sat
Intro	An	An	An	Bi	Ass
Ph	Ph	Intro	An/Rad	An	Ass
Bi	Ph	Ph/Bi	Ph/Med	An	SDL
An	An	Ph/Bi	Ph	Ph	
Ph	Ph/Bi	An	Ass	An	
CM	Ph	Bi	AETCOM	An	

Mon	Tues	Wed	Thurs	Fri	Sat
An	An	An	An	Bi	Ass
Ph	Intro	Ph	Intro	An/Rad	Ass
Bi	Ph	An	Ph/Med	Ph	SDL
An	An	Sh Ph/Bi	Ph/Mic	Ass	
Ph	Ph/Bi	Ph/Bi	Ph/Phar	Ph	
CM	Ph	Bi	AETCOM	An	

CV system	
AITO MI	
Respiratory System	
AITO Tuberculosis	
Unaligned sessions	
Shared sessions	
Nested sessions	
An	Anatomy
Ph	Physiology
Bi	Biochemistry
Rad	Radiology
Intro	Introduction
Ass	Assessment

Representative timetable using showing how alignment can be done using system based timetable with use of topics in each system to improve integration

**Figure 2c:** Creating an aligned timetable using organ systems and topics

## Integration

*Integration is a learning experience that allows the learner to perceive relationships from blocks of knowledge and develop a unified view of its basis and its application.* The GMER 2019 applies these principles to the extent that will retain the strengths of subject based education and assessment while providing experiences that will allow learners to integrate concepts.

Keeping this in mind, the Regulations recommend the adoption of temporal coordination (called **alignment** in this document) as the major method to be followed allowing similar topics in different subjects to be learnt separately but during the same time frame (Fig 1a).

Example: Pancreatic Beta cell anatomy and histology, Pancreatic Beta cell physiology and Insulin structure and synthesis in biochemistry are usually taught at different times of the year. An effort is made to group these related topics in different subjects during the same time frame in the calendar (figure 3a and 3b).

In a small proportion - not to exceed 20% of the total curriculum an attempt can be made to **share** (figure 1b) topics or **correlate** (figure 1c) topics by using an integration or linker session. The integration session most preferred will be a case-based discussion in an appropriate format ensuring that elements in the same phase (horizontal) and from other phases are addressed.

Example: Since there is significant overlap in liver function in physiology and bilirubin metabolism in biochemistry - two departments could **share** sessions thereby reducing redundancy in what is being taught. (Note that it is not essential for two teachers to teach but it is important that the session is planned to ensure that the objectives of both subjects are achieved) (figure 3c).

As much as possible, the necessary correlates from other phases must also be introduced while discussing a topic in a given subject - **Nesting** (figure 1d).

Example: In a session on bilirubin metabolism a patient (a paper case is sufficient) with Dubin Johnson syndrome is **nested** as a short discussion to provide an understanding of what can go wrong, how does it manifest and what is the relevance and future application of learning bilirubin metabolism (figure 3e).

*Care must be taken to ensure that achievement of phase based objectives are given primacy* - the integrative elements from other phases are used only to provide adequate recall and understand the clinical application of concepts. It must be emphasised that integration does not necessarily require multiple teachers in each class. Experts from each phase and subject may be involved in the lesson planning but not in its delivery unless deemed necessary.

Topics that cannot be aligned and integrated must be provided adequate time in the curriculum throughout the year. These concepts are summarised in table 1 and figure 3 (a-e).

**Assessment will continue to be subject based.** However, efforts must be made to ensure that phase appropriate correlates are tested to determine if the learner has internalised and integrated the concept and its application.

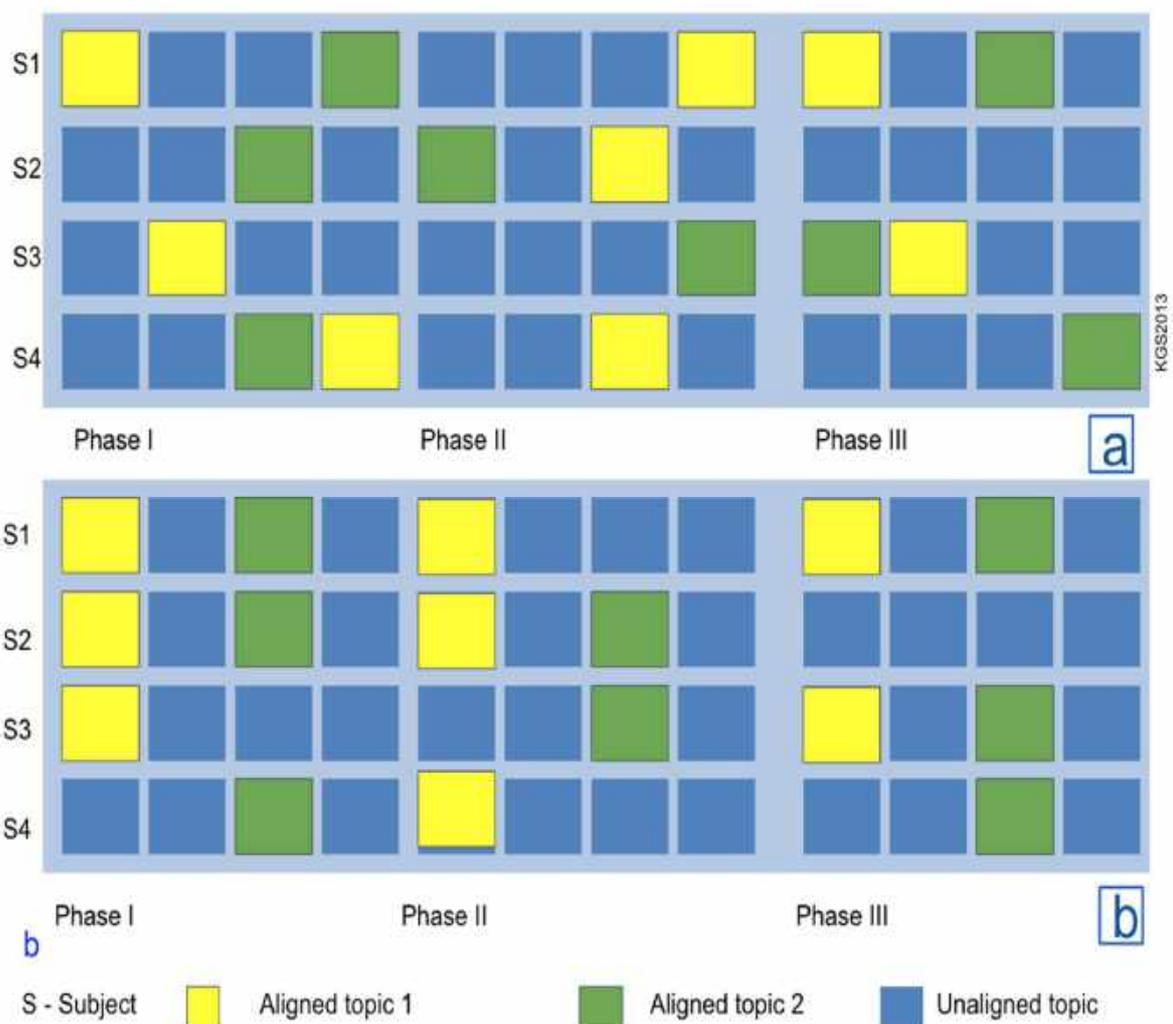
**Table 1.** Considerations for using alignment and integration in the curriculum

Competency /Objective	Same Phase	Different Phase
Cannot be aligned with a similar topic in a different subject  eg. Lower limb anatomy and dissection	Teach separately	-
Can be taught together in different sessions in the same topic  eg. Beta Cell histology in anatomy, Beta Cell function in physiology and structure and secretion of insulin, in biochemistry	Align	-
Can be taught in the same session in the same topic  eg. Sharing - function of the hepatocyte, in physiology and bilirubin metabolism, in biochemistry  eg. <b>Nesting</b> - Present the clinical features and laboratory data of patient with Dubin Johnson syndrome in a session on Bilirubin metabolism	Share	Nest
Can be used to link concepts taught in a particular topic  eg. a patient with Type 1 Diabetes is used to understand the functions of the pancreatic islet - secretion and metabolism	-	Correlate

**Figure 3:** Pictorial illustration of alignment and integration concepts used in the GMER

Figure 3a: Traditionally topics which have the same core of ideas in different subjects are taught at different times.

Figure 3b: Alignment is teaching these related components of a topic from different subjects at the same time i.e, in a temporally coordinated fashion.



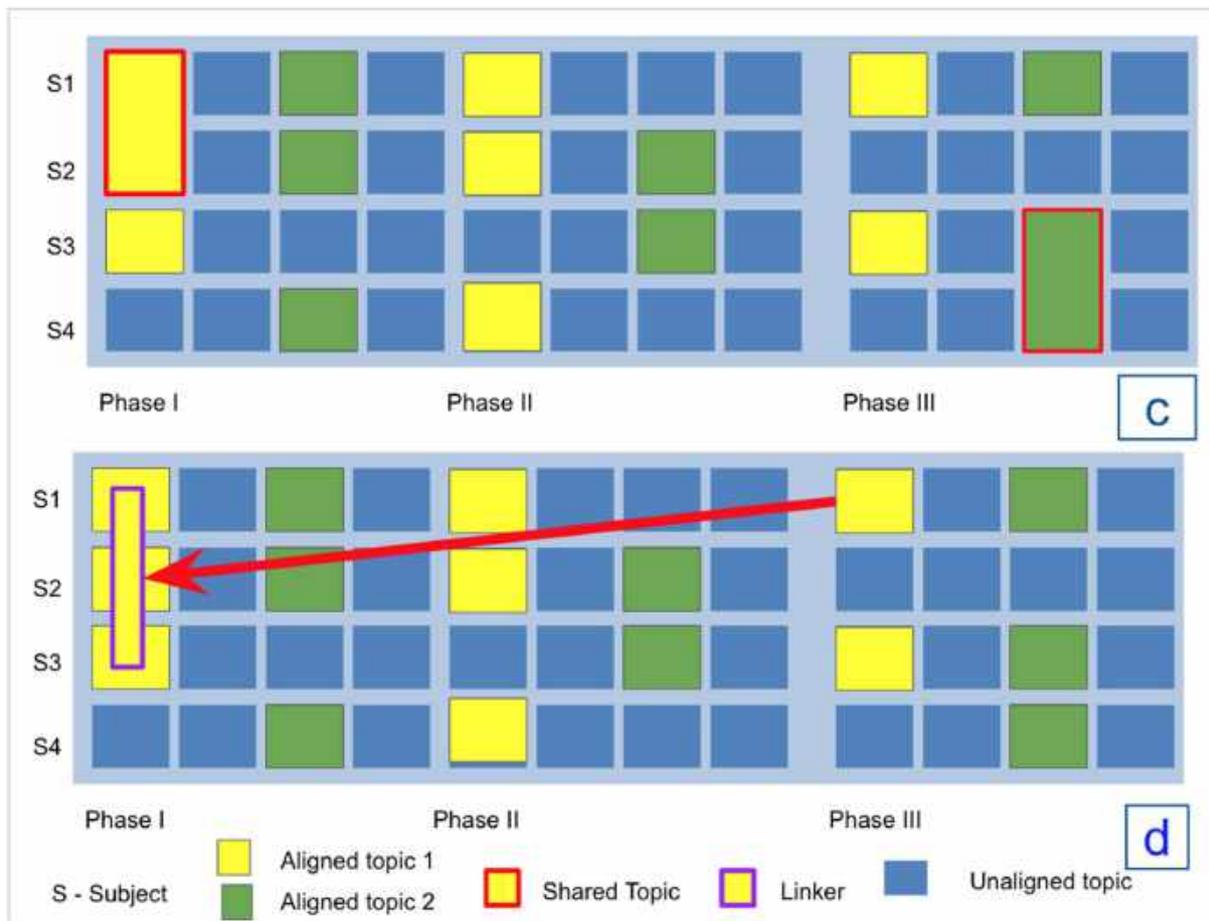


Figure 3c: Redundancy can be reduced by creating a session, merging session objectives from two or more subjects and creating a shared session (Box with red outline).

Figure 3d: Increased correlation can be achieved by using a Linker (Box with purple outline) - usually a case (with sufficient complexity) from the same topic from a higher phase is used to anchor the learning.

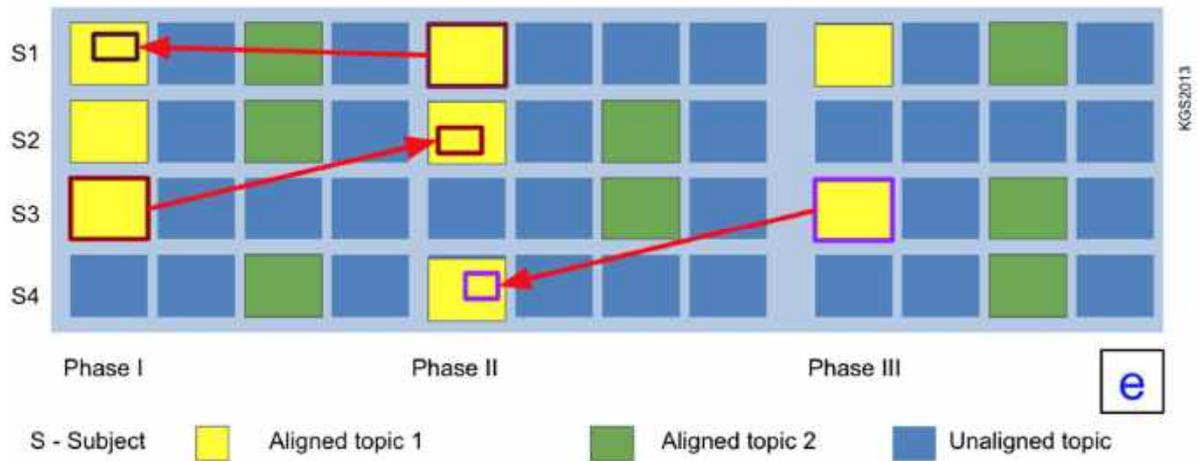
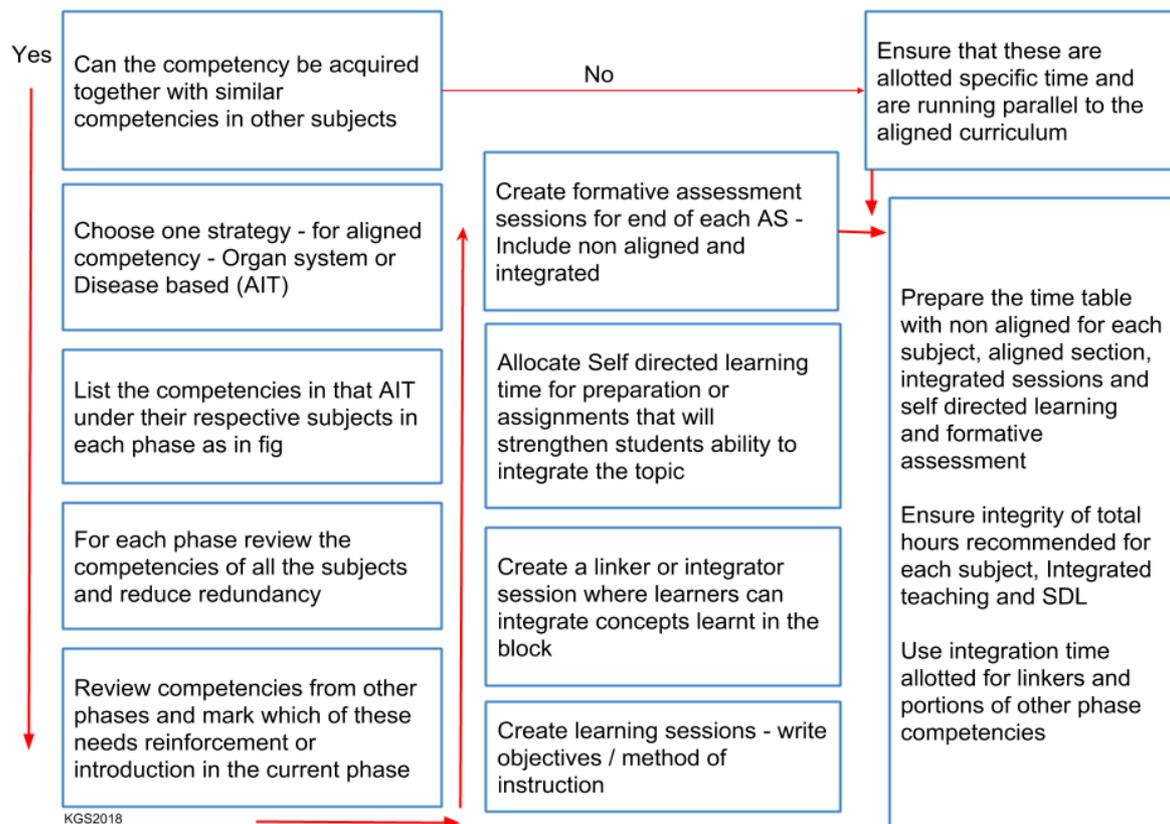


Figure 3e: Appropriate concepts from other phases can be brought into a phase: to increase relevance at a lower phase or increase prior recall or reinforce the fundamental basis at a higher phase. This is done by nesting some learning objectives from the topic in other phases into a learning session.

## Steps in the development of Aligned and Integrated Topic (AITo) (Figure 4)



**Figure 4:** Overview of process to create an aligned and integrated topic

**Step 1:** Identify a list of topics or organ systems that will be accommodated in the timetable as aligned and integrated topics (AITo). Examples of such topics included: Anemia, Febrile illnesses, Trauma etc. are provided in Appendix 1 **of this book**. Examples of organ system are Cardiovascular System, Gastro-intestinal system, Endocrine system.

**Step 2:** From the subject-wise competency document book developed by the MCI, transfer the competences that address the topic into a template. Arrange these competencies according to phase and subject (see Appendix 3 for an example).

Examples for the topics are available in Appendix 1. A glossary to understand competency is available in Appendix 2. A comprehensive list of competency for the AITo Anemia is available in Appendix 3.

**Step 3:** For each competency, derive learning objectives, learning sessions and assessment methods.

- a. A learning session is created by putting together a bunch of objectives that can be accomplished in the allotted time and/or require a similar method of instruction.
- b. A bunch of learning sessions that are put together that address the topic from different subjects in the phase form an Aligned and Integrated Topic (AITo).

(See Figures 5-8 extracted from the Competency based UG curriculum document published by the Medical Council of India that illustrates this process).

**Step 4:** In each AITo of the phase, it is important to review competencies from the previous phase that will bear reinforcement in the current phase. Similarly, it is important to ensure that competencies in the next higher phases are reviewed to explore if some of these require introduction in this phase. Integration sessions allotted in each phase may be used to deliver these competencies.

- a. By reviewing objectives / competencies in a phase, redundant ones and those in each subject that can be taught together without a subject demarcation can be identified for horizontal integration (**Sharing**).
- b. Similarly, by reviewing objectives or competencies across phases, those with a common thread can be identified for vertical integration (**Nesting and Correlation**).
- c. Objective writing and session planning must be done with teachers of all subjects involved in the aligned and integrated topic (AITo) and their inputs taken for the integrated session.
- d. It is important to remember that **the concept and not necessarily teachers** have to be integrated. Using different teachers in each integrated session is nice but rarely required.

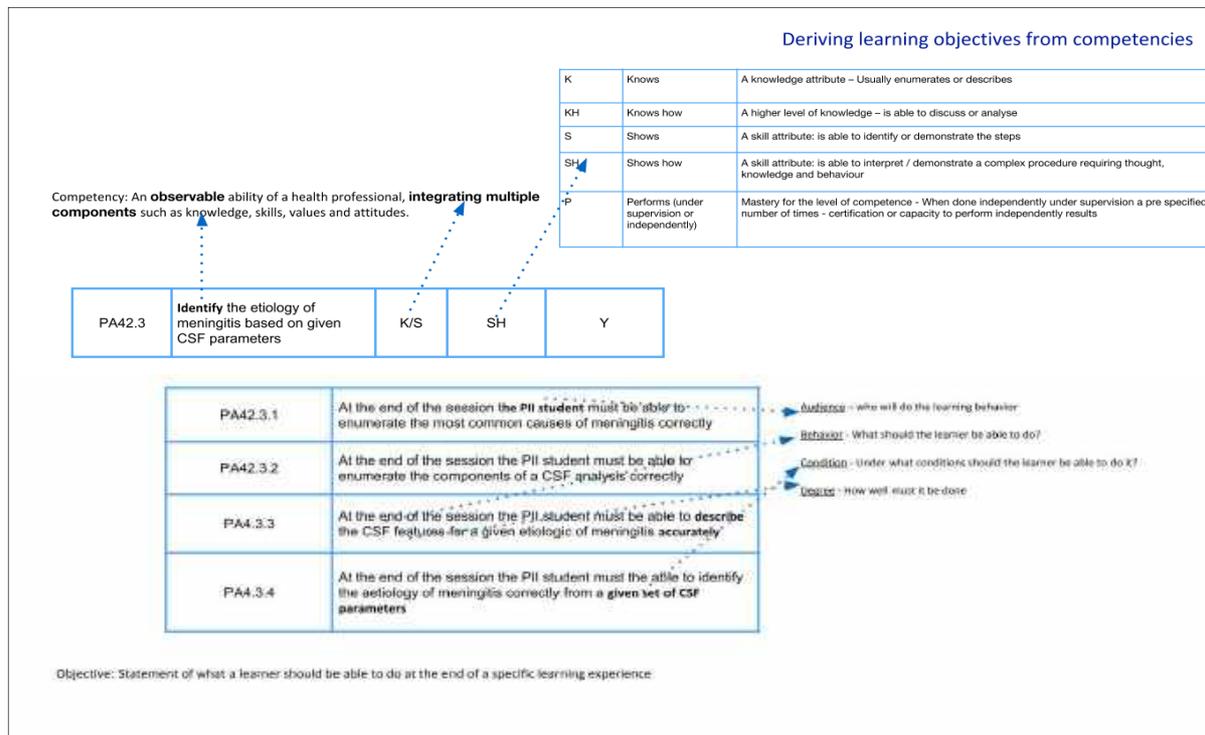
**Step 5:** Consider adding a **linker** to each AITo. A linker, as defined above, is a session that aptly links the various related stand-alone elements represented in an AITo and helps **Correlate**. In the medical curriculum, the linker is most commonly a case. A case that is creatively written can be used in each phase (often the same case) to allow students to correlate what they have learnt and apply into understanding disease process, diagnosis and care. Using a case-based discussion in small groups will, in addition, encourage collaborative and self-directed learning. Using the case discussion at different time points in AITo, will allow students to reinforce and link concepts appropriately.

*An example of creating learning sessions with objectives incorporating principles of alignment, sharing, nesting and correlation is illustrated in figure 9 (1-8).*

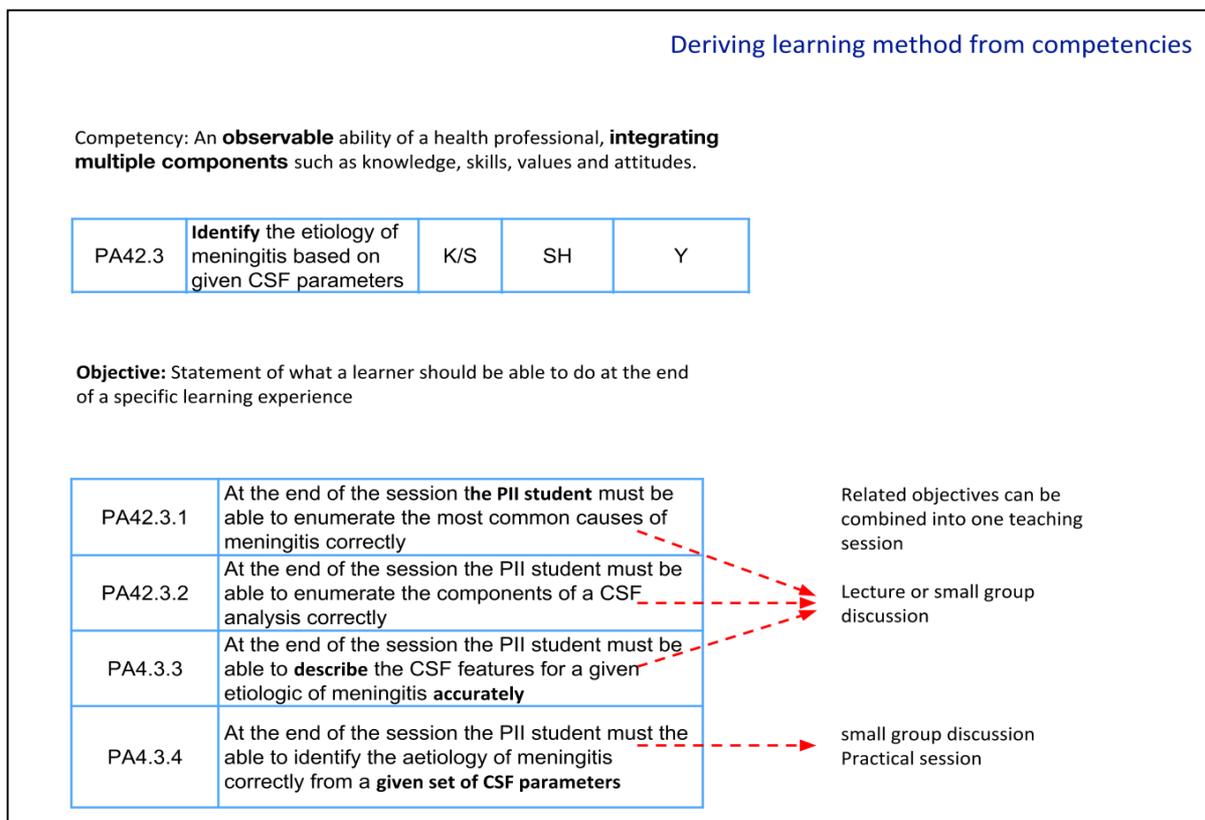
**Step 6:** Ensure that adequate time for the AITo is created in the time table. It is important to consider the inclusion of an end of block assessment that will count towards formative/internal assessment.

**Important:** While creating the timetable ensure that topics in each subject that cannot be aligned are also taught simultaneously in each subject and that the timetable accommodates these topics appropriately.

An example of timetable incorporating an aligned and integrated topic is available in Appendix 4. The functions of the AIT team in collaboration with phase-wise Curriculum subcommittee and Curriculum Committee in creating the AIT is illustrated in figure 11 in the section on governance.



**Figure 5 - Deriving learning objectives from competencies**



**Figure 6. Deriving learning methods from competencies**

## Deriving assessment method from competencies

Competency: An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

PA42.3	Identify the etiology of meningitis based on given CSF parameters	K/S	SH	Y
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Objective: Statement of what a learner should be able to do at the end of a specific learning experience

PA42.3.1	At the end of the session the PII student must be able to enumerate the most common causes of meningitis correctly	Short note or part of structured essay: Enumerate 5 causes of meningitis based on their prevalence in India
PA42.3.2	At the end of the session the PII student must be able to enumerate the components of a CSF analysis correctly	Short note or part of structured essay: Enumerate the components tested in a CSF analysis
PA4.3.3	At the end of the session the PII student must be able to <b>describe</b> the CSF features for a given etiologic of meningitis <b>accurately</b>	Short note or part of structured essay: Describe the CSF findings that are characteristic of tuberculous meningitis
PA4.3.4	At the end of the session the PII student must be able to identify the aetiology of meningitis correctly from a <b>given set of CSF parameters</b>	Short note / part of the structured essay/ Skill station/ Viva: Review the CSF findings in the following patient and identify (write or vocalise) the most likely ethology

**Figure 7: Deriving assessment methods from competencies**

## Deriving integration from competencies

Competency: An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

MI2.4	List the common microbial agents causing anemia. Describe the morphology, mode of infection and discuss the pathogenesis, clinical course, diagnosis and prevention and treatment of the common microbial agents causing Anemia.	K	KH	Y	Didactic Small group	Written Viva	Medicine	Pathology
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Objective: Statement of what a learner should be able to do at the end of a specific learning experience

MI2.4.1	Enumerate the common microbial agents causing anaemia	<p>Integrate concept - not necessarily teachers Plan session with teachers of both subjects -Teachers from both subjects usually not needed to Ensure redundancy and duplication removed by reviewing both subjects</p> <p>Horizontally aligned and integrated with pathology</p> <p>Vertically integrated with general medicine</p> <p>Integrate concept - not necessarily teachers Plan session with teachers from both phases Make a decision on how much of the information needs to be brought to this phase to make it relevant Consider how a competency can ascend over phases For eg - can be at a KH - know how in phase II but become a SH in phase III For vertical integration with clinical subjects use of a case to link the concept (a well written paper case is sufficient. Using teachers from both phases is rarely required</p>
MI2.4.2	Describe the morphology of agent (1,2 etc)	
MI2.4.3	Describe the mode of infection of agent in humans	
MI2.4.4	Discuss the pathogenesis of anemia caused by agent	
MI2.4.4	Describe the clinical course of infection by agent	
MI2.4.5	Enumerate the diagnostic tests to identify the aetiology of agent as a cause of anaemia	
MI2.4.6	Discuss the methods to prevent infection by agent	
MI2.4.7	Describe the treatment of infection by agent	

**Figure 8: Marking objectives/ competencies for integration**

**Figure 9 (1-8) has used anemia as an example for creating an Aligned and Integrated topic.**

Note: A comprehensive list of competencies for the topic anemia gleaned from the competency booklet is presented in Appendix 3.

For illustrative purposes only

AITO - Anemia	Step 1. Identify relevant competencies in each subject in the phase that can be taught in a temporarily coordinated fashion under a topic	
Phase 1 Competencies	<p><b>Physiology</b> Describe and discuss the synthesis and functions of Haemoglobin and explain its breakdown. Describe variants of haemoglobin KH</p>	<p><b>Biochemistry</b> Describe the functions of haem in the body and describe the processes involved in its metabolism and derangements associated with these. KH Describe the major types of haemoglobin and its derivatives found in the body and their physiological/ pathological relevance. KH</p>

Figure 9.1 In this example two related competencies are identified from physiology (purple) and Biochemistry (Green) from the competency booklet

AITO - Anemia	Step 2. List session objectives for each subject that can be taught in a temporarily coordinated fashion	
Phase 1 Competencies	<p><b>Physiology</b> Describe and discuss the synthesis and functions of Haemoglobin and explain its breakdown. Describe variants of haemoglobin KH</p>	<p><b>Biochemistry</b> Describe the functions of haem in the body and describe the processes involved in its metabolism and derangements associated with these. KH Describe the major types of haemoglobin and its derivatives found in the body and their physiological/ pathological relevance. KH</p>
Session Objectives	<p>At the end of the session the student must be able to</p> <ol style="list-style-type: none"> <li>Enumerate the steps in the synthesis of hemoglobin</li> <li>Enumerate the steps in the breakdown of hemoglobin</li> <li>Describe the functions of hemoglobin</li> <li>Describe the process of oxygen carrying by hemoglobin</li> <li>Enumerate the major variants of hemoglobin</li> <li>Describe the structure function relationship of hemoglobin variants</li> <li>Describe the changes in function consequent to abnormalities in hemoglobin structure</li> <li>Describe the changes in function consequent to abnormalities in hemoglobin function</li> </ol>	<p>At the end of the session the student must be able to</p> <ol style="list-style-type: none"> <li>Describe the functions of hemoglobin</li> <li>Describe the structure of hemoglobin</li> <li>Enumerate the major variants of hemoglobin</li> <li>Describe the alteration seen in the major variants of hemoglobin</li> <li>Describe the structure function relationship of variants of hemoglobin</li> <li>Describe the steps in the metabolism of hemoglobin</li> <li>Describe the changes in metabolism consequent to abnormalities or variance in hemoglobin structure / composition</li> </ol>
		<p>Purple: Physiology Green: Biochemistry Brown: Pathology</p> <p><b>Principle : Alignment</b></p>

Fig 9.2 Session objectives are derived for each competency are identified

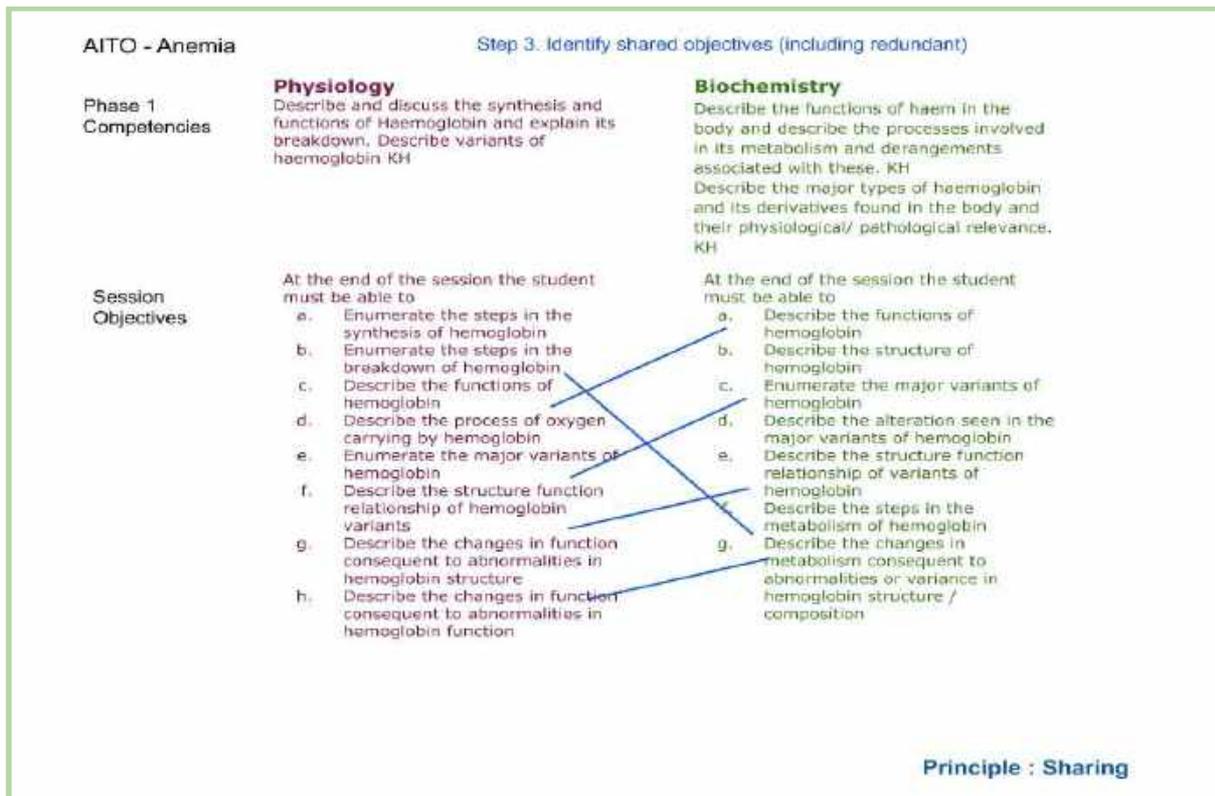


Fig 9.3 Objectives that are similar to both subjects are marked for redundancy and sharing

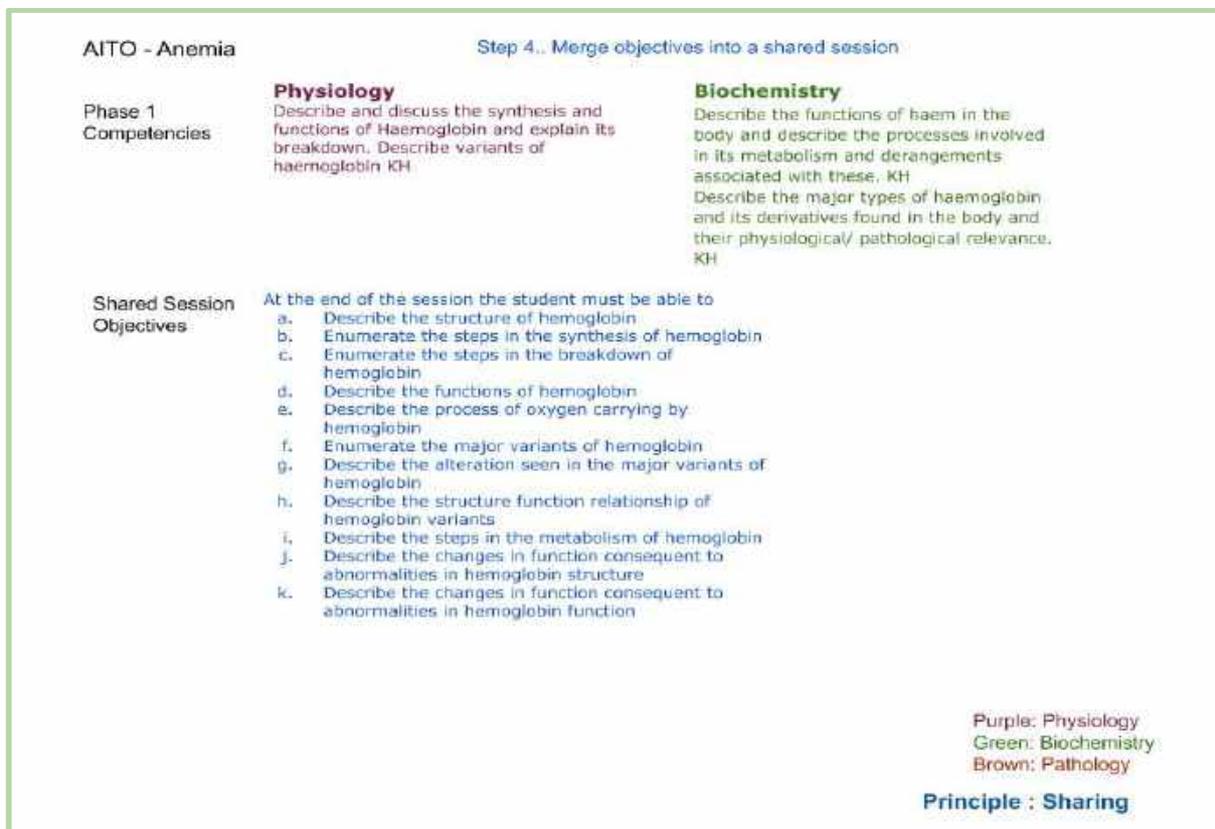


Fig 9.4 A new shared session is created merging the objectives from both subjects by removing redundancy

AITO - Anemia		Step 5. If needed identify competencies from other phases for vertical integration	
<b>Phase 1 Competencies</b>	<p><b>Physiology</b> Describe and discuss the synthesis and functions of Haemoglobin and explain its breakdown. Describe variants of haemoglobin KH</p>	<p><b>Biochemistry</b> Describe the functions of haem in the body and describe the processes involved in its metabolism and derangements associated with these. KH Describe the major types of haemoglobin and its derivatives found in the body and their physiological/ pathological relevance. KH</p>	
<b>Shared Session Objectives</b>	<p>At the end of the session the student must be able to</p> <ol style="list-style-type: none"> <li>Describe the structure of hemoglobin</li> <li>Enumerate the steps in the synthesis of hemoglobin</li> <li>Enumerate the steps in the breakdown of hemoglobin</li> <li>Describe the functions of hemoglobin</li> <li>Describe the process of oxygen carrying by hemoglobin</li> <li>Enumerate the major variants of hemoglobin</li> <li>Describe the alteration seen in the major variants of hemoglobin</li> <li>Describe the structure function relationship of hemoglobin variants</li> <li>Describe the steps in the metabolism of hemoglobin</li> <li>Describe the changes in function consequent to abnormalities in hemoglobin structure</li> <li>Describe the changes in function consequent to abnormalities in hemoglobin function</li> </ol>		
<b>Phase 2 Competencies</b>	<p><b>Pathology</b> Define and classify hemolytic anemia Describe the pathogenesis and clinical features and hematologic indices of hemolytic anemia Describe the pathogenesis features, hematologic indices and peripheral blood picture of sickle cell anemia and thalassemia</p>		<p>Purple: Physiology Green: Biochemistry Brown: Pathology</p>
			<b>Principle : Nesting</b>

Fig 9.5 If desired, subjects from other phases are reviewed for competencies that will enhance the value of the learning session - in this instance a few competencies from pathology are brought into phase I to enhance the value of learning in the shared session.

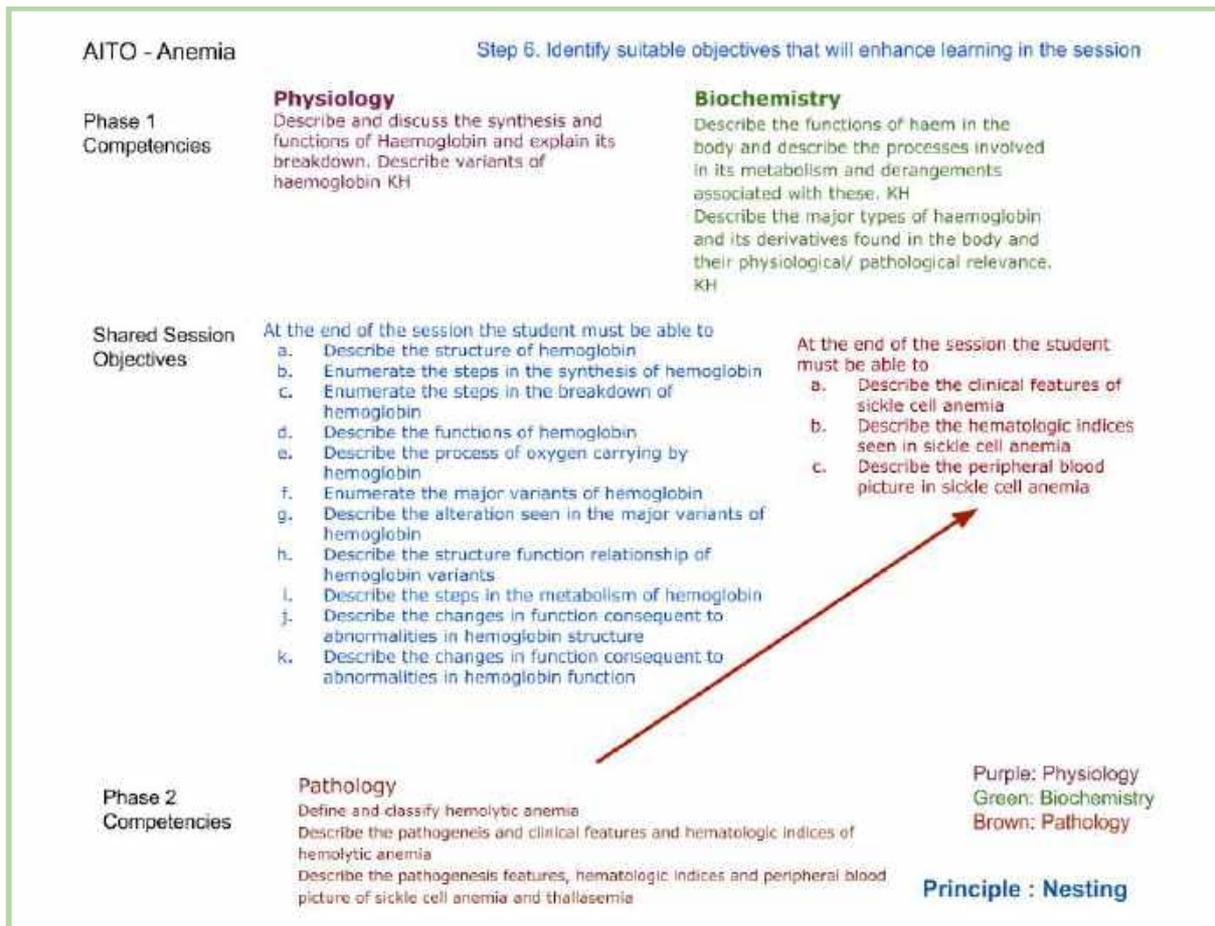


Fig 9.6 Objectives from the pathology (brown) competencies are listed

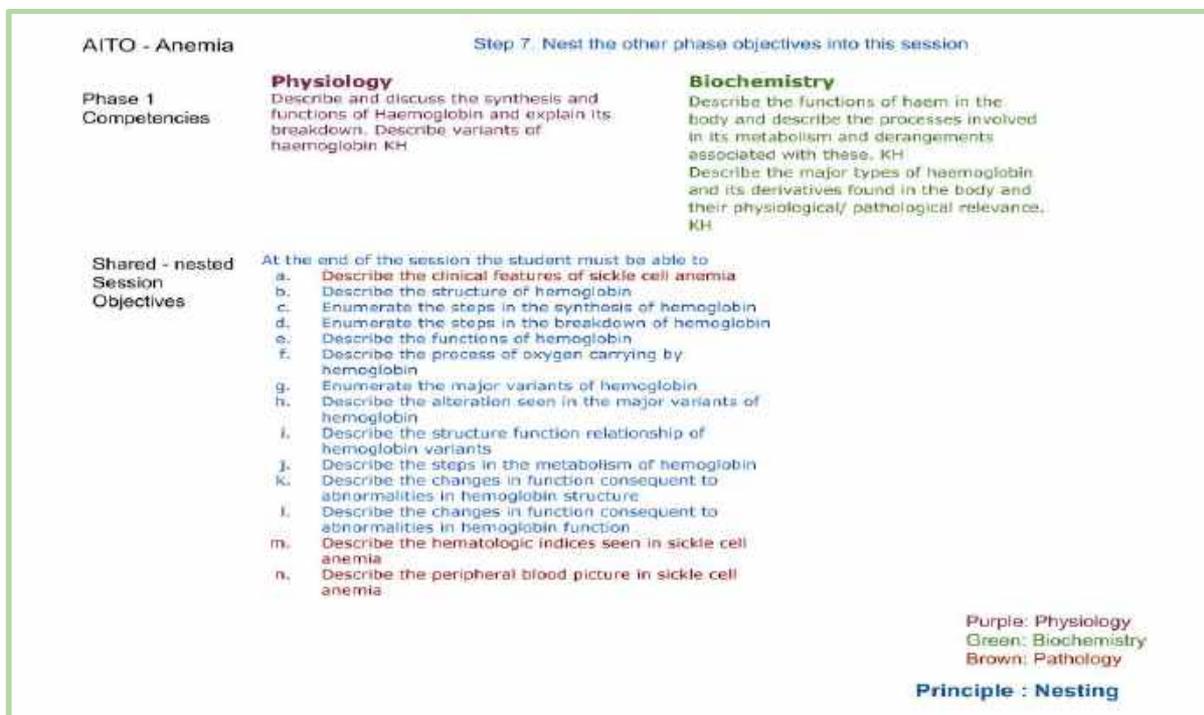


Fig 9.7: Selected objectives are “nested” to the shared session

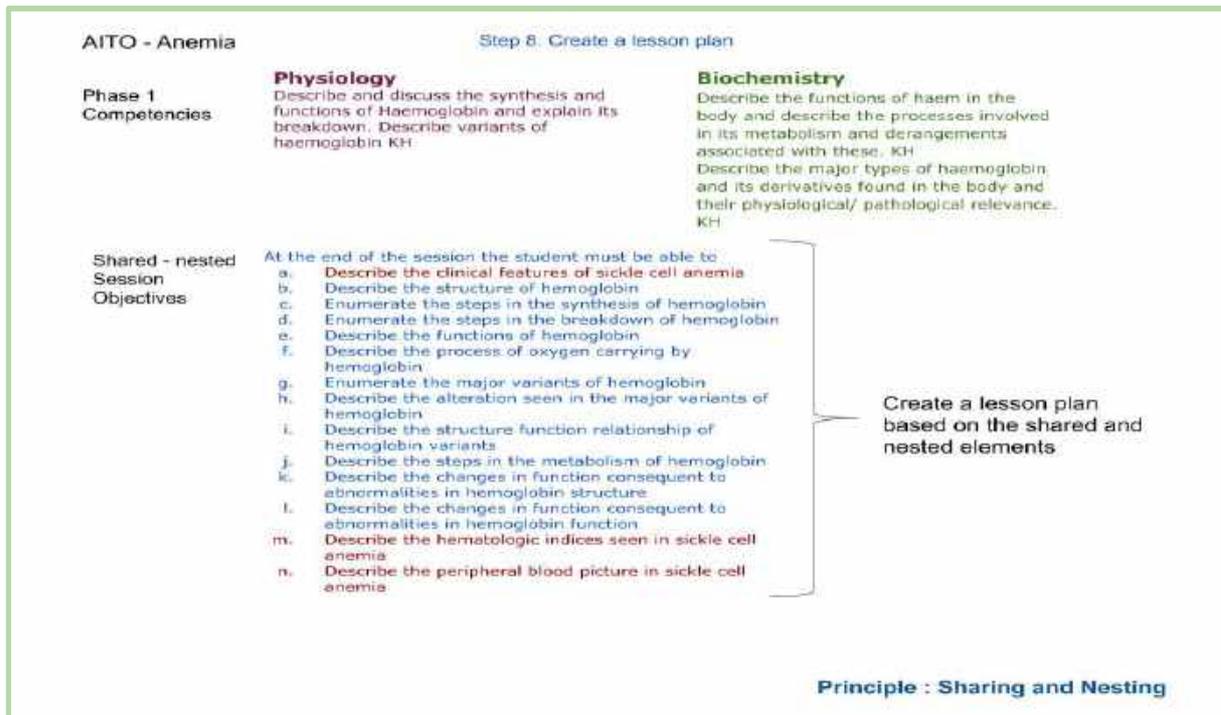


Fig 9.8 A lesson plan is created for the integrated session

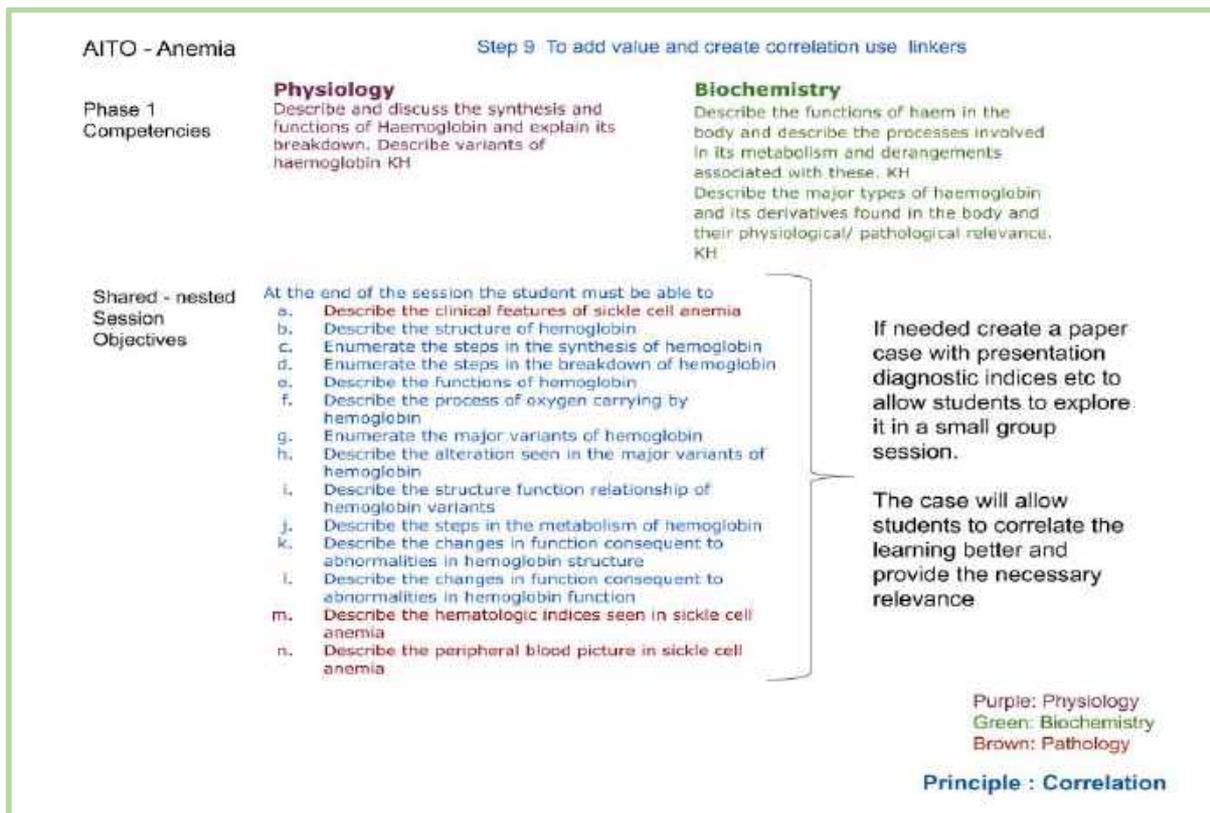
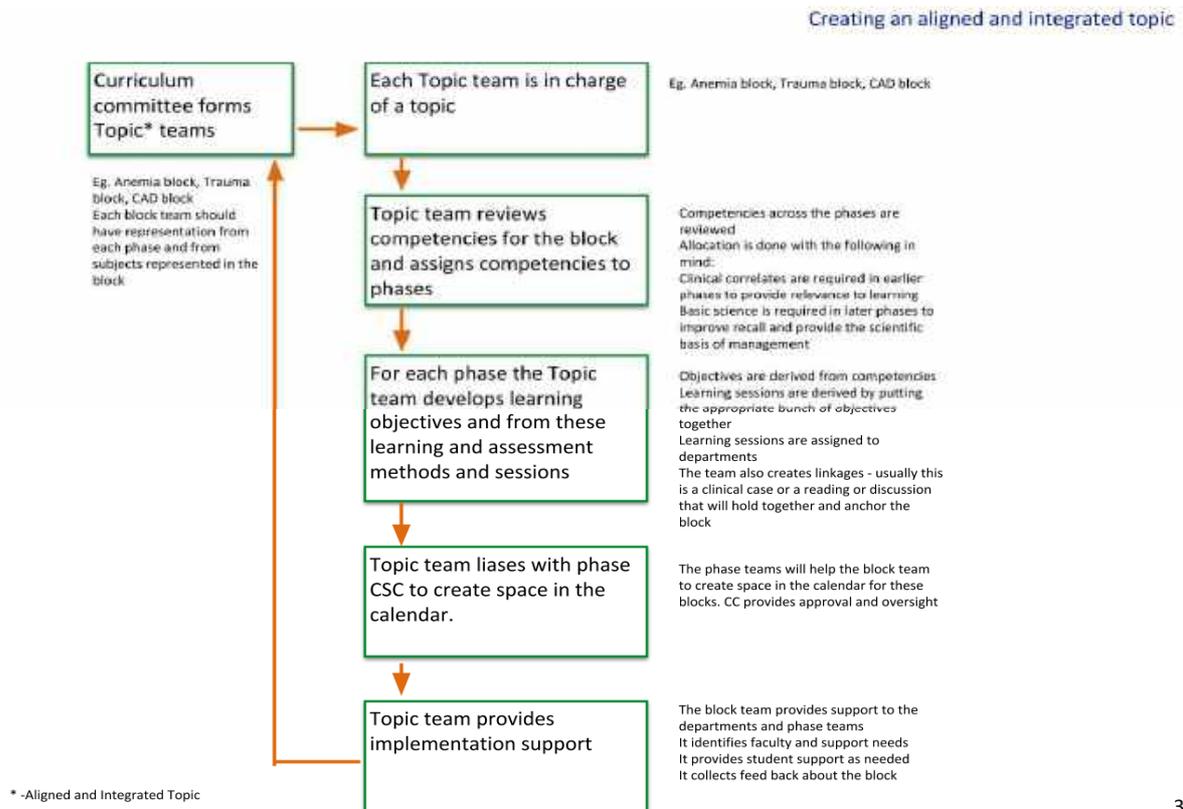


Fig 9.9 A paper case is often used as a linker to improve the relevance and allow greater correlation

## Curricular Governance required to create and implement an Aligned and Integrated Curriculum



3

**Figure 10: Steps and oversight required in development of Aligned and Integrated Topic**

The development of an aligned and integrated curriculum will require significant collaboration from all stakeholders. In addition, curricular oversight will be required for its smooth implementation.

1. The Dean as the head of the institution and also as the Chairman of the Curriculum Committee will be responsible for the overall development, implementation and oversight of the curriculum.
2. The Curriculum Committee as constituted in accordance with the directives of the MCI will:
  - a. Develop a strategy for creating and implementing the curriculum and providing oversight,
  - b. Decide if the alignment will be topic or organ system based,
  - c. Create a phase-wise Curriculum Subcommittee (PWCS) to oversee the creation and delivery of aligned and integrated curriculum,
  - d. Create and support topic teams which will develop objectives and learning sessions for each topic across the phases,
  - e. Approve and release the annual timetable for each phase,

- f. Liaise with the Medical Education Unit or Department for required faculty support.
3. The Phase-wise Curricular Sub-committees (PWCSC) may be constituted with heads of Departments or key faculty in each phase with adequate representation from other phases and reporting to the Curriculum Committee. The PWCSC should:
  - a. Review competencies for each phase and convert them into learning objectives,
  - b. Align the curriculum as much as possible and enlist help from other phases in creating necessary vertical integration and links,
  - c. Reduce redundancy across the phase by integrating overlapping teaching elements,
  - d. Develop learning and assessment methods for each phase,
  - e. Prepare the timetable for the phase and present it to the Curriculum Committee for approval.
4. If needed, topic teams or Alignment and Integration (AIT) teams may be created. These teams will have at least one member from each department across phases and is responsible for delivery of the topics identified. The AIT team will:
  - a. Create learning and assessment sessions of the Aligned and Integrated Topics (AITo) identified across phases,
  - b. Represent the Aligned and Integrated Topic (AITo) to the phase-wise Curricular subcommittee and/or Curriculum Committee,
  - c. Review competencies and develop learning objectives for the topic,
  - d. Assign learning objectives to each phase and teaching session,
  - e. Develop learning and assessment methods for the AITo,
  - f. Help faculty with delivering session appropriately and in a collaborative manner across phases,
  - g. Collect feedback for the AITo, and
  - h. Provide student support.

## Further reading

### Required Reading

1. Ronald M Harden, The integration ladder: a tool for curriculum planning and evaluation, *Medical Education* 2000;34:551-557.
2. Alam Sher Malik & Rukhsana Hussain Malik, Universiti Teknologi MARA, Malaysia Twelve tips for developing an integrated curriculum". *Medical Teacher* 2011; 33: 99–104.
3. David G. Brauer & Kristi J. Ferguson 1, Washington University School of Medicine, USA, University of Iowa, USA; The integrated curriculum in medical education: AMEE Guide No. 96.
4. Integration of basic and clinical sciences - AMEE 2008 Paul Bradley and Karen Mattick, Peninsula College of Medicine and Dentistry, UK, <https://amee.org/getattachment/Conferences/AMEE-Past-Conferences/AMEE-Conference-2008/Introduction-to-Medical-Education-Bradley-Mattick.pdf>.

### Additional reading

1. Gustavo A. Quintero, John Vergel, Martha Arredondo, Maria-Cristina Ariza, Paula Gomez & Ana-Maria Pinzon-Barrios, Integrated Medical Curriculum: Advantages and Disadvantages. *Journal of Medical Education and Curriculum Development* 2016; J Med Educ Curric Dev 3:S18920 (online).

# Appendix 1

## Examples of aligned and integrated topics (indicative)

Anemia  
Jaundice  
Diabetes  
Thyroid Diseases  
Nutrition  
Febrile Illness  
Tuberculosis  
Malaria  
Diarrhoea  
Ischemic Heart Disease  
Polycystic Ovarian Syndrome

## Appendix 2

### Understanding the competencies table

1	2	3	4	5	6	7	8	9	10
No.	Competencies	Domain	K/KH/SH/P	Core	Suggested Teaching Learning method	Suggested Assessment method	No req to certify P	Vertical Integration	Horizontal Integration
<b>Physiology</b>									
<b>Summary</b>									
Name of Topic: <b>General Physiology</b>									
Number of competencies: <b>(08)</b>									
Number of procedures that require certification: <b>Nil</b>									
PY1.1	Describe the structure and functions of a mammalian cell Elicit document and present a medical history that helps delineate the aetiology of these diseases that includes the evolution and pattern of symptoms, risk factors, exposure through occupation and travel	K	KH	Y	Lectures, Small group discussion	Written/viva			Biochemistry
GM25.4		S	SH	Y	bed side clinic, DCAP	Skill assessment	no of times a skill needs to be done independently to be certified for independent performance Rarely used in UG	Community Medicine	
Unique number of the competency First two alphabets represent the subject (see list) Number following alphabet reflects topic Number following period is a running number	Description of competency	Identifies the domain or domains addressed K - Knowledge S - Skill A - Attitude C - Communication	Identifies the level of competency required based on the miller's pyramid K - Knows KH - Knows How S - Skill SH - Show How P - Perform independently	Identifies if the competency is core or desirable. Y indicates Core	Identifies the suggested learning method. DOAP - <b>D</b> emonstrate (by student) <b>O</b> bserve <b>A</b> ssist <b>P</b> erform	Identifies the suggested assessment method Skill assessment - Clinics, Skills lab, Practicals etc	Subject(s) in other phases with which the competency can be vertically integrated to increase relevance or improve basic understanding	Subject(s) in the same phase with which the competency can be horizontally integrated or aligned to allow a more wholesome understanding	

## Appendix 3

### How to choose competencies from different subjects in various phases for a given topic

(illustrative example)

Competencies for the topic anemia from various phases from the competency booklet volumes 1-3

Year	No.	Competencies*	No.	Competencies*	
<b>1</b>		<b>Physiology</b>		<b>Biochemistry</b>	
	PY2 .1	Describe the composition and functions of blood components			
	PY2 .2	Discuss the origin, forms, variations and functions of plasma proteins	BI 5. 2	Describe and discuss functions of proteins and structure-function relationships in relevant areas eg, hemoglobin and selected hemoglobinopathies	
	PY2 .3	Describe and discuss the synthesis and functions of Haemoglobin and explain its breakdown. Describe variants of haemoglobin	BI 6. 11	Describe the functions of haem in the body and describe the processes involved in its metabolism and describe porphyrin metabolism.	
	PY2 .4	Describe RBC formation (erythropoiesis & its regulation) and its functions	BI 6. 12	Describe the major types of haemoglobin and its derivatives found in the body and their physiological/ pathological relevance.	
				<b>No</b>	
<b>2</b>		<b>Pathology</b>		<b>Pharmacology</b>	
	PA1 3.1	Describe hematopoiesis and extramedullary hematopoiesis	P H 1. 35	Describe drugs used in hematological disorders and discuss mechanism/s of action, types, doses, side effects, indications and contraindications, like 1. Drugs used in anemias 2. Colony Stimulating factors	
				<b>Microbiology</b>	
				M 1 2 4	List the common microbial agents causing anemia. Describe the morphology, mode of infection and discuss the pathogenesis, clinical course, diagnosis and prevention and treatment of the common microbial agents causing Anemia.

	PA1 3.2	Describe the role of anticoagulants in hematology		
	PA1 3.3	Define and classify anemia		
	PA1 3.4	Enumerate and describe the investigation of anemia		
<b>3</b>		<b>Medicine</b>		<b>Pediatrics</b>
	IM9. 1	define describe and classify anemia based on red blood cell size and reticulocyte count	PE 13 .1	Discuss the RDA, dietary sources of Iron and their role in health and disease
	IM9. 2	describe and discuss the morphological characteristics aetiology and prevalence of each of the causes of anemia	PE 13 .2	Describe the causes, diagnosis and management of Fe deficiency
	IM9. 4	describe and discuss the genetic basis of some forms of anemia	PE 13 .3	Identify the clinical features of dietary deficiency of Iron and make a diagnosis
	IM9. 5	elicit document and present a medical history that includes symptoms, risk factors including GI bleeding, prior history, medications, menstrual history, and family history	PE 13 .4	Interpret hemogram and Iron Panel

\* List of competencies only representative, not complete.

## Appendix 4 Sample time table with AIT

Time	Day1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	DAY 8	
8-9 am	Blood and its components by a Hematologist <b>Linker-Case 1</b> PY 2.1 Describe the composition and functions of blood and its components		<b>Linker Part A</b> of case 1 addresses PY 2.1 PY 2.2 PY 2.9 small group discussion + Formative assessment					Written Assessment PY 2.5 PA 13.3	
9-10 am	Blood groups , Principles of Blood transfusion and banking PY 2.9 Describe different blood groups and discuss the clinical importance of blood grouping, blood banking and transfusion	Blood groups , Principles of Blood transfusion and banking PY 2.9 Describe different blood groups and discuss the clinical importance of blood grouping, blood banking and transfusion	<b>Erythropoiesis - Linker part B</b> PY 2.5 Describe RBC formation (erythropoiesis & its regulation) and its functions PA 13.1 Describe hematopoiesis and extra medullary hematopoiesis	Role of Iron and Vit A B12 in Erythropoiesis PA 14.1 Describe iron metabolism PA 15.1 Describe the metabolism of Vitamin B12 and the etiology and pathogenesis of B12 deficiency	Haem synthesis and metab PY2.3 Describe & discuss synthesis & functions of Hb & explain its breakdown. Describe Hb variants BI 6.11 Describe the functions of haem in body and describe the processes involved in its metabolism and derangements associated. Porphyrins	Types of hemoglobin and their clinical significance BI 6.12 Describe the major types of Hb and its derivatives found in body and their physiological/ pathological relevance.	Physiology of Hemolysis and Anemia PA 13.3 Define and classify anemia PY 2.5 Describe different types of anemias & Jaundice	<b>Linker Part B</b> of case 1 addresses PY 2.3 , BI 6.12 ,PY 2.9 , PA 13.3 small group discussion + Formative assessment	
10 - 11 am	PY 2.9 Group A) Visit to the blood bank Group B ) PY 2.11 Blood Grouping cross matching DQAP session	PY 2.9 Group B ) Visit to the blood bank Group A ) PY 2.11 Blood Grouping cross matching	<b>Peripheral smear examination</b> Group A PY 2.1 Describe the composition and functions of blood and its components OBJ A) Identify RBC , WBC and platelet in normal peripheral smear B) Discuss their functions Group B Visit to Hematology lab / Or ALC animation	<b>Physiology practical</b> Group A PY 2.11 Estimate RBC count and interpret normal Group B PY2.11 Estimate Hb, RBC indices and interpret PA 13.4 Enumerate and describe the normal blood parameters	<b>Physiology practical</b> Group B PY 2.11 Estimate RBC count and interpret normal Group A PY2.11 Estimate Hb, RBC indices and interpret PA 13.4 Enumerate and describe the normal blood parameters	<b>Physiology practicals</b> Group A PY 2.12 Demonstrate the tests for ESR, Hematocrit. Note the findings and interpret the results Group B PY 2.12 Demonstrate Osmotic fragility test . Note the findings and interpret the results	<b>Physiology practical</b> Group B PY 2.12 Demonstrate the tests for ESR, Hematocrit. Note the findings and interpret the results Group A PY 2.12 Demonstrate Osmotic fragility test Note the findings and interpret the results	<b>Skill assessment</b> t PY 2.9, PY 2.11, PY 2.1, PA 13.4 ,PY 2.12	
11-12.00									
1-2 pm	<b>Plasma Proteins</b> PY 2.2 Discuss the origin, forms, variations and functions of plasma proteins	<b>Blood groups , Principles of Blood transfusion and banking</b> PY 2.1 ,2.2 PY 2.9 Formative Assessment Reflective exercise						Feedback-	
2-3 pm	Non Aligned sessions in Anatomy						Radiological ANATOMY	Osteology	Remedial
3-4 pm							Surgical Anatomy	Surface Anatomy	
Submissions						PY 2.5 PA 14.1 PA 15.1 Assignment- 1 on Erythropoiesis and factors regulating	PY 2.3 BI 6.11BI 6.12 Assignment 2 on Haem synthesis and metabolism		



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## COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR THE INDIAN MEDICAL GRADUATE

Knows    Knows how    Shows    Shows how    Performs

Describe

Enumerate

Observe

Demonstrate

Assist

Counsel



Prescribe

Analyse



Integrate

Guide



Communicate

Correlate



Interpret

Critique

Collaborate

### Module 5 Skills Training

Clinician

Communicator

Team Leader

Professional

Lifelong Learner

Knowledge

Skills

Attitude

Values

Responsiveness

Communication

Curriculum Implementation Support Program

**Skills Training Module**  
**(Including Guidelines for Skills Lab)**

**For Undergraduate Medical Education**

**Program**

**2019**



**Medical Council of India**  
**Pocket-14, Sector-8, Dwarka,**  
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**Skills module**

**Foreword**

Clinicians are defined by their skill sets. From listening to procedures the continuum of skills that are garnered by learners and doctors are myriad. There is a compelling need to focus on observable and measurable skill acquisition in the MBBS program.

The emphasis on skill acquisition is one of the key features of the competency based curriculum and in many ways is its soul. The competency based undergraduate curriculum provides a framework for learning and assessing skills. The curriculum will necessitate a paradigm shift in medical education in India and requires teachers and education administrators alike to re-think the construct and delivery of instruction, like: 1) what are the skills that must be taught, 2) how to create the right environment in which skills can be taught, practiced, observed and assessed, 3) what are the facilitatory skills that teachers must acquire, 4) how should acquisition of skills be documented, and 5) how would the acquisition or non-acquisition of skills affect the progress of the learner?

A skills lab is a safe environment in which learners can acquire and practice skills and be observed and assessed. A skills lab that provides this environment is an important step in helping learners acquire skills – procedural, communication or others. The establishment of a basic skills lab that is in alignment with the requirements of the competency based curriculum must be established by all medical colleges, if the implementation of the new undergraduate curriculum is to be successfully implemented. This will also provide the faculty with the support mechanisms to adapt to these new changes and requirements.

The skills module developed by the Expert Group of MCI is a compilation of best practices and is a guide to teaching skills needed to implement the competency based curriculum. Institutions, educators and teachers are encouraged to use this guide to help facilitate skill acquisition by learners. We also solicit your innovations and best practices so that these can be shared with institutions and teachers across the nation.

Chairman, Board of Governors

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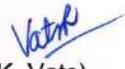
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**Foreword**  
**Skills module**

A key feature of the Regulations in Graduate Medical Education Part II is the emphasis on an outcome driven education with emphasis on acquisition of competencies. The skills, knowledge and practice acquired by the Indian Medical Graduate to deal with the health problems of the community, particularly in the context of a number of newly emerging and re-emerging diseases, is a challenge to medical educationists. This situation necessitates that the student-learner should have acquired competent and verifiable skills at the time of graduation. Acquisition of these skills, which include cognitive, procedural, and communication skills require dedicated teaching learning practices and time in a supervised environment. The primacy of patient safety also necessitates that practice of skill acquisition, its usage and assessment are done in a safe environment under peer supervision and should be a planned collaborative activity of the institution. The Medical Council of India has thus felt that every medical college should establish an adequately equipped skills lab and provide resources and opportunities so that these can be meaningfully used to improve the skill outcomes of the medical graduate.

This booklet on skills module has been designed to help institutions meet the challenge of transforming the learning environment to align with the requirements of implementation of the competency driven undergraduate curriculum. This module has been written and diligently scrutinised by members of the Expert group. The Medical Council of India hopes that medical institutions would find this a useful resource material as they make the momentous transition to the teaching of the new undergraduate curriculum.

  
(Dr. R. K. Vats)  
Secretary General

**Module – 5**  
**SKILLS TRAINING**

# Skills Training Module

## 1. Objective of the Document

The objective of the document is to facilitate institutions and faculty to develop and implement skills training as part of implementation of new Undergraduate Curriculum.

## 2. Glossary of Terms Used in the Document

**Skill:** Skill is the ability to perform a task leading to a specific predefined outcome.

Skill may be:

- a) Intellectual or cognitive which includes clinical reasoning and decision making skills,
- b) Procedural or psychomotor skills that require manual dexterity and include laboratory and clinical skills,
- c) Communication skills,
- d) Team skills including leadership skills.

**Competency:** The habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, attitude, values, and reflection in daily practice for the benefit of the individual and the community being served.

**Skill Assessment:** A session that assesses the skill of the student including those in the laboratory, bed-side, skills lab, skills station that uses mannequins/ paper cases/simulated patients/real patients as the context demands.

**DOAP (Demonstration -Observation - Assistance - Performance):** A practical session that allows the student to observe a demonstration, assist the performer, perform in a simulated environment, perform under supervision or perform independently.

### **3. Introduction**

The current undergraduate medical education curriculum focuses on competencies and outcomes and gives emphasis to skill development in all phases. The competencies 'Shows How' (SH) or 'Perform' (P) are listed in relation to the skills to be acquired by the learner. The Graduate Medical Education Regulations Part II, 2019 envisages that certain skills are prerequisites for graduation. Therefore, it is necessary for institutions to create skill sessions in which essential/ desirable and certifiable skills are acquired. These skill sessions should be planned during their respective phase in a laboratory/during clinical posting. There should be proper documentation of the process of acquisition of skills. When required, a skills lab may be used to impart training. Skills lab provides a safe training environment in which a learner can be observed and be provided with the feedback necessary to improve. It also allows the learner to do tasks repetitively under supervision till the desired level of competency is achieved.

### **4. Salient Principles**

The undergraduate medical education program is designed with a goal to create an "Indian Medical Graduate" (IMG) possessing the requisite knowledge, skills, attitudes, values and responsiveness, so that he or she may function appropriately and effectively as a physician of first contact of the community while being globally relevant.

The principles governing skill acquisition have been presented in this module which also facilitate the utilization of 'Skills lab' during the undergraduate training and assessment.

This module helps to:

- a) understand the link between competency and skill,
- b) enumerate the general principles of skill acquisition,
- c) explain how to apply these principles,
- d) understand the different methods and steps of skills teaching and acquisition (skill cycle),

- e) develop skill sessions from a given competency, and
- f) impart, assess and document the acquisition of these skills.

The module also elaborates the concepts, processes, resources and organizational set up for a basic skills lab in a college setting.

**Context from GMER 2019**

*2.2.2 All efforts must be made to equip the medical graduate to acquire the skills as detailed in Table 11 Certifiable procedural skills – A Comprehensive list of skills recommended as desirable for Bachelor of Medicine and Bachelor of Surgery (MBBS) – Indian Medical Graduate.*

*4.1.4. Clinical training shall emphasize early clinical exposure, skill acquisition, certification in essential skills; community/primary/secondary care-based learning experiences and emergencies.*

*4.1.6. Acquisition and certification of skills shall be through experiences in patient care, diagnostic and skill laboratories.*

*4.1.8. Progress of the medical learner shall be documented through structured periodic assessment that includes formative and summative assessments. Logs of skill-based training shall be also maintained.*

*4.2. Appropriate Faculty Development Programmes shall be conducted regularly by institutions to facilitate medical teachers at all levels to continuously update their professional and teaching skills, and align their teaching skills to curricular objectives.*

*10.5.1. Initiate appropriate cost-effective treatment based on an understanding of the rational drug prescriptions, medical interventions required and preventive measures.*

**Certifiable Procedural Skills, as given in GMER 2019 are given below:**

**Table 11 (GMER 2019): Certifiable Procedural Skills:**

A Comprehensive list of skills recommended as desirable for Bachelor of Medicine and Bachelor of Surgery (MBBS) – Indian Medical Graduate

<b>Specialty</b>	<b>Procedure</b>
<b>General Medicine</b>	<ul style="list-style-type: none"><li>• Venipuncture (I)</li><li>• Intramuscular injection (I)</li><li>• Intradermal injection (D)</li><li>• Subcutaneous injection (I)</li><li>• Intra Venous (IV) injection (I)</li><li>• Setting up IV infusion and calculating drip rate (I)</li><li>• Blood transfusion (O)</li><li>• Urinary catheterization (D)</li><li>• Basic life support (D)</li><li>• Oxygen therapy (I)</li><li>• Aerosol therapy / nebulization (I)</li><li>• Ryle’s tube insertion (D)</li><li>• Lumbar puncture (O)</li><li>• Pleural and ascitic aspiration (O)</li><li>• Cardiac resuscitation (D)</li><li>• Peripheral blood smear interpretation (I)</li><li>• Bedside urine analysis (D)</li></ul>
<b>General Surgery</b>	<ul style="list-style-type: none"><li>• Basic suturing (I)</li><li>• Basic wound care (I)</li><li>• Basic bandaging (I)</li><li>• Incision and drainage of superficial abscess (I)</li><li>• Early management of trauma (I) and trauma life support (D)</li></ul>
<b>Orthopedics</b>	<ul style="list-style-type: none"><li>• Application of basic splints and slings (I)</li><li>• Basic fracture and dislocation management (O)</li><li>• Compression bandage (I)</li></ul>

<b>Gynecology</b>	<ul style="list-style-type: none"> <li>• Per Speculum (PS) and Per Vaginal (PV) examination (I)</li> <li>• Visual Inspection of Cervix with Acetic Acid (VIA) (O)</li> <li>• Pap Smear sample collection &amp; interpretation (I)</li> <li>• Intra- Uterine Contraceptive Device (IUCD) insertion &amp; removal (I)</li> </ul>
<b>Obstetrics</b>	<ul style="list-style-type: none"> <li>• Obstetric examination (I)</li> <li>• Episiotomy (I)</li> <li>• Normal labor and delivery (including partogram) (I)</li> </ul>
<b>Pediatrics</b>	<ul style="list-style-type: none"> <li>• Neonatal resuscitation (D)</li> <li>• Setting up Pediatric IV infusion and calculating drip rate (I)</li> <li>• Setting up Pediatric Intraosseous line (O)</li> </ul>
<b>Forensic Medicine</b>	<ul style="list-style-type: none"> <li>• Documentation and certification of trauma (I)</li> <li>• Diagnosis and certification of death (D)</li> <li>• Legal documentation related to emergency cases (D)</li> <li>• Certification of medical-legal cases e.g. Age estimation, sexual assault etc. (D)</li> <li>• Establishing communication in medico-legal cases with police, public health authorities, other concerned departments, etc. (D)</li> </ul>
<b>Otorhinolaryngology</b>	<ul style="list-style-type: none"> <li>• Anterior nasal packing (D)</li> <li>• Otoscopy (I)</li> </ul>
<b>Ophthalmology</b>	<ul style="list-style-type: none"> <li>• Visual acuity testing (I)</li> <li>• Digital tonometry (D)</li> <li>• Indirect ophthalmoscopy (O)</li> <li>• Epilation (O)</li> <li>• Eye irrigation (I)</li> <li>• Instillation of eye medication (I)</li> <li>• Ocular bandaging (I)</li> </ul>

<b>Dermatology</b>	<ul style="list-style-type: none"> <li>• Slit skin smear for leprosy (O)</li> <li>• Skin biopsy (O)</li> <li>• Gram's stained smear interpretation (I)</li> <li>• KOH examination of scrapings for fungus (D)</li> <li>• Dark ground illumination (O)</li> <li>• Tissue smear (O)</li> <li>• Cautery - Chemical and electrical (O)</li> </ul>
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I- Independently performed on patients,  
O- Observed in patients or on simulations,  
D- Demonstration on patients or simulations and performance under supervision in patients

**Certification of Skills:** Any faculty member of concerned department can certify skills. For common procedures, the certifying faculty may be decided locally.

## 5. Major Components and Structure of the Skill Development program

Skill was the term used traditionally to denote procedural skill. However, there has been a paradigm shift and in the present context, it is the ability to perform a task leading to a specific predefined outcome in several domains.

### Classification of Skills-

Skills are classified as:

- a) **Intellectual or cognitive skills** are defined as abilities such as application, analysis and synthesis as building on basic knowledge and are related to underlying component of knowledge.  
e.g. ability to interpret haematological tests of a patient with anemia
- b) **Psychomotor or procedural skills** (require manual dexterity and include laboratory and clinical skills  
e.g. ability to obtain a blood sample by venepuncture
- c) **Communication skills** is defined as the ability to communicate with others in a given situation.

e.g. ability to motivate volunteers for blood donation

d) **Team Skill** is defined as the ability to work together in a team.

e.g. Ability to work towards implementing a project/operating on a patient with the team.

### **Link between competency and skills**

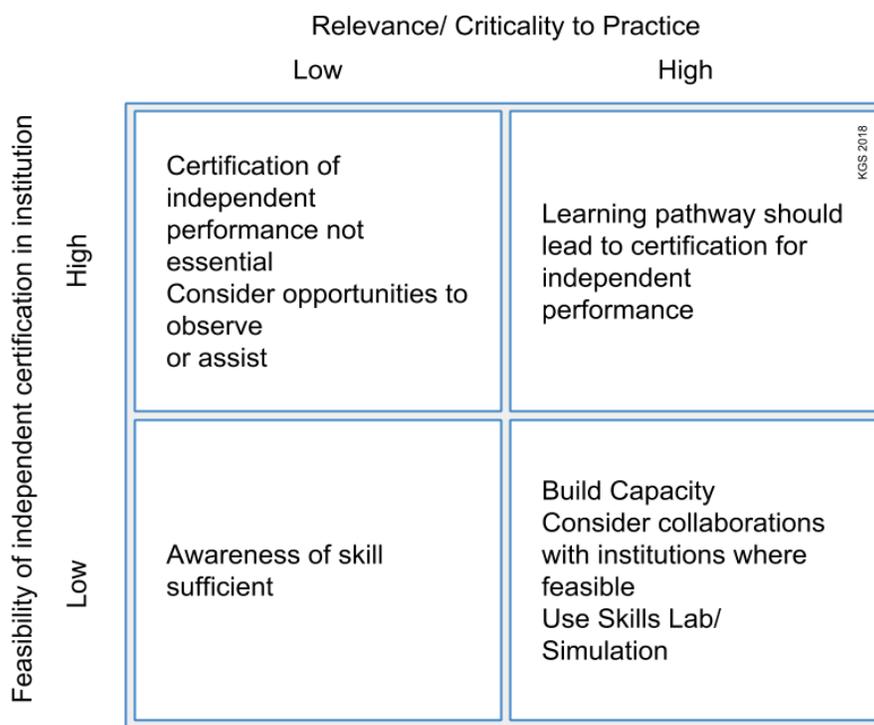
Competency based medical education is outcome oriented. The learner is expected to be able to demonstrate achievement of predefined outcomes including skills. The competency based curriculum document on skills defines levels of competence for different skills from mere awareness to successful performance (K/KH/SH/P). It is necessary therefore to create learning experiences that will allow the learner to attain the predefined level of outcome. For competencies that require an 'SH', or 'P' level of competence, provision of a learning experience that will allow performance of the skill repeatedly under supervision is critical. It should be also noted that the acquisition of the skill and its correct performance must be documented and assessed.

### **The general principles of skill acquisition and its application are:**

- a) Outcome is predefined for the phase and level of training,
- b) Standard approved process of acquisition including required steps are clearly outlined,
- c) Learners are provided opportunity to progressively acquire and practice repeatedly under supervision, in a structured format and in a safe, non-threatening environment, and
- d) Opportunities are made available for self-assessment and improvement, feedback and assessment of performance.

### **Developing a skill session from a competency, methods of skill teaching and steps of skill acquisition**

It is important to determine the criticality and feasibility of the skill being taught, as given in Figure 1.



**Figure I: Criticality vs feasibility matrix in context to Skills training**

**Explanation of the criticality vs feasibility matrix with examples from the new undergraduate curriculum:**

**Example1:** Competency of Phase I - PY11.14 -Demonstrate Basic Life Support in a simulated environment.

Domain of ‘Skill’ at the level of Shows How (SH). Suggested method is DOAP sessions and assessment using OSCE. Now in a real situation, the feasibility of independent performance by a learner may be low, but since the criticality is high, it is a must, to use a Skills lab for training using simulation.

**Example 2:** Competency of Phase III- EN3.2 - Observe and describe the indications for and steps involved in the performance of diagnostic nasal endoscopy.

Domain of ‘Skill’ is at the level of Knows How (KH). Suggested method being Lecture, Small group discussion, demonstration and assessment using Written/ Viva voce. Both the feasibility and criticality are low and hence awareness of this skill is sufficient and there is no need for skills training in this competency.

If the competency lends itself to skill acquisition across phases, the phase-wise objectives must be first enumerated. It must be remembered that the ultimate achievement of the competency may be in a later phase but several steps to achieving it phase-wise may be developed.

**Example 3:** ‘performing and interpreting ECG’:

In phase 1, the competencies related to this skill acquisition are:

PY 5.13: Record and interpret normal ECG in a volunteer or simulated environment-  
‘SH’

PY 5.6: Describe abnormal ECG, arrhythmias, heart block and myocardial Infarction-  
‘KH’

This skill is also addressed in the competencies of General Medicine and Pediatrics. If we take an example of acquiring this skill in adults, the following competencies in General Medicine are related to performing and interpreting ECG for various disorders:

- IM 1.17: Order and interpret diagnostic testing based on the clinical diagnosis including 12 lead ECG, Chest radiograph, blood cultures - ‘SH’.
- IM 1.18: Perform and interpret a 12 lead ECG - ‘P’.
- IM 2.10: Order, perform and interpret an ECG - ‘P’.
- IM 8.13 Enumerate the indications for and interpret the results of: CBC, Urine routine, BUN, Cr, Electrolytes, Uric acid, ECG - ‘KH’.
- IM 10.18: Identify the ECG findings in hyperkalemia - ‘SH’.
- IM11.11: Order and interpret laboratory tests to diagnose diabetes and its complications including: glucose, glucose tolerance test, glycosylated hemoglobin, urinary micro albumin, ECG, electrolytes, ABG, ketones, renal function tests and lipid profile- ‘SH’.
- IM 12.9: Order and interpret diagnostic testing based on the clinical diagnosis including CBC, thyroid function tests and ECG and radio-iodine uptake and scan - ‘SH’.
- IM12.10: Identify atrial fibrillation, pericardial effusion and bradycardia on ECG - ‘SH’.

**In phase 1**, while the student acquires the skill of recording and interpreting normal ECG in a volunteer/ simulated environment - to a level of *Shows How* 'SH', he will also gain knowledge of the various abnormal ECGs in arrhythmias, heart block, MI etc. Sensitization of the ECG findings in hyperkalemia, MI, heart failure, thyroid function, diabetes and its complications can also occur at *knows* - 'K' level. This may be achieved during the integration session while conducting teaching learning sessions of PY 5.6,& PY 5.13. It is important to remember that, since the completion of teaching of Phase 1 competency is the priority at this time, the students will be only sensitized to ECG findings in these conditions.

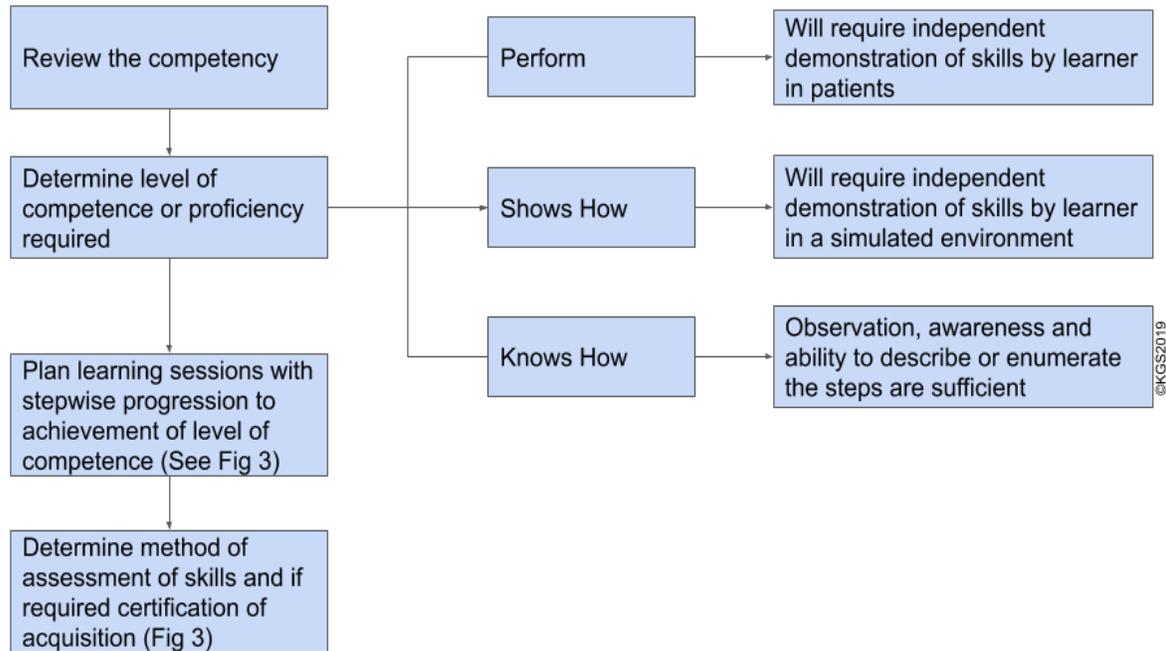
**In phase 2**, the General Medicine competencies will be dealt in bedside clinics after the students have received preliminary knowledge on these disorders integrated with knowledge in Pathology, Pharmacology, etc. During this phase, phase 2 subjects are primary, but at the same time, the General Medicine competencies are slowly developed towards the requirement of phase 3.

**In phase 3**, the teaching learning sessions are planned in such a way that each of the competencies mentioned earlier can be slowly progressed to *Shows How / Perform*, as the need may be. Also those competencies requiring a mandatory minimum number of times the skill is to be performed is also required to be documented for each student.

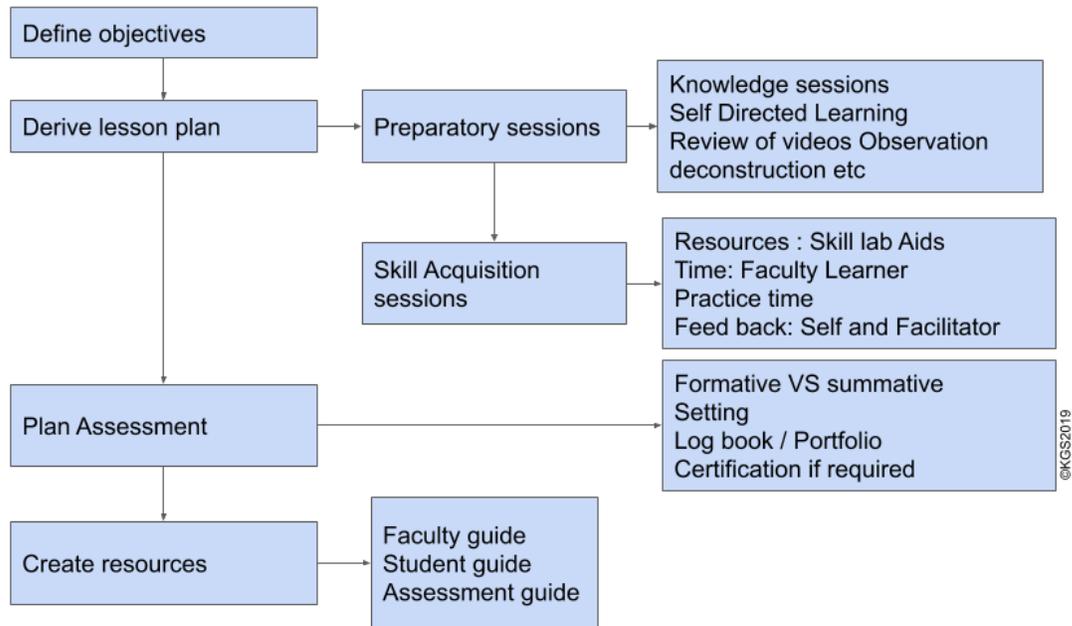
In each phase, learning sessions are derived based on the level of the phase-wise objectives. To ensure a progressive buildup of the competencies to phase 3 at the required level, it is important to have the objectives of phase 3 competencies in place, right at the beginning.

A lesson plan should be made for the learning session that includes objectives, resources, setting (clinical/ laboratory, need for skills lab), learning steps, supervision required, methods of assessment and documentation of the process of the skill acquisition using log/portfolios. These are summarized in Figures II & III.

**Figure II: Approach to competency based skill development**



**Figure III: Planning a skill session**



A template of developing a competency which is skill based is enclosed as **Annexure A (Sample lesson Plan)** which can be used as a guide to various subjects. **Annexure B shows example of task training modules. This can be used by faculty members to develop specific task modules.**

### ***Methods for teaching intellectual skills***

Clinical reasoning is best taught during the course of a clinical encounter either conducted by the physician-teacher (for demonstration), or preferably by the student observing a clinical encounter. Clinical case presentations, case based discussions/ chart stimulated recall, clinical problem solving exercises and structured case presentation models like SNAPPS (Summarising, Narrowing the differential, Analyzing the differential, Probing the preceptor, Planning the management & Self-directed learning) and One Minute Preceptor are good settings for teaching clinical reasoning skills.

SNAPPS model can help learners build illness scripts essentially by way of comparing differential diagnoses and clarifications of uncertainties. This method encourages expression of intuitive as well as analytical thinking and promotes self-reflection by the student.

The One Minute Preceptor (OMP) model is another useful model of structured clinical case discussion. In this five-step micro-skills model, the student presents a case, he/she is then asked to commit to a diagnosis, and is probed for reasoning for the same. The preceptor (teacher), now aware of patient as well as student's diagnosis, appreciates what was done well, points out omissions and teaches general rules (e.g. key features, principles of management, effective communication). Usually, it takes about 10 minutes (arbitrary division of time could be: 6 minutes for case presentation, 3 minutes for questioning and 1 minute for teaching the general rule and feedback). Despite being a teacher initiated model, it drives the student to propose and justify the diagnosis, employing appropriate clinical reasoning skills by the learner (Jyoti Nath Modi et al., 2015).

**Reflection and metacognition:** Students must be encouraged and provided an opportunity to reflect on their diagnostic approach, and think about what they could be missing.

In addition to these methods, there are alternative ways of acquiring intellectual skills such as case discussions, seminars, small group discussions, critical incidence reporting, grand rounds, bed side teaching, assignments, symposia etc. which can be utilized.

### **Methods for teaching psychomotor skill:**

There are various theories and methods of acquiring a psychomotor skill - Few of these methods are described below:

Peyton's Four-Step Approach has proven to be most helpful. Peyton's approach combines multiple aspects of learning theory.

The Four-Step Approach consists of the following four clearly defined steps:

1. The trainer demonstrates the skill in real time without giving instructions or explanatory words ("**Demonstration**").
2. The trainer repeats the procedure, this time describing all necessary sub-steps ("**Deconstruction**").
3. The trainer performs the skill for a third time, this time following the sub-steps only as described to him by the trainee ("**Comprehension**"). This step has been identified as the most important step of the Four-Step Approach in the past as deeper processing mechanisms reflecting what was observed in the first two steps are necessary for the trainees' to be able to give instructions.
4. The trainee performs the skill on his/her own ("**Performance**").

The learning in **Steps 1 and 2** is based on a social-cognitive approach to learning theory, whereas Step 4, the actual implementation and training of the procedure up to its successful application, is associated with the behaviorist learning theory.

The **third step** of Peyton's approach is crucial: The perceptually processed information (Step 1 & Step 2) must be actively manipulated in the working memory in Step 3 to be transferred into the long-term memory (Tobias Münster et al., 2016).

In addition to this method, there are alternative ways of acquiring psychomotor skills such as using demonstration, simulation, skills lab, use of models/ mannequins, performance under supervision, cadaveric labs, animal tissue labs, virtual reality, standardized patients, etc. which can be utilized.

Deliberate practice as elucidated by Ericsson (2004) includes finding opportunities for repeated practice, requesting honest feedback on performance at frequent intervals, maximizing learning from each case, reflecting on feedback and errors to improve performance and using mental practice to support clinical experiences. Deliberate practice involves (a) repetitive practice of the intended skill, combined with (b) the thorough assessment of the skill so that the learner (c) can receive specific, informative feedback, which results in an increasingly (d) better performance of skill. The provision of a safe environment for the learner to be observed while performing skills and providing constructive feedback is the critical component of skill acquisition.

**When psychomotor skills training require/ necessitate exposure to body fluids or biological hazardous materials, students must be trained on the infection control / biosafety requirements beforehand. Procedures involving dangerous steps like mouth pipetting should be avoided or replaced with suitable other technologies / methods like bulb suction or vacuum aspiration etc. Use of non-hazardous materials must be encouraged.**

### **Method and theory for communication skills**

There are several theories involved in communication skills. A consensus statement from experts called the Kalamazoo declaration provides a simple framework that addresses the essential elements that form healthcare communication. These include

build a relationship; open the discussion; gather information; understand the patient's perspective; share information; reach agreement on problems and plans; and provide closure (Makoul, 2001).

### **The AETCOM module**

The AETCOM module describes the competencies phase-wise and also mentions the suggested teaching learning methods with assessment (from AETCOM module (available at: [https://www.mciindia.org/CMS/wp-content/uploads/2019/01/AETCOM\\_book.pdf](https://www.mciindia.org/CMS/wp-content/uploads/2019/01/AETCOM_book.pdf)), is reproduced below:

#### ***AETCOM Module 2.1: The foundations of communication - 2***

Background Communication is a fundamental prerequisite of the medical profession and beside skills is crucial in ensuring professional success for doctors. This module continues to provide an emphasis on effective communication skills. During professional year II, the emphasis is on active listening and data gathering.

#### **Competency addressed:**

**The student should be able to:** Demonstrate ability to communicate to patients in a patient, respectful, non-threatening, non-judgmental and empathetic manner.

**Level:** SH

**Learning Experience:**

**Year of study:** Professional year 2

**Hours:** 5 (1 + 2 +1+1)

- i.* Introductory small group session - 1 hour
- ii.* Focused small group session - 2 hours
- iii.* Skills lab session – 1 hour
- iv.* Discussion and closure – 1 hour

**Contents:** This module includes 3 interdependent learning sessions:

1. Introductory small group session on the principles of communication with focus on opening the discussion, listening and gathering data.
2. Focused small group session with role play or videos where the students have an opportunity to observe, criticise and discuss common mistakes in opening the discussion, listening and data gathering.
3. Skills lab sessions where students can perform tasks on standardised or regular patients with opportunity for self critique, critique by patient and by the facilitator.

### **Methods for teaching team Skills**

Team skills are enhanced by Immersive Learning. A learner is placed in a situation as a part of a team in an immersive simulated learning environment. His performance is monitored and multilevel feedback is provided, leading to the acquisition and enhancement of skills. For e.g. training students to work in an emergency situation can be taught by simulating an offsite emergency scenario where tasks are allotted to students as a team. The students are allowed to perform. This is observed by experts and following a debrief during which the students are allowed to reflect, they can also be assessed by the experts as a team and such a scenario is used for learning to act as an effective team.

## 6. Organizational set up

### 6.1 Guidelines for development of skills lab at medical colleges and training institutions have been detailed in Annexure C.

**The basic requirements for a skills lab at a medical college are given below:**

Please refer to the Competency Based Undergraduate Curriculum for the IMG, Volumes I-III (2018) for an exhaustive list of subject based competencies which require skill training (accessible at: <https://www.mciindia.org/CMS/wp-content/uploads/2019/01/UG-Curriculum-Vol-I.pdf>)

1. Institutions are encouraged to build capacity over and above these minimum requirements.
2. Institutions within a geographical area or governance can create more advanced shared facilities and resources to reduce cost.

Communication skills training using AETCOM module should be conducted. Resuscitation skills of Basic Life Support (BLS), Advanced Cardiac Life support (ACLS), Pediatric Advanced Life Support (PALS), Neonatal Advanced Life Support (NALS), Advanced trauma Life Support (ATLS), prescription writing and communication skills along with being an effective team member and leader can be taught/trained using offsite simulation of simulated environments in an integrated manner.

**Evaluation and Reporting:** Program effectiveness questionnaire from faculty and students should be developed. Acquisition and certification of skills shall be through experiences in patient care, diagnostic and skill laboratories. A proper phase-wise logbook is recommended to ensure completion of competencies requiring skills training. Assessment of skills must be planned according to the level of competence desired.

Details can be accessed at

[https://mciindia.org/CMS/wp-content/uploads/2019/10/Module\\_Competence\\_based\\_02.09.2019.pdf](https://mciindia.org/CMS/wp-content/uploads/2019/10/Module_Competence_based_02.09.2019.pdf)

### 6.2 Skill assessment:

Skill assessment is ongoing, formative and summative. Please refer to the module 3 of Medical Council of India on Assessment.

## Recommended Reading:

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16. Tobias Münster, Christoph Stosch, Nina Hindrichs, Jeremy Franklin, and Jan Matthes (2016). Peyton's 4-Steps-Approach in comparison: Medium-term effects on learning external chest compression – a pilot study. *GMS J Med Educ*. 33(4).
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# **Annexure A**

## **Outline of a Session Plan**

## Annexure A

### Outline of a Session Plan

Name of the group:

Facilitator/ Supervisor/ Faculty:

Parameter	Description
Name of the lesson	
Number of learners	
Objectives of the session	
Primary teaching method chosen	
Break up of the session	Step 1 Step 2 Step 3 Step 4 Step 5
Teaching aids required	
Infrastructure required	
Student preparation required/ prior reading required	
Assessment method chosen	
Other comments	

**Annexure B**

**Examples of Task Training**

**Modules**

## **Annexure B**

### **Examples of Task Training Modules**

#### **Example 1: Module for Recording Blood Pressure**

##### **Competency in Phase-I:**

PY5.12: Record blood pressure & pulse at rest and in different grades of exercise and postures in a volunteer or simulated environment.

**Skill training:** Recording of blood pressure.

##### **Objectives:**

By the completion of this module, the student will be able to:

- Record blood pressure of volunteer by palpatory and Auscultatory method, with sphygmomanometer in right / left upper limb, step wise in sitting / lying down / standing position at rest.
- Suggested Teaching Learning Method: DOAP sessions

##### **Background Knowledge:**

PY5.3 Discuss the events occurring during the cardiac cycle

PY5.7 Describe and discuss hemodynamics of circulatory system

PY5.8 Describe and discuss local and systemic cardiovascular regulatory mechanisms

PY5.9 Describe the factors affecting heart rate, regulation of cardiac output & blood pressure

Knowledge about the equipment = Sphygmomanometer, its parts, appropriate size selection and placement.

##### **Equipment/ Instrument/ Other requirement:**

- Sphygmomanometer
- Stethoscope

- Volunteer / mannequin
- Hand-outs / check list
- Bed/Couch

### **Steps in Blood Pressure Recording:**

- Patient counselling and consent. Explain to the patient the need for Blood Pressure recording and the procedure. Assess patient's understanding and answer any questions they may have. Respond to the patient's concerns throughout the procedure.
- Check the sphygmomanometer and stethoscope.
- Ensure the equipment mercury column is at zero mark.
- Ensure appropriate position of the patient (sitting on a chair with back supported, feet on the floor, legs uncrossed or lying supine).
- Record Blood Pressure after 5 mins. of inactivity.
- Expose the arm and support it at the level of the heart.
- Palpate the brachial artery in cubital fossa.
- Choose appropriately sized cuff & position the center of cuff's bladder over the brachial artery.
- Wrap the cuff smoothly and snugly around the arm. Cuff should be wrapped in a circular manner one-inch above the level of elbow.
- Correctly palpate the radial artery of the volunteer / or the mannequin with 3 fingers.
- Close the sphygmomanometer valve and inflate the cuff to determine mm Hg at which arterial pulsation can no longer be felt.
- Slowly deflate the cuff by opening the sphygmomanometer valve and note the point where arterial pulsation can be felt again (this is estimated systolic BP).
- Inflate the cuff again to a level 20 – 30 mm Hg more than estimated systolic BP.

- Place diaphragm head of the stethoscope lightly over the brachial artery.
- Deflate the cuff slowly by opening the sphygmomanometer valve so that the pressure falls at 2–3 mm Hg / second.
- Note the mm of Hg pressure at which arterial pulsation / beats can be heard (this is systolic BP).
- Continue deflation and note the mm of Hg pressure at which the last arterial beat is heard (this is diastolic BP).
- Continue deflation for another 10 – 20 mm of Hg past the last heard beat to ensure that the absence of sound is not due to skipped beat.
- Deflate the cuff rapidly and completely.
- If necessary to re-record, wait at least 2 minutes.
- Document the recording in terms of patient position, arm used, cuff size, blood pressure recording.
- Inform the patient of your findings and conclude.

**Skill assessment:**

OSCE type stations, where observer can observe and assess communication skill (counseling), psychomotor skill and attitude (respond to the patient's concerns, inform the patient of the findings and conclude). This can be done either with check lists or using global ratings.

**Suggested Reading:**

Books Recommended (latest edition)

1. AC Guyton – Text book of Medical Physiology
2. WF Ganong – Review of Medical Physiology

## **Example 2: Module for Prescription writing**

### **Competency in Phase-II:**

**PH3.1:** Write a rational, correct and legible generic prescription for a given condition and communicate the same to the patient.

Vertically integrated with General Medicine.

### **Related Competency in Phase-III:**

**IM12.14:** Write and communicate to the patient appropriately a prescription for thyroxine based on age, sex, and clinical and biochemical status.

Vertically integrated with Pharmacology.

**Skill training:** Write a prescription taking into consideration appropriate drug/s, appropriate doses, contraindications, drug-drug interactions, side effects and cost.

### **Objectives:**

By the completion of this module, the student will be able to:

- Establish therapeutic goal/s, based on a diagnosis,
- Choose the medicine/s,
- Choose the dose, route and frequency,
- Choose the duration of therapy,
- Write the prescription,
- Inform the patient,
- Monitor drug effects and compliance,
- Review/alter prescription in the light of further investigation.

**Suggested Teaching Learning Method:** Skill station using case-based scenarios; communication skills can be taught using role play or videos for cases in Indian context.

### **Background knowledge**

Prescribing constitutes a significant component of the job, especially for newly qualified IMG. Prescribing involves a complex chain of competencies (as mentioned above),

each of which demands a combination of knowledge and skill. It also represents the most challenging task for which they have to be prepared. Moreover, the clinical situation in which an IMG has to make a prescription is eternally challenging as more and more medicines with complex pharmacology are available or withdrawn, patient population becoming older and more vulnerable, chances of litigation and a greater need for considering cost-effectiveness as well as the use of generics.

### **Steps of good prescribing:**

The following steps are essential before a prescription is made:

- To have clarity about the reasons for prescribing,
- To obtain patient's medication history (including drugs of alternative systems of Medicine),
- To consider other factors that might alter the benefits and harms of treatment,
- To consider the patient's financial status and expectations (generic prescription),
- To know about efficacy, safety and cost-effectiveness of medicines,
- To know National Guidelines on use of drugs, National List of Essential Medicines (NLEM) and local formularies,
- To be clear about the legality of prescriptions involving narcotics etc. using the correct documentation,
- To monitor the outcome of treatment, both beneficial and adverse,
- To communicate and document prescribing decisions, reasons for them and importance of medication adherence.
- To work within the limitations of one's knowledge, skills, and experience.

**Skill assessment:** In phase II, this skill requires certification and the required number is also given. Skill assessment using OSCE, log books or portfolios is recommended.

**Suggested Reading:**

Books Recommended (latest edition)

1. Goodman & Gilman's The Pharmacological Basis of Therapeutics, ed. Laurence Brunton, Bruce A. Chabner, BjornKnollman.
2. Essentials of Medical Pharmacology, by KD Tripathi
3. Davidson's Principles and Practice of Medicine
4. Kumar & Clark: Book of Clinical Medicine

### **Example 3: Module for Pediatric Intravenous Cannulation**

#### **Competency in Phase-III:**

**PE 15.6:** Demonstrate the steps of inserting an IV cannula in a model

#### **Background Information**

**PE 15.1:** Discuss the fluid and electrolyte requirement in health and disease

**PE 15.2:** Discuss the clinical features and complications of fluid and electrolyte imbalance and outline the management

**PE 15.3:** Calculate the fluid and electrolyte requirement in health

**PE 15.4:** Interpret electrolyte report

**PE 15.5:** Calculate fluid and electrolyte imbalance

**PE 24.10:** Assess for signs of dehydration, document and present

**PE 24.14:** Plan fluid management as per WHO criteria

**PE 27.5:** Describe the etio-pathogenesis, clinical approach and management of shock in children

**PE 27.19:** Check for signs of shock i.e. pulse, Blood Pressure, CRT

**PE 27.21:** Choose the type of fluid and calculate the fluid requirement in shock

**PE 27.23:** Assess for signs of severe dehydration

#### **Introduction**

Intravenous access is used when therapies cannot be used or are less effective by alternative routes. Peripheral access is safer, easier to obtain, and less painful than central access. An IMG is required to independently perform pediatric IV cannulation, before being certified.

**Suggested Teaching Learning method:** Mannequin in a Skills lab

#### **Pre-requisites**

Knowledge of superficial veins on the limbs,

Knowledge of indications/ contraindications of IV access,

At least 5 successful supervised practice sessions on arm of rubber mannequin. Should have independently performed at least 02 insertions on an adult patient.

## **Indications**

Replacement of fluids and electrolytes

Blood transfusion

Administration of IV medications

Collection of blood samples

## **Contraindications**

Anatomic disparities

Massive edema

Burns

Cellulitis

Injuries at or proximal to insertion site.

## **Equipments required:**

Gloves, which fit comfortably but are tight, especially at finger tips,

Skin disinfectant (Alcohol Swabs),

22-26 gauge IV catheter / butterfly needle,

Adhesive tape,

Syringe (2 to 10 cc, depending on the age of the child),

Normal saline

Sample collection bottles

Infusion set, elastic tourniquet

Clinical waste dustbin.

## **Steps in Pediatric intravenous cannulation**

### **Preparation**

- Explain the procedure to the child and the family without using technical jargon. Tell about the indication for cannulation.

- Obtain informed or implied consent, following procedure discussion, risks, and benefits. Consider the age and competence of the child for consent or assent to the procedure.
- Select the vein to be cannulated. The vein should be wide, straight, palpable, non-tortuous and non-sclerosed. Avoid veins close to the joints or bony prominences. Avoid using dominant hand or paralyzed limb.
- Always apply universal precautions.
- Both visualize and palpate the vein to be cannulated. There is a slight 'give' over the vessel compared to other tissues.
- Disinfect overlying skin.
- Use appropriate procedures (toys, music, stories etc.) to distract the child during procedure. For a very irritable child, use of oral sedatives may be considered in consultation with the consultant I/C.
- Avoid using the bed for performing the procedure. A procedure room is better. The room should be adequately lighted and have provision for a spot light.
- Select the correct type and size of the cannula, depending on the indication for cannulation. Should be able to identify the size of the cannula by its color coding.
- Have all the equipments on an autoclaved tray.

## **Procedure**

- Seek the assistance of a colleague or a nurse to hold the child's limb.
- Position yourself comfortably. Wear the appropriate size gloves using all antiseptic precautions.
- Apply a tourniquet 2-3inches above the intended site. Check for signs of arterial occlusion like blanching or absence of pulse.
- Instruct the child to clench the fist which will improve venous filling.
- Disinfect the site with appropriate antiseptic swab and allow it to dry naturally.

- Take out the cannula and hold it firmly, bevel side up. Look for any signs of breakage.
- Stabilize the vein by stretching the skin over it.
- Using a 'no-touch' technique, insert the cannula distal to and along the line of the vein keeping it 10-45 degrees to the skin. This will prevent the cannula piercing the opposite wall.

After insertion, check flashback of blood into hub. If blood is seen, advance cannula slightly further without stylet and stabilize. Apply pressure to tip of cannula to stabilize it and remove stylet.

- Release the tourniquet.
- Flush the cannula with normal saline to see the free flow.
- Once in place, lower the cannula so that it is now resting on the skin. Request your colleague to help with securing the cannula using a hypo-allergenic tape. Avoid elastic tapes.
- Connect a 3 way connector/ IV set depending on the indication.
- Start the flow of fluid. Watch for any extravasation of fluid. If it happens, stop the flow. Re-attempt the cannulation at a site proximal to the previous one. Do not make more than 02 attempts. Request a senior colleague if you are not successful even after 02 attempts.
- Apply a clean splint to stabilize the limb. Dress with a sterile dressing.
- Fingers/toes should not be covered and remain visible.
- Write the date and time of insertion on a sticker and place over the dressing.

### **Complications**

- Thrombosis
- Hemorrhage
- Phlebitis
- Local site infection

- Extravasation of fluids/medications
- Counter puncture of the vessel wall
- Gangrene of fingers/toes

**Assessment:**

The procedure is to be assessed by a faculty member using DOPS format and feedback provided.

**Suggested Reading:**

Books Recommended (latest edition)

1. PG Textbook of Pediatrics, IAP P Gupta et al (Editors)
2. Clinical Methods in Pediatrics, P Gupta
4. Davidson's Principles and Practice of Medicine
5. Kumar & Clark: Book of Clinical Medicine

**Example 4: TRAINING MODULE FOR URINARY BLADDER CATHETERISATION  
(Male & Female)**

**Competency in Phase III Part 1 and 2**

**1. Competency No:**

OG35.17	Demonstrate the correct technique of urinary catheterisation in a simulated/ supervised environment	S	SH
SU29.7	Describe the principles of management of acute and chronic retention of urine.	K	KH
OR13.2	Participate as a member in team for resuscitation of Polytrauma victim by doing all of the following :  (a) I.V. access central - peripheral (b) Bladder catheterization (c) Endotracheal intubation (d) Splintage	S/A	KH / SH

**2. Objectives:**

By the completion of this module, the student will be able to:

- a. List the indications for urinary catheterisation (K)
- b. Select the equipment for female/male urinary catheterization and choose appropriate catheter type/size (SH)
- c. Enumerate the risks associated with catheterization (K)
- d. Communicate to the patient about the procedure and care of catheter, including the need for aseptic care (SH)
- e. Demonstrate correct method of urinary catheterization with strict aseptic technique in mannequin as well as in patients (male & female) (SH).

### 3. Background Knowledge:

AN52.2	Describe & identify the micro-anatomical features of: <u>Urinary system:</u> Kidney, Ureter & Urinary bladder <u>Male Reproductive System</u> Testis, Epididymis, Vas deferens, Prostate & penis <u>Female Reproductive system</u> Ovary, Uterus, Uterine tube, Cervix, Placenta & Umbilical cord	K/S	SH
AN48.6	Describe neurological basis of Automatic bladder	K	KH
PY7.6	Describe the innervations of urinary bladder, physiology of micturition and its abnormalities	K	KH
IM18.8	Describe and distinguish based on the clinical presentation, the types of bladder dysfunction seen in CNS disease	K	KH
SU29.7	Describe the principles of management of acute and chronic retention of urine.	K	SH
SU29.9	Describe the clinical features, investigations and principles of management of disorders of prostate.	K	KH
SU29.11	Describe clinical features, investigations and management of Urethral strictures	K	KH
PM7.6	Enumerate the indications and describe the pharmacology and side effects of commonly used drugs in neuropathic bladder	K	KH

### 4. Setting/Equipment/ Instrument/ other requirements:

Catheterization tray consists of disposable sterile gloves, one fenestrated drape, lubricant, cotton balls with container, artery forceps (2), prefilled 10cc syringe with sterile water to inflate the balloon, sterile specimen container for urine sample collection; sterile catheter, latex (rubber) or silicone: 2 way or 3 way (where possible, select the non-latex

catheter), chlorhexidine 2% aqueous solution, Sterile water, catheter-secure device or adhesive tape, urinary drainage bag.

Choosing the appropriate catheter depends on

- i. The size of the patient's urethral canal
- ii. The expected duration of catheterization (e.g. intermittent or indwelling)
- iii. Knowledge of any allergies to latex or plastic and cleansing solutions

**Catheter diameters:** 5Fr, 6Fr, 8Fr 10Fr, 12Fr, 14Fr, 16Fr, 18Fr, 20Fr, 22Fr, 24Fr, 26Fr.

Commonly used range is from 12 to 16 Fr

The higher the number the larger the diameter of the catheter.

3Fr. = 1mm (i.e. a 24fr. catheter is 8mm in diameter)

## **5. Procedure Steps: (can be used to prepare check list)**

### **Communication:**

Prior to starting, explain to the patient about the need and process of urinary catheterization. Assess patient's understanding and answer any questions they may have. Check consent for procedure. Explain about the care of catheter after insertion also.

### **Steps in female catheterization**

- Place the patient in the supine position with the knees flexed and separated and feet flat on the bed, about 60 cm apart. If this position is uncomfortable, instruct the patient either to flex only one knee and keep the other leg flat on the bed, or to spread her legs as far apart as possible. A lateral position may also be used for elderly or disabled patients. Drape the patient appropriately using the sterile drapes provided.

- With the thumb, middle and index fingers of the non-dominant hand, separate the labia majora and labia minora. Pull slightly upward to locate the urinary meatus. Maintain this position to avoid contamination during the procedure.
- With your dominant hand, cleanse the urinary meatus, using forceps and chlorhexidine soaked cotton balls. Use each cotton ball for a single downward stroke only.
- Place the drainage basin containing the catheter between the patient's thighs.
- Pick up the catheter with your dominant hand.
- Insert the lubricated tip of the catheter into the urinary meatus.
- Advance the catheter about 5-5.75 cm, until urine begins to flow, then advance the catheter a further 1-2 cm.
- **Note:** If the catheter slips into the vagina, leave it there to assist as a landmark. With another lubricated sterile catheter, insert into the urinary meatus until you get urine back. Remove the catheter left in the vagina at this time.
- Attach the syringe with the sterile water and inflate the balloon. It is recommended to inflate the 5cc balloon with 7-10cc of sterile water, and to inflate the 30cc balloon with 30-35cc of sterile water.
- If resistance is met during advancement of the catheter, pause for 10-20 seconds. Instruct the patient to breathe deeply and evenly. Apply gentle pressure as the patient exhales.
- Improperly inflated balloons can cause drainage and leakage difficulties.
- Gently pull back on the catheter until the balloon engages the bladder neck.
- Attach the urinary drainage bag and position it below the bladder level. Secure the catheter to the thigh. Avoid applying tension to the catheter.
- Remove drapes and cover patient. Ensure drainage bag is attached to bed frame. Remove your gloves and wash hands.

## Steps in male catheterization

- Place the patient in the supine position with legs extended and flat on the bed.
- Prepare the catheterization tray and catheter and drape the patient appropriately using the sterile drapes provided. Place the fenestrated (drape with hole) drape over the penis.
- Apply water-soluble lubricant to the catheter tip.
- With your non-dominant hand, grasp the penis just below the glans and hold upright.
- If the patient is uncircumcised, retract the foreskin. Replace the foreskin at the end of the procedure.
- With your dominant hand, cleanse the glans using chlorhexidine soaked cotton balls. Use each cotton ball for a single circular motion.
- Place the drainage basin containing the catheter on or next to the thighs.
- With your non-dominant hand, gently straighten and stretch the penis. Lift it to an angle of 60-90 degrees. At this time, you may use the gel to anesthetize the urinary canal, which will minimize the discomfort.
- With your dominant hand, insert the lubricated tip of the catheter into the urinary meatus.
- Continue to advance the catheter completely to the bifurcation i.e. until only the inflation and drainage ports are exposed and urine flows (this is to ensure proper placement of the catheter in the bladder and prevent urethral injuries and hematuria that result when the Foley catheter balloon is inflated in the urethra).
- **Note:** If resistance is met during advancement of the catheter, pause for 10-20 seconds. Instruct the patient to breathe deeply and evenly. Apply gentle pressure as the patient exhales.
- If you still meet resistance, stop the procedure and repeat above steps with a smaller size.

- Attach the syringe with the sterile water and inflate the balloon. It is recommended to inflate the 5cc balloon with 7-10cc of sterile water, and to inflate the 30cc balloon with 35cc of sterile water. Improperly inflated balloons can cause drainage and leakage difficulties.
- Gently pull back on the catheter until the balloon engages the bladder neck.
- Attach the urinary drainage bag and position it below the bladder level. Secure the catheter to the thigh. Avoid applying tension to the catheter.
- Remove drapes and cover patient. Ensure drainage bag is attached to bed frame. Remove your gloves and wash hands.
- **Note:** Never inflate a balloon before establishing that the catheter is in the bladder and not just in the urethra. If the patient reports discomfort, withdraw the fluid from the balloon and advance the catheter a little further, then re-inflate the balloon.

**Risks associated with catheterization include:**

- a. Urethral trauma and bleeding from inappropriate catheter size or use of force.
- b. Urinary tract infections related to poor sterile technique or long-term catheterization.
- c. Bladder spasms and pain.

**Skill assessment:**

- i. **Formative:** Demonstration of successful urinary bladder catheterization in a mannequin with demonstration of all aseptic precautions (5 times).
- ii. **Summative:** Demonstration of successful urinary bladder catheterization in male and female patients with demonstration of all aseptic precautions (5 times each) during internship.

### Example 5: Module for Consent taking and documentation

#### Competency in Phase-III:

#### Relevant Competencies:

FM 4.19	Define Consent. Describe different types of consent and ingredients of informed consent. Describe the rules of consent and importance of consent in relation to age, emergency situation, mental illness and alcohol intoxication.	K	KH
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SU 10.2	Describe the steps and obtain informed consent in a simulated environment	S/A/ C	SH
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IM26.15	Identify, discuss and defend, medico-legal, socio-cultural and ethical issues as they pertain to consent for surgical procedures	K	KH
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EN 2.12	Counsel and administer informed consent to patients and their families in a simulated environment	S/A/C	SH
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#### Prior competencies

FM2.32	Demonstrate ability to exchange information by verbal, or nonverbal communication to the peers, family members, law enforcing agency and judiciary	A and C	KH
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IM26.35	Demonstrate empathy in patient encounters	S	SH
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SU8.2	Demonstrate Professionalism and empathy to the patient undergoing General surgery	A/C	SH
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PS1.1	Establish rapport and empathy with patients	A/C	SH
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**Skill training:** Counsel and administer informed consent prior to lumbar puncture to a patient and family in a simulated environment.

**Objectives:**

By the completion of this module, the student will be able to:

- i. Demonstrate good communication skills and empathy,
- ii. Counsel a patient regarding the purpose, steps and complications related to lumbar puncture,
- iii. Obtain informed consent,
- iv. Document the informed consent as per legal requirements.

**Suggested Teaching Learning Methods:**

- Lecture regarding the definition, importance, legal aspects of the consent taking process;
- Skill station using case based scenarios;
- Communication skills taught using role play or videos for cases in Indian context; documentation using structured exercises and critics.

**Background knowledge**

The IMG should be aware of the need and advantages, steps to perform, and consequences of lumbar puncture in a patient suspected to have meningitis or similar illnesses. She / He should know about the rights of the patient to be informed about (a) the procedure, (b) alternatives to the procedure, and (c) right for refusal (autonomy) without treatment being affected. The importance of proper documentation of the informed consent should be emphasized. The communication skills, attitude, ethics and knowledge domains should also be discussed.

**Steps for consent taking:**

The following steps are essential:

- The student should have completed communication skills training and counselling exercises and must be capable of demonstrating empathy.

- The students should have thorough knowledge of the indications, anatomical and physiologic basis and the consequences of the procedure to be followed.
- The student shall discuss the above information in a language that is understandable to the patient (simulated in skill lab). The student should consider the patient's educational status and expectations and be open to questioning.
- The student shall emphasize the advantages of the procedure to convince the patient and family, but should also make them understand of their right to refusal, without the treatment being affected.
- The student shall describe about the legality of informed consent.
- Perform the correct documentation including writing the consent by hand in vernacular with signatures of patient, legally authorized representative or parent (as the case may be) and countersigned by the witness and the clinician with date, time etc..
- The training can also include critics of few consent documents from various situations and departments (like General Medicine, General Surgery, Pediatrics, Obstetrics & Gynaecology, Radiodiagnosis, Oncology etc.)
- The student can also be introduced to consent taking in relation to recruitment of subjects in research as well (Competency No. IM 26.49 administer informed consent and appropriately address patient queries to a patient being enrolled in a research protocol in a simulated environment)

**Skill assessment:** This skill requires certification. Skill assessment is recommended using affective OSCE (using simulated patients), written exercises, logbooks or portfolios.

## **Example 6: Module for Suturing a wound– simple sutures**

Relevant competencies:

- SU14.3 Describe the materials and methods used for surgical wound closure and anastomosis (sutures, knots and needles).
- SU14.4 Demonstrate the techniques of asepsis and suturing in a simulated environment
- Regulations on Graduate Medical Education, Part II, 2019 - Table 11:

Certifiable Procedural Skills: General Surgery: **Basic suturing**

### **Objectives:**

By the completion of this module, the student will be able to suture a wound by simple suture in a simulated environment.

- Suggested Teaching Learning Method: DOAP sessions

### **Background Knowledge:**

SU5.1 Describe normal wound healing and factors affecting healing.

SU5.2 Elicit, document and present a history in a patient presenting with wounds.

SU5.3 Differentiate the various types of wounds, plan and observe management of wounds.

SU5.4 Discuss medico-legal aspects of wounds.

Knowledge about different suture materials, advantages, disadvantages, selection of appropriate suture material.

Wound cleaning and administration of local anesthesia.

### **Equipment / Instruments / other requirements:**

Suturing task training models / part mannequins.

Appropriate Suture material like 2-zero nylon/silk with atraumatic reverse cutting needle.  
Suturing Instruments – Thumb forceps, Needle holder and scissors.

	<b>Steps for simple suturing</b> - can be used as check list	Performed Correct = ✓ Not correct= X	Remarks
1	Explain to patient or relatives regarding need of procedure and record informed consent.		
2	Clean the wound and surroundings with appropriate antiseptic solution and maintain asepsis during procedure. Wear well-fitting surgical glove.		
3	Local or general anaesthesia is given / tested/ confirmed		
4	Hold the toothed forceps with non-dominant hand to grasp the skin edges. If necessary, debride edge		
5	Hold a needle holder in dominant hand by partially inserting the thumb and ring fingers into the loops of the handle		
6	Needle grasped at its centre or 50 – 60 % back from pointed end.		
7	The needle grasped 1-2 mm from the tip of needle holder.		
8	Placement of the 1 <sup>st</sup> suture is begun by grasping the skin edge, slightly everting and needle entering perpendicular from outside-in 1.5 cm from the edge of the wound.		
9	The needle is re-grasped with forceps after being driven through the full thickness of the skin from outside in.		
10	Same technique is followed on the other skin edge exactly opposite to the previous bite from inside out.		
11	The suture material is drawn through the skin leaving 2-3 cm protruding from the skin surface.		
12	The long strand is wrapped around needle holder to form loop for throw.		
13	The short strand is grasped and pulled through the loop to form a square knot, just tight enough to approximate the wound edges.		
14	The second throw of the square knot is initiated with the long strand warped around the needle holder.		
15	Hold the short end with the needle holder and pull the strand out to make a knot and tightened securely over the first knot.		
16	The suture material is cut with scissor 1 – 2 cm away from the knot.		
17	The procedure is repeated 1.5 cm away.		
18	Wound is cleaned, local antibiotic ointment/ cream is applied and proper dressing is given.		
19	Patient is explained about postoperative care.		

**Skill assessment:**

**OSCE type stations, where observer or their group members can observe with a check list.**

**Note:** Apart from the Psychomotor skill, the module can be further expanded to include communication skill (counseling, obtaining consent) and attitude (respond to the patient's concerns, inform the patient of your findings and conclude). This can be done either with check lists or by using global ratings.

## **Annexure C**

# **Guidelines for development of skills lab at medical colleges**

# Annexure C

## **6.1 Guidelines for development of skills lab at medical colleges:**

1. Every medical institution must provide students access to a skills laboratory where they can practice and improve skills pre-specified in the curriculum.
2. The purpose of the skills lab is to provide a safe and non-threatening environment for students to learn, practice and be observed performing skills in a simulated environment thus mitigating the risks involved in direct patient exposure without adequate preparation and supervision.
3. The skills lab attempts to recreate the clinical environment and tasks which future health care workers have to perform with various levels of complexity and fidelity.
4. Skills labs are used to enhance - clinical, psychomotor and communication skills - as well as teamwork.
5. The skills lab that fulfills the requirements of the outcomes in undergraduate curriculum should contain, at the minimum, the following:
  - a. The skills lab should have a total area of at least 2000 sqft for 100 students, there must be a facility for minimum of 04 rooms (preferably 08) for examination of patients or standardized/ simulated patients.
  - b. The skills lab should be equipped with a facility for video recording and review of the interaction. This is vital for teaching communication skills.
  - c. A room for demonstration of skills to small groups,
  - d. A review or debriefing area,
  - e. Stations for practicing skills individually or in groups,
  - f. Trainers or mannequins required to achieve skills outlined in the competency based undergraduate curriculum document,
  - g. Adequate storage space for storage of mannequins and/or other equipments,

- h. A room for faculty coordinator, and for support staff.
- i. Dedicated technical officer and support staff must be available.

## **6.2 Suggested facilities in Skill Labs (for 100 students) by the start of Phase 1 in all medical colleges**

Part Time task trainer simulators / models / mannequins for:

- First aid, Bandaging, splinting; n=4
- Basic Life Support (BLS), CPR (Cardio Pulmonary Resuscitation) mannequin: n=4
- Various types of injections- Subcutaneous, Intra-muscular, Intra-venous; n=5
- Urine Catheter insertion; n =4
- Skin & Fascia suturing n=5
- Breast examination model /mannequin
- Gynecological examination model / mannequin including IUCD (Intra Uterine Contraceptive Device) Training model
- Obstetrics mannequins including Obstetric examination, conduct and management of vaginal delivery.
- Neonatal & Pediatric resuscitation mannequins
- Whole body mannequins, Trauma mannequin (Optional)

Each model (Low or High Fidelity) should have a module for training including objectives, methods and assessment. Modules can also have hybrid models where real patients or standardized/simulated patients/ computer simulations can be used.



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## COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR THE INDIAN MEDICAL GRADUATE

Knows    Knows how    Shows    Shows how    Performs

Describe

Enumerate

Observe

Demonstrate

Assist

Counsel

Prescribe

Analyse

Integrate

Guide

# ELECTIVES

Communicate

## Module 6

Correlate

Interpret

Critique

Collaborate

Clinician

Communicator

Team Leader

Professional

Lifelong Learner

Knowledge

Skills

Attitude

Values

Responsiveness

Communication

Curriculum Implementation Support Program

**Module on Electives  
for  
Undergraduate Medical Education  
Program  
2020**



**Medical Council of India  
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## **Foreword ELECTIVES**

Students who join medicine come in with many professional and personal aspirations. While meeting the needs of the profession and nation, the MBBS program is also designed to create time and opportunity for students to explore future interests. Allowing students time to experience a specialty or project of their choice is thus key to helping student interest bloom.

Creating a diversity of choices within a specified framework that will allow students to be part of a laboratory, participate in research, be part of a super-specialty care team or interact with patients in a community care setting is a mandate of the new regulations notified by the Government of India. Electives allow students to get a taste of a future career; they also allow them to pursue academic interests, do projects and work in diverse environments. These experiences outside the traditional boundaries of the core program allow students to reflect, plan and grow their careers. They also allow students to begin the process of professional networking early.

Institutions must give sufficient importance to the planning and execution of electives. Besides creating diverse opportunities, thought must be given to providing a safe and enabling environment for students to learn. Identifying and orienting preceptors for this purpose, developing portfolio and log book events and continuous program evaluation are key to the success of the program. I urge all institutions to look beyond traditional boundaries to create areas of opportunity for students. Strategic collaborations with centers of excellence will increase value for students while building bridges of collaborative work among institutions.

This booklet is designed to help institutions plan and execute elective rotations. The Expert Group has elucidated a balanced approach that can be followed by all institutions. As always we are keen to learn and share any best practices that institutions develop. I am grateful to the Academic Cell of MCI and the Expert Group as well as the nodal and regional centers of the MCI for their continued contribution in supporting institutions and teachers in implementing the forward looking changes in the new competency based UG curriculum.

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**Foreword**

**Electives**

Changes in the Graduate Medical Education Regulations notified by the Government of India in 2019 have been done with a view to create physicians of first contact who are relevant to both their community and the globe. These regulations aim at defining outcomes and help students work towards these. These Regulations also envisage a broader role for trainees as scholars, researchers and specialists. In order to diversify experience, stimulate interest in research and discover learning beyond primary care, an opportunity has been created in the new MBBS program for the student to undertake electives of his or her choice subject to availability. Two months of elective time one each in the basic sciences or research and the other in clinical sciences or community clinics have been created. Leverage has been given to institutions to create these electives based on local circumstances and perceived need. Elective postings are compulsory for students and its successful completion is necessary for students to be able to attend the final examination.

This booklet is intended as a guide for institutions to plan the elective postings. Institutions are requested to provide the opportunity for students to take electives of their choice, if needed through external collaborations, if such opportunities are limited while following the guidelines mentioned in the Graduate Medical Education Regulations and this booklet. I would like to express my gratitude to the Academic Cell of MCI and the Expert Group whose constant guidance has helped in the successful roll out of the new curriculum.

Secretary General, MCI

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# **Curriculum Implementation Support Program**

**Module:**

## **ELECTIVES**

# Electives

## Introduction

The MBBS program is geared to create a primary care provider of first contact. It also visualises the student as a future scholar, specialist, researcher and scientist.

Provision of avenues in the competency based undergraduate MBBS program for the student to explore and experience various streams of the profession is important. Electives are learning experiences that will provide the learner with an opportunity to gain immersive experience of a career stream, discipline or research project.

The opportunity to “work” in a clinical, laboratory, research, community set up or in a team-based setting at an early stage in the profession is an invaluable experience for learners as this will have lasting impact on their professional life. An elective allows students to think of a career beyond examinations and gives them an impetus to think laterally besides laying down the foundation for future professional pathways. It also allows students to match their aspirations with the ground reality in a field of their dreams.

The revised Regulations on Graduate Medical Education, part II 2019 (GMER 2019) have created such opportunity in the MBBS program providing students options to do electives in basic sciences, join in ongoing clinical programs and in research settings. This document is meant to guide institutions, Curriculum Committee members and MEU faculty of colleges, and teachers on how to prepare and experience the conduct of an elective that incorporates the principles enshrined in the GMER document, 2019.

## Objectives

The participant must be able to develop electives for block 1 and block 2 as envisaged in GMER 2019 document.

## Glossary

**Elective:** An elective is a learning experience created in the curriculum to provide an opportunity for the learner to explore, discover and experience areas or streams of interest.

**Block:** is a defined time period during which learning experiences are created in a particular specialty, subject or theme.

**Log Book:** Is a *verified record* of the progression of the learner documenting the acquisition of the requisite knowledge, skills, attitude and/or competencies.

**Portfolio:** is a collection of the learner's progression in tasks and competencies. A portfolio is an evidence of events documented in the log book. It includes selected assignments, self-assessment, feedback, work-based and in-training formative assessments, reflections and learnings from planned activity in the curriculum.

Log books are thus linked to portfolios and may be included in the portfolio.

## Definitions

An Elective is a learning experience created in the curriculum to provide an opportunity for the learner to explore, discover and experience areas or streams interest in the profession.

## Curricular Element or Program addressed

Electives

## Relevant extract from Regulations on Graduate Medical Education, Regulations on Graduate Medical Education (Amendment), 2019, part - II for MBBS course starting from academic year 2019-20 onwards

### 9.3. Electives

9.3.1 Objectives: To provide the learner with opportunities:

- (a) For diverse learning experiences,
- (b) To do research/community projects that will stimulate enquiry, self-directed, experiential learning and lateral thinking.

9.3.2 Two months are designated for elective rotations after completion of the examination at end of the third MBBS Part I and before commencement of third MBBS Part II.

9.3.3 It is mandatory for learners to do an elective. The elective time should not be used to make up for missed clinical postings, shortage of attendance or other purposes.

9.3.4 Structure

- (a) The learner shall rotate through two elective blocks of 04 weeks each.
- (b) Block 1 shall be done in a pre-selected preclinical or para-clinical or other basic sciences laboratory OR under a researcher in an ongoing research project. During the electives, regular clinical postings shall continue.
- (c) Block 2 shall be done in a clinical department (including specialties, super-specialties, ICUs, blood bank and casualty) from a list of electives developed and available in the institution OR as a supervised learning experience at a rural or urban community clinic.
- (d) Institutions will pre-determine the number and nature of electives, names of the supervisors, and the number of learners in each elective based on the local conditions, available resources and faculty.

9.3.5 Each institution will develop its own mechanism for allocation of electives.

9.3.6 It is preferable that the list of elective choices are made available to the learners in the beginning of the academic year.

9.3.7 The learner must submit a learning log book based on both blocks of the elective.

9.3.8 75% attendance in the electives and submission of log book maintained during elective postings is required for eligibility to appear in the final MBBS examination.

9.3.9 Institutions may use part of this time for strengthening basic skill certification.

## Description of Curricular program

Two choices of electives are offered to medical students before the commencement of III MBBS part 2. For the purpose of this document these shall be called Block 1 and Block 2. The salient features of each block and their differences are summarised in Table 1.

**Table 1: Salient features of Electives in Block 1 and Block 2**

	Block 1	Block 2
<b>When</b>	Before commencement of III <sup>rd</sup> MBBS part 2	Before commencement of III <sup>rd</sup> MBBS part 2
<b>Duration</b>	4 weeks	4 weeks
<b>Focus of electives</b>	Pre-/para - clinical disciplines or in other basic sciences laboratory or join ongoing research programs	Clinical specialties or community clinics (rural or urban)
<b>Nature of learning</b>	Supervised Experiential Immersive Self-directed	Supervised Experiential Immersive Self-directed
<b>Regular clinical postings</b>	Will continue	Will not be offered
<b>Attendance</b>	Mandatorily 75% attendance is required as prerequisite to be allowed	Mandatorily 75% attendance is required as prerequisite to be allowed

	to take Part 2 summative examination	to take Part 2 summative examination
<b>Assessment</b>	Formative Record of activities in log book and portfolio (or annexure to log book) to be submitted as prerequisite to be allowed to take Part 2 summative exam	Formative Record of activities in log book and portfolio (or annexure to log book) to be submitted as prerequisite to be allowed to take Part 2 summative exam
<b>Out of institution experience</b>	Allowed (note clinical postings allowed to continue)*	Allowed within the city*
<b>Out of city or state experience</b>	Continuation of clinical postings makes this difficult	Allowed with due approval*

\* See caveat in text

The primary purpose of block 1 is to provide the learner with research experience in basic sciences OR laboratory sciences OR in clinical sciences. The purpose of block 2 is to provide the learner an explorative experience with guided patient care in a specialty of choice.

Electives in both blocks will require planning and coordination by the institution, various departments involved and preceptors who will directly supervise and guide students. Coordination will also be required with external institutions, community clinics and preceptors as may be required for the conduct of electives.

## 1. Planning the learning experience

The first step in the process is to plan the learning experience. Given the diversity of blocks there will be some variation in the content style and degree of learning; however, each elective should have the following:

- a. defined learning objectives,
- b. an identified preceptor responsible for guiding the student,

- c. a pre-published timetable of activities identified for the learner during the elective,
- d. list of learning resources for the learner to be used during the elective,
- e. provision to be part of the team to obtain an immersive learning experience,
- f. prerequisites, if any, to be completed before joining the elective,
- g. defined formative assessments with appropriate requirements for portfolio and log book entry, and
- h. program evaluation by the stakeholders.

A template for planning learning experiences is provided in Table 2.

Examples of several kinds of learning experiences are found in annexure 1.

**Table 2: Template for planning learning experiences in electives**

Name of Block	
Name of Elective	
Location of hospital lab or research facility	
Name of internal preceptor(s)	
Name of external preceptor (if any)	
Learning objectives of the elective	
Number of students that can be accommodated in this elective	
Prerequisites for the elective	
Learning resources for students	
List of activities in which the student will participate	
Portfolio entries required	
Log book entry required	
Assessment	
Other comments	

## 2. Identifying learning experiences

To ensure that there is an immersive learning experience and greater attention to the learner, each preceptor identified must be tagged with only a minimum number of students. Therefore, it is important to identify a sufficient number of preceptors, laboratory positions, and existing research projects (for block 1) and specialties and community clinics, for block 2. Input from both faculty and students can be sourced to identify electives that are feasible and desired.

If required and feasible, collaboration with external resources including central and private research institutes and laboratories, hospitals and clinics can be done ensuring that the quality and principles outlined in section 1 are maintained. Student-initiated external rotations may be permitted as long as they do not violate institutional rules and conform with the broad principles outlined. Rotations outside the city will require prior permission from the Medical Council of India. Examples (neither exhaustive nor comprehensive) of block 1 and block 2 electives are provided in Table 3.

**Table 3: Examples of Block 1 and Block 2 learning experiences**

Block 1	Block 2
<b>Laboratory Experience:</b>	<b>Clinical Specialty Experience:</b>
Pathology	Emergency room
Microbiology, Virology	Intensive Care unit
Biochemistry	Psychiatry
Genetics	Adolescent Reproductive Health issues
Molecular biology	Neonatology
Immunology	Dermatology
Pharmaco-vigilance and clinical pharmacology	Health care quality and safety

Infection Control	Rehabilitation and palliative care
<b>Community outreach experience</b>	Sports medicine
Assisted living	Clinical Ethics
Hospice care	<b>Super-specialty experience</b>
School Health programs	Hematology
Community outreach for National Health Programs	Oncology
Maternal and child health outreach	Rheumatology
<b>Research</b>	Endocrinology and Diabetes
Student initiated research	Nephrology
Participation in faculty research	Neurosurgery
Community and epidemiologic surveys	Cardiology / Cardiac Surgery
<b>Others</b>	GI surgery
Bioinformatics / Tissue engineering	Organ Transplant Anesthesia
Computers and artificial intelligence in health care	<b>Urban or Rural community experience</b>
	Rural Community Health Center
	Primary Health Center
	Corporation health clinic
	Selected private primary care clinic

### 3. Student counseling and allocation of electives

The list of available learning experiences for each block and the names of preceptors for each should be available to students on the institutional notice board at least three months before the commencement of the electives. A process for submitting applications for both blocks with choices should be made available to

the students. Written information on each learning experience must be available for students to examine and make an informed choice.

A counseling session with faculty mentors to help students choose electives is desirable. The faculty mentors must ascertain a student's expectation from the electives he/she has chosen. Students must also be made aware of the rules regarding attendance, work schedule, documentation and assessment requirements for each elective. The allocation of electives may be done based on student choice and availability of rotation by faculty who have been identified to be in-charge of the electives program, for each block. The allocation must be done sufficiently in advance and the students informed so that the prerequisites for the electives, if any (such as knowledge training in good laboratory practices, good research practices, CPR training etc.) can be completed by the student. A process to identify the veracity of student initiated electives must be in place.

#### 4. Student research

Block 1 may also be used by students under the guidance of a preceptor to complete funded (e.g. ICMR student grant, institutional grant etc,) or unfunded research projects. In addition, predefined work, monitoring, presentation and writing plan may be finalised by the learner and the preceptor, prior to starting the elective. Students may also participate in a pre-existing research project ongoing under the preceptor.

It is important to define the objectives, role of the student in the project and his or her part in the writing and publication or presentation of a part of the project. An assessment by the preceptor of the student's role, contribution, involvement and performance must be made. Documentation of experiences, observations, reflections and presentations by the student may be added to the portfolio or as annexure to the log book. Appropriate log book entries that document the student participation and which are verified by the preceptor are critical for successful

completion of the work undertaken. Similar arrangements must be made if an external preceptor or institution is identified.

## 5. External institutions

Given the number of positions available in each elective and the need to provide a broad diverse experience for students, colleges can enter into agreements with external institutions within the country to accommodate students for undertaking an elective experience in both block 1 and block 2, as long as this is not in conflict with the rules and policies of the Medical Council of India, the college of the student and the institution identified and the conditions outlined above are complied with. Student-initiated external rotations may not be discouraged provided they meet the expectations of the program as outlined. Out of city/state experiences may be decided based on institutional policy (since clinical postings will continue during block 1, out of city programs may not be feasible here). Out of state electives in block 2 require prior permission from the Medical Council of India. Identifying suitable preceptors in the host institution and briefing them of the expectations and requirements of the program is important. A local preceptor or faculty who can liaise with the external preceptor will help to solve problems and ensure smooth conduct of the elective.

## 6. Student safety

In each of these electives especially in those involving external rotations, safety of the student should be paramount. Rotations in which the student may be exposed to potentially hazardous situations must be avoided. It must be made clear to the preceptors by the college authorities that students need to be supervised and must not be involved in patient care as the responsible health provider. When required, students must complete the prerequisite training such as good laboratory practice, universal precautions, good clinical practice etc. before being allowed to participate in electives. The student must be oriented to the program through a formal

orientation process that spells out the expectations/outcomes and the precautions to be observed.

## 7. Assessment

Assessment will be formative (refer to MCI module no. 3 on Assessment, for details). Attendance of not less than 75% and successful completion of items that require log book entry and their submission is a requirement for the student to become eligible to take the final examination. Assessment elements could include participation in grand rounds, seminars, case records, submission of assignments, reflection on learnings, preparation of abstracts for research posters, design and participation in patient education programs etc. The module on Log book available on the MCI Website may be consulted for further information.

## 8. Program evaluation

Provision for evaluation of the program based on information from all stakeholders should be made in order to evaluate the effectiveness of the program and need for modifications and improvement.

## 9. Curricular governance

The Curriculum Committee of the college constituted as per MCI norms and headed by the Dean of the college will be responsible for the design, conduct, implementation and evaluation of the elective program. The design and conduct of block 1 may be assigned to Phase 1 and Phase 2 subcommittees constituted by the Dean while that of block 2 may be assigned to Phase 2 Sub-committee. The departmental heads and preceptors are responsible for the day-to-day conduct of the program, guiding and supervising and assessing students.

## Annexure 1

### 1. Example of a learning experience in block 1

**Table 4: Example of a block 1 learning experience**

Name of Block	Block 1
Name of Elective	Medical Genetics
Location of hospital Lab or research facility	Medical College hospital
Name of internal preceptor(s)	Name/s
Name of external preceptor (if applicable)	N/A
Learning objectives of elective	<ol style="list-style-type: none"> <li>1. to demonstrate the conduct of commonly available genetic tests in a controlled environment</li> <li>2. to enumerate indications for common genetic tests</li> <li>3. To enumerate the testing protocol for commonly performed genetic tests</li> <li>4. to demonstrate the correct method to perform a karyotype</li> <li>5. to present a genetic history and determine the nature of inheritance of a given condition</li> </ol>
Number of students that can be accommodated in this elective	4
Prerequisites for elective	Necessary immunisations, Universal precaution certification
Learning resources for students	Departmental handbook provided
List of activities of student participation	<ol style="list-style-type: none"> <li>1. Work daily with a supervisor in observing, assisting and performing genetic tests</li> <li>2. Participate in departmental education activities</li> <li>3. Present at least two tests done by student as a case work up</li> </ol>

Portfolio entries required	<ol style="list-style-type: none"> <li>1. Documentation of worked up cases</li> <li>2. Documentation of presentation done</li> </ol>
Log book entry required	Completion of posting signed by preceptor with a “meets expectation ‘(M)’ grade”
Assessment	<p><b>Formative:</b> attendance;  day-to-day participation in departmental activity;  performance of assigned tasks and presentation of worked up case in department</p>
Other comments	

2. Example of a learning experience in block 2

**Table 5: Example of a block 2 learning experience**

Name of Block	Block 2
Name of Elective	Diabetology
Location of hospital Lab or research facility	Medical College hospital
Name of internal preceptor(s)	Name/s
Name of external preceptor if applicable	N/A
Learning objectives of elective	<ol style="list-style-type: none"> <li>1. To provide care for patients with diabetes in a supervised environment</li> <li>2. To function effectively as a team member in a multidisciplinary team managing diabetes</li> <li>3. To counsel patients about diabetes care appropriately</li> <li>4. To describe the pathophysiological clinical correlates as they apply to care of patients with diabetes</li> </ol>
Number of students that can be accommodated in this elective	6
Prerequisites for elective	Must have received necessary immunisations, Basic Life Support training
List of activities of student participation	<ol style="list-style-type: none"> <li>1. Participate in OP and IP rounds</li> <li>2. Participate in afternoon teaching sessions of the department</li> <li>3. Present at least two cases that are fully worked up in the teaching session</li> <li>4. Participate in patient education and multidisciplinary team meetings</li> <li>5. Participate in audit meetings</li> </ol>
Learning Resources	Seshadri K: Clinician's handbook of diabetes

Portfolio entries required	<b>Assignments provided</b> Two worked up case records that have been presented Documentation of self-directed learning as summary and reflection
Log book entry required	Satisfactory completion of posting by a preceptor with a “meets expectation ‘M’ grade”
Assessment	Attendance <b>Formative:</b> Participation in OP & IP rounds and team activities, Presentation of worked up cases, Documentation of attendance and required portfolio and log book entries
Other comments	

3. Example of a research rotation in block 1

**Table 6: Example of a research learning experience in block 1**

Name of Block	Block 1
Name of Elective	Research (Preceptor initiated)
Location of hospital Lab or research facility	Medical College hospital
Name of internal preceptor(s)	Name
Name of external preceptor	N/A
Learning objectives of elective	<ol style="list-style-type: none"> <li>1. To collect data as prescribed in the protocol</li> <li>2. To document data in the electronic case record correctly</li> <li>3. To demonstrate the use of statistical software to do basic research calculations</li> <li>4. To write an abstract based on the collated data</li> <li>5. To present abstract to a group of peers and supervisors</li> </ol>
Number of students that can be accommodated in this elective	4
Prerequisites for elective	Good clinical practice, Good laboratory practice
List of activities of student participation	<ol style="list-style-type: none"> <li>1. Work with supervisor in making observations, collect data and document as per protocol</li> <li>2. Work with statistician to provide a statistical analysis of the data</li> <li>3. Participate in research meetings of the department, internal and external meetings</li> <li>4. Write abstract of work done</li> <li>5. Present abstract in an internal meeting and if possible at an external meeting as a poster or oral presentation</li> </ol>

Learning Resources	Sackett DL: Clinical epidemiology Robbins & Cotran Pathological basis of disease
Portfolio entries required	Laboratory notes Statistical work sheet Abstract created
Log book entry required	Satisfactory completion of posting with a “meets expectation ‘(M)’ grade”
Assessment	Attendance Successful completion of research objectives and log book entry
Other comments	

4. Example of an external rotation in block 2

**Table 7: Example of a community clinic rotation in block 2**

Name of Block	Block 2
Name of Elective	Community Clinic
Location of hospital Lab or research facility	Primary health care center in (name of ) a village
Name of internal preceptor(s)	Name
Name of external preceptor if applicable	Name
Learning objectives of elective	<ol style="list-style-type: none"> <li>1. To provide primary care to patients in a resource limited setting under supervision</li> <li>2. To function as a member of a health care team in a primary care center</li> <li>3. To participate in health outreach activities of a primary care center</li> </ol>
Number of students that can be accommodated in this elective	6
Prerequisites for elective	Required immunisations to be taken, BLS, Basic Suturing and first aid
List of activities of student participation	<ol style="list-style-type: none"> <li>1. Provide patient care under the supervision of a community clinic preceptor</li> <li>2. Assist in common procedures in a community care clinic</li> <li>3. Counsel patients in their own language</li> <li>4. Participate in national health care programs offered through the PHC</li> <li>5. Participate in team meetings of the PHC</li> </ol>
Learning Resources	The Washington Manual of Medical Therapeutics, 2019

Portfolio entries required	Daily log of patients seen and activities participated At least 04 fully worked up patients to be documented
Log book entry required	Satisfactory completion of posting by external preceptor co-signed by institutional preceptor
Assessment	Attendance Successful verification of required portfolio entries, Successful completion of the posting as certified in the log book with a “meets expectation ‘M’ grade”
Other comments	

5. Example of a block 1 rotation in emerging infections

**Table 8: Example of a learning experience in block 1 in virology**

Name of Block	Block 1
Name of Elective	Emerging viral infections
Location of hospital Lab or research facility	Medical college hospital
Name of internal preceptor(s)	Name
Name of external preceptor if applicable	N/A
Learning objectives of elective	<ol style="list-style-type: none"> <li>1. To obtain experience in the laboratory investigation of viral outbreaks</li> <li>2. To obtain experience in diagnostic testing in viral diseases</li> </ol>
Number of students that can be accommodated in this elective	6
Prerequisites for elective	Universal precautions and Good laboratory practice modules to be completed
List of activities of student participation	<ol style="list-style-type: none"> <li>1. Participate in laboratory activities including sample processing, sequencing RT PCR viral cultures etc.</li> <li>2. Participate in academic programs of the department</li> <li>3. Write up the laboratory work up of two patients with viral illness</li> <li>4. Visit to a center with electronic or confocal microscope</li> <li>5. Present at least two cases in departmental academic forum</li> </ol>
Learning Resources	Handbook of Virology testing
Portfolio entries required	Lab Notes and work book entries; Presentations done

Log book entry required	Satisfactory completion of posting authenticated by preceptor
Assessment	Attendance Successful verification of required portfolio entries, Successful completion of the posting as certified in the log book with a “meets expectation ‘M’ grade”
Other comments	

6. Example of a block 2 rotation in emerging infections

**Table 9: Example of a learning experience in block 2 in virology**

Name of Block	Block 2
Name of Elective	Clinical infectious disease and virology
Location of hospital Lab or research facility	Medical college hospital
Name of internal preceptor(s)	Name
Name of external preceptor if applicable	N/A
Learning objectives of elective	<ol style="list-style-type: none"> <li>1. To function as part of an infectious disease team</li> <li>2. To be able to approach and investigate infection outbreaks</li> <li>3. Get hands on experience on contact tracing, community isolation measures, and use of technology</li> <li>4. To understand the principles of the management of viral infections</li> </ol>
Number of students that can be accommodated in this elective	6
Prerequisites for elective	Universal precautions and must have taken required immunizations; CPR training
List of activities of student participation	<ol style="list-style-type: none"> <li>1. Participate in inpatient and outpatient team rounds</li> <li>2. Participate in community outbreak investigations</li> <li>3. Counsel patients on correct precautions during outbreaks</li> <li>4. Diagnose and understand the principles in the management of viral diseases</li> <li>5. Liaise with the laboratory in the diagnosis</li> <li>6. Present at least one patient or outbreak investigation in the departmental meeting</li> </ol>

Learning Resources	Handbook of clinical virology
Portfolio entries required	Case record of at least one patient Record of patient counseling session or contact tracing done
Log book entry required	Satisfactory completion of posting by preceptor
Assessment	Attendance, Successful verification of required portfolio entries, Successful completion of the posting as certified in the log book with a “meets expectation ‘M’ grade”
Other comments	



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**Define**



**Pandemic Management  
Module for UG  
Module 7**

**Curriculum Implementation Support Program**

# **Module on Pandemic Management**

**August 2020**



**Medical Council of India  
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## **Foreword**

### **Pandemic Management**

The Medical Council of India has prepared revised Regulations on Graduate Medical Education and competency based Undergraduate curricula, accompanied by detailed guidance for its implementation. One of the desirable outcomes of the Competency derived education program is to enable the Indian Medical Graduate to be prepared for the unknown - to be able to understand, investigate, treat and prevent new and emerging diseases as a clinician, community leader and scholar. The emergence of COVID19 and its rapid spread across the globe has further underlined the need to develop these skills in our graduates.

This Pandemic Management module is designed to ensure that the MBBS student acquires competencies in handling not only the illness, but also the social, legal and other issues arising from such disease outbreaks. A pandemic or disease outbreak calls in to play all the five roles envisaged for the Indian Medical Graduate viz. clinician, communicator, leader and member of health care team, professional, life-long learner and committed to excellence, is ethical, responsive and accountable to patients. It is expected that this longitudinal module extending from Foundation Course to the final year undergraduate program will help in ensuring the creation of an IMG who will serve humanity as a doctor, leader and healer in bleak times such as the occurrence of a pandemic.

We are grateful to the members of the Expert Group and the Academic Cell for painstakingly putting this booklet together. We hope that teachers and institutions will benefit in creating a generation of Indian Medical Graduates who will be able to provide promotive, preventive and curative aspects of health care to the nation in times of extreme need like the outbreak of a pandemic.

**Chairman, Board of Governors**

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**Foreword**

**Pandemic Management**

The world community including India is facing an unprecedented crisis due to the rapidly spreading Covid-19 infection, across countries and continents. Recent reports indicate Covid-19 cases have crossed the 18 million mark globally. The impact of Covid-19 infection is being felt severely on the health sector. An acute necessity is being felt to maximise the health care facilities available in the country particularly the availability of trained health care workers to meet this unexpected health crisis.

The Competency based undergraduate curriculum was designed to enable the Indian Medical Graduate to be prepared to meet new challenges - to be able to recognise, diagnose, investigate, and treat newly emerging diseases as a clinician and community health leader; the Covid-19 pandemic outbreak has provided this opportunity. The longitudinal module on Pandemic Management extending from Foundation Course to the final year undergraduate program prepared by the Academic Cell and Expert Group is designed to provide year-wise detailed protocols in training the students to fulfil their role as a doctor, leader and healer during this difficult period of a rampaging pandemic. The Medical Council of India is appreciative of the efforts of the members of the Expert Group and the Academic Cell in preparing this module in a very short time.

*Vatm*  
19/8/20  
(Dr. R.K. Vats)  
Secretary General

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## **How to use this document**

This document has been prepared, considering the metamorphosis of a first year MBBS student to the Indian Medical Graduate (IMG) and the knowledge and competence that is expected from him/her in adapting to and managing a clinical condition that is predicted to happen, too often in the form of outbreaks, epidemics and pandemics, during his/her career.

The module is arranged in a Phase-based manner. It is expected that components of Self Directed Learning, Early Clinical Exposure, Integration and alignment as envisaged in the Competency documents (2018) would be incorporated in the execution of these modules in various phases, as applicable. It is also expected that the modules would be covered by an interdisciplinary team under supervision by the college level Curriculum Committee. The major coordinating departments involved in the execution of this document are identified in the table below.

### Longitudinal Module on Management of Pandemics for MBBS course

Period	Module	Broad areas	No. of hours	Major department(s) to coordinate
Foundation Course	F.1	History of Outbreaks, Epidemics & Pandemics	2	Pre-Clinical
Phase I	1.1	Infection Control: Part - I Infection Control Practices – Hand washing, Decontamination Use of PPEs	4	Microbiology
Phase II	2.1	Infection Control: Part II Air borne precautions Contact Precautions Infection Control Committee	4	Microbiology
	2.2	Emerging and Re-emerging infections, early identification and control of new infections	6	Community Medicine
	2.3	Sample Collection, Microbial diagnosis, Serologic tests and their performance parameters	6	Microbiology
	2.4	Vaccination strategies including vaccine development & Implementation	6	Community Medicine, Biochemistry
	2.5	Therapeutic strategies including new drug development	6	Pharmacology, General Medicine
Phase III Part 1	3.1	Outbreak Management including Quarantine, Isolation, Contact Tracing	5	Community Medicine
	3.2	Interdisciplinary Collaboration, Principles of Public Health Administration, Health Economics, International Health	5	
	3.3	Operational Research, Field work, Surveillance	8	
Electives		Epidemiology and research Components		Community Medicine
Phase III Part 2	4.1	Care of patients during Pandemics	6	Clinical departments (General Medicine, Pulmonary Medicine, Anaesthesiology as Integrated sessions)
	4.2	Emergency Procedures	8	
	4.3	Death related management	2	
	4.4	Communications and media management	4	
	4.5	Intensive Care Management during Pandemics	4	
	4.6	Palliative Care during Pandemics	4	
Total			80 hours	

## **Skills suggested**

### **1. Infection Control related**

- a. Hand washing
- b. PPE Donning & Doffing
- c. Disinfection

### **2. Diagnostic**

- a. Sample collection
- b. Sample transportation & storage
- c. Choose the appropriate test based on performance parameters

### **3. Disease Management**

- a. Pharmaco-vigilance measures
- b. Protocol based Management
- c. Therapeutic decision making
- d. Terminal care including CPR, ALS, PALS

### **4. Epidemic Management**

- a. Outbreak investigation
- b. Contact tracing, Quarantine and Isolation
- c. Surveillance
- d. Documentation

### **5. Research**

- a. Operational research
- b. Clinical trial protocol preparation including Vaccine trials
- c. Ethical considerations

### **6. Communication**

- a. To the media
- b. Use of Telemedicine
- c. Patient & stakeholder communication

### **7. Intensive Care**

### **8. Palliative care during pandemics**

# Foundation Course

## Module F

## Module F.1

# History of Outbreaks, Epidemics & Pandemics

### Background:

The occurrence of disease is a common phenomenon in communities. The frequency with which disease occurs in a population depends upon a number of epidemiological factors specific to the host, agent and environment including geographical location. Most of the diseases occur with a predictable frequency which is considered as normal for the population in that area. If there is increase in the frequency (more than expected), change in type of host population, clinical manifestations or involvement of newer geographical locations, then depending upon the extent of involvement, an outbreak, epidemic or pandemic has occurred.

A medical student must be aware of such events that have occurred in the past. This can help them learn from historical events, particularly causative or precipitating factors that might have resulted in such events, the most successful strategy that lead to its control and ways that can help in predicting and controlling future events of similar nature and / or magnitude.

### Competencies addressed:

<b>The student should demonstrate the ability to:</b>	<b>Level</b>
Define pandemic and differentiate it from outbreak/epidemic.	K
Identify the reasons and /or events that lead to pandemics in the past.	KH
Describe key strategies (by the State/Central Government, Non-Government Organization and society at large) that were adopted in prevention and control of these pandemics.	KH
Discuss the role which will be played by National and International bodies like WHO and ICMR, if these events take place	KH

## **Learning Experience**

**Year of study:** Foundation course Professional year 1

**Hours:** two (02)

- i. Reading history of pandemics in small groups- 0.5 hours
- ii. Identifying reasons/events that lead to these pandemics - 0.5 hours
- iii. Sharing with large group & summarizing learning points - 1 hour

Students can also be given assignments where they can come prepared with the history of pandemics in the past through online/offline resources or hand outs can be made for them to discuss in class.

Some of the points for discussion in small group can be-

- Type of microbe involved in the pandemic and its properties that helped it spread e.g. route of entry and exit from host, mechanism of transmission involved, ability to survive on various external surfaces etc.
- How did the microbe evolve? Is this emerging or re-emerging in nature?
- Identify common factors in the community that helped the microbe to re/emerge and spread e.g. deforestation, change in trade practices, Host characteristics that supported the spread etc.
- Impact on health, economics and society,
- Steps taken to control the pandemic,
- Time taken to control,
- Current state of infection by that organism.

## **Assessment**

1. **Formative:** Not required
2. **Summative:** Not required

### **Introductory write-up:**

A **pandemic** is derived from a Greek word (*pan*, ="all" and *demos*, ="people"). This is an epidemic that affects a significant number of people across a large geographic location, multiple continents or worldwide. Pandemics usually are caused by new microbes, particularly viruses. A large number of previously unexposed population is highly susceptible to these new microbes and if the disease is capable of human to human transmission, then the spread of these organisms is quite rapid leading to pandemics with major impact on society.

Thus, depending upon the pathogenic/ virulence properties of the new microbe, host susceptibilities and risk factors, pandemics can result in significant increase in morbidity and mortality in affected population in large geographic areas with huge impact on the economic growth, social life, and political parties.

Though most of the times it is difficult to pinpoint the factors that result in emergence or re-emergence of microbes capable of causing pandemics, some of the factors that are contributing significantly are global travel, industrial development, urbanization, global food production, wildlife trade, deforestation and overall misuse of nature. Socio-economic and anthropogenic environmental changes have resulted in emerging zoonosis, which can spread and cause pandemics as had happened in the spread of Black Death in the 14th century due to expansion of trade routes.

Further, the way the world is connected today, human beings have become extremely vulnerable to the rapid spread of new infections including zoonosis. A primarily animal pathogen can evolve into a human pathogen, and then with time, need for the original animal host is lost as microbes establish human-to-human transmission. Though this is a gradual process, but it has resulted in evolution of many predominantly human viral pathogens like smallpox, Human Immunodeficiency Virus(HIV), Nipah virus, Rabies, West Nile viruses, Ebola, Marburg, human monkey pox viruses, influenza A, dengue, SARS, Corona virus etc. resulting in widespread outbreaks, epidemics as well as pandemics.

As declared by the World Health Organization, the latest pandemic that we are facing globally is Covid-19 pandemic, a respiratory illness caused by the newly identified Coronavirus, which has originated in the live market of Wuhan in China. But this is not new as a large number of pandemics have happened in the past and few examples of devastating pandemics are given below:

### **1) Antonine Plague (165 AD)**

Death Toll: 5 million

Cause: Unknown

Antonine Plague was an ancient pandemic that affected Asia Minor, Egypt, Greece and Italy and is thought to have been either Smallpox or Measles, though the true cause is still unknown.

### **2) Plague of Justinian (541-542 AD)**

Death Toll: 25 million

Cause: Bubonic Plague

Generally regarded as the first recorded incident of the Bubonic Plague, killed up to a quarter of the population of the Eastern Mediterranean and devastated the city of Constantinople by killing an estimated 5,000 people per day and eventually resulting in the deaths of 40% of the city's population.

### **3) The Black Death (1346-1353 AD)**

Death Toll: 75 – 200 million

Cause: Bubonic Plague

Bubonic Plague is thought to have originated in Asia. It spread most likely via the fleas living on the rats that commonly lived on merchant ships. Ports being major urban centres at the time, gave the perfect breeding ground for rats and fleas, and thus the insidious bacterium flourished, devastating three continents.

#### **4) Third Cholera Pandemic (1852–1860 AD)**

Death Toll: 1 million

Cause: Cholera

**Third Cholera Pandemic** was the deadliest of the seven cholera pandemics. This originated in India, spreading from the Ganges River Delta before spreading through Asia, Europe, North America and Africa. British physician John Snow succeeded in identifying contaminated water as the means of transmission for the disease.

#### **5) Flu Pandemic (1889-1890 AD)**

Death Toll: 1 million

Cause: Influenza virus

It was also known as “Asiatic Flu” or “Russian Flu”. This was thought to be an outbreak due to the Influenza A virus. Rapid population growth of the 19th century, particularly in urban areas, helped in the spread of the flu, and the outbreak spread rapidly across the globe.

#### **6) Sixth Cholera Pandemic (1899-1923)**

Death Toll: 800,000+

Cause: Cholera

Originated in India then spread to the Middle East, North Africa, Eastern Europe and Russia.

#### **7) Flu Pandemic (1918)**

Death Toll: 20 -50 million

Cause: Influenza virus

1918 flu pandemic was different from other influenza outbreaks. The host properties of Influenza virus were affecting the juveniles previously and the elderly or already immunologically weak individuals but, the new strain had infected and killed completely

healthy young adults, leaving children and those with weaker immune systems still alive.

### **8) Asian Flu (1956-1958)**

Death Toll: 2 million

Cause: Influenza virus

Asian Flu was a pandemic outbreak of Influenza A of the H2N2 subtype, that originated in China in 1956 and lasted until 1958.

### **9) Flu Pandemic (1968)**

Death Toll: 1 million

Cause: Influenza virus

“The Hong Kong Flu” was caused by the H3N2 strain of the Influenza A virus. Outbreak appeared in July 1968 in Hong Kong and by September 1968 virus had spread to Philippines, India, Australia, Europe, and the United States.

### **10) HIV/AIDS Pandemic (at its peak, 2005-2012)**

Death Toll: 36 million

Cause: HIV/AIDS

It was first identified in the Democratic Republic of the Congo in 1976. Currently, there are nearly 35 million people living with HIV. As awareness has grown, new treatments have been developed that make HIV far more manageable, and many of those infected go on to lead productive lives.

### **11) Covid-19, the novel Coronavirus:**

In December 2019, in the region of Wuhan, China, a new (“novel”) Coronavirus began appearing in human beings. This new virus named as Covid-19, spreads incredibly quickly among people, due to its newness – no one had immunity to Covid-19, because no one had Covid-19 until 2019. Countries across the world declared mandatory stay-at-home measures, closing schools, businesses, and public places to curtail the spread of disease.

The outcome of the Covid-19 pandemic is difficult to predict, at least presently. But we can learn from the history of pandemics to determine our best course of action.

## **Dealing with pandemics**

Looking back in history, we can see respiratory viruses, particularly influenza viruses have been a major cause of repeated pandemics. This has justified the need for global influenza surveillance and monitoring systems, so as to keep an active surveillance of the strains of virus, their pathogenic potentials and host preferences. WHO has developed pandemic phases in 1999 with latest revisions in 2009 as planning tools that can loosely correspond to pandemic risk, identify sustained human to human transmission and give time for preparedness and response. These tools are not designed to predict. The six phases as given by WHO can be studied in three stages-

1. Inter-pandemic phase
2. Pandemic alert period
3. Pandemic phase

Thus, a basic understanding of these phases provides a framework to help countries to tackle the pandemic and prepare response planning.

Preparedness for impending pandemics is a necessary step to successful handling with minimal loss of life, economic and social disruptions. This requires involvement of government leadership, health sector, on-health sectors, individuals, families, and communities whole-heartedly. Activities that lead to capacity development, planning, coordination, and communication at various levels are critical for successful management.

The **WHO** plays an important role in rapid detection and verification of health emergencies like pandemics, as this is essential to save lives. WHO works with Member States across a range of activities, including coordination under the International Health Regulations (2005). Some of the important activities are:

Within 48 hours of an emergency, WHO

- Grades the severity of the event,
- Deploys field teams and activates global stockpiles of essential supplies, including personal protective equipment, medicines, and vaccines.
- Communicates the risk to the community and neighbouring countries through official International Health Regulations.
- Activates the **Global Health** Cluster, the Global Outbreak Alert and Response Network (GOARN), emergency medical teams and standby partners.
- WHO also develops new technologies to be able to detect and track new health events in the most difficult settings, such as the Early Warning, Alert and Response System (EWARS).
- Helps countries strengthen their public health surveillance system.
- Provides guidance on risk communications.
- Advises countries on establishing or accessing laboratory services.
- Enhances laboratory biosafety and biosecurity capacities.
- Increases domestic testing capacity in range and volume.

The WHO also supports Member States with the help of the World Bank, UNICEF, the World Food Programme and other partners to deliver universal health coverage and basic health services during these times. The WHO also deploys mobile medical teams and maintains stockpiles of essential supplies, life-saving medicines and personal protective equipment that can be dispatched quickly across the world. The WHO Emergency Medical Teams (EMT) Initiative also helps organizations and Member States build national capacities and stronger health systems so that countries have the ability to respond promptly when a disaster strikes or an outbreak flares.

### Role of the **Indian Council of Medical Research (ICMR)**

The ICMR, New Delhi is one of the oldest medical research bodies in the world and apex body in India. This is the main national agency for the Planning, Formulation, Coordination, Implementation and Conduct or promotion of biomedical research in India.

For prevention and control of influenza outbreaks, ICMR Influenza Network was initiated in 2003. The influenza network collects clinical data, epidemiological data from patients with influenza-like illness (ILI) and severe acute respiratory infections (SARI) from several clinical virology setups in India. The surveillance database contains data on genetic characterization of the influenza viruses isolated. The network provides useful data for monitoring circulating influenza strains, detection of emerging/re-emerging viruses and defining seasonality in different geographical areas.

**Thus, ICMR plays a very active role in monitoring and helps in predicting impending pandemics.**

Indian Council of Medical Research is also coordinating “India COVID-19 Clinical Research Collaborative Network”. The goal of this network is to enhance the clinical understanding of Covid-19 in the country so as to develop specific clinical management protocols and further R&D for therapeutics. For this purpose, a central database of clinical and laboratory parameters of hospitalized Covid-19 cases is being created. All hospitals currently managing Covid-19 patients are invited to become partners in the network. ICMR also issues timely advisories required in testing and treatment of patients during pandemics.

#### **Resources:**

- (1) Swetha G, Eashwar VM, Gopalakrishnan S. Epidemics and Pandemics in India throughout History: A Review Article. Indian Journal of Public Health Research & Development. 2019; 10(8):1570-6.
- (2) <https://www.ncbi.nlm.nih.gov/pubmed/30212163>.
- (3) Hughes JM, Wilson ME, Pike BL, Saylor KE, Fair JN, Le Breton M, Tamoufe U, Djoko CF, Rimoin AW, Wolfe ND. The origin and prevention of pandemics. Clinical Infectious Diseases. 2010 Jun 15; 50(12):1636-40.
- (4) Daszak P. Anatomy of a pandemic. The Lancet. 2012 Dec 1;380 (9857):1883-4. The Lancet's Zoonoses Series; <http://www.thelancet.com/series/zoonoses>.
- (5) <https://www.mphonline.org/worst-pandemics-in-history/>

- (6) WHO Global Influenza Preparedness Plan. The role of WHO and recommendations for national measures before and during pandemics, World Health Organization. 2005 (WHO/CDS/CSR/GIP/2005.5).
- (7) <https://www.who.int/activities/rapidly-detecting-and-responding-to-health-emergencies>.
- (8) <https://www.who.int/activities/strengthening-national-emergency-preparedness>.
- (9) <https://www.who.int/activities/accessing-essential-health-services-in-fragile-conflict-affected-and-vulnerable-settings>.
- (10) <https://www.who.int/activities/building-a-skilled-workforce-to-respond-to-emergencies>.
- (11) Dasgupta, S., & Crunkhorn, R. (2020). A History of pandemics over the ages and the human cost. *The Physician*, 6(2). <https://doi.org/10.38192/1.6.2.1>.

# Phase I: Module 1

# Module 1.1

## Infection Control Practices- Part I

### Background:

Exposure to infectious organisms is a common phenomenon but development of disease following such exposures can be easily prevented by following certain practices that have been labelled as “Standard Precautions”. It has been shown in studies that students who receive education about standard precautions have a higher level of knowledge and comply better. Various studies along with “Patient Safety Module” by WHO strongly recommends incorporation of infection control modules in the curriculum of medical schools as medical students, the future doctors need to understand these concepts at an early stage to be able to incorporate them in their practice. The student must be taught scientific bases of these practices that can protect against infections both in community as well as hospital settings. The student should be taught about the basics of Infection control practices with emphasis on ability to use Personal Protective Equipment (PPE) optimally.

This module is aimed at enabling the learner to practise standard infection control practices including proper and consistent hand washing, use of PPEs and to familiarise with various disinfection and antiseptic procedures.

### Competencies addressed

<b>The student should be able to:</b>	<b>Level</b>
Demonstrate proper hand washing	SH
Demonstrate Donning and Doffing of PPE	SH

### Learning Experience

**Year of study:** Professional year 1

**Hours:** 4 hours

- I. Interactive discussion – 1 hour
  - a. Basics of infection and chain of transmission,
  - b. Significance and ways of infection prevention,
  - c. Role of hand in spread of infections and importance of hand hygiene in prevention of spread of infections,
  - d. Components of standard precautions and use of PPE,
  - e. Cough etiquette.
- II. DOAP session on hand washing, use of gloves, mask, donning and doffing of PPE -1 hour
- III. Visit to the hospital and discussion with the staff about the infection control practices followed by them - 1 hour
- IV. Debriefing and Feedback - 1hour

### **Assessment**

1. **Formative:** Viva can be used. This could be done immediately after the module and/or later with internal assessment.

The technique of hand washing and donning & doffing of gloves can be randomly observed during conduct of practical sessions in first MBBS particularly in dissection halls. Peer feedback can also be incorporated.

2. **Summative:** Not required

### **Resources:**

<https://www.cdc.gov/infectioncontrol/training/infection-control.html>.

# Phase II: Module 2

# Module 2.1

## Infection Control Practices - Part II

### Background:

The basics of infection and components of the standard precaution have been covered in the first phase. The second phase student is better equipped to understand the details of transmission-based precautions as they now learn about the microbes along with disinfection and antiseptic procedures in detail. This is also the right time to introduce a student to the roles and responsibilities of an Infection Control Team in a hospital.

This module is aimed at enabling the learner to identify the most probable route of spread of a particular microbe causing infection and based upon that, identify which transmission-based precaution need to be adhered to along with standard infection control practices.

### Competencies addressed

<b>The student should be able to:</b>	<b>Level</b>
Describe and discuss the implementation of airborne and contact precautions in a specific clinical situation	KH
Describe and discuss the functioning of institutional Infection Control Committee	KH

### Learning Experience

**Year of study:** Professional year 2

**Hours:** 4 hours

- I. Interactive discussion – 1 hour
  - a. Revisit the various routes of spread of infections
  - b. Need for isolation of patients in various circumstances
  - c. Airborne and contact precautions including use of PPEs

- d. Disinfection and antisepsis in patient care
  - e. Roles and responsibilities of infection control team
- II. Small group case discussion followed by plenary– 1.5 hours

### **Example of Case study**

Rajani, 34 years has returned home from Italy, at a time when that country is having an epidemic of a new virus infection. She has mild cough and sore throat. When she develops severe breathlessness, she is admitted in the general ward of the hospital. You have been asked to take a detailed history and examine the patient.

- What precautions are necessary in this case?
  - What precautions are advised for the subordinate staff attending her?
- III. Visit to the isolation ward in the hospital with discussion with the staff about the precautions they take - 1 hour
- IV. Debriefing and Feedback - 0.5 hour

### **Assessment**

1. **Formative:** OSCE, Viva, MCQ can be used.
2. **Summative:** OSCE, Viva, MCQ

### **Resources:**

[https://www.who.int/diseasecontrol\\_emergencies/training/m4\\_infection.pdf?ua=1](https://www.who.int/diseasecontrol_emergencies/training/m4_infection.pdf?ua=1)

<https://www.cdc.gov/infectioncontrol/training/infection-control.html>

## Module 2.2

# Emergence and Re-emergence of microbes

### Background:

The serendipitous discovery of Penicillin by Alexander Fleming in 1928 made man dream about victory over microbes, but emerging and re-emerging infectious diseases have proven the futility of that dream and power of the microbes over man.

**Emerging Infectious Disease (EID)** are diseases that have been newly detected or were found only in restricted geographical locations with few cases. In contrast to this, **Re-Emerging Infectious Diseases (REID)** are diseases that were once major health problems and then their incidence declined to a great extent, but are again becoming health problems for a significant proportion of the population either globally or in a specific geographical location.

Incidence of these Emerging and Re-Emerging infectious diseases is increasing and there are a large number of factors that contribute to the origin or spread of these diseases which can increase the risk of Outbreaks or Pandemics dramatically. These factors can be related to the microbial properties, environmental, socio-economic, and demographic factors. Majority of the EID and REID are Zoonotic in origin and signifies the role of cohabitation in evolution of these organisms.

Keeping in mind the significance of understanding the factors that result in evolution of these infectious diseases and understanding mechanisms that can be adopted for prevention and control of these diseases a sound knowledge, skills and attitudes about Emergence and Re-emergence of microbes need to be developed in undergraduate medical students.

## Competencies addressed:

The student should be able to:	Level
Define emerging and re-emerging infections. Explain reasons or Identify factors responsible for emergence and re-emergence of these infectious diseases.	K
Discuss strategies for early identification, prevention and control of emerging and re-emerging infectious diseases.	K
Discuss the challenges faced in control/ prevention of these infections	KH

## Learning Experience

Year of study: Professional year 2

### Hours: 6

- i. Exploratory and interactive theory session- 1 hour
- ii. Self study/ individual/ small group assignment about any one emerging or re-emerging infectious disease – 2 hours
- iii. Discussion in small groups about reasons/ factors responsible for emerging or re-emerging infectious disease identified through case studies - 1 hour
- iv. Plenary of findings in the case studies and closure - 2 hours

## Assessment

1. **Formative:** Required, SAQ, MCQ, Viva Voce
2. **Summative:** Required

## Resources:

1. Zumla A, Hui DS, (eds). Emerging and Re-Emerging Infectious Diseases, An Issue of Infectious Disease Clinics of North America E-Book. Elsevier Health Sciences; 2019 Nov 2.
2. Lessler J, Orenstein WA. The Many Faces of Emerging and Re-emerging Infectious Disease. Epidemiologic reviews. 2019 Nov 4.

## Module 2.3

# Diagnostic tools

### **Background:**

Diagnostics are a fundamental component of successful outbreak containment or control strategies, being involved at every stage of an outbreak, from initial detection to eventual resolution. Each individual pathogen presents specific diagnostic challenges.

Pandemics are caused by either emergence or re-emergence of microbes. In case of re-emergence, availability of validated diagnostic protocols and tools make laboratory confirmation of the cases easy but this is not the case when we have newly evolved microbes causing pandemic. The laboratory diagnostic tests are either not available and if available, they need to be validated and their performance characteristics like sensitivity, specificity, positive predictive and negative predictive value studied before they can be used for diagnosis. The health care professionals are faced with various dilemmas at these times which can range from a very basic query like the best time and best sample that needs to be collected, to sensitivity and specificity of a chosen procedure that can be isolation of microbes, antigen or antibody detection or gene that needs to be detected in molecular diagnostics.

**Thus, the questions are innumerable and it becomes important to train a medical student to deal with such dilemmas in the diagnosis of an infection particularly during pandemics. They must be taught to choose and collect the most appropriate clinical sample in a suitable container with/without transport media, at the most appropriate time from a suspected case during pandemic and interpret the results of the test keeping in mind various performance characteristics and validation requirements.**

## Competencies addressed:

The student should be able to:	Level
Describe specimen selection, collection, transportation & storage requirement during a pandemic.	KH
Choose and collect the most appropriate clinical sample in a suitable container at the most appropriate time from a suspected case during pandemic (or in a simulated environment).	SH
Demonstrate appropriate safety measures in handling and processing of clinical specimens (use of PPE etc.)	SH
Discuss various diagnostic modalities available for an infectious disease. Explain sensitivity, specificity, positive predictive value & negative predictive value of each of the diagnostic test/modality.	KH
Chose the most appropriate diagnostic test keeping in mind sensitivity, specificity, positive & negative predictive value of the diagnostic test/modality available.	SH

## Learning Experience

Year of study: Professional year II

**Hours:** 6

- i. Exploratory and interactive theory session- 1 hour
- ii. Sample collection demo and hand on in skill lab- 1 hour
- iii. Visit to laboratory with demonstration of diagnostic test-1hour
- iv. Small group activity, where students can be asked to discuss different test reports of suspected cases with performance characteristic and asked to interpret followed by discussion on choosing a lab test– 2 hours
- v. Discussion and closure - 1 hour

## Assessment

1. **Formative:** Required by assignments, OSPE, viva
2. **Summative:** Required by OSPE, SAQ, MCQ

## Resources:

1. Kelly-Cirino CD, Nkengasong J, Kettler H, et al. Importance of diagnostics in epidemic and pandemic preparedness. *BMJ Global Health* 2019;4: e001179.
2. J Michael Miller, Matthew J Binnicker, Sheldon Campbell, Karen C Carroll, Kimberle C Chapin, Peter H Gilligan et al. A Guide to Utilization of the Microbiology Laboratory for Diagnosis of Infectious Diseases: 2018. Update by the Infectious Diseases Society of America and the American Society for Microbiology, *Clinical Infectious Diseases*, Volume 67, Issue 6, 15 September 2018, Pages e1–e94.
3. Washington JA. Principles of Diagnosis. In: Baron S, editor. *Medical Microbiology*. 4th edition. Galveston (TX): University of Texas Medical Branch at Galveston; 1996. Chapter 10. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK8014/>.

## Module 2.4

# Vaccination strategies including vaccine development & Implementation

### Background:

Virulent agent, susceptible host and favourable environment forms the epidemiological triad for all infectious diseases in all settings. The disease can be controlled by addressing any of these components. If available, an effective vaccine can be very useful in breaking the chain of transmission quickly as host will no longer remain susceptible. Given the ease of logistics and quickness of action, vaccine has been looked upon as a potential saviour in situations of epidemics and pandemics especially in diseases caused by viruses. In fact, world owes it to vaccines, for the eradication of Smallpox and control of Polio and Measles. However, the development of vaccines is a long and tedious process, which takes several months to years. Also, equally important is to develop a rational strategy for use of vaccine for any illness. Usually there is undue pressure from communities and administrators for use of vaccines as ad-hoc measure. As a trained medical personnel, the Medical Officer should be able to guide them on this issue sensibly. Also, the Medical Officer should be vigilant to the generalized complacency that follows in the diseases known to have vaccine available. This module will focus on empowering the students to develop sound and rational knowledge about vaccines, vaccine development process and their role in small and large disease outbreaks.

### Competencies addressed:

<b>The student should be able to:</b>	<b>Level</b>
Describe the process of vaccine development.	KH
Describe the role of vaccines in disease control and eradication.	KH
Describe the steps to prepare a micro plan for vaccination activity at PHC level.	KH
Describe the importance of routine vaccination during pandemics.	KH
Describe the role of communities in vaccination programmes.	KH
Describe the cold chain for vaccine storage and delivery.	KH

## Learning Experience

Year of study: Professional year 2

### Hours: 6

- i. Exploratory and interactive theory session- 30 min.
- ii. Small Group Discussion- 3 hrs.

**Suggested Topics for discussion:** Vaccines in Disease Control, Vaccine Development Process, Routine Vaccination during Pandemic & Pandemic Influenza Vaccines -WHO.

- iii. Visit to PHC/ local hospital to show cold chain and sample micro-planning for Supplementary Polio Vaccination [Interaction with Medical Officer] -2 hrs.
- iv. Discussion and closure – 30 min.

## Assessment

**1. Formative:** Required- assignment, MCQ, SAQ

**2. Summative:** Short Answers, Short Notes

## Resources:

1. Pandemic influenza vaccines: WHO. Available from: [https://www.who.int/immunization/newsroom/vaccine\\_PI/en/](https://www.who.int/immunization/newsroom/vaccine_PI/en/)
2. Vaccine Testing and the Approval Process- Centre for Disease Control, USA. Available from: <https://www.cdc.gov/vaccines/basics/test-approve.html>
3. Immunization Handbook for Medical Officers. National Health Mission. 2017. [https://nhm.gov.in/New\\_Updates\\_2018/NHM\\_Components/Immunization/Guidelines\\_for\\_immunization/Immunization\\_Handbook\\_for\\_MedicalOfficers%202017.pdf](https://nhm.gov.in/New_Updates_2018/NHM_Components/Immunization/Guidelines_for_immunization/Immunization_Handbook_for_MedicalOfficers%202017.pdf)
4. Vaccination in Humanitarian Emergencies: Literature review and case studies. Available from: [https://www.who.int/immunization/sage/meetings/2012/april/2\\_SAGE\\_WGVHE\\_SG1\\_Lit\\_Review\\_CaseStudies.pdf](https://www.who.int/immunization/sage/meetings/2012/april/2_SAGE_WGVHE_SG1_Lit_Review_CaseStudies.pdf)

## Module 2.5

# Therapeutic strategies including new drug development

### **Background:**

In many pandemics, causative organisms may not be identified in the beginning. Even when identified, it is likely that a specific drug may not be available. However, persons with illnesses will have to be taken care of. This includes general care, supportive care, early recognition and management of complications. Many drugs which are already being used for existing indications may be used as 'off label'. The knowledge of biochemical features, enzymes, receptors, co-receptors, facilitating and inhibiting molecules may help one in postulating and verifying the use of some existing molecules. Considering the major role of immune mediators in disease pathogenesis and that of immunity in the elimination of the organism, various immune-modulators may also be considered in the management at various stages. Some of these molecules may also be used for prophylaxis in exposed persons or for primary prophylaxis in susceptible populations.

The development of a molecule, identifying its effects and detecting toxicities and side effects needs to be done systematically. Before release, any molecule has to undergo phase 1, 2 and 3 trials. Almost always this is done in animals and human volunteers. Post marketing trials also may lead to new observations. However, these steps which generally require long time lags may have to be shortened during a pandemic situation. Many drugs which show good effects may be discarded, as time passes. Experiences with one pandemic in one part of the globe may not be applicable to another. This module helps the learner to understand the pharmacologic approach to a pandemic situation.

## Competencies addressed:

The student should be able to:	Level
Describe and discuss the various phases of drug trials	KH
Prepare a plan for evaluation of off label use of a drug	SH
Organise pharmaco-vigilance activities	SH
Discuss ethical aspects of clinical trials in pandemics	SH

## Learning Experience

Year of study: Professional year 2

### Hours: 6

- i. Exploratory and interactive theory session- 1 hour
- ii. Small Group Discussion- 2 hours

### Suggested Topics for discussion- New Drug Development – Challenges and Solutions – Urgency in procedures – Need for monitoring.

- iii. Visit to a pharmaceutical firm/ pharmacy lab to show various stages of drug development or an ADR monitoring exercise in clinical wards - 2 hours. (since it is not present in many cities - an appropriate video followed by discussion)
- iv. Discussion and closure – 1 hour

### Case study

1. During the beginning of the Covid-19 epidemic, various drugs were tried in different parts of the globe at various stages of the epidemic. Some of them are off label use of existing drugs, some are extrapolations based on molecular features of the virus. Discuss how you would reach a conclusion and explain to the authorities.
2. There is a pandemic caused by an unknown virus. Someone has come with a claim that a plant extract can be used to prevent and treat this infection.

Describe and discuss how you will proceed to identify any benefit from such an attempt.

3. A group of persons who have taken a tablet for prevention of infection during a pandemic develops a skin eruption. How will you establish any linkage between the drug and the new manifestation or conclude that this is a new manifestation that is just being recognised.

### **Learning Points**

- a. Various phases of clinical trials
- b. Compliance with regulatory authorities
- c. Exploration of off label uses and new molecules for therapy
- d. Pharmaco-vigilance measures.

### **Assessment**

1. **Formative:** SAQ, Viva
2. **Summative:** SAQ, Viva

# **Phase III: Part 1**

## **Module 3**

# Module 3.1

## Outbreak management

### including quarantine, isolation, contact tracing

#### Background

Outbreak management is one of the most important duties for all health care providers concerned with public health. To manage outbreaks, first we must investigate the outbreak to find out answers to what, where, when and who are affected and also as far as possible trace the source which may help us to suggest control measures so that we can contain the outbreak.

#### Competency addressed

The student should be able to:	Level
Demonstrate the ability to conduct various epidemiological investigation related to pandemics - Level ( or in a simulated environment)	SH

#### Learning experience

Year of study: professional Year 3

1. Introduction of case scenarios (4) -1 hour
2. Self-directed learning -1 hour
3. Interactive Lecture – 1 hour
4. Preparation of epidemic curve, spot map and calculating attack rate from a given data
5. Discussion and closure- 1 hour

#### Case scenario 1

Mr. X, Medical Officer of a primary health centre noticed increased number of cases with symptoms of fever, sore throat and cough during third week of March. While taking detailed history one patient had a history of international travel 2 weeks back from a place where some of his friends also had similar illness. In the next week, one of the tertiary care hospitals in the city reported increased number of severe acute respiratory illness among admitted patients and two of them died due to this.

As a Medical Officer or a member of a district health care team, how do you investigate this and manage the situation?

**Case scenario 2**

Dr. X was appointed as Medical Officer of the Primary Health Centre. One of his field staff reported three cases of watery diarrhoea and dehydration (two mild and one severe) in his field area and he referred them for admission to the hospital.

As a health professional what do you think about this episode and how do we proceed to investigate and control the situation.

**Case scenario 3:**

Dr. X was on casualty duty that day. Mr. Y, 49 years old, presented to Medicine casualty with high grade fever (3 days), retro-orbital pain, myalgia and rash. While eliciting detailed history from the patient, he revealed that there was history of fever and body ache for his brother and brother's wife one week back for which they took treatment in a private hospital. Mr. Y and his four brothers lived in nearby houses in the same compound (within 300 metres). He took paracetamol on the first two days of fever thinking that he was feverish as he walked in the rain the previous day.

As a health professional what do you think about this episode and how do we proceed to investigate and manage the situation.

**Case scenario 4:**

Mr. A, 17 years old, was brought to Medicine casualty with history of headache, myalgia and vomiting in the past 2 days. He reached home only 4 days back after a tour along with 13 friends. The day after he came home, he had mild fever and body ache. He thought it might be due to tedious travel and took rest at home. But last night his friend phoned him and said that one of their friends was taken to hospital following fever, vomiting and loss of consciousness.

As a health professional what do you think about this episode and how do we proceed to investigate and manage the situation.

**Learning Points**

- a. Define terms: outbreak, epidemic, pandemic.

- b. How to detect / recognise an outbreak- warning signs of an impending outbreak -  
Steps of outbreak investigation
- c. Describing the event in terms of time, place and person and importance of epidemic curve, spot map and attack rate.
- d. Responses at different levels – general and specific measures include reservoir control, breaking the chain of transmission and protecting the at-risk group.
- e. Differentiate between isolation and quarantine.
- f. Role of contact tracing in outbreak control.
- g. If it is a new disease, gaps will be there, so to fill the gap research activity is required.

### **Assessment**

1. **Formative:** conducting clinic-social discussion based on a scenario, short answer questions, OSPE response station.
2. **Summative:** modified essay/ short question on steps of outbreak investigation, OSPE response in practical.

### **Discussion**

#### **Definition of an outbreak/ epidemic:**

An **outbreak or epidemic** is defined as the occurrence in a community or region of cases of an illness clearly in excess of expected numbers. Usually an outbreak is limited to a small focal area, an epidemic covers large geographic area and has more than one focal point. **Pandemic** is defined as an epidemic occurring world-wide or over a very wide area crossing international boundaries and usually affects a large number of people.

#### **Warning signs of an impending outbreak**

- Clustering of cases or deaths in time and /or place,
- Unusual increase in cases or deaths,
- Even a single case of measles, AFP, Cholera, plague, dengue or JE,
- Acute febrile illness of unknown aetiology,
- Occurrence of two or more epidemiologically linked cases of meningitis,
- Shifting age distribution of cases,
- High or sudden increase in vector density,
- Natural disasters.

## Detecting an outbreak

1. **Rumour register:** it has to be maintained in each public health facility for collecting information related to infectious diseases. There are key informants in the community like teachers, Anganwadi workers (AWW), ward members, Self-help Group (SHG), Youth club leaders, etc. They are the eyes and ears of health services in the community
2. Media – an important source of health information
3. Review of routine data
4. Through strict vigilance on warning signs of impending outbreak

## Steps of outbreak investigation:

1. **Verification of the diagnosis:** The first and foremost step in outbreak investigation would be to verify the diagnosis. A clinical examination along with laboratory investigations of a sample of cases may be sufficient for this, but the epidemiological investigation should not be delayed until laboratory results are available.
2. **Confirmation of existence of an outbreak:** For this, Medical Officer should check
  - If there is an abnormal increase in the number of cases, or
  - See there is clustering of cases, or
  - If the cases are epidemiologically linked, or
  - If some trigger events have occurred, or
  - If many deaths have occurred.

An arbitrary limit of two standard errors from the endemic occurrence is used to define epidemic threshold for common diseases like influenza. If there is evidence of an outbreak, and if the aetiology, source and route of transmission are known, specific control measures need to be initiated immediately. If anyone of the above is unknown, the outbreak must be investigated to identify the specific cause. The Rapid Response Team (RRT) which was formed during the phase of epidemic preparedness should be alerted and requested to further

investigate the outbreak. At the same time general control measures should be started.

3. **Defining population at risk:** before starting investigation, it is necessary to have the attack rates.
4. **Rapid search area map and age gender distribution of entire population in the area.** This is essential for calculating for all cases and their characteristics: this is to identify all cases including those who have not sought medical care and those possibly exposed to the risk.

For this, we can use a carefully designed epidemiological case sheet. The information collected should be relevant to the disease under study. Based on the information collected from the affected ones, search for more cases and their contacts should be continued. Laboratory investigations are done with the help of microbiologist. Microbiologist may advise on what samples are required, mode of collection and transport and also the laboratory to which these are to be sent. Entomological investigation should also be done if the outbreak warrants it.

5. **Data Analysis:** Data collected should be analysed to identify common event or experience using the epidemiological parameters like time, place and person.

**Time:** Epidemic curve can be constructed based on chronological distribution of dates of onset and number of cases. It may suggest a time relationship with exposure to a suspected source, whether it is a common source or propagated epidemic, whether it is of a seasonal or cyclic pattern.

**Place:** A spot map is prepared with cases in relation to possible source of infection. Clustering may suggest common source of infection.

**Person:** Analyse the data by age, sex, occupation, and other risk factors. Find out attack rates/ case fatality rates for those exposed and not exposed. In food borne epidemic, food specific attack rates are calculated.

6. **Formulation of hypothesis:** on the basis of time, place and person analysis, hypothesis is formulated to explain the epidemic in terms of possible source, causative agent, possible modes of spread, people at risk and the environmental factors

7. **Testing the hypothesis:** If the hypothesis fits with the facts, response measures can be initiated; otherwise, further analytical investigation in terms of case control studies will need to be carried out. In the meantime, general control measures are carried out.
8. **Evaluation of ecologic factors:** This is to prevent further transmission of disease. Ecologic factors include sanitary status of eating establishments, water and milk supply, break down in water supply, population movements, atmospheric changes, population dynamics of insects and animal reservoirs.
9. **Further investigation of population at risk:** To obtain additional information, for e.g. serological study may reveal clinically in-apparent cases and throw light on the pathogenesis of the condition.
10. **Writing the report:** This can be an interim report which includes details of the investigation, the diagnosis and control measures initiated. Once the outbreak is coming under control, we should make follow up visits to see whether control measures are implemented adequately and also help to collect new information which was missed in the previous visits. The final report is given within 10 days of the outbreak being declared to be over. The outbreak is declared over when there are no new cases for a period of two incubation period since the onset of last case.

### **Responses to an outbreak**

1. **General measures** is till the specific source and route of transmission is identified. For example, if one is suspecting a droplet infection outbreak, start a campaign requesting people to follow social distancing, use of mask and hand hygiene.
2. **Specific measures** depend on the causative agent. The broad steps are:
  - Identification and nullification of the source of outbreak like chlorinating wells,
  - Minimising transmission to prevent further exposure: vector control,
  - Protection of the host- immunization / chemoprophylaxis,
  - Controlling the reservoir include early diagnosis, notification, isolation, treatment, quarantine.

**Isolation:** Separation **of infected** persons or animals **for the period of communicability** from others in such places and conditions as to prevent or limit the direct or indirect transmission of infectious agent from those infected to those who are susceptible. Purpose is to protect the community by preventing transfer of infection from the reservoir to the possible susceptible host.

**Quarantine:** Limitation of freedom of movement **of healthy person** or domestic animals exposed to communicable disease for **a period not longer than the longest usual incubation period** of the disease to prevent contact with those not so exposed.

**Contact tracing:** The process of identifying, assessing and managing people who have been exposed to a disease to prevent onward transmission. When systematically applied, this will break the chain of transmission of an infectious disease and is an effective tool in public health. This has to be explained according to the scenario provided.

**Resources:**

1. Park's Textbook of Preventive and social medicine - 25<sup>th</sup> edition-published by Banarasidas Bhanot-2019.
2. Medical officer's manual on Integrated Disease Surveillance Project by National institute of Communicable Diseases, DGHS, GOI 2006.

## **Module 3.2**

# **Interdisciplinary collaboration, Principles of Public Health Administration, Health Economics**

### **Background:**

When an outbreak is suspected as given in the case scenarios of previous module, interdisciplinary collaboration is essential. Inter-sectoral coordination is one among the four principles of primary health care. To ensure this, the outbreak control team or multidisciplinary team is convened to conduct the investigation in the field for confirming the outbreak and taking measures for preventing the spread of disease. The powerful public health administration which aims equity, use of appropriate technology, community participation and inter-sectoral coordination is our strength. While managing an outbreak we would understand that many of the determinants of health lie outside the domain of Health Department. Provision of safe drinking water, sanitation, nutrition, legal measures for imposing strict interventions, good house and shelter are some examples. This also points towards the importance of interdisciplinary collaboration. Members of the community should have all the rights to participate in their duties towards controlling an outbreak.

### **Competency addressed**

<b>The student should be able to:</b>	<b>Level</b>
Demonstrate the ability to conduct various epidemiological investigation related to pandemics (need clarity on simulated environment).	SH

### **Sub competency**

Demonstrate the ability to form interdisciplinary team for conducting outbreak investigation.

### **Learning objectives**

The learners should be able to:

1. List the four principles of primary healthcare,

2. Describe the scope of inter-sectoral coordination in outbreak control,
3. List the members of inter-sectoral team for outbreak investigation,
4. Describe the activities of inter-sectoral team in each case scenario provided,
5. Demonstrate the formation and meeting of Rapid Response Team (RRT) as role play according to the case scenarios.

### **Learning experience**

Year of study: professional Year 3

1. Introduction of topic based on previous case scenario -1 hour
2. Self -directed learning -1 hour
3. Interactive Lecture – 1 hour
4. Role play on forming RRT- 1 hour (based on one case scenario)
4. Discussion and closure- 1 hour

### **Learning Points**

- a. Inter-sectoral coordination as one among the four principles of primary health care,
- b. The role of inter-sectoral coordination in outbreak management,
- c. How this can be applied in all four case scenarios,
- d. Who are included in the outbreak investigation team and what are their roles and responsibilities?
- e. What is health economics? What is the impact of epidemic/pandemic on economic status of the family/ state/country?
- f. Cost effectiveness of interventions/ actions to control epidemic.

### **Assessment**

1. **Formative:** theory examination -as short questions /practical – group viva voce.
2. **Summative:** modified essay/ short question on role of inter-sectoral coordination in epidemic management, practical - viva voce.

### **Discussion points**

**Inter-sectoral coordination:** It is a fact that health care cannot be provided by the health sector alone. While managing outbreak we realise that many of the determinants

of health are outside the domain of health care. Hence inter-sectoral coordination as one among the four principles of primary health care is worth mentioning. The other areas closely related to health are agriculture, animal husbandry, food, industry, education, housing, public works, communication etc. To ensure such coordination, administrative system should take the lead with suitable legislation and strong political will. Proper planning should be there to avoid duplication of activities.

In the event of a suspected outbreak, the Rapid Response Teams (RRT) which is a multidisciplinary team that looks into various aspects of an outbreak is alerted and meeting is convened. The team includes an epidemiologist, clinician, microbiologist and other specialities and sectors as per requirements (described earlier). The main role of RRT will be to investigate and confirm outbreak. The members of RRT are regularly doing their work but, in the event of an outbreak, come together to undertake a special function. They should work in coordination with the Government health staff. They will help and support health staff in management and control of outbreak but the responsibility of implementing control measures mainly rests with local health staff. RRT should be formed at all levels of administrative system (district, block, Panchayath). The name, address and mobile phone number of RRT members should be available at respective levels so that they can be alerted as soon as possible.

**Health economics:** Health economics as a branch of economics, is concerned with issues related to efficiency, effectiveness, values and behaviour in the production and consumption of health and health care. Pandemics may affect a large population across borders and nobody can predict when it ends, especially if it is a new disease without vaccine or treatment. So, we are forced to implement other measures like isolation, quarantine and complete lock-down to save the lives of the people. But, at the same time globally we have to face economic crisis due to reduction in gross domestic product (GDP) due to loss of life, workplace closures and quarantine measures.

Economic evaluation can be done as the comparative analysis of alternative course of action in terms of both their cost and consequences. Methods can be cost-benefit analysis (in monetary terms) and cost-effective analysis (in natural units).

## **The Epidemic Diseases Act, 1897 (ANNEXURE I)**

One of the shortest legislations in India, The Epidemic Diseases Act has four sections. It is aimed at 'providing for better prevention of the spread of Dangerous Epidemic Diseases'. The Act was first enacted in the British colonial era primarily to control the Bubonic Plague outbreak in the late 1800s. It has remained relevant ever since.

Section 2A of the Act allows the Centre to prescribe regulations to inspect any ship or vessel leaving or arriving in any port and to detain any person planning to leave or arrive into India.

The Government's decisions on restricting international and domestic travel to and from India fall under the provisions of this Act.

The Act also empowers State Governments under Section 2(1) to prescribe Regulations with respect to any person or group of people to contain the spread of Covid-19.

### **Penalty**

Section 3 of the Epidemic Diseases Act, 1897 gives the penalties for violating the Regulations. Section 188 of the Indian Penal Code states that it will be six months imprisonment or Rs. 1000 fine or both.

## **The Disaster Management Act, 2005 (ANNEXURE II)**

The Disaster Management Act was enacted to tackle disasters at both Central and State Government levels.

Section (2) defines a disaster as a “catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made causes”. **On March 14, 2020 the Central Government termed Covid- 19 as a ‘notified disaster’ as a “critical medical condition or pandemic situation”.**

The Act enables the Centre and States to enforce a lock-down and restrict public movement. It allows the Government to get access to the National Disaster Response Fund, the State Disaster Response Fund and the District Disaster Response Fund. It also has provisions for allocation of resources for prevention, mitigation, capacity building etc.

### **The Penalties**

Sections 51 to 60 of the Act prescribes the penalties for the violators.

The Law describes the offence as obstructing any officer or employee from performing their duty or refusing to comply with directions. Violators can be jailed for up to 1 year or fine, or both. In the case of dangerous behaviour, the jail term can be extended to two years.

### **Resources:**

1. Park’s Textbook of Preventive and social medicine - 25<sup>th</sup> edition: published by Banarasidas Bhanot -2019.
2. Medical officer’s manual on Integrated Disease Surveillance Project by National Institute of Communicable Diseases, DGHS, GOI 2006.

## **Module 3. 3:**

# **Operational research, field work, surveillance**

### **Background**

Operational research is the discipline that uses statistics, mathematics, computer modelling and similar science models for decision making. It is a potential tool for use in many areas that demands evidence-based or model-based decision making. One such area is the epidemic/ pandemic management but it is used less frequently. The reason for its limited use may be because of low awareness among the specialist community. In the era of frequent epidemics, it is the need of the hour to sensitize undergraduate medical students of today (health professionals of tomorrow) about operational research and its use in epidemic management.

Another important area is surveillance which is the backbone of public health programmes and provides information on public health events so that effective action can be taken in controlling and preventing disease outbreaks. The course of an epidemic depends on how early it is identified and how effectively specific control measures are applied.

### **Competency addressed**

<b>The student should be able to:</b>	<b>Level</b>
Demonstrate the ability to conduct various epidemiological investigation related to pandemics (or in simulated environment)	SH

### **Sub-competencies addressed**

1. Demonstrate the ability to appreciate the need of operational research in epidemic control.
2. Demonstrate the ability to identify syndromes and underlying diseases in the given scenario and suggest control measures.

## Learning experience

Year of study: professional Year 3

1. Introduction of topics based on previous case scenario -1 hour
2. Self –directed learning -1 hour
3. Interactive Lecture – 2 hours (surveillance, operational research)
4. Discussion and closure- 1 hour
5. Visit to PHC/sub-centre and field area along with field staff of sub-centre -3 hours

## Points to be discussed

- a. What is operational research?
- b. The role of operational research in outbreak management,
- c. How this can be applied in all four case scenarios,
- d. What is public health surveillance, its key elements and uses of surveillance in outbreak prevention,
- e. Integrated Disease Surveillance Project (IDSP) – syndromes and core conditions in IDSP, types of surveillance, data collection methods,
- f. How surveillance activity is carried out in peripheral institution (SC/PHC) as per IDSP
- g. What are the field activities and how data is collected, compiled, analysed and reported?

## Assessment

1. **Formative:** theory examination –as short questions /practical – viva voce
2. **Summative**– modified essay/ short question on role of operational research in epidemic management, Public Health Surveillance, practical – viva voce.

## Discussion points

**Operational research (OR):** is the discipline that uses statistics, mathematics, computer modelling and similar science methodology for decision making. This is helpful in many areas especially outbreak management activity that requires evidence-based or model-based decision making. Operational research can address important issues in epidemic management like how to allocate resources among options for a

better control of epidemic, what resources are needed to control an outbreak and which resources should be employed for the same.

Analytical computer-based models are used for plotting and forecasting epidemics. Advanced models with quantitative analysis are used for quantifying exposure and forecasting resources needed. Decision making techniques are used to help policy makers to set up policies. It is again a multi-disciplinary approach which requires team activity of OR/ statistics researchers, epidemiologist, managers, physicians, microbiologists etc. which help staff dealing with Statistics to better understand the nature of the epidemic and that is reflected in predictive accuracy of models. At the same time, epidemiologists will be more involved in OR and modelling which help them to better manage outbreaks.

**Public health surveillance:** Surveillance is defined as ongoing systematic collection, collation, analysis and interpretation of data and dissemination of information to those who need to know in order that action can be taken. In simple words, it is a data collection for action. We already have a system of decentralized state-based surveillance program in the country named as **Integrated Disease Surveillance Project (IDSP)**. This is the back bone of public health program as it provides information so that timely action can be taken in controlling and preventing diseases/ outbreaks.

**Key elements of surveillance system** are:

- Detection and notification of health event,
- Investigation and confirmation (epidemiological, clinical, laboratory),
- Collection of data,
- Analysis and interpretation of data,
- Feedback and dissemination of results,
- Response – a link to public health program as action for prevention and control

Uses of surveillance in outbreak control and prevention:

- Recognize cases or cluster of cases to trigger interventions to prevent transmission or reduce morbidity and mortality,

- Identify high risk groups or geographical areas to target interventions and guide analytic studies,
- Demonstrate the need for public health intervention programs and resource allocation during public health planning,
- Monitor effectiveness of prevention and control measures.

Core conditions under surveillance:

- Regular surveillance: vector borne diseases, water borne diseases, Respiratory diseases, vaccine preventable diseases, disease/s under eradication, other conditions (RTA), international commitments, Unusual clinical syndromes.
- Sentinel surveillance: Sexually transmitted disease/ blood borne, other conditions (water quality, outdoor air quality).
- Regular periodic surveillance: NCD risk factors, State specific diseases (Dengue, JE, Leptospirosis).

### **Types of surveillance in IDSP**

**Syndromic:** Diagnosis made on the basis of symptoms/ clinical pattern by paramedical personnel and members of the community.

**Presumptive:** Diagnosis made on typical history and clinical examination by Medical Officer.

**Confirmed:** Clinical diagnosis confirmed by laboratory test.

### **Major syndromes and (conditions) given under IDSP**

- Acute watery diarrhoea – (Cholera),
- Fever <7 days duration- only fever (malaria), fever with rash (Measles/Dengue), altered consciousness (Japanese encephalitis), fever with bleeding (Dengue), with convulsions,
- Fever > 7 days– (Typhoid),
- Jaundice- (Hepatitis),
- Cough >3 weeks,- (Pulmonary Tuberculosis),
- Acute flaccid paralysis - (Poliomyelitis),
- Unusual event?

### **Data collection methods**

- Routine reporting – passive surveillance
- Sentinel surveillance
- Active surveillance
- Laboratory surveillance
- Outbreak investigation

PHC / sub-centre visit– interacting with Medical Officers of PHC and field staff about surveillance activities going on there as part of IDSP. Also getting acquainted with different registers and reporting formats for all three types of surveillance (syndromic, presumptive, Laboratory).

Field area visits with field staff to acquire skills of data collection methods, recording, analysing and reporting.

### **Resources:**

1. Park's Textbook of Preventive and social medicine - 25<sup>th</sup> edition published by Banarasidas Bhanot-2019.
2. Medical Officer's Manual on Integrated Disease Surveillance Project by National Institute of Communicable Diseases, DGHS, GOI 2006.

# **Phase III: Part 2**

## **Module 4**

# Module 4.1

## Care of patients during Pandemics

### **Description:**

During any pandemic, infected persons can be divided into three categories. Asymptomatic persons, mildly symptomatic, Advanced disease. Epidemiologically all symptomatics can also be classified as suspected, probable and confirmed. Most infected persons in most infections tend to be asymptomatic but infective to others. They are usually not picked up unless there is substantial active surveillance mechanisms in place. If all contacts are kept under observation or in quarantine and they are regularly screened, the asymptomatic persons can be picked up in large numbers.

The patients who come to the hospital are mostly symptomatic. Some of them may be serious enough to be hospitalised and some may need intensive care. They are usually graded as mild, moderate and severe, based on clinical finding and prognosis. The progression from mild to moderate and severe will depend on many factors.

The Institutional approach to a person reaching the health system includes proper triaging with the purpose of recognising and restricting the potential for transmission of infection to others, recognising bad prognostic signs and early institution of care depending on the presentation. All health care workers at the triage point should be aware of the specific information that needs to be elicited (e.g. travel history) and the bad prognostic indicators (symptoms and signs). In many illnesses, contact / airborne precautions must be initiated in the triage area itself and unnecessary movement of patients and close associates must be restricted too.

The clinical management of patients during pandemics must be based on specific protocols/ guidelines from immediate higher authority. This should be evidence-based and as per standard practices recognised. Extreme care should be taken to

document all history and other epidemiologic evidences, however subtle they may be. All activities should be properly documented and communicated to higher authorities as required. The treatment can be divided into non-pharmacologic interventions (like isolation, nutritional support), supportive care, specific management (if any), recognition and management of complications and prevention.

### Competencies addressed

The student should be able to:	Level
Describe and discuss the triage facilities required for persons during epidemics	KH
Demonstrate the role of IMG in triage and referral	SH
Demonstrate the ability to manage a suspected / confirmed case in the emergency room during a pandemic	SH

### Case study

There is some news about an unknown disease spreading in the town. An ambulance stops in front of your clinic. A group of 05 persons immediately jump out and rush to transport the patient to the emergency room. Mrs. Gracy, 65 years suffering from cough and breathlessness, is carried by four persons to the clinic. One among the group of doctors examines the patient and requests the nurse to arrange for a Chest X-ray and Blood Glucose estimation. Another doctor records the blood pressure. A third person tries to do a venesection. The patient is sent to the Radiology department. The patient develops breathlessness and syncope while returning to the emergency room.

- How should the emergency room prepare to receive a suspect case during an emergency?
- How can such a situation be handled better and safely during an outbreak?
- What precautions should be taken while patient is transported during an outbreak?

## Learning Points

- Principles of Triage during epidemics,
- Precautions and care to be made while transporting a person with infections,
- Responsibility to other health care workers while a person with infection is cared.

## Learning Experience

**Year of study:** Professional year Phase III Part 2

**Hours:** 6 hours

- a) Interactive discussion – 2 hours
  - i. Triage practices to be followed in a clinic / hospital
  - ii. Primary care to be given to a patient on reaching the hospital
  - iii. Steps to be taken to reduce transmission of infections in emergency area.
- b) Role play to highlight the various roles to be played in emergency area - 1 hour
- c) Visit to the hospital with discussion with staff about the practices followed - 2 hours
- d) Debriefing and Feedback - 1hour

## Assessment

1. **Formative:** DOPS, Viva can be used. This could be done immediately after the module and/or later with internal assessment.
2. **Summative:** not required

## Module 4.2

# Emergency Procedures during Pandemics

### Description:

During outbreaks of illnesses, many patients can develop life-threatening complications. This is more common among persons of extreme age (children and elderly), depending on the pathogen. It is also likely to be more common among persons with co-morbidities as well. These co-morbidities may also make them vulnerable to dangerous events. Toxin or cytokine-mediated damage, metabolic causes, coagulation abnormalities, sepsis etc. can cause multi-organ dysfunction quickly. Persons may develop respiratory, cardiac, renal or neurological events. Proper and timely intervention can prevent further deterioration or even reverse the situation. The IMG should demonstrate required competencies to perform certain procedures. These may include endotracheal intubation, ventilation, cardiopulmonary resuscitation, tracheostomy, to name a few. All situations demand extreme care to be adopted to protect the health care worker involved in such procedures as well. Beyond the skills that are necessary to perform these psychomotor procedures, the IMG should also have the knowledge, attitude and communication skills to manage such a situation.

### Competencies addressed

<b>The student should be able to:</b>	<b>Level</b>
Demonstrate the ability to perform life-saving interventions during outbreaks, ensuring safety of HCWs	SH

### Case study

Mr. Joseph, 72 years old, has been admitted with a febrile illness, one week after a foreign trip at a time when a pandemic had been declared in the country he visited. He is being managed in an isolation room with all airborne precautions. The nurse notices that he has suddenly developed breathlessness and is tachypnoeic. The

oxygen saturation by pulse oximetry is only 70%. The duty doctor has found crackles all over the lung fields and mild cyanosis. The relatives are planning to take him home on their own. The doctor is called in by an emergency call.

- What are the steps that can be taken immediately to ensure a better survival for him?
- What are the factors influencing the decision to do any invasive procedure?
- How will you discuss the issues with the relatives?

### **Learning points**

1. The type of emergency procedures required in various emergencies,
2. The logistics and infrastructure facilities and prioritisation to be considered,
3. The aspects related to communication with the relatives,
4. The immediate, short-term and long-term care of such persons in Intensive care.

### **Learning Experience**

**Year of study:** Professional year Phase III Part 2

**Hours:** 8 hours

- I. Interactive Discussion – 2 hours
  1. Indications for invasive procedures in Pandemics
  2. Points to be verified before emergency procedures
  3. Steps to be taken to reduce transmission of infections
  4. Attitude and Communication Issues related to complicated procedures
- II. Skill development program – with mannequins e.g. intubation, CPR, ALS, PALS etc - 4 hours (*This may be linked with the routine Skill training component as well*)
- III. Role Plays for communication skills and documentation - 1 hour
- IV. Debriefing and Feedback -1hour

## **Assessment**

1. **Formative:** OSCE, DOPS, Viva can be used. This could be done immediately after the module and/or later with internal assessment
2. **Summative:** OSCE, Viva, SAQ, MCQ

## Module 4.3

# Managing Death during Pandemics

### **Description:**

During outbreaks of illnesses, many patients may expire, due to various causes. This is more common among persons of extreme ages (children and elderly) depending on the pathogen. It is also likely to be more common among persons with co-morbidities as well. These co-morbidities may also make them vulnerable to death as well. The inevitable consequence of death during pandemics must be handled with extreme caution. The management may start from the time the person becomes sick or is brought in a moribund condition. Death may be unexpected or even expected at times. Many procedures discussed in the previous module may not help in preventing death. Breaking the bad news regarding the condition of the patient well in time may ease the handling of death related issues. Documentation of death in as much clear terms as possible is absolutely essential. Handling of the dead body adhering to the infection control recommendations is also very important. Cooperation from relatives and administration has to be ensured, depending on the situation. The IMG is expected to be well aware of the medical and social consequences of death during a pandemic. Beyond the skills that are necessary to perform these procedures, the IMG should also have the knowledge, attitude and communication skills to manage such a situation.

### **Competencies addressed**

<b>The student should be able to:</b>	<b>Level</b>
Demonstrate the ability to handle death related events during outbreaks	SH

### **Case study**

Mr. Abdul, 50 years old, has been admitted with a febrile illness, which he developed after staying with his son who recently came from a metropolitan city where an unknown disease had been declared. He was intubated and was on ventilator for two

days. He was being managed in an isolation room with all airborne precautions. He was showing signs of improvement when he suddenly became unconscious and stopped breathing. Cardio-pulmonary resuscitation was attempted but failed. He died about 15 minutes after he developed the symptoms in the ICU. The doctor declared that he is no more.

- How is the event discussed with the relatives?
- What documents are to be prepared regarding the event?
- What care has to be exercised to prevent the transmission of infection after death?
- How will you discuss the issues with the relatives?

### **Learning points**

- The emotional issues for the relatives and HCWs related to death of a person during epidemics.
- The principles of documentation and reporting and legal and ethical issues of death during epidemics.
- The aspects related to infection control practices like prophylaxis (if any), disinfection etc.

### **Learning Experience**

**Year of study:** Professional year Phase III Part 2

**Hours:** 2 hours

- i. Interactive discussion – 1 hour
  - a. Confirmation and documentation of death
  - b. Steps to be taken to reduce transmission of infections
  - c. Attitude and Communication Issues related to handling of dead bodies
  - d. Responding to media
- ii. Role Play for communication skills and documentation with debriefing and feedback - 1 hour

### **Assessment**

1. **Formative:** Viva can be used. This could be done immediately after the module and/or later with internal assessment.
2. **Summative:** Viva, SAQ, MCQ

## Module 4.4

# Information Management during Pandemics

### **Description:**

During the spread of any infection, the community reacts in a certain fashion. Initially there will be fear of spread, maligning the affected people, stigma and discrimination and panic. The media also plays with this and try to sensationalise the whole issue. Any variations from normal pattern of response and functioning of HCWs will be criticised and negative messages will be generated. The media, when well informed, can help a lot in public awareness, health education and behaviour change. It depends to a large extent in sharing the proper information with them at the right time. The sanctity of the media and the right of society to criticise must also be respected.

The social media gets flooded with messages related to outbreaks very early. Most of these messages are based on inadequate information and improper interpretation of the unscientific ideas. Unfortunately, most of the knowledge that is shared in the social media is neither verified nor controlled by anyone. At the same time the online social media is an effective tool for spreading the right messages.

In many epidemics, contact precautions are to be adopted by HCWs and the general public. The visit to the hospital could contribute significantly to spread of infections. In many infections, home or institutional quarantine may be in place. These persons may develop many illnesses and other problems that do not require a face to face consultation. In such instances, the authorities have opened up the avenue of Telemedicine as a viable alternative. History taking and to some extent visual examination of the patient can be done using common virtual platforms. More exploratory options are available using sophisticated instruments like electronic stethoscope, portable ultrasound etc. Counselling is another activity that can use this platform. Online prescriptions in standardised format is also being accepted now. The IMG should be aware of the clinical, emotional, social and legal issues associated with this form of medical practice. Familiarity with electronic medical records, referral

patterns, virtual documentation etc. is also desirable. The virtual platform is also useful for health education and formal teaching and training for students and HCWs.

**Competencies addressed:**

The student should be able to:	Level
Demonstrate the ability to prepare media reports, use online communication	SH
Demonstrate the ability to handle media communication and education	SH
Demonstrate the ability to recognise spam & fake messages	SH

**Case study 1**

Mrs. Rachel, 30 years old, has been admitted with a febrile illness, 4 days after attending a funeral attended by many persons from outside the country. She became sick and was intubated in the emergency room. There was some delay in transferring the patient to intensive care unit. Within a few minutes, a few cameramen from visual media reached the campus and started reporting alleged deficiencies in care. Messages with similar content also started appearing in the social media. It was argued that the delay was because a very fatal infection was suspected in the patient and HCWs were refusing to see the patient. It was also suggested that this disease is spreading fast, is lethal and no cure is available.

- As the Medical Officer on duty on that particular day, you are asked to comment on what went wrong?
- You have been requested by your friends to start a messaging series countering the text messages appearing in the social media. What steps are recommended?
- How will you create a proper message for the visual media and social messaging platform?
- How can you develop a Tele-consultation system in your practice?

## **Learning points**

- The chance of even small variations in the working of hospitals getting media attention
- The irresponsible behaviour from many corners of the society
- The need to prevent fake messages and to spread correct information.
- The proper use of Telemedicine for clinical and academic work.

## **Learning Experience**

**Year of study:** Professional year Phase III Part 2

**Hours:** 4 hours

- i. Interactive discussion - 2 hours
  - a. Responding to media
  - b. Use and misuse of social media for health related messages.
- ii. Visit to the media centre / Tele Medicine unit - 1 hour
- iii. Role Plays for responding to media with Debriefing and Feedback - 1 hour

## **Assessment**

1. **Formative:** Viva can be used. This could be done immediately after the module and/or later with internal assessment
2. **Summative:** Not needed

## Module 4.5

# Intensive Care Management during Pandemics

### **Description:**

Pandemics become important, when there is a high degree of morbidity and associated mortality. This usually happens to persons at extremes of age. The elderly are highly vulnerable due to the aging process and compromised system functions and also because of many co-morbidities. Children and infants suffer mainly because of lack of immunity and higher chances of mingling and other issues like malnutrition. However, this pattern may get altered due to various reasons. The working population constituted by the young and middle aged can be affected in epidemics with direct links to the environment – ecological and employment related: e.g. Leptospirosis, Dengue, Chikungunya etc. Gender variations can also happen due to various predisposing factors among any gender groups. Serious involvement of organs systems like respiratory, cardiac, nervous or renal can lead to rapid deterioration in the patient's condition which may require extra care with lot of support and monitoring.

Intensive care is specialised care given in specialised settings with regular monitoring and corrective measures instituted without delay by a team of trained health care workers. The Intensive Care Unit (ICU) of today works with lots of gadgets and standard protocols. In addition to the technical details about diagnosis, prognostication and management, the team care concept and management of affective and communication issues related to ICU care also has to be imbibed by the learner. This form of care is usually very expensive and adds to the financial burden of the family as well. Maintenance of a good ICU demands the use of lots of technology, behaviour change, attitudinal modifications and team skills.

The routine intensive care that is offered for management of pandemic related cases also needs special training, as this involves high levels of integrity, dedication and commitment in terms of effort, compassion and a sense of urgency. This is also compounded by the fact that there are epidemiological issues as well.

This module intends to give the learner an insight into the intricacies of intensive care during the pandemics.

**Competencies addressed:**

The student should be able to:	Level
Visit, enumerate and describe the functions of an Intensive Care Unit	KH
Enumerate and describe the criteria for admission and discharge of a patient to an ICU	KH
Observe and describe the management of an unconscious patient	KH
Observe and describe the basic setup process of a ventilator	KH
Observe and describe the principles of monitoring in an ICU	KH

**Case study**

55 year old Krishnan, known case of systemic hypertension and type 2 diabetes mellitus presented with cough and breathing difficulty in the last 3 days. Patient was diagnosed with Covid-19 infection. Patient was referred to Covid isolation ICU in view of severe breathing difficulty, tachypnoea and desaturation. Patient was transported to ICU in oxygen trolley with O<sub>2</sub> via simple face mask considering all Covid-19 precautions.

Monitors were attached. On examination, patient conscious, oriented, tachypnoeic, Pulse Rate -120/min, BP-128/72mmHg, RR-32/min. ABG showed respiratory alkalosis with PaO<sub>2</sub>/FiO<sub>2</sub> = 138(moderate ARDS). Initial CURB 60 score was 2. Patient was put on High Frequency Nasal Cannula (HFNC) with flow rate of 40L/min and FiO<sub>2</sub> of 90%. Routine investigations were sent which includes CBC, ESR, RFT, LFT, serum electrolytes, coagulation profile, viral markers, blood grouping. Prognostic markers were done : CRP > 100 mg/L, LDH – 600 units/L, Trop I - <2.5 ng/L, D dimer – 1400 ng/ml, Serum ferritin – 565 ng/ml. Chest X-ray showed bilateral chest infiltrates. ECG showed normal sinus rhythm.

As the doctor on duty on that particular day, you are asked to plan future management.

### **Learning points**

1. Initial assessment of patient in ICU
2. Early stabilisation of patient
3. Prognostication and management using standard protocols
4. Coordination with doctors and paramedical staff
5. Communication with the bystanders
6. Reporting to higher authorities

### **Learning Experience**

**Year of study:** Professional year Phase III Part 2

**Hours:** 4 hours

- i. Interactive Discussion – 1 hour
  - a. Interactive Lecture with videos
- ii. Visit to the ICU – 1 hour
  - a. Infection control
  - b. Monitoring of vital signs
  - c. Interpreting investigations
  - d. Monitoring using equipment
- iii. Role Play – 1 hour
- iv. Debriefing session by intensivist - 1 hour

### **Points for Discussion**

#### ***INITIAL STABILISATION OF PATIENT IN ICU***

When a patient is received in ICU,

1. Make sure that the below said equipments are available:
  - a. Oxygen source
  - b. Airway cart
  - c. Working suction
  - d. Monitors

- e. Emergency drugs
  - f. Defibrillator
2. Attach monitors
  3. The primary survey should follow A-B-C-D-E

#### **A- Airway**

- If the patient can speak, the airway is patent
- Airway patency not maintained, triple manoeuvre-head tilt, chin lift and jaw thrust.
- If still not maintained, use oropharyngeal/nasal airways.

#### **B- Breathing**

- Check for oxygen saturation and respiratory rate
- If SpO<sub>2</sub><90% and RR>30---give oxygen supplementation via
  - a) Nasal prongs
  - b) Simple face mask
  - c) Venturie face mask

#### **C- Circulation**

- SBP<90—check distal pulses, confirm IV access and give fluid bolus
- Start on inotropic support

**D - Determine GCS and assess pupils**

**E- Examine the patient**

#### **4. Inform superior officer**

#### **Assessment**

1. **Formative:** Pre-test – Post Test; Viva can be used. This could be done immediately after the module and/or later with internal assessment.
2. **Summative:** Case based short note with plan of management, MCQ

## Module 4.6

# Palliative Care during Pandemics

### Description:

During pandemics and other periods, many patients are likely to develop long lasting consequences after acute illness. After intensive care, a stage may be reached, when patients do not require to be in major institutions or need regular therapeutic procedures. Such persons require long-term care with social support systems. They may require only supportive, curative and rehabilitative interventions. The care is also aimed at making life comfortable and pleasant for them in the future. The patient may or may not recover, but giving hope for a better tomorrow may help them cope with the illness.

Palliative care is a broad speciality with plenty of activities. This module aims to familiarise the learner with the concept of palliative care.

This module may also be used to discuss about the issues related to isolation and solitude by the patients and also about the unhealthy stigma and discrimination experienced by patients, relatives and colleagues. Points may be raised about the issues faced by Health Care Workers, their emotional issues, burn out etc. as well. Social issues related to restriction of activities may be also be discussed along with this module.

### Competencies addressed:

<b>The student should be able to:</b>	<b>Level</b>
Demonstrate an understanding and needs and preferences of patients when choosing curative and palliative therapy.	KH

## Case study

James, 38 year old salesman, developed a febrile illness He was tested positive for a new viral infection. He developed shock while on treatment. He was started on inotropic supports, catheterised, was shifted with O<sub>2</sub> via simple face mask.

In CCU, on day 2 patient developed fever, GCS was E3VTM4, oliguria. Investigations revealed increased total count, increase in CRP, thrombocytopenia, altered RFT. ABG showed high anion gap metabolic acidosis. Patient developed sepsis with Acute Kidney Injury and Renal Replacement Therapy was initiated. Post dialysis patient was on double inotropic (noradrenaline and vasopressin) supports.

Post op day 4, GCS was E2VTM3, anisocoria present, investigations revealed haemoglobin - 9g/dl, total count – 20,000, platelet count – 60,000, urea/creatinine – 90/3, potassium – 5.2, altered LFT and coagulopathy. CT brain was taken which showed large right temporo-parietal bleed with IVH and midline shift. Since the patient was in septic shock with multi-organ dysfunction and DIC, it was decided for conservative line of management. Intensivist decided to discuss about palliative care with the family.

“I am Dr. , I am the treating physician of your son. I am here to explain the health condition of your son. As you know your son now has multi-organ failure. He has widespread blood stream infection which has affected his multiple organs. His vitals are unstable and is on multiple inotropic supports. He developed a condition called DIC and as a result there is large bleeding in his brain. In this situation, surgery would offer no benefit. It might further worsen his condition. Now, his vitals are only maintained with so much medications and ventilatory support. Any therapy aiming to improve his clinical condition will be futile. We are anticipating a gradual clinical deterioration which might end up in his death. So, we would suggest a palliative comfort care for this patient with your consent.

## Learning points

1. Need to assess a patient well before palliative care is suggested
2. Importance of planning palliative care

3. Communicating to the patients and relatives about the need and utility of planned palliative care

### **Learning Experience**

**Year of study:** Professional year Phase III Part 2

**Hours:** 4 hours

- i. Interactive discussion – 1 hour
  - a. Interactive Lecture with videos
- ii. Visit to the palliative care unit – 1 hour
  - a. Pain & palliation
  - b. Educational activities regarding continuation of care and warning signs
  - c. Monitoring using basic observations and examinations
  - d. Nutritional care
  - e. Emotional care
- iii. Role Play – 1 hours
- iv. Debriefing session by intensivist - 1 hour

### **Assessment**

1. **Formative:** Pre-test – Post Test; Viva can be used. This could be done immediately after the module and/or later with internal assessment
2. **Summative:** Case based short note on palliative care, MCQ

## Module 4.7

# Mental health issues during Pandemics

### **Description:**

The pandemic, besides affecting the physical health, has a potential of immense mental health effects, both during and after its occurrence. The mental health repercussions are on an affected individual and in the general community. There is an apprehension of contracting the disease, the uncertainty of procuring medical help and the unpredictable nature of the disease, which causes fear and anxiety in the people. Social isolation or social distancing impacts wellbeing; work from home and home schooling are new and alien dimensions to life. There are worries about the real-world consequences of the pandemic, such as financial struggles.

The loneliness of quarantine, death and long-term consequences affecting oneself and the family are causes for perturbation in patients. Stigma and guilt for spreading the disease are two burdens carried by most patients. There is an increase in anxiety, depression, stress, post-traumatic stress disorder and the possibility of risk of suicide. Besides these direct and indirect psychosocial effects, the virus directly or through an immune reaction affects the brain and leads to mental health and neurological manifestations. In the aftermath of the disease, long term complications can precipitate mental illness.

Some groups of people are more prone to mental health impact. The vulnerable population are frontline workers, elders, children and adolescent, people suffering from mental illnesses and disabilities, women, migrant workers and individuals in conflict situations.

**Competencies addressed:**

<b>The student should be able to:</b>	<b>Level</b>
Describe and discuss the mental health consequences of an epidemic on the general population, patients and health care workers	K
Demonstrate the ability to look after one's mental health during a stressful time of a pandemic	KH
Demonstrate the role of IMG in identification and referral of significant mental illness in response to the pandemic	SH
Demonstrate the ability to counsel patients with minor stress related symptoms in response to the pandemic	SH

**Case study**

Mr. P. businessman aged 62 years, admitted in a single room of a Covid-19 hospital with mild respiratory symptoms. He could not sleep for two nights. During ward rounds, he expresses worry about the future of his business in case something happens to him. His wife and son were admitted to another isolation hospital, and he was unable to communicate with them and suffers from palpitations and tremors when he thinks about them. You are approached by relatives, who request you to assess him for suicidal ideas.

How will you manage the situation?

**Learning points**

The student should be able to recognize:

1. The psychological impact of a novel disease and about which there is little known, and many uncertainties exist.

2. Issues related to quarantine or lockdown such as social distancing, isolation, stigma, loss of contacts.
3. Patient's concerns about availability and cost of treatment, economic issues, probable death and its impact.
4. Signs and symptoms of anxiety, panic and depression and its management.
5. Signs of suicidal ideation and the need for referral of patients if needed.
6. The ability to counsel patients for minor stress related symptoms.

## **Learning Experience**

**Year of study:** Professional year Phase III Part 2

Hours: 04

- v. Interactive Lecture with videos – 1 hour
- vi. Group discussion with frontline staff and telephonic conversations with recovered patients and their family members (live or recorded) - 1 hour
- vii. Role plays – 1 hour
- viii. Debriefing session by a physician, psychiatrist and nurse - 1 hour

## **Discussion points**

Different issues are faced by people belonging to the following categories:

- a. Older people who are dependent on others for daily activities and who are technologically handicapped,
- b. People with co-morbidities that worsen with any co-existing illness, e.g. Chronic Kidney Disease, Chronic Lung, Liver and heart diseases,
- c. Worsening of disorders in persons with pre-existing mental health problems,
- d. People with disabilities,
- e. Persons who do not stay with their relatives, e.g. at nursing homes, homeless people,
- f. Ethnic minorities, persons staying in far off places,
- g. Illiterate persons, persons who cannot use electronic media,
- h. Healthy persons who are caring for the above types of patients at home.

There are other relevant issues like:

- i. **Knowing when a psychiatry referral is required.** Being aware of where the nearest help is available,
- ii. **Knowledge and skills required for supportive counselling.** Counselling involves forming an empathetic, warm and genuine relationship, demonstrating non-judgmental, active listening and giving positive feedback and reassurance. It involves encouraging the person to find simple solutions to their problems,
- iii. **Burden and mental health of caretakers.** Health care workers are at risk for mental health issues which can be prevented and treated. Self-care and the need for professional advice as and when required is important. Periodic relaxation with duty breaks may be helpful.

The emotional issues may take the form of anxiety as expressed by persistent and excessive worry, irritability and sleep problems. Panic attacks may present as sudden onset of anxiety with trembling, paresthesia, palpitations, shortness of breath, choking sensation, chest pain, nausea, vomiting, dizziness, sweating and a sense of impending doom.

It is necessary to observe for signs of depression. These include sadness of mood, helplessness, hopelessness, loss of worth, decreased interactions, loss of appetite, loss of sleep, and recurrent thoughts about death or suicide. There may be references to bereaved persons, guilt, self-hatred, and self-harm. Unless taken care of promptly, these may lead to suicidal ideation/ attempts.

Stress may have varying presentations and may include:

- **physical symptoms:** headaches, sleeping and eating difficulties,
- **behavioural symptoms:** low motivation to work, starting or increasing use of alcohol or drugs, decreased interaction,
- **emotional symptoms:** fear, anxiety, sadness and anger.

A psychiatry referral is required if symptoms are pervasive, distressing and cause impairment. The presence of persistent suicidal ideas is another important reason for a consult. Patients who do not improve with brief counselling interventions would benefit from interventions by a psychiatrist.

**Interventions suggested are:**

- a. Be informed and do not fall prey to rumours and social media infodemic.
- b. Have a routine regarding sleep and meals. Allocate time for work, rest and exercise. Set up priorities and follow a daily pattern of activities. Revive hobbies.
- c. Be in contact with your social circle. Regular conversations and communications at a personal level with the use of phones or digital media (video conferencing) is important.
- d. Restriction of screen time is suggested.
- e. Engage oneself in stimulating and motivational activities.
- f. Connect with nature, life, people around and with those who have recovered.
- g. Look after oneself through nutritious food, exercises, motivating and positive thoughts and practice spirituality.
- h. Use relaxation and breathing exercises to help in anxiety and sleep.
- i. Seek help from phone counselling and self-help groups.
- j. Refer to psychiatrist, if required for telemedicine consults.

**Assessment**

1. **Formative:** DOPS, Viva can be used. This could be done immediately after the module and/or later with internal assessment.
2. **Summative:** not required.

**Further reading:**

WHO. Mental health and psychosocial considerations during the COVID-19 outbreak- Interim guidance WHO/2019-nCoV/MentalHealth/2020.1 available at <https://www.who.int/publications/i/item/WHO-2019-nCoV-MentalHealth-2020.1>

The copy of THE EPIDEMIC DISEASES ACT, 1897 & THE DISASTER MANAGEMENT ACT, 2005 which have been attached as Annexure I and Annexure II respectively, have been obtained from India Code Depository of All Central and States Acts Website.

Link:- <https://www.indiacode.nic.in/>

**Annexure I**  
**THE EPIDEMIC DISEASES ACT, 1897**  
**&**  
**Annexure II**  
**THE DISASTER MANAGEMENT ACT, 2005**

THE EPIDEMIC DISEASES ACT, 1897

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ARRANGEMENT OF SECTIONS

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SECTIONS

1. Short title and extent.
2. Power to take special measures and prescribe regulations as to dangerous epidemic disease.
- 2A. Powers of Central Government.
3. Penalty.
4. Protection to persons acting under Act.

THE EPIDEMIC DISEASES ACT, 1897

ACT NO. 3 OF 1897<sup>1</sup>

[4th February, 1897.]

An Act to provide for the better prevention of the spread of Dangerous Epidemic Diseases.

WHEREAS it is expedient to provide for the better prevention of the spread of dangerous epidemic disease; It is hereby enacted as follows :—

**1. Short title and extent.**—(1) This Act may be called the Epidemic Diseases Act, 1897.

<sup>2</sup>[(2) It extends to the whole of India except <sup>3</sup>[the territories which, immediately before the 1st November, 1956, were comprised in Part B States]] <sup>4</sup>\* \* \*

<sup>5</sup>\* \* \* \* \*

**<sup>6</sup>2. Power to take special measures and prescribe regulations as to dangerous epidemic disease.**—(1) When at any time the <sup>7</sup>[State Government] is satisfied that <sup>7</sup>[the State] or any part thereof is visited by, or threatened with, an outbreak of any dangerous epidemic disease, the <sup>8</sup>[State Government], if <sup>9</sup>[it] thinks that the ordinary provisions of the law for the time being in force are insufficient for the purpose, may take, or require or empower any person to take, such measures and, by public notice, prescribe such temporary regulations to be observed by the public or by any person or class of persons as <sup>9</sup>[it] shall deem necessary to prevent the outbreak of such disease or the spread thereof, and may determine in what manner and by whom any expenses incurred (including compensation if any) shall be defrayed.

(2) In particular and without prejudice to the generality of the foregoing provisions, the <sup>7</sup>[State Government] may take measures and prescribe regulations for—

<sup>10</sup>\* \* \* \* \*

(b) the inspection of persons travelling by railway or otherwise, and the segregation, in hospital, temporary accommodation or otherwise, of persons suspected by the inspecting officer of being infected with any such disease.

<sup>11</sup>\* \* \* \* \*

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1. This Act has been amended in its application to—

(1) the Punjab by the Epidemic Diseases (Punjab Amendment) Act, 1944 (Punjab Act 3 of 1944); in East Punjab by East Punjab Act 1 of 1947:

(2) the C. P. and Berar by the C. P. and Berar Epidemic Diseases (Amendment) Act, 1945 (C. P. and Berar Act 4 of 1945).

The Act has been extended to—

(1) the whole of Madhya Pradesh by M.P. Act 23 of 1958 (when notified).

(2) the transferred territories of Punjab by Punjab Act 8 of 1961.

(3) in Dadra and Nagar Haveli (w.e.f. 1-7-1965) by Reg. 6 of 1963, s. 2 and Sch.

(4) to Lakshadweep (w.e.f. 1-10-1967) : vide Reg. 8 of 1965, s. 3 and Sch.

(5) Union territory of Pondicherry by Act 26 of 1968, s. 3 and Sch.

The Act has been repealed in its application to Bellary District by Mysore Act 14 of 1955.

2. Subs. by the A.O. 1950.

3. Subs. by the Adaptation of Laws (No. 2) Order, 1956 for “Part B States”.

4. The word “and” rep. by Act 10 of 1914, s. 3 and the Second Schedule.

5. Sub-section (3) rep. by s. 3 and the Second Schedule, *ibid.*

6. For Notifications issued under this section, *see* different local Rules and Orders.

7. Subs. by the A.O. 1937, for “G.G. in C.”

8. Subs., *ibid.*, for “India”.

9. Subs., *ibid.*, for “he”.

10. Paragraph (a) omitted, *ibid.*

11. Sub-section (3) omitted by Act 38 of 1920, s. 2 and the First Schedule.

<sup>1</sup>**[2A. Powers of Central Government.**—When the Central Government is satisfied that India or any part thereof is visited by, or threatened with, an outbreak of any dangerous epidemic disease and that the ordinary provisions of the law for the time being in force are insufficient to prevent the outbreak of such disease or the spread thereof, the Central Government may take measures and prescribe regulations for the inspection of any ship or vessel leaving or arriving at any port in <sup>2</sup>[the territories to which this Act extends] and for such detention thereof, or of any person intending to sail therein, or arriving thereby, as may be necessary.]

**3. Penalty.**—Any person disobeying any regulation or order made under this Act shall be deemed to have committed an offence punishable under section 188 of the Indian Penal Code (45 of 1860).

**4. Protection to persons acting under Act.**—No suit or other legal proceeding shall lie against any person for anything done or in good faith intended to be done under this Act.

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1. Ins. by Act 38 of 1920, s. 2 and the First Schedule. Earlier substituted by the A.O.1937.  
2. Subs. by the Adaptation of Laws (No.2) Order, 1956, for "a Part A State or a Part C State".

# THE DISASTER MANAGEMENT ACT, 2005

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# THE DISASTER MANAGEMENT ACT, 2005

ACT No. 53 OF 2005

[23rd December, 2005.]

An Act to provide for the effective management of disasters and for matters connected therewith or incidental thereto.

BE it enacted by Parliament in the Fifty-sixth Year of the Republic of India as follows:—

## CHAPTER I

### PRELIMINARY

**1. Short title, extent and commencement.**—(1) This Act may be called the Disaster Management Act, 2005.

(2) It extends to the whole of India.

(3) It shall come into force on such date<sup>1</sup> as the Central Government may, by notification in the Official Gazette appoint; and different dates\* may be appointed for different provisions of this Act and for different States, and any reference to commencement in any provision of this Act in relation to any State shall be construed as a reference to the commencement of that provision in that State.

**2. Definitions.**—In this Act, unless the context otherwise requires,—

(a) “affected area” means an area or part of the country affected by a disaster;

(b) “capacity-building” includes—

(i) identification of existing resources and resources to be acquired or created;

(ii) acquiring or creating resources identified under sub-clause (i);

(iii) organisation and training of personnel and coordination of such training for effective management of disasters;

(c) “Central Government” means the Ministry or Department of the Government of India having administrative control of disaster management;

(d) “disaster” means a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man made causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of, property, or damage to, or degradation of, environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area;

(e) “disaster management” means a continuous and integrated process of planning, organising, coordinating and implementing measures which are necessary or expedient for—

(i) prevention of danger or threat of any disaster;

(ii) mitigation or reduction of risk of any disaster or its severity or consequences;

(iii) capacity-building;

(iv) preparedness to deal with any disaster;

(v) prompt response to any threatening disaster situation or disaster;

(vi) assessing the severity or magnitude of effects of any disaster;

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1. 28th July, 2006 (ss. 2, 3, 4, 5, 6, 8, 10, 75, 77, 79), *vide* notification No. S.O. 1216(E), dated 28th July, 2006;

\*1st August, 2007 [ss. 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 38, 39, 40, 41, 48, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, sub-sec. (2) of s. 70, 71, 72, 73, 74, 78, 79], *vide* notification No. S.O. 722(E), dated 7th May, 2007;

\*17th March, 2008 (ss. 44, 45), *vide* notification No. 517(E), dated 17th March, 2008;

\*18th October, 2011 (s. 46), *vide* notification No. S.O. 2397(E), dated 18th October, 2011, *see* Gazette of India, Extraordinary, Part II, sec. 3(ii).

- (vii) evacuation, rescue and relief;
- (viii) rehabilitation and reconstruction;
- (f) “District Authority” means the District Disaster Management Authority constituted under sub-section (1) of section 25;
- (g) “District Plan” means the plan for disaster management for the district prepared under section 31;
- (h) “local authority” includes panchayati raj institutions, municipalities, a district board, cantonment board, town planning authority or Zila Parishad or any other body or authority, by whatever name called, for the time being invested by law, for rendering essential services or, with the control and management of civic services, within a specified local area;
- (i) “mitigation” means measures aimed at reducing the risk, impact or effects of a disaster or threatening disaster situation;
- (j) “National Authority” means the National Disaster Management Authority established under sub-section (1) of section 3;
- (k) “National Executive Committee” means the Executive Committee of the National Authority constituted under sub-section (1) of section 8;
- (l) “National Plan” means the plan for disaster management for the whole of the country prepared under section 11;
- (m) “preparedness” means the state of readiness to deal with a threatening disaster situation or disaster and the effects thereof;
- (n) “prescribed” means prescribed by rules made under this Act;
- (o) “reconstruction” means construction or restoration of any property after a disaster;
- (p) “resources” includes manpower, services, materials and provisions;
- (q) “State Authority” means the State Disaster Management Authority established under sub-section (1) of section 14 and includes the Disaster Management Authority for the Union territory constituted under that section;
- (r) “State Executive Committee” means the Executive Committee of a State Authority constituted under sub-section (1) of section 20;
- (s) “State Government” means the Department of Government of the State having administrative control of disaster management and includes Administrator of the Union territory appointed by the President under article 239 of the Constitution;
- (t) “State Plan” means the plan for disaster management for the whole of the State prepared under section 23.

## CHAPTER II

### THE NATIONAL DISASTER MANAGEMENT AUTHORITY

**3. Establishment of National Disaster Management Authority.**—(1) With effect from such date as the Central Government may, by notification in the Official Gazette appoint in this behalf, there shall be established for the purposes of this Act, an authority to be known as the National Disaster Management Authority.

(2) The National Authority shall consist of the Chairperson and such number of other members, not exceeding nine, as may be prescribed by the Central Government and, unless the rules otherwise provide, the National Authority shall consist of the following:—

- (a) the Prime Minister of India, who shall be the Chairperson of the National Authority, *ex officio*;

(b) other members, not exceeding nine, to be nominated by the Chairperson of the National Authority.

(3) The Chairperson of the National Authority may designate one of the members nominated under clause (b) of sub-section (2) to be the Vice-Chairperson of the National Authority.

(4) The term of office and conditions of service of members of the National Authority shall be such as may be prescribed.

**4. Meetings of National Authority.**—(1) The National Authority shall meet as and when necessary and at such time and place as the Chairperson of the National Authority may think fit.

(2) The Chairperson of the National Authority shall preside over the meetings of the National Authority.

(3) If for any reason the Chairperson of the National Authority is unable to attend any meeting of the National Authority, the Vice-Chairperson of the National Authority shall preside over the meeting.

**5. Appointment of officers and other employees of the National Authority.**—The Central Government shall provide the National Authority with such officers, consultants and employees, as it considers necessary for carrying out the functions of the National Authority.

**6. Powers and functions of National Authority.**—(1) Subject to the provisions of this Act, the National Authority shall have the responsibility for laying down the policies, plans and guidelines for disaster management for ensuring timely and effective response to disaster.

(2) Without prejudice to generality of the provisions contained in sub-section (1), the National Authority may —

(a) lay down policies on disaster management;

(b) approve the National Plan;

(c) approve plans prepared by the Ministries or Departments of the Government of India in accordance with the National Plan;

(d) lay down guidelines to be followed by the State Authorities in drawing up the State Plan;

(e) lay down guidelines to be followed by the different Ministries or Departments of the Government of India for the purpose of integrating the measures for prevention of disaster or the mitigation of its effects in their development plans and projects;

(f) coordinate the enforcement and implementation of the policy and plan for disaster management;

(g) recommend provision of funds for the purpose of mitigation;

(h) provide such support to other countries affected by major disasters as may be determined by the Central Government;

(i) take such other measures for the prevention of disaster, or the mitigation, or preparedness and capacity building for dealing with the threatening disaster situation or disaster as it may consider necessary;

(j) lay down broad policies and guidelines for the functioning of the National Institute of Disaster Management.

(3) The Chairperson of the National Authority shall, in the case of emergency, have power to exercise all or any of the powers of the National Authority but exercise of such powers shall be subject to *ex post facto* ratification by the National Authority.

**7. Constitution of advisory committee by National Authority.**—(1) The National Authority may constitute an advisory committee consisting of experts in the field of disaster management and having practical experience of disaster management at the national, State or district level to make recommendations on different aspects of disaster management.

(2) The members of the advisory committee shall be paid such allowances as may be prescribed by the Central Government in consultation with the National Authority.

**8. Constitution of National Executive Committee.**—(1) The Central Government shall, immediately after issue of notification under sub-section (1) of section 3, constitute a National Executive Committee to assist the National Authority in the performance of its functions under this Act.

(2) The National Executive Committee shall consist of the following members, namely:—

(a) the Secretary to the Government of India in charge of the Ministry or Department of the Central Government having administrative control of the disaster management, who shall be Chairperson, *ex officio*;

(b) the Secretaries to the Government of India in the Ministries or Departments having administrative control of the agriculture, atomic energy, defence, drinking water supply, environment and forests, finance (expenditure), health, power, rural development, science and technology, space, telecommunication, urban development, water resources and the Chief of the Integrated Defence Staff of the Chiefs of Staff Committee, *ex officio*.

(3) The Chairperson of the National Executive Committee may invite any other officer of the Central Government or a State Government for taking part in any meeting of the National Executive Committee and shall exercise such powers and perform such functions as may be prescribed by the Central Government in consultation with the National Authority.

(4) The procedure to be followed by the National Executive Committee in exercise of its powers and discharge of its functions shall be such as may be prescribed by the Central Government.

**9. Constitution of sub-committees.**—(1) The National Executive Committee may, as and when it considers necessary, constitute one or more sub-committees, for the efficient discharge of its functions.

(2) The National Executive Committee shall, from amongst its members, appoint the Chairperson of the sub-committee referred to in sub-section (1).

(3) Any person associated as an expert with any sub-committee may be paid such allowances as may be prescribed by the Central Government.

**10. Powers and functions of National Executive Committee.**—(1) The National Executive Committee shall assist the National Authority in the discharge of its functions and have the responsibility for implementing the policies and plans of the National Authority and ensure the compliance of directions issued by the Central Government for the purpose of disaster management in the country.

(2) Without prejudice to the generality of the provisions contained in sub-section (1), the National Executive Committee may—

(a) act as the coordinating and monitoring body for disaster management;

(b) prepare the National Plan to be approved by the National Authority;

(c) coordinate and monitor the implementation of the National Policy;

(d) lay down guidelines for preparing disaster management plans by different Ministries or Departments of the Government of India and the State Authorities;

(e) provide necessary technical assistance to the State Governments and the State Authorities for preparing their disaster management plans in accordance with the guidelines laid down by the National Authority;

(f) monitor the implementation of the National Plan and the plans prepared by the Ministries or Departments of the Government of India;

(g) monitor the implementation of the guidelines laid down by the National Authority for integrating of measures for prevention of disasters and mitigation by the Ministries or Departments in their development plans and projects;

(h) monitor, coordinate and give directions regarding the mitigation and preparedness measures to be taken by different Ministries or Departments and agencies of the Government;

(i) evaluate the preparedness at all governmental levels for the purpose of responding to any threatening disaster situation or disaster and give directions, where necessary, for enhancing such preparedness;

(j) plan and coordinate specialised training programme for disaster management for different levels of officers, employees and voluntary rescue workers;

(k) coordinate response in the event of any threatening disaster situation or disaster;

(l) lay down guidelines for, or give directions to, the concerned Ministries or Departments of the Government of India, the State Governments and the State Authorities regarding measures to be taken by them in response to any threatening disaster situation or disaster;

(m) require any department or agency of the Government to make available to the National Authority or State Authorities such men or material resources as are available with it for the purposes of emergency response, rescue and relief;

(n) advise, assist and coordinate the activities of the Ministries or Departments of the Government of India, State Authorities, statutory bodies, other governmental or non-governmental organisations and others engaged in disaster management;

(o) provide necessary technical assistance or give advice to the State Authorities and District Authorities for carrying out their functions under this Act;

(p) promote general education and awareness in relation to disaster management; and

(q) perform such other functions as the National Authority may require it to perform.

**11. National Plan.**—(1) There shall be drawn up a plan for disaster management for the whole of the country to be called the National Plan.

(2) The National Plan shall be prepared by the National Executive Committee having regard to the National Policy and in consultation with the State Governments and expert bodies or organisations in the field of disaster management to be approved by the National Authority.

(3) The National Plan shall include—

(a) measures to be taken for the prevention of disasters, or the mitigation of their effects;

(b) measures to be taken for the integration of mitigation measures in the development plans;

(c) measures to be taken for preparedness and capacity building to effectively respond to any threatening disaster situations or disaster;

(d) roles and responsibilities of different Ministries or Departments of the Government of India in respect of measures specified in clauses (a), (b) and (c).

(4) The National Plan shall be reviewed and updated annually.

(5) Appropriate provisions shall be made by the Central Government for financing the measures to be carried out under the National Plan.

(6) Copies of the National Plan referred to in sub-sections (2) and (4) shall be made available to the Ministries or Departments of the Government of India and such Ministries or Departments shall draw up their own plans in accordance with the National Plan.

**12. Guidelines for minimum standards of relief.**—The National Authority shall recommend guidelines for the minimum standards of relief to be provided to persons affected by disaster, which shall include,—

(i) the minimum requirements to be provided in the relief camps in relation to shelter, food, drinking water, medical cover and sanitation;

(ii) the special provisions to be made for widows and orphans;

(iii) *ex gratia* assistance on account of loss of life as also assistance on account of damage to houses and for restoration of means of livelihood;

(iv) such other relief as may be necessary.

**13. Relief in loan repayment, etc.**—The National Authority may, in cases of disasters of severe magnitude, recommend relief in repayment of loans or for grant of fresh loans to the persons affected by disaster on such concessional terms as may be appropriate.

### CHAPTER III

#### STATE DISASTER MANAGEMENT AUTHORITIES

**14. Establishment of State Disaster Management Authority.**—(1) Every State Government shall, as soon as may be after the issue of the notification under sub-section (1) of section 3, by notification in the Official Gazette, establish a State Disaster Management Authority for the State with such name as may be specified in the notification of the State Government.

(2) A State Authority shall consist of the Chairperson and such number of other members, not exceeding nine, as may be prescribed by the State Government and, unless the rules otherwise provide, the State Authority shall consist of the following members, namely:—

(a) the Chief Minister of the State, who shall be Chairperson, *ex officio*;

(b) other members, not exceeding eight, to be nominated by the Chairperson of the State Authority;

(c) the Chairperson of the State Executive Committee, *ex officio*.

(3) The Chairperson of the State Authority may designate one of the members nominated under clause (b) of sub-section (2) to be the Vice-Chairperson of the State Authority.

(4) The Chairperson of the State Executive Committee shall be the Chief Executive Officer of the State Authority, *ex officio*:

Provided that in the case of a Union territory having Legislative Assembly, except the Union territory of Delhi, the Chief Minister shall be the Chairperson of the Authority established under this section and in case of other Union territories, the Lieutenant Governor or the Administrator shall be the Chairperson of that Authority:

Provided further that the Lieutenant Governor of the Union territory of Delhi shall be the Chairperson and the Chief Minister thereof shall be the Vice-Chairperson of the State Authority.

(5) The term of office and conditions of service of members of the State Authority shall be such as may be prescribed.

**15. Meetings of the State Authority.**—(1) The State Authority shall meet as and when necessary and at such time and place as the Chairperson of the State Authority may think fit.

(2) The Chairperson of the State Authority shall preside over the meetings of the State Authority.

(3) If for any reason, the Chairperson of the State Authority is unable to attend the meeting of the State Authority, the Vice-Chairperson of the State Authority shall preside at the meeting.

**16. Appointment of officers and other employees of State Authority.**—The State Government shall provide the State Authority with such officers, consultants and employees, as it considers necessary, for carrying out the functions of the State Authority.

**17. Constitution of advisory committee by the State Authority.**—(1) A State Authority may, as and when it considers necessary, constitute an advisory committee, consisting of experts in the field of disaster management and having practical experience of disaster management to make recommendations on different aspects of disaster management.

(2) The members of the advisory committee shall be paid such allowances as may be prescribed by the State Government.

**18. Powers and functions of State Authority.**—(1) Subject to the provisions of this Act, a State Authority shall have the responsibility for laying down policies and plans for disaster management in the State.

(2) Without prejudice to the generality of provisions contained in sub-section (1), the State Authority may—

(a) lay down the State disaster management policy;

(b) approve the State Plan in accordance with the guidelines laid down by the National Authority;

(c) approve the disaster management plans prepared by the departments of the Government of the State;

(d) lay down guidelines to be followed by the departments of the Government of the State for the purposes of integration of measures for prevention of disasters and mitigation in their development plans and projects and provide necessary technical assistance therefor;

(e) coordinate the implementation of the State Plan;

(f) recommend provision of funds for mitigation and preparedness measures;

(g) review the development plans of the different departments of the State and ensure that prevention and mitigation measures are integrated therein;

(h) review the measures being taken for mitigation, capacity building and preparedness by the departments of the Government of the State and issue such guidelines as may be necessary.

(3) The Chairperson of the State Authority shall, in the case of emergency, have power to exercise all or any of the powers of the State Authority but the exercise of such powers shall be subject to *ex post facto* ratification of the State Authority.

**19. Guidelines for minimum standard of relief by State Authority.**—The State Authority shall lay down detailed guidelines for providing standards of relief to persons affected by disaster in the State:

Provided that such standards shall in no case be less than the minimum standards in the guidelines laid down by the National Authority in this regard.

**20. Constitution of State Executive Committee.**—(1) The State Government shall, immediately after issue of notification under sub-section (1) of section 14, constitute a State Executive Committee to assist the State Authority in the performance of its functions and to coordinate action in accordance with the guidelines laid down by the State Authority and ensure the compliance of directions issued by the State Government under this Act.

(2) The State Executive Committee shall consist of the following members, namely:—

(a) the Chief Secretary to the State Government, who shall be Chairperson, *ex officio*;

(b) four Secretaries to the Government of the State of such departments as the State Government may think fit, *ex officio*.

(3) The Chairperson of the State Executive Committee shall exercise such powers and perform such functions as may be prescribed by the State Government and such other powers and functions as may be delegated to him by the State Authority.

(4) The procedure to be followed by the State Executive Committee in exercise of its powers and discharge of its functions shall be such as may be prescribed by the State Government.

**21. Constitution of sub-committees by State Executive Committee.**—(1) The State Executive Committee may, as and when it considers necessary, constitute one or more sub-committees, for efficient discharge of its functions.

(2) The State Executive Committee shall, from amongst its members, appoint the Chairperson of the sub-committee referred to in sub-section (1).

(3) Any person associated as an expert with any sub-committee may be paid such allowances as may be prescribed by the State Government.

**22. Functions of the State Executive Committee.**—(1) The State Executive Committee shall have the responsibility for implementing the National Plan and State Plan and act as the coordinating and monitoring body for management of disaster in the State.

(2) Without prejudice to the generality of the provisions of sub-section (1), the State Executive Committee may—

(a) coordinate and monitor the implementation of the National Policy, the National Plan and the State Plan;

(b) examine the vulnerability of different parts of the State to different forms of disasters and specify measures to be taken for their prevention or mitigation;

(c) lay down guidelines for preparation of disaster management plans by the departments of the Government of the State and the District Authorities;

(d) monitor the implementation of disaster management plans prepared by the departments of the Government of the State and District Authorities;

(e) monitor the implementation of the guidelines laid down by the State Authority for integrating of measures for prevention of disasters and mitigation by the departments in their development plans and projects;

(f) evaluate preparedness at all governmental or non-governmental levels to respond to any threatening disaster situation or disaster and give directions, where necessary, for enhancing such preparedness;

(g) coordinate response in the event of any threatening disaster situation or disaster;

(h) give directions to any Department of the Government of the State or any other authority or body in the State regarding actions to be taken in response to any threatening disaster situation or disaster;

(i) promote general education, awareness and community training in regard to the forms of disasters to which different parts of the State are vulnerable and the measures that may be taken by such community to prevent the disaster, mitigate and respond to such disaster;

(j) advise, assist and coordinate the activities of the Departments of the Government of the State, District Authorities, statutory bodies and other governmental and non-governmental organisations engaged in disaster management;

(k) provide necessary technical assistance or give advice to District Authorities and local authorities for carrying out their functions effectively;

(l) advise the State Government regarding all financial matters in relation to disaster management;

(m) examine the construction, in any local area in the State and, if it is of the opinion that the standards laid for such construction for the prevention of disaster is not being or has not been followed, may direct the District Authority or the local authority, as the case may be, to take such action as may be necessary to secure compliance of such standards;

(n) provide information to the National Authority relating to different aspects of disaster management;

(o) lay down, review and update State level response plans and guidelines and ensure that the district level plans are prepared, reviewed and updated;

(p) ensure that communication systems are in order and the disaster management drills are carried out periodically;

(q) perform such other functions as may be assigned to it by the State Authority or as it may consider necessary.

**23. State Plan.**—(1) There shall be a plan for disaster management for every State to be called the State Disaster Management Plan.

(2) The State Plan shall be prepared by the State Executive Committee having regard to the guidelines laid down by the National Authority and after such consultation with local authorities, district authorities and the people's representatives as the State Executive Committee may deem fit.

(3) The State Plan prepared by the State Executive Committee under sub-section (2) shall be approved by the State Authority.

(4) The State Plan shall include,—

(a) the vulnerability of different parts of the State to different forms of disasters;

(b) the measures to be adopted for prevention and mitigation of disasters;

(c) the manner in which the mitigation measures shall be integrated with the development plans and projects;

(d) the capacity-building and preparedness measures to be taken;

(e) the roles and responsibilities of each Department of the Government of the State in relation to the measures specified in clauses (b), (c) and (d) above;

(f) the roles and responsibilities of different Departments of the Government of the State in responding to any threatening disaster situation or disaster.

(5) The State Plan shall be reviewed and updated annually.

(6) Appropriate provisions shall be made by the State Government for financing for the measures to be carried out under the State Plan.

(7) Copies of the State Plan referred to in sub-sections (2) and (5) shall be made available to the Departments of the Government of the State and such Departments shall draw up their own plans in accordance with the State Plan.

**24. Powers and functions of State Executive Committee in the event of threatening disaster situation.**—For the purpose of, assisting and protecting the community affected by disaster or providing relief to such community or, preventing or combating disruption or dealing with the effects of any threatening disaster situation, the State Executive Committee may—

(a) control and restrict, vehicular traffic to, from or within, the vulnerable or affected area;

(b) control and restrict the entry of any person into, his movement within and departure from, a vulnerable or affected area;

(c) remove debris, conduct search and carry out rescue operations;

(d) provide shelter, food, drinking water, essential provisions, healthcare and services in accordance with the standards laid down by the National Authority and State Authority;

(e) give direction to the concerned Department of the Government of the State, any District Authority or other authority, within the local limits of the State to take such measure or steps for rescue, evacuation or providing immediate relief saving lives or property, as may be necessary in its opinion;

(f) require any department of the Government of the State or any other body or authority or person in charge of any relevant resources to make available the resources for the purposes of emergency response, rescue and relief;

(g) require experts and consultants in the field of disasters to provide advice and assistance for rescue and relief;

(h) procure exclusive or preferential use of amenities from any authority or person as and when required;

(i) construct temporary bridges or other necessary structures and demolish unsafe structures which may be hazardous to public;

(j) ensure that non-governmental organisations carry out their activities in an equitable and non-discriminatory manner;

(k) disseminate information to public to deal with any threatening disaster situation or disaster;

(l) take such steps as the Central Government or the State Government may direct in this regard or take such other steps as are required or warranted by the form of any threatening disaster situation or disaster.

## CHAPTER IV

### DISTRICT DISASTER MANAGEMENT AUTHORITY

**25. Constitution of District Disaster Management Authority.**—(1) Every State Government shall, as soon as may be after issue of notification under sub-section (1) of section 14, by notification in the Official Gazette, establish a District Disaster Management Authority for every district in the State with such name as may be specified in that notification.

(2) The District Authority shall consist of the Chairperson and such number of other members, not exceeding seven, as may be prescribed by the State Government, and unless the rules otherwise provide, it shall consist of the following, namely:—

(a) the Collector or District Magistrate or Deputy Commissioner, as the case may be, of the district who shall be Chairperson, *ex officio*;

(b) the elected representative of the local authority who shall be the co-Chairperson, *ex officio*;

Provided that in the Tribal Areas, as referred to in the Sixth Schedule to the Constitution, the Chief Executive Member of the district council of autonomous district, shall be the co-Chairperson, *ex officio*;

(c) the Chief Executive Officer of the District Authority, *ex officio*;

(d) the Superintendent of Police, *ex officio*;

(e) the Chief Medical Officer of the district, *ex officio*;

(f) not exceeding two other district level officers, to be appointed by the State Government.

(3) In any district where zila parishad exists, the Chairperson thereof shall be the co-Chairperson of the District Authority.

(4) The State Government shall appoint an officer not below the rank of Additional Collector or Additional District Magistrate or Additional Deputy Commissioner, as the case may be, of the district to be the Chief Executive Officer of the District Authority to exercise such powers and perform such functions as may be prescribed by the State Government and such other powers and functions as may be delegated to him by the District Authority.

**26. Powers of Chairperson of District Authority.**—(1) The Chairperson of the District Authority shall, in addition to presiding over the meetings of the District Authority, exercise and discharge such powers and functions of the District Authority as the District Authority may delegate to him.

(2) The Chairperson of the District Authority shall, in the case of an emergency, have power to exercise all or any of the powers of the District Authority but the exercise of such powers shall be subject to *ex post facto* ratification of the District Authority.

(3) The District Authority or the Chairperson of the District Authority may, by general or special order, in writing, delegate such of its or his powers and functions, under sub-section (1) or (2), as the case may be, to the Chief Executive Officer of the District Authority, subject to such conditions and limitations, if any, as it or he deems fit.

**27. Meetings.**—The District Authority shall meet as and when necessary and at such time and place as the Chairperson may think fit.

**28. Constitution of advisory committees and other committees.**—(1) The District Authority may, as and when it considers necessary, constitute one or more advisory committees and other committees for the efficient discharge of its functions.

(2) The District Authority shall, from amongst its members, appoint the Chairperson of the Committee referred to in sub-section (1).

(3) Any person associated as an expert with any committee or sub-committee constituted under sub-section (1) may be paid such allowances as may be prescribed by the State Government.

**29. Appointment of officers and other employees of District Authority.**—The State Government shall provide the District Authority with such officers, consultants and other employees as it considers necessary for carrying out the functions of District Authority.

**30. Powers and functions of District Authority.**—(1) The District Authority shall act as the district planning, coordinating and implementing body for disaster management and take all measures for the purposes of disaster management in the district in accordance with the guidelines laid down by the National Authority and the State Authority.

(2) Without prejudice to the generality of the provisions of sub-section (1), the District Authority may—

(i) prepare a disaster management plan including district response plan for the district;

(ii) coordinate and monitor the implementation of the National Policy, State Policy, National Plan, State Plan and District Plan;

(iii) ensure that the areas in the district vulnerable to disasters are identified and measures for the prevention of disasters and the mitigation of its effects are undertaken by the departments of the Government at the district level as well as by the local authorities;

(iv) ensure that the guidelines for prevention of disasters, mitigation of its effects, preparedness and response measures as laid down by the National Authority and the State Authority are followed by all departments of the Government at the district level and the local authorities in the district;

(v) give directions to different authorities at the district level and local authorities to take such other measures for the prevention or mitigation of disasters as may be necessary;

(vi) lay down guidelines for prevention of disaster management plans by the department of the Government at the districts level and local authorities in the district;

(vii) monitor the implementation of disaster management plans prepared by the Departments of the Government at the district level;

(viii) lay down guidelines to be followed by the Departments of the Government at the district level for purposes of integration of measures for prevention of disasters and mitigation in their development plans and projects and provide necessary technical assistance therefor;

(ix) monitor the implementation of measures referred to in clause (viii);

(x) review the state of capabilities for responding to any disaster or threatening disaster situation in the district and give directions to the relevant departments or authorities at the district level for their up gradation as may be necessary;

(xi) review the preparedness measures and give directions to the concerned departments at the district level or other concerned authorities where necessary for bringing the preparedness measures to the levels required for responding effectively to any disaster or threatening disaster situation;

(xii) organise and coordinate specialised training programmes for different levels of officers, employees and voluntary rescue workers in the district;

(xiii) facilitate community training and awareness programmes for prevention of disaster or mitigation with the support of local authorities, governmental and non-governmental organisations;

(xiv) set up, maintain, review and upgrade the mechanism for early warnings and dissemination of proper information to public;

(xv) prepare, review and update district level response plan and guidelines;

(xvi) coordinate response to any threatening disaster situation or disaster;

(xvii) ensure that the Departments of the Government at the district level and the local authorities prepare their response plans in accordance with the district response plan;

(xviii) lay down guidelines for, or give direction to, the concerned Department of the Government at the district level or any other authorities within the local limits of the district to take measures to respond effectively to any threatening disaster situation or disaster;

(xix) advise, assist and coordinate the activities of the Departments of the Government at the district level, statutory bodies and other governmental and non-governmental organisations in the district engaged in the disaster management;

(xx) coordinate with, and give guidelines to, local authorities in the district to ensure that measures for the prevention or mitigation of threatening disaster situation or disaster in the district are carried out promptly and effectively;

(xxi) provide necessary technical assistance or give advise to the local authorities in the district for carrying out their functions;

(xxii) review development plans prepared by the Departments of the Government at the district level, statutory authorities or local authorities with a view to make necessary provisions therein for prevention of disaster or mitigation;

(xxiii) examine the construction in any area in the district and, if it is of the opinion that the standards for the prevention of disaster or mitigation laid down for such construction is not being or has not been followed, may direct the concerned authority to take such action as may be necessary to secure compliance of such standards;

(xxiv) identify buildings and places which could, in the event of any threatening disaster situation or disaster, be used as relief centers or camps and make arrangements for water supply and sanitation in such buildings or places;

(xxv) establish stockpiles of relief and rescue materials or ensure preparedness to make such materials available at a short notice;

(xxvi) provide information to the State Authority relating to different aspects of disaster management;

(xxvii) encourage the involvement of non-governmental organisations and voluntary social-welfare institutions working at the grassroots level in the district for disaster management;

(xxviii) ensure communication systems are in order, and disaster management drills are carried out periodically;

(xxix) perform such other functions as the State Government or State Authority may assign to it or as it deems necessary for disaster management in the District.

**31. District Plan.**—(1) There shall be a plan for disaster management for every district of the State.

(2) The District Plan shall be prepared by the District Authority, after consultation with the local authorities and having regard to the National Plan and the State Plan, to be approved by the State Authority.

(3) The District Plan shall include—

(a) the areas in the district vulnerable to different forms of disasters;

(b) the measures to be taken, for prevention and mitigation of disaster, by the Departments of the Government at the district level and local authorities in the district;

(c) the capacity-building and preparedness measures required to be taken by the Departments of the Government at the district level and the local authorities in the district to respond to any threatening disaster situation or disaster;

(d) the response plans and procedures, in the event of a disaster, providing for—

(i) allocation of responsibilities to the Departments of the Government at the district level and the local authorities in the district;

(ii) prompt response to disaster and relief thereof;

(iii) procurement of essential resources;

(iv) establishment of communication links; and

(v) the dissemination of information to the public;

(e) such other matters as may be required by the State Authority.

(4) The District Plan shall be reviewed and updated annually.

(5) The copies of the District Plan referred to in sub-sections (2) and (4) shall be made available to the Departments of the Government in the district.

(6) The District Authority shall send a copy of the District Plan to the State Authority which shall forward it to the State Government.

(7) The District Authority shall, review from time to time, the implementation of the Plan and issue such instructions to different departments of the Government in the district as it may deem necessary for the implementation thereof.

**32. Plans by different authorities at district level and their implementation.**—Every office of the Government of India and of the State Government at the district level and the local authorities shall, subject to the supervision of the District Authority,—

(a) prepare a disaster management plan setting out the following, namely:—

(i) provisions for prevention and mitigation measures as provided for in the District Plan and as is assigned to the department or agency concerned;

(ii) provisions for taking measures relating to capacity-building and preparedness as laid down in the District Plan;

(iii) the response plans and procedures, in the event of, any threatening disaster situation or disaster;

(b) coordinate the preparation and the implementation of its plan with those of the other organisations at the district level including local authority, communities and other stakeholders;

(c) regularly review and update the plan; and

(d) submit a copy of its disaster management plan, and of any amendment thereto, to the District Authority.

**33. Requisition by the District Authority.**—The District Authority may by order require any officer or any Department at the district level or any local authority to take such measures for the prevention or mitigation of disaster, or to effectively respond to it, as may be necessary, and such officer or department shall be bound to carry out such order.

**34. Powers and functions of District Authority in the event of any threatening disaster situation or disaster.**—For the purpose of assisting, protecting or providing relief to the community, in response to any threatening disaster situation or disaster, the District Authority may—

(a) give directions for the release and use of resources available with any Department of the Government and the local authority in the district;

(b) control and restrict vehicular traffic to, from and within, the vulnerable or affected area;

- (c) control and restrict the entry of any person into, his movement within and departure from, a vulnerable or affected area;
- (d) remove debris, conduct search and carry out rescue operations;
- (e) provide shelter, food, drinking water and essential provisions, healthcare and services;
- (f) establish emergency communication systems in the affected area;
- (g) make arrangements for the disposal of the unclaimed dead bodies;
- (h) recommend to any Department of the Government of the State or any authority or body under that Government at the district level to take such measures as are necessary in its opinion;
- (i) require experts and consultants in the relevant fields to advise and assist as it may deem necessary;
- (j) procure exclusive or preferential use of amenities from any authority or person;
- (k) construct temporary bridges or other necessary structures and demolish structures which may be hazardous to public or aggravate the effects of the disaster;
- (l) ensure that the non-governmental organisations carry out their activities in an equitable and non-discriminatory manner;
- (m) take such other steps as may be required or warranted to be taken in such a situation.

## CHAPTER V

### MEASURES BY THE GOVERNMENT FOR DISASTER MANAGEMENT

**35. Central Government to take measures.**—(1) Subject to the provisions of this Act, the Central Government shall take all such measures as it deems necessary or expedient for the purpose of disaster management.

(2) In particular and without prejudice to the generality of the provisions of sub-section (1), the measures which the Central Government may take under that sub-section include measures with respect to all or any of the following matters, namely:—

- (a) coordination of actions of the Ministries or Departments of the Government of India, State Governments, National Authority, State Authorities, governmental and non-governmental organisations in relation to disaster management;
- (b) ensure the integration of measures for prevention of disasters and mitigation by Ministries or Departments of the Government of India into their development plans and projects;
- (c) ensure appropriate allocation of funds for prevention of disaster, mitigation, capacity-building and preparedness by the Ministries or Departments of the Government of India;
- (d) ensure that the Ministries or Departments of the Government of India take necessary measures for preparedness to promptly and effectively respond to any threatening disaster situation or disaster;
- (e) cooperation and assistance to State Governments, as requested by them or otherwise deemed appropriate by it;
- (f) deployment of naval, military and air forces, other armed forces of the Union or any other civilian personnel as may be required for the purposes of this Act;
- (g) coordination with the United Nations agencies, international organisations and governments of foreign countries for the purposes of this Act;
- (h) establish institutions for research, training, and developmental programmes in the field of disaster management;
- (i) such other matters as it deems necessary or expedient for the purpose of securing effective implementation of the provisions of this Act.

(3) The Central Government may extend such support to other countries affected by major disaster as it may deem appropriate.

**36. Responsibilities of Ministries or Departments of Government of India.**—It shall be the responsibility of every Ministry or Department of the Government of India to—

(a) take measures necessary for prevention of disasters, mitigation, preparedness and capacity-building in accordance with the guidelines laid down by the National Authority;

(b) integrate into its development plans and projects, the measures for prevention or mitigation of disasters in accordance with the guidelines laid down by the National Authority;

(c) respond effectively and promptly to any threatening disaster situation or disaster in accordance with the guidelines of the National Authority or the directions of the National Executive Committee in this behalf;

(d) review the enactments administered by it, its policies, rules and regulations, with a view to incorporate therein the provisions necessary for prevention of disasters, mitigation or preparedness;

(e) allocate funds for measures for prevention of disaster, mitigation, capacity-building and preparedness;

(f) provide assistance to the National Authority and State Governments for—

(i) drawing up mitigation, preparedness and response plans, capacity-building, data collection and identification and training of personnel in relation to disaster management;

(ii) carrying out rescue and relief operations in the affected area;

(iii) assessing the damage from any disaster;

(iv) carrying out rehabilitation and reconstruction;

(g) make available its resources to the National Executive Committee or a State Executive Committee for the purposes of responding promptly and effectively to any threatening disaster situation or disaster, including measures for—

(i) providing emergency communication in a vulnerable or affected area;

(ii) transporting personnel and relief goods to and from the affected area;

(iii) providing evacuation, rescue, temporary shelter or other immediate relief;

(iv) setting up temporary bridges, jetties and landing places;

(v) providing, drinking water, essential provisions, healthcare, and services in an affected area;

(h) take such other actions as it may consider necessary for disaster management.

**37. Disaster management plans of Ministries or Departments of Government of India.**—(1) Every Ministry or Department of the Government of India shall—

(a) prepare a disaster management plan specifying the following particulars, namely:—

(i) the measures to be taken by it for prevention and mitigation of disasters in accordance with the National Plan;

(ii) the specifications regarding integration of mitigation measures in its development plans in accordance with the guidelines of the National Authority and the National Executive Committee;

(iii) its roles and responsibilities in relation to preparedness and capacity-building to deal with any threatening disaster situation or disaster;

(iv) its roles and responsibilities in regard to promptly and effectively responding to any threatening disaster situation or disaster;

(v) the present status of its preparedness to perform the roles and responsibilities specified in sub-clauses (iii) and (iv);

(vi) the measures required to be taken in order to enable it to perform its responsibilities specified in sub-clauses (iii) and (iv);

(b) review and update annually the plan referred to in clause (a);

(c) forward a copy of the plan referred to in clause (a) or clause (b), as the case may be, to the Central Government which Government shall forward a copy thereof to the National Authority for its approval.

(2) Every Ministry or Department of the Government of India shall—

(a) make, while preparing disaster management plan under clause (a) of sub-section (1), provisions for financing the activities specified therein;

(b) furnish a status report regarding the implementation of the plan referred to in clause (a) of sub-section (1) to the National Authority, as and when required by it.

**38. State Government to take measures.**—(1) Subject to the provisions of this Act, each State Government shall take all measures specified in the guidelines laid down by the National Authority and such further measures as it deems necessary or expedient, for the purpose of disaster management.

(2) The measures which the State Government may take under sub-section (1) include measures with respect to all or any of the following matters, namely:—

(a) coordination of actions of different departments of the Government of the State, the State Authority, District Authorities, local authority and other non-governmental organisations;

(b) cooperation and assistance in the disaster management to the National Authority and National Executive Committee, the State Authority and the State Executive Committee, and the District Authorities;

(c) cooperation with, and assistance to, the Ministries or Departments of the Government of India in disaster management, as requested by them or otherwise deemed appropriate by it;

(d) allocation of funds for measures for prevention of disaster, mitigation, capacity-building and preparedness by the departments of the Government of the State in accordance with the provisions of the State Plan and the District Plans;

(e) ensure that the integration of measures for prevention of disaster or mitigation by the departments of the Government of the State in their development plans and projects;

(f) integrate in the State development plan, measures to reduce or mitigate the vulnerability of different parts of the State to different disasters;

(g) ensure the preparation of disaster management plans by different departments of the State in accordance with the guidelines laid down by the National Authority and the State Authority;

(h) establishment of adequate warning systems up to the level of vulnerable communities;

(i) ensure that different departments of the Government of the State and the District Authorities take appropriate preparedness measures;

(j) ensure that in a threatening disaster situation or disaster, the resources of different departments of the Government of the State are made available to the National Executive Committee or the State Executive Committee or the District Authorities, as the case may be, for the purposes of effective response, rescue and relief in any threatening disaster situation or disaster;

(k) provide rehabilitation and reconstruction assistance to the victims of any disaster; and

(l) such other matters as it deems necessary or expedient for the purpose of securing effective implementation of provisions of this Act.

**39. Responsibilities of departments of the State Government.**—It shall be the responsibility of every department of the Government of a State to—

(a) take measures necessary for prevention of disasters, mitigation, preparedness and capacity-building in accordance with the guidelines laid down by the National Authority and the State Authority;

(b) integrate into its development plans and projects, the measures for prevention of disaster and mitigation;

(c) allocate funds for prevention of disaster, mitigation, capacity-building and preparedness;

(d) respond effectively and promptly to any threatening disaster situation or disaster in accordance with the State Plan, and in accordance with the guidelines or directions of the National Executive Committee and the State Executive Committee;

(e) review the enactments administered by it, its policies, rules and regulations with a view to incorporate therein the provisions necessary for prevention of disasters, mitigation or preparedness;

(f) provide assistance, as required, by the National Executive Committee, the State Executive Committee and District Authorities, for—

(i) drawing up mitigation, preparedness and response plans, capacity-building, data collection and identification and training of personnel in relation to disaster management;

(ii) assessing the damage from any disaster;

(iii) carrying out rehabilitation and reconstruction;

(g) make provision for resources in consultation with the State Authority for the implementation of the District Plan by its authorities at the district level;

(h) make available its resources to the National Executive Committee or the State Executive Committee or the District Authorities for the purposes of responding promptly and effectively to any disaster in the State, including measures for—

(i) providing emergency communication with a vulnerable or affected area;

(ii) transporting personnel and relief goods to and from the affected area;

(iii) providing evacuation, rescue, temporary shelter or other immediate relief;

(iv) carrying out evacuation of persons or live-stock from an area of any threatening disaster situation or disaster;

(v) setting up temporary bridges, jetties and landing places;

(vi) providing drinking water, essential provisions, healthcare and services in an affected area;

(i) such other actions as may be necessary for disaster management.

**40. Disaster management plan of departments of State.**—(1) Every department of the State Government, in conformity with the guidelines laid down by the State Authority, shall—

(a) prepare a disaster management plan which shall lay down the following :—

(i) the types of disasters to which different parts of the State are vulnerable;

(ii) integration of strategies for the prevention of disaster or the mitigation of its effects or both with the development plans and programmes by the department;

(iii) the roles and responsibilities of the department of the State in the event of any threatening disaster situation or disaster and emergency support function it is required to perform;

(iv) present status of its preparedness to perform such roles or responsibilities or emergency support function under sub-clause (iii);

(v) the capacity-building and preparedness measures proposed to be put into effect in order to enable the Ministries or Departments of the Government of India to discharge their responsibilities under section 37;

(b) annually review and update the plan referred to in clause (a); and

(c) furnish a copy of the plan referred to in clause (a) or clause (b), as the case may be, to the State Authority.

(2) Every department of the State Government, while preparing the plan under sub-section (1), shall make provisions for financing the activities specified therein.

(3) Every department of the State Government shall furnish an implementation status report to the State Executive Committee regarding the implementation of the disaster management plan referred to in sub-section (1).

## CHAPTER VI

### LOCAL AUTHORITIES

**41. Functions of the local authority.**—(1) Subject to the directions of the District Authority, a local authority shall—

(a) ensure that its officers and employees are trained for disaster management;

(b) ensure that resources relating to disaster management are so maintained as to be readily available for use in the event of any threatening disaster situation or disaster;

(c) ensure all construction projects under it or within its jurisdiction conform to the standards and specifications laid down for prevention of disasters and mitigation by the National Authority, State Authority and the District Authority;

(d) carry out relief, rehabilitation and reconstruction activities in the affected area in accordance with the State Plan and the District Plan.

(2) The local authority may take such other measures as may be necessary for the disaster management.

## CHAPTER VII

### NATIONAL INSTITUTE OF DISASTER MANAGEMENT

**42. National Institute of Disaster Management.**—(1) With effect from such date as the Central Government may, by notification in the Official Gazette appoint in this behalf, there shall be constituted an institute to be called the National Institute of Disaster Management.

(2) The National Institute of Disaster Management shall consist of such number of members as may be prescribed by the Central Government.

(3) The term of office of, and vacancies among, members of the National Institute of Disaster Management and manner of filling such vacancies shall be such as may be prescribed.

(4) There shall be a governing body of the National Institute of Disaster Management which shall be constituted by the Central Government from amongst the members of the National Institute of Disaster Management in such manner as may be prescribed.

(5) The governing body of the National Institute of Disaster Management shall exercise such powers and discharge such functions as may be prescribed by regulations.

(6) The procedure to be followed in exercise of its powers and discharge of its functions by the governing body, and the term of office of, and the manner of filling vacancies among the members of the governing body, shall be such as may be prescribed by regulations.

(7) Until the regulations are made under this section, the Central Government may make such regulations; and any regulation so made may be altered or rescinded by the National Institute of Disaster Management in exercise of its powers.

(8) Subject to the provisions of this Act, the National Institute of Disaster Management shall function within the broad policies and guidelines laid down by the National Authority and be responsible for planning and promoting training and research in the area of disaster management, documentation and development of national level information base relating to disaster management policies, prevention mechanisms and mitigation measures.

(9) Without prejudice to the generality of the provisions contained in sub-section (8), the National Institute, for the discharge of its functions, may—

(a) develop training modules, undertake research and documentation in disaster management and organise training programmes;

(b) formulate and implement a comprehensive human resource development plan covering all aspects of disaster management;

(c) provide assistance in national level policy formulation;

(d) provide required assistance to the training and research institutes for development of training and research programmes for stakeholders including Government functionaries and undertake training of faculty members of the State level training institutes;

(e) provide assistance to the State Governments and State training institutes in the formulation of State level policies, strategies, disaster management framework and any other assistance as may be required by the State Governments or State training institutes for capacity-building of stakeholders, Government including its functionaries, civil society members, corporate sector and people's elected representatives;

(f) develop educational materials for disaster management including academic and professional courses;

(g) promote awareness among stakeholders including college or school teachers and students, technical personnel and others associated with multi-hazard mitigation, preparedness and response measures;

(h) undertake, Organise and facilitate study courses, conferences, lectures, seminars within and outside the country to promote the aforesaid objects;

(i) undertake and provide for publication of journals, research papers and books and establish and maintain libraries in furtherance of the aforesaid objects;

(j) do all such other lawful things as are conducive or incidental to the attainment of the above objects; and

(k) undertake any other function as may be assigned to it by the Central Government.

**43. Officers and other employees of the National Institute.**—The Central Government shall provide the National Institute of Disaster Management with such officers, consultants and other employees, as it considers necessary, for carrying out its functions.

## CHAPTER VIII

### NATIONAL DISASTER RESPONSE FORCE

**44. National Disaster Response Force.**—(1) There shall be constituted a National Disaster Response Force for the purpose of specialist response to a threatening disaster situation or disaster.

(2) Subject to the provisions of this Act, the Force shall be constituted in such manner and, the conditions of service of the members of the Force, including disciplinary provisions therefore, be such as may be prescribed.

**45. Control, direction, etc.**—The general superintendence, direction and control of the Force shall be vested and exercised by the National Authority and the command and supervision of the Force shall vest in an officer to be appointed by the Central Government as the Director General of the National Disaster Response Force.

## CHAPTER IX

### FINANCE, ACCOUNTS AND AUDIT

**46. National Disaster Response Fund.**—(1) The Central Government may, by notification in the Official Gazette, constitute a fund to be called the National Disaster Response Fund for meeting any threatening disaster situation or disaster and there shall be credited thereto—

(a) an amount which the Central Government may, after due appropriation made by Parliament by law in this behalf provide;

(b) any grants that may be made by any person or institution for the purpose of disaster management.

(2) The National Disaster Response Fund shall be made available to the National Executive Committee to be applied towards meeting the expenses for emergency response, relief and rehabilitation in accordance with the guidelines laid down by the Central Government in consultation with the National Authority.

**47. National Disaster Mitigation Fund.**—(1) The Central Government may, by notification in the Official Gazette, constitute a Fund to be called the National Disaster Mitigation Fund for projects exclusively for the purpose of mitigation and there shall be credited thereto such amount which the Central Government may, after due appropriation made by Parliament by law in this behalf, provide.

(2) The National Disaster Mitigation Fund shall be applied by the National Authority.

**48. Establishment of funds by State Government.**—(1) The State Government shall, immediately after notifications issued for constituting the State Authority and the District Authorities, establish for the purposes of this Act the following funds, namely:—

(a) the fund to be called the State Disaster Response Fund;

(b) the fund to be called the District Disaster Response Fund;

(c) the fund to be called the State Disaster Mitigation Fund;

(d) the fund to be called the District Disaster Mitigation Fund.

(2) The State Government shall ensure that the funds established—

(i) under clause (a) of sub-section (1) is available to the State Executive Committee;

(ii) under sub-clause (c) of sub-section (1) is available to the State Authority;

(iii) under clauses (b) and (d) of sub-section (1) are available to the District Authority.

**49. Allocation of funds by Ministries and Departments.**—(1) Every Ministry or Department of the Government of India shall make provisions, in its annual budget, for funds for the purposes of carrying out the activities and programmes set out in its disaster management plan.

(2) The provisions of sub-section (1) shall, *mutatis mutandis*, apply to departments of the Government of the State.

**50. Emergency procurement and accounting.**—Where by reason of any threatening disaster situation or disaster, the National Authority or the State Authority or the District Authority is satisfied that immediate procurement of provisions or materials or the immediate application of resources are necessary for rescue or relief,—

(a) it may authorise the concerned department or authority to make the emergency procurement and in such case, the standard procedure requiring inviting of tenders shall be deemed to be waived;

(b) a certificate about utilisation of provisions or materials by the controlling officer authorised by the National Authority, State Authority or District Authority, as the case may be, shall be deemed to be a valid document or voucher for the purpose of accounting of emergency, procurement of such provisions or materials.

## CHAPTER X

### OFFENCES AND PENALTIES

**51. Punishment for obstruction, etc.**—Whoever, without reasonable cause—

(a) obstructs any officer or employee of the Central Government or the State Government, or a person authorised by the National Authority or State Authority or District Authority in the discharge of his functions under this Act; or

(b) refuses to comply with any direction given by or on behalf of the Central Government or the State Government or the National Executive Committee or the State Executive Committee or the District Authority under this Act,

shall on conviction be punishable with imprisonment for a term which may extend to one year or with fine, or with both, and if such obstruction or refusal to comply with directions results in loss of lives or imminent danger thereof, shall on conviction be punishable with imprisonment for a term which may extend to two years.

**52. Punishment for false claim.**—Whoever knowingly makes a claim which he knows or has reason to believe to be false for obtaining any relief, assistance, repair, reconstruction or other benefits consequent to disaster from any officer of the Central Government, the State Government, the National Authority, the State Authority or the District Authority, shall, on conviction be punishable with imprisonment for a term which may extend to two years, and also with fine.

**53. Punishment for misappropriation of money or materials, etc.**—Whoever, being entrusted with any money or materials, or otherwise being, in custody of, or dominion over, any money or goods, meant for providing relief in any threatening disaster situation or disaster, misappropriates or appropriates for his own use or disposes of such money or materials or any part thereof or wilfully compels any other person so to do, shall on conviction be punishable with imprisonment for a term which may extend to two years, and also with fine.

**54. Punishment for false warning.**—Whoever makes or circulates a false alarm or warning as to disaster or its severity or magnitude, leading to panic, shall on conviction, be punishable with imprisonment which may extend to one year or with fine.

**55. Offences by Departments of the Government.**—(1) Where an offence under this Act has been committed by any Department of the Government, the head of the Department shall be deemed to be guilty of the offence and shall be liable to be proceeded against and punished accordingly unless he proves that the offence was committed without his knowledge or that he exercised all due diligence to prevent the commission of such offence.

(2) Notwithstanding anything contained in sub-section (1), where an offence under this Act has been committed by a Department of the Government and it is proved that the offence has been committed with the consent or connivance of, or is attributable to any neglect on the part of, any officer, other than the head of the Department, such officer shall be deemed to be guilty of that offence and shall be liable to be proceeded against and punished accordingly.

**56. Failure of officer in duty or his connivance at the contravention of the provisions of this Act.**—Any officer, on whom any duty has been imposed by or under this Act and who ceases or refuses to perform or withdraws himself from the duties of his office shall, unless he has obtained the express written permission of his official superior or has other lawful excuse for so doing, be punishable with imprisonment for a term which may extend to one year or with fine.

**57. Penalty for contravention of any order regarding requisitioning.**—If any person contravenes any order made under section 65, he shall be punishable with imprisonment for a term which may extend to one year or with fine or with both.

**58. Offence by companies.**—(1) Where an offence under this Act has been committed by a company or body corporate, every person who at the time the offence was committed, was in charge of, and was responsible to, the company, for the conduct of the business of the company, as well as the company,

shall be deemed to be guilty of the contravention and shall be liable to be proceeded against and punished accordingly:

Provided that nothing in this sub-section shall render any such person liable to any punishment provided in this Act, if he proves that the offence was committed without his knowledge or that he exercised due diligence to prevent the commission of such offence.

(2) Notwithstanding anything contained in sub-section (1), where an offence under this Act has been committed by a company, and it is proved that the offence was committed with the consent or connivance of or is attributable to any neglect on the part of any director, manager, secretary or other officer of the company, such director, manager, secretary or other officer shall also, be deemed to be guilty of that offence and shall be liable to be proceeded against and punished accordingly.

*Explanation.*—For the purpose of this section—

(a) “company” means any body corporate and includes a firm or other association of individuals; and

(b) “director”, in relation to a firm, means a partner in the firm.

**59. Previous sanction for prosecution.**—No prosecution for offences punishable under sections 55 and 56 shall be instituted except with the previous sanction of the Central Government or the State Government, as the case may be, or of any officer authorised in this behalf, by general or special order, by such Government.

**60. Cognizance of offences.**—No court shall take cognizance of an offence under this Act except on a complaint made by—

(a) the National Authority, the State Authority, the Central Government, the State Government, the District Authority or any other authority or officer authorised in this behalf by that Authority or Government, as the case may be; or

(b) any person who has given notice of not less than thirty days in the manner prescribed, of the alleged offence and his intention to make a complaint to the National Authority, the State Authority, the Central Government, the State Government, the District Authority or any other authority or officer authorised as aforesaid.

## CHAPTER XI

### MISCELLANEOUS

**61. Prohibition against discrimination.**—While providing compensation and relief to the victims of disaster, there shall be no discrimination on the ground of sex, caste, community, descent or religion.

**62. Power to issue direction by Central Government.**—Notwithstanding anything contained in any other law for the time being in force, it shall be lawful for the Central Government to issue direction in writing to the Ministries or Departments of the Government of India, or the National Executive Committee or the State Government, State Authority, State Executive Committee, statutory bodies or any of its officers or employees, as the case may be, to facilitate or assist in the disaster management and such Ministry or Department or Government or Authority, Executive Committee, statutory body, officer or employee shall be bound to comply with such direction.

**63. Powers to be made available for rescue operations.**—Any officer or authority of the Union or a State, when requested by the National Executive Committee, any State Executive Committee or District Authority or any person authorised by such Committee or Authority in this behalf, shall make available to that Committee or authority or person, such officers and employees as requested for, to perform any of the functions in connection with the prevention of disaster or mitigation or rescue or relief work.

**64. Making or amending rules, etc., in certain circumstances.**—Subject to the provisions of this Act, if it appears to the National Executive Committee, State Executive Committee or the District Authority, as the case may be, that provisions of any rule, regulation, notification, guideline, instruction, order, scheme or bye-laws, as the case may be, are required to be made or amended for the purposes of prevention of disasters or the mitigation thereof, it may require the amendment of such rules, regulation,

notification, guidelines, instruction, order, scheme or bye-laws, as the case may be, for that purpose, and the appropriate department or authority shall take necessary action to comply with the requirements.

**65. Power of requisition of resources, provisions, vehicles, etc., for rescue operations, etc.**—(1) If it appears to the National Executive Committee, State Executive Committee or District Authority or any officer as may be authorised by it in this behalf that—

(a) any resources with any authority or person are needed for the purpose of prompt response;

(b) any premises are needed or likely to be needed for the purpose of rescue operations; or

(c) any vehicle is needed or is likely to be needed for the purposes of transport of resources from disaster affected areas or transport of resources to the affected area or transport in connection with rescue, rehabilitation or reconstruction,

such authority may, by order in writing, requisition such resources or premises or such vehicle, as the case may be, and may make such further orders as may appear to it to be necessary or expedient in connection with the requisitioning.

(2) Whenever any resource, premises or vehicle is requisitioned under sub-section (1), the period of such requisition shall not extend beyond the period for which such resource, premises or vehicle is required for any of the purposes mentioned in that sub-section.

(3) In this section,—

(a) “resources” includes men and material resources;

(b) “services” includes facilities;

(c) “premises” means any land, building or part of a building and includes a hut, shed or other structure or any part thereof;

(d) “vehicle” means any vehicle used or capable of being used for the purpose of transport, whether propelled by mechanical power or otherwise.

**66. Payment of compensation.**— (1) Whenever any Committee, Authority or officer referred to in sub-section (1) of section 65, in pursuance of that section requisitions any premises, there shall be paid to the persons interested compensation the amount of which shall be determined by taking into consideration the following, namely:—

(i) the rent payable in respect of the premises, or if no rent is so payable, the rent payable for similar premises in the locality;

(ii) if as consequence of the requisition of the premises the person interested is compelled to change his residence or place of business, the reasonable expenses (if any) incidental to such change:

Provided that where any person interested being aggrieved by the amount of compensation so determined makes an application within the thirty days to the Central Government or the State Government, as the case may be, for referring the matter to an arbitrator, the amount of compensation to be paid shall be such as the arbitrator appointed in this behalf by the Central Government or the State Government, as the case may be, may determine:

Provided further that where there is any dispute as to the title to receive the compensation or as to the apportionment of the amount of compensation, it shall be referred by the Central Government or the State Government, as the case may be, to an arbitrator appointed in this behalf by the Central Government or the State Government, as the case may be, for determination, and shall be determined in accordance with the decision of such arbitrator.

*Explanation.*—In this sub-section, the expression “person interested” means the person who was in actual possession of the premises requisitioned under section 65 immediately before the requisition, or where no person was in such actual possession, the owner of such premises.

(2) Whenever any Committee, Authority or officer, referred to in sub-section (1) of section 65 in pursuance of that section requisitions any vehicle, there shall be paid to the owner thereof compensation the amount of which shall be determined by the Central Government or the State Government, as the case may be, on the basis of the fares or rates prevailing in the locality for the hire of such vehicle:

Provided that where the owner of such vehicle being aggrieved by the amount of compensation so determined makes an application within the prescribed time to the Central Government or the State Government, as the case may be, for referring the matter to an arbitrator, the amount of compensation to be paid shall be such as the arbitrator appointed in this behalf by the Central Government or the State Government, as the case may be, may determine:

Provided further that where immediately before the requisitioning the vehicle or vessel was by virtue of a hire purchase agreement in the possession of a person other than the owner, the amount determined under this sub-section as the total compensation payable in respect of the requisition shall be apportioned between that person and the owner in such manner as they may agree upon, and in default of agreement, in such manner as an arbitrator appointed by the Central Government or the State Government, as the case may be, in this behalf may decide.

**67. Direction to media for communication of warnings, etc.**—The National Authority, the State Authority, or a District Authority may recommend to the Government to give direction to any authority or person in control of any audio or audio-visual media or such other means of communication as may be available to carry any warning or advisories regarding any threatening disaster situation or disaster, and the said means of communication and media as designated shall comply with such direction.

**68. Authentication of orders or decisions.**—Every order or decision of the National Authority or the National Executive Committee, the State Authority, or the State Executive Committee or the District Authority, shall be authenticated by such officers of the National Authority or the National Executive Committee or, the State Executive Committee, or the District Authority, as may be authorised by it in this behalf.

**69. Delegation of powers.**—The National Executive Committee, State Executive Committee, as the case may be, by general or special order in writing, may delegate to the Chairperson or any other member or to any officer, subject to such conditions and limitations, if any, as may be specified in the order, such of its powers and functions under this Act as it may deem necessary.

**70. Annual report.**—(1) The National Authority shall prepare once every year, in such form and at such time as may be prescribed, an annual report giving a true and full account of its activities during the previous year and copies thereof shall be forwarded to the Central Government and that Government shall cause the same to be laid before both Houses of Parliament within one month of its receipt.

(2) The State Authority shall prepare once in every year, in such form and at such time as may be prescribed, an annual report giving a true and full account of its activities during the previous year and copies thereof shall be forwarded to the State Government and that Government shall cause the same to be laid before each House of the State Legislature where it consists of two Houses, or where such Legislature consists of one House, before that House.

**71. Bar of jurisdiction of court.**—No court (except the Supreme Court or a High Court) shall have jurisdiction to entertain any suit or proceeding in respect of anything done, action taken, orders made, direction, instruction or guidelines issued by the Central Government, National Authority, State Government, State Authority or District Authority in pursuance of any power conferred by, or in relation to its functions, by this Act.

**72. Act to have overriding effect.**—The provisions of this Act, shall have effect, notwithstanding anything inconsistent therewith contained in any other law for the time being in force or in any instrument having effect by virtue of any law other than this Act.

**73. Action taken in good faith.**—No suit or prosecution or other proceeding shall lie in any court against the Central Government or the National Authority or the State Government or the State Authority or the District Authority or local authority or any officer or employee of the Central Government or the National Authority or the State Government or the State Authority or the District Authority or local authority or any person working for on behalf of such Government or authority in respect of any work done or purported to have been done or intended to be done in good faith by such authority or Government or such officer or employee or such person under the provisions of this Act or the rules or regulations made thereunder.

**74. Immunity from legal process.**—Officers and employees of the Central Government, National Authority, National Executive Committee, State Government, State Authority, State Executive Committee or District Authority shall be immune from legal process in regard to any warning in respect of any impending disaster communicated or disseminated by them in their official capacity or any action taken or direction issued by them in pursuance of such communication or dissemination.

**75. Power of Central Government to make rules.**—(1) The Central Government may, by notification in the Official Gazette, make rules for carrying out the purposes of this Act.

(2) In particular, and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely:—

(a) the composition and number of the members of the National Authority under sub-section (2), and the term of office and conditions of service of members of the National Authority under sub-section (4), of section 3;

(b) the allowances to be paid to the members of the advisory committee under sub-section (2) of section 7;

(c) the powers and functions of the Chairperson of the National Executive Committee under sub-section (3) of section 8 and the procedure to be followed by the National Executive Committee in exercise of its powers and discharge of its functions under sub-section (4) of section 8;

(d) allowances to be paid to the persons associated with the sub-committee constituted by the National Executive Committee under sub-section (3) of section 9;

(e) the number of members of the National Institute of Disaster Management under sub-section (2), the term of the office and vacancies among members and the manner of filling such vacancies under sub-section (3) and the manner of constituting the Governing Body of the National Institute of Disaster Management under sub-section (4) of section 42;

(f) the manner of constitution of the Force, the conditions of service of the members of the Force, including disciplinary provisions under sub-section (2) of section 44;

(g) the manner in which notice of the offence and of the intention to make a complaint to the National Authority, the State Authority, the Central Government, the State Government or the other authority or officer under clause (b) of section 60;

(h) the form in which and the time within which annual report is to be prepared under section 70;

(i) any other matter which is to be, or may be, prescribed, or in respect of which provision is to be made by rules.

**76. Power to make regulations.**—(1) The National Institute of Disaster Management, with the previous approval of the Central Government may, by notification in the Official Gazette, make regulations consistent with this Act and the rules made thereunder to carry out the purposes of this Act.

(2) In particular, and without prejudice to the generality of the foregoing power, such regulations may provide for all or any of the following matters, namely:—

(a) powers and functions to be exercised and discharged by the governing body;

(b) procedure to be followed by the governing body in exercise of the powers and discharge of its functions;

(c) any other matter for which under this Act provision may be made by the regulations.

**77. Rules and regulations to be laid before Parliament.**—Every rule made by the Central Government and every regulation made by the National Institute of Disaster Management under this Act shall be laid, as soon as may be after it is made, before each House of Parliament, while it is in session, for a total period of thirty days which may be comprised of one session or in two or more successive sessions, and if, before the expiry of the session immediately following the session or the successive sessions aforesaid, both Houses agree in making any modification in the rule or regulation or both Houses agree that the rule or regulation should not be made, the rule or regulation shall thereafter have effect only

in such modified form or be of no effect, as the case may be; so, however, that any such modification or annulment shall be without prejudice to the validity of anything previously done under that rule or regulation.

**78. Power of State Government to make rules.**—(1) The State Government may, by notification in the Official Gazette, make rules to carry out the provisions of this Act.

(2) In particular, and without prejudice to the generality of the foregoing power, such rules may provide for all or any of the following matters, namely:—

(a) the composition and number of the members of the State Authority under sub-section (2), and the term of office and conditions of service of the members of the State Authority under sub-section (5), of section 14;

(b) the allowances to be paid to the members of the advisory committee under sub-section (2) of section 17;

(c) the powers and functions of the Chairperson of the State Executive Committee under sub-section (3), and the procedure to be followed by the State Executive Committee in exercise of its powers and discharge of its functions under sub-section (4) of section 20;

(d) allowances to be paid to the persons associated with the sub-committee constituted by the State Executive Committee under sub-section (3) of section 21;

(e) the composition and the number of members of the District Authority under sub-section (2), and the powers and functions to be exercised and discharged by the Chief Executive Officer of the District Authority under sub-section (3) of section 25;

(f) allowances payable to the persons associated with any committee constituted by the District Authority as experts under sub-section (3) of section 28;

(g) any other matter which is to be, or may be, prescribed, or in respect of which provision is to be made by rules.

(3) Every rule made by the State Government under this Act shall be laid, as soon as may be after it is made, before each House of the State Legislature where it consists of two Houses, or where such Legislature consists of one House before that House.

**79. Power to remove difficulties.**—(1) If any difficulty arises in giving effect to the provisions of this Act, the Central Government or the State Government, as the case may be, by notification in the Official Gazette, make order not inconsistent with the provisions of this Act as may appear to it to be necessary or expedient for the removal of the difficulty:

Provided that no such order shall be made after the expiration of two years from the commencement of this Act.

(2) Every order made under this section shall be laid, as soon as may be after it is made, before each House of Parliament or the Legislature, as the case may be.



# NATIONAL MEDICAL COMMISSION

COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR  
THE INDIAN MEDICAL GRADUATE



Curriculum Implementation Support Program

**Module on  
Online  
Learning and Assessment**

**2020**

**National Medical Commission  
Pocket-14, Sector-8, Dwarka,  
New Delhi 110 077**

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## **Foreword**

### **Online learning and Assessment**

The COVID- 19 pandemic in many ways has challenged educators to innovate and ensure that the medical students are able to continue their learning during a situation that has placed an unprecedented strain on the medical education system. Creating a learning experience that allows learners to accomplish the required competency online, many of which are skill and attitude based, is a tough ask. Despite this, many institutions have risen to the challenge and displayed ingenuity in creating a learning environment that fulfils many of the demands of medical education.

Online learning, while not without its drawbacks, has some significant strengths that warrant its continuation in some form beyond these tough times. Flexible learning opportunities, greater learner involvement, impetus to self-directed and collaborative learning are some of the obvious strengths of online learning. Blended learning is going to be the future of medical education.

This module prepared by the Expert Group with inputs from outside experts is a primer of how to improvise at times of necessity and demand. It provides guidance to Curriculum Committee of medical colleges and to the teachers on how to use the online medium to help learners achieve many of the stated competencies including procedural skills and Attitude, Ethics and Communication skills which are traditionally considered not amenable to distance learning. Many of these modalities require very little monetary investment. Wherever possible - low cost alternatives to paid premium platforms - such as open access and free to use resources have been outlined.

Online medical education is nascent - and is fertile with innovations happening in all the medical institutions in the country. I request all the institutions in the country to share their best practices in a spirit of collaboration and ensure that our students get to learn in an environment - real or virtual - that best allows them to fulfil their aspirations. I am grateful to the Expert Group for preparing this learning module on Online learning and assessment which is of current relevance.

  
Chairman  
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## राष्ट्रीय आयुर्विज्ञान आयोग National Medical Commission

### Foreword Online learning and Assessment

The implementation of the new competency based Undergraduate curriculum across medical colleges in India required training of medical college teachers in the various changes built into this outcome-driven new curriculum, year-wise. To achieve this, the Expert Group, advising academic matters, developed a sequential step-wise Curriculum Implementation Support Program (CISP) which included a number of training modalities like Faculty Guides, Learning Resource materials and in-situ training of teaching faculty of colleges through a multi-tier Faculty Development Program. The successful implementation of CISP I in the first year of teaching of the new UG curriculum was a major achievement.

The COVID-19 outbreak in early 2020 posed a major setback to our efforts to train medical college faculty on the changes incorporated in the second year of the new UG curriculum wherein the major challenge of horizontal and vertical integration of curricula were built in, in addition to new teaching learning modalities like Learner-doctor method of clinical training (Clinical Clerkship). This challenge forced the Academic cell and the Expert Group advising the National Medical Commission to explore Online teaching-learning and assessment modalities. This module on Online learning and Assessment is the outcome of these efforts and provides valuable and much needed information to medical college faculty. I hope the information contained herein will be useful to students, teachers and institutions interested in virtual teaching.



Secretary  
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**Module on  
Online  
Learning and Assessment**

## Glossary

**AETCOM:** Attitude, Ethics and Communication module introduced into its Faculty Development Program by the Medical Council of India in 2015 for undergraduate medical education.

**Asynchronous learning:** A learning event in which teachers and students participate at different times. Generally, there is no real-time interaction between the teacher and the students.

**Blended learning:** Learning which integrates online learning with conventional face-to-face (f2f) teaching. Also called ‘**hybrid learning**’.

**Distance learning:** A form of remote teaching-learning method where media replaces word of mouth as the sole means of academic communication. There is often a spatial distance between the teacher and the student.

**E-learning:** Teaching-learning which is delivered using electronic resources. The teacher and the student may be within the same classroom or at a remote location.

**Flipped classroom:** An approach where the conventional sequence of teaching-learning activities is reversed. Students read the material at home *before the class* and then use the classroom time to discuss, clarify concepts, create and apply knowledge.

**Online Learning:** Teaching-learning interactions which take place over the internet. This term is conventionally used for learning that happens across a distance. Learning can happen either partially or purely through the internet.

**Pedagogy:** Theory and practice of education.

**Synchronous learning:** A learning event in which teachers and learners engage at the same time. The place may be same or different. It is conventionally used in the context of online learning.

### Disclaimer

Mention of/or example of a technology, platform or app for online teaching and assessment is not to be seen as an endorsement of the same.

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## Introduction to online learning

The Covid-19 pandemic has dramatically changed the medical education environment and made the shift to online learning inevitable. Close human contact that was the essence of clinical teaching now looks so distant. The current coronavirus pandemic has forced us to explore non-conventional ways of teaching-learning and assessment. Medical schools will now need to be prepared to train the next generation of digital learners using virtual learning environments. This does not mean that traditional classroom teaching will become obsolete, but there is now an opportunity to use both methods efficiently in a hybrid manner, to make the process of learning efficient and effective.<sup>1</sup>

Though online learning has been in vogue for many years now, its application in medical education, especially in India, is rather new. Some teachers have had the experience of online learning – some as facilitators, and others as ‘students’ – during earlier faculty development interventions<sup>2-3</sup>; but its use for undergraduate education is a relatively new phenomenon.

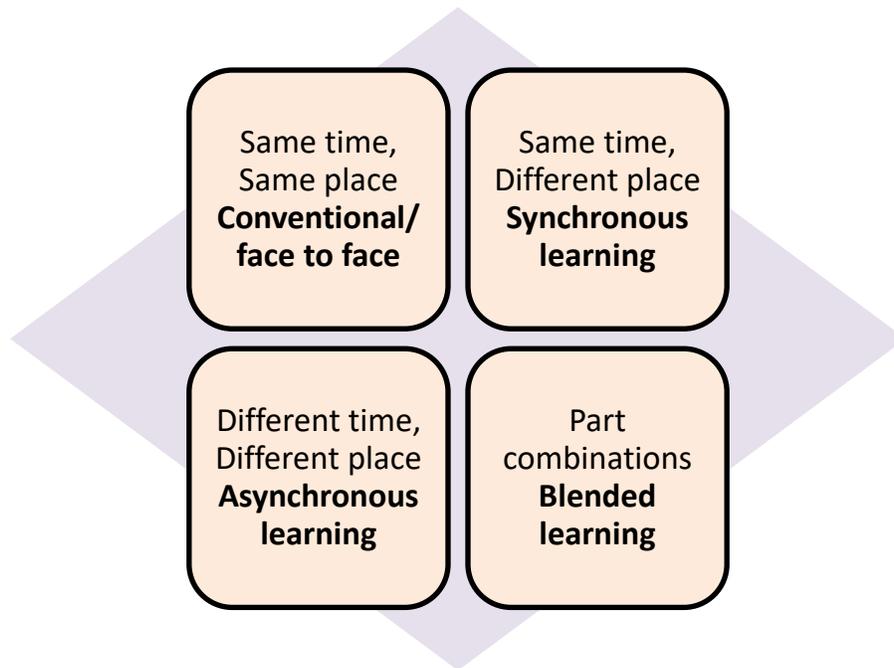
The ‘theory’ of online learning is more or less the same when compared to face-to-face (f2f) instruction, but there are subtle differences and similarities. The educational cycle, the learning processes, need for interactivity, integration, assessment and feedback are similar in both formats. The use of technology, the spatial distance between the teacher and students, and learner isolation stand out as prominent differences.

Different people have different ideas, interpretations and perspectives about online learning. Depending on the purpose, technology, context and institution, various terms such as e-learning, distance learning, web-based learning, web-facilitated learning, virtual learning, internet learning, distributed learning, computer-based learning, and technology-based learning have been used rather loosely and interchangeably to denote non face-to-face (f2f) learning.<sup>4-7</sup>

Means et al<sup>8</sup> define online learning as “*learning that occurs entirely (purely online learning) or partially (blended learning) through the internet*” and this is the definition we are going to use in the context of this module.

The most accepted typology of online learning is given in Figure 1.

**Fig.1: Typology of online learning** (Modified from Coldeway, 1995)<sup>9</sup>



Blended learning is a teaching-learning format where the facilitator effectively integrates the online teaching component with face-to-face sessions. For the purpose of this module, blended learning has been taken as: *“Seamless integration of traditional face to face learning with online activities to enhance the learning experience”*.

### **Online learning: What works, what doesn't**

Several factors influence the effectiveness of online learning. These factors include technical skills, academic skills, learner motivation, administrative issues, social interaction, time management, technical problems, cost, and accessibility to the internet.<sup>10</sup> Poor design of courses and inadequate availability of multimedia materials could affect the quality of online training. Online learning has been reported to be as effective as didactic teaching. It can also be instrumental in promoting self-directed learning. Learners can have greater control over their learning as they can go over the content at their own pace. Teachers too can evaluate competencies through online assessments and provide learners feedback for self-improvement.

If faculty in higher education are not adequately trained in educational methods, the problem of ineffective teaching gets exaggerated during online sessions as it has special requirements.<sup>11</sup> Online teaching requires a learner-centered approach, where teachers

need to be competent in using principles of pedagogy, constructive and transformative learning, and assessment and feedback.<sup>12</sup>

## **Online learning formats**

Online learning platforms now offer many opportunities that are being widely used around the world, such as online videos, tutorials, webcasts, video-conferences and virtual simulations. Online teaching-learning can be implemented through **synchronous** or **asynchronous modes**.

The range of available choices for real-time communication extends from online discussion spaces to online chat rooms to online meeting applications. Classroom lectures have now been replaced by live-streamed online lectures, where technology allows recording and online dissemination. Small group discussions and tutorials have been replaced with interactive webinars using online platforms. Almost all these learning resources can also be easily accessed using smartphones.

Information or learning resources can be posted on online platforms, such as websites and blogs. Videos can be shared to demonstrate essential clinical skills, procedural skills or communication skills. Lectures, problem-based learning, simulated lab work, sessions using virtual patients, and discussions can be conducted online, both in synchronous and asynchronous mode. All of these, if used effectively, can build in student engagement and interaction.

Online learning offers flexible learning experiences and allows learners the freedom to experiment with learning at their own pace. It is however not a replacement for f2f teaching.<sup>13</sup> It is initially expensive to set up and requires familiarity with technology.<sup>14</sup>

## **What the future holds for online learning in India**

Although the recent surge in use of online learning has been propelled by the Covid-19 pandemic, it is likely to be adopted as a regular part of teaching and learning in the future as well. Furthermore, newer modes of health care delivery are evolving with rapid advances in information technology. Online learning promises to play a major role in this backdrop.

The recently introduced, competency-based curriculum in India already advocates use of e-learning as a tool for encouraging self-directed learning among students. The CBME document of Medical Council of India (2018)<sup>15</sup> recommends e-learning at the following junctures:

**Table 1: Emphasis on online learning in the recently introduced competency-based curriculum**

- As a lifelong learner, the Indian Medical Graduate is expected to “*demonstrate ability to search (including through electronic means), and critically evaluate the medical literature and apply the information in the care of the patient*”
- One of the objectives of Foundation Course is to “*to enable the learner to acquire enhanced skills in use of information technology*”
- The new curriculum has reserved time for self-directed learning during every phase of the MBBS course
- The document recommends mandatory provision of skills laboratory in every medical college
- It also recommends mandatory provision of virtual lecture theatres

In addition, medical students also need to develop certain skills, collectively called 21<sup>st</sup> century skills<sup>16</sup> to fully benefit from online instruction. They need to have digital literacy skills. While students in general are comfortable working with computers and other digital platforms, a deliberate effort must be made to inculcate information technology related literacy, which includes, accessing information, evaluating it critically, and its application to address a given problem. Readers would recall that the Foundation Course introduced from 2019 admissions tried to address many of these issues.

## The Pedagogy of Online Learning

Pedagogical approaches which are used for face to face (f2f) teaching might not work if replicated in online settings. It is time to re-conceptualize pedagogical approaches for online teaching.<sup>17</sup>

**Table 2: Pedagogical approaches to be used in online learning**

1. *Online learning must not be restricted to delivery of information:* Online methods should not merely be used as tools to distribute teachers' notes or PowerPoint slides.
2. *Online tools must be used to innovate and create knowledge:* Online teaching must address higher-order cognitive skills. It must promote creativity, innovation, critical thinking and problem-solving skills in undergraduate medical students.
3. *Online tools must be explored to teach all domains:* Ways and means to teach psychomotor skills, communication skills, ethics, and medical humanities via online mode must be explored.
4. *Online approaches used must encourage participation and collaboration:* Online learning must be conducted through 'involvement' and 'inclusiveness' of the learners. This will also reduce learner isolation.
5. *Feedback, support and mentoring of learners must be carried out:* Learners in online sessions need more interactivity, mentoring, support, feedback and evaluation than the traditional classrooms. Communication between facilitators and learners must be encouraged.
6. *Online teaching must be supplemented by online assessment:* Periodic formative and summative assessment must be built into online courses.
7. *Quality assurance of online teaching and learning must be monitored:* Quality assurance in online teaching must be adopted within the institutional policy document.

## Building student engagement online

Here are some tips for building learner engagement in online sessions which work both in synchronous and asynchronous modes:

- a. **Allow students to do most of the work:** It is important to give students time to engage and interact with the content. Student should be taught to take up responsibility for their own learning. This must be supplemented by facilitating discussions amongst students, and by giving them collaborative projects.
- b. **Interactivity is the heart and soul of effective learning:** Students must be given opportunities to interact with the content, teacher, peers, environment and context; and
- c. **Strive for presence:** Teachers should strive to ensure the following three types of presence in their online sessions:

<b>Table 3:</b> <b>Enhancing effectiveness of online teaching by ensuring cognitive, teaching and social presence</b>	
Type of presence	Examples
<i>Cognitive presence</i> (Related to content)	<ul style="list-style-type: none"> <li>• Select suitable content</li> <li>• Arrange from simple to complex</li> <li>• Introduce content in bite-sized modules</li> <li>• Introducing conceptual and theoretical knowledge into discussions</li> </ul>
<i>Teaching presence</i> (Related to instructor)	<ul style="list-style-type: none"> <li>• Facilitating discussions</li> <li>• Acknowledge and encourage students' contribution</li> <li>• Identify areas of agreement and disagreement</li> <li>• Respond to technical concerns</li> <li>• Set the appropriate climate for learning</li> </ul>
<i>Social presence</i> (Related to interaction)	<ul style="list-style-type: none"> <li>• Allow students to express emotions</li> <li>• Ask for evidence of reading, thinking and understanding others' responses</li> <li>• Build cohesiveness amongst learners by given group work and allowing student-student interactions</li> </ul> <p style="text-align: right;">(Adapted from Garrison et al<sup>18</sup>, and Pelz<sup>19</sup>)</p>

## Good Online Teaching Practices

The principles for good teaching offline<sup>20-21</sup> and online<sup>1</sup> have been enlisted in literature. These principles reflect the basic premise of alignment between objectives, teaching-learning and assessment methods, need to promote interactivity, use of assessment, feedback, collaborative work, self-directed learning and promotion of higher order thinking skills using online pedagogical approaches.

**Table 4: Good Online Teaching Practices**

**Principle 1: *Teaching-learning methods must match curricular objectives and assessment***

Online pedagogy must be aligned with clear learning objectives, meaningfulness of content covered, the appropriateness of student activities, and the type of assessment.

**Principle 2: *Synchronous and asynchronous teacher-student interaction must be encouraged***

Create supportive and non-threatening online environment. Open synchronous and asynchronous communication channels to encourage students to complete their work. This results in higher levels of achievement.

**Principle 3: *Promote higher order thinking skills and communication skills***

Online pedagogy should include learning strategies that encourage demonstration of higher order thinking skills and communication skills.

**Principle 4: *Teamwork and cooperation among students must be encouraged***

Online pedagogy must encourage collaboration and social interaction among students. This enhances their involvement in learning.

**Principle 5: *Encourage active learning***

Teachers must incorporate authentic, problem-solving activities that augment student efforts to actively construct meaningful knowledge through interactivity and application in real-life situations.

**Principle 6: *Encourage development of self-directed learning***

Online pedagogy should offer meaningful opportunities to students to bridge the knowledge gap by motivating and instilling responsibility in them. Resultantly, students will embark on significant self-directed learning.

**Principle 7: *Opportunities for online summative and formative assessment must be provided***

Online courses should build in valid and reliable assessment periodically. This will provide learners timely feedback and ample opportunities to reflect on their progress.

**Principle 8: *Mechanisms for providing prompt feedback must be built into the course***

Students need appropriate, timely and specific feedback on their performance. Online pedagogy must provide opportunities for students to reflect on what they have learned, what they still need to know, and how to assess themselves.

**Principle 9: *Effective time management and timely task completion must be emphasized***

Learning to use one's time well is critical for students, more so in an online environment as there is no substitute for time on task. Due emphasis should be given to defining time expectations for students in order to establish the basis for high performance.

**Principle 10: *All stakeholders must communicate high expectations from students***

In an online setting, it is pertinent to set clear expectations for quality student performance. Clear and high expectations provide students with precise guidelines about the type and quality of work essential for proficient and timely assignment completion.

**Principle 11: *Respect diverse talents and ways of learning***

Students have a wide variety of learning styles and needs. Online pedagogy should carefully consider prior knowledge, cognitive processing, personality styles, beliefs about learning, and demographics.

**Principle 12: *There must be a robust mechanism for monitoring development and mentoring***

Online pedagogy must support continuous monitoring and mentoring so as to facilitate achievement of intended outcomes of online learning.

*(Modified from Saiyad et al<sup>1</sup> with permission)*

## Teacher roles, competencies and skills required for online teaching

Good online teaching practices will also require faculty to develop competencies in three major areas: technology, subject expertise, and pedagogy. Technical support to develop and manage online teaching modules, time, and support to online teaching are other minor issues.

Table 5 below lists some of the expectations from teachers by students when going through online courses:

<b>Table 5: Students' expectations during online courses</b>
<ul style="list-style-type: none"><li>• Easy to follow course design and navigation</li><li>• Clear directions for activities and assessments</li><li>• Reasonably quick grading and feedback</li><li>• Regular communication from the instructors</li></ul>

Based on these needs, teachers need to perform the following roles and develop the required competencies to be effective at online teaching (Table 6):

<b>Table 6: Teacher roles and competencies needed for online teaching</b>
<p><b>A: Roles:</b></p> <ul style="list-style-type: none"><li>• instructional designer</li><li>• content facilitator</li><li>• technologist</li><li>• process facilitator</li><li>• advisor or counselor</li><li>• assessor</li><li>• manager or administrator</li><li>• researcher</li></ul> <p style="text-align: right;"><i>Goodyear et al<sup>22</sup></i></p>

## **B: Competencies**

To perform the above roles, the following **competencies** will be required:

- Knowledge of the online process
- Technical skills
- Online communication skills
- Content expertise, and
- Personal attributes: inherent motivation, integrity, visible, responsive and approachable, organized, analytical, respectful, active, flexible, open, honest, compassionate and supportive, and ability to lead by example.

(Salmon<sup>23</sup>; Keengwe et al<sup>24</sup>).

## **Skills needed for online teaching**

The teaching skills required in the context of online teaching include<sup>25</sup>:

- Communication skills:** The need for clear and concise instruction is important for online teaching. Teachers who are adept at face to face teaching may need to augment their communication skills to be good online teachers.
- Technological skills:** Skills specific to the medium and content being taught, general computer literacy to be able to use word processors, spread sheets and presentations are pre-requisites for online teaching. For using simulations, additional skills may be required.
- Pedagogical skills:** Online is only a medium for academic exchange - it requires a full complement of teaching skills, including generating learning objectives, matching content and mode to objectives, promoting interactivity, assessment and feedback, classroom management, and mentoring. A particular mention must be made of the skills of the teacher to engage the students who are physically separated from the teacher as well from peers and to encourage them to apply what they are being taught.
- Design skills:** These include understanding and applying instructional design principles using learning materials in different formats. Teachers need to use student feedback to make changes in the format as well as ensure quality of learning.
- Managerial skills:** Managing the classroom is as important in online teaching as it is in f2f situation. Ability to manage time, demonstrating leadership, managerial and mentoring skills, handling assignments and record keeping and following institutional, legal, ethical and professional requirements are some examples of these skills.<sup>13</sup>

## Technology for online teaching

There have been rapid advances in technology used to deliver educational content, and now even social media platforms have started exploring educational needs. Moore's law,<sup>26</sup> which is often extrapolated to state that technology advances which almost doubles every eighteen months, suggests that training people in use of one technology will have limited effect. Further, with advances in technology, teaching methods are also expected to evolve (Table 7).

**Table 7: Types of technology available in online courses**

- **Websites and blogs** – access to stored information and repositories; electronic versions of scientific papers
- **Multimedia technology** – appropriate combination of video / still images and sound
- **Asynchronous modes** – like threaded discussions, assignments
- **Interactive resources** – providing real time interaction between teachers and students

Compatibility, accessibility, ease of use, user-friendly, opportunities for feedback are some of the criteria directing the choice and adoption of online platforms. While selecting a technological resource, the following points become important:

- Technology needs to be chosen depending on user needs, and not simply because it exists. Technology needs to be aligned to the learning objective.
- Technology has to be user-friendly to all stakeholders. This includes elements such as easy installation of software on computers, requirement of basic programming skills etc.
- Technology needs to be accessible and amenable to use in a variety of platforms, such as desktop computers, laptops, tablets and even smart phones.
- Technology needs to be compatible with the level of learners in terms of language and ease of learning to make it effective.
- Consideration of costs always determine feasibility of use of technology.

It is often useful to use a mix of appropriate technological resources which are available. This enables one to cater to online learners with a diverse variety of learning styles. This in turn helps students achieve desired learning outcomes.<sup>27</sup>

## Pre-requisites to begin online teaching

To initiate online teaching, preparations will be required at all levels of stakeholders (teacher, learner, institution etc.). An important point is to ensure that all students have equal access to technology. So availability of enough computers and access to a high-speed internet connection on campus for all faculty and learners is an essential investment. The checklist to identify the pre-requisites in terms of infrastructure and support system that is required is given below (Table 8):

**Table 8: Checklist to identify pre-requisites for initiating online teaching**

1. Besides generalized IT support, does the institution have a separate cell to provide technical support to online learning activities?
2. Has a Committee been formed to coordinate and monitor online teaching in the institute?
3. What learning management system and software packages has the institute installed?
4. Is high speed internet freely available on campus?
5. Do all faculty and learners have access to laptops and/or smart phones?
6. Do all faculty and learners have individual and unique log-in IDs and passwords to access the learning management system?

(Modified from Brenton<sup>28</sup>)

7

A Coordination Committee formed for each phase of MBBS teaching and headed by the MEU will be useful to monitor the quality of online teaching. Further, it may be useful to decide the workload and number of online sessions given to students each week, at the inter-departmental level. It is important not to subject them to cognitive overload as the attention span of students in online sessions can be pretty short.

## Tools for online teaching

- **Online collaboration tools:** These enable the teacher and learner to upload and access lessons and assignments online. Texts, documents, images and videos can be shared, viewed and also edited in real time. Tools included in Google Apps and Google Classroom are a wonderful medium to brainstorm and simultaneously document the work of both the instructor and learner. Other tools available for online learning are Google Meet, Zoom, Cisco Webex, Free conference call, Microsoft teams, Go to meeting etc.

- **Presentation software:** Widely used tools such as Microsoft PowerPoint and Google Slides are an excellent means to augment lecture content by embedding high resolution images, diagrams, animation, audio and video files.
- **Course management platforms:** This is also known as Learning Management Systems (LMS). These platforms allow stakeholders to organize all resources needed for a class in terms of the syllabus, document sharing, audio and video files, assignment announcement and submission, discussion boards, online quizzes, grading tools, etc. Canvas is one such example. Some of the widely known online learning management tools are Swayam, Moodle, Google Classroom, Coursera, Clinical Key, Udemy, Teachable among many others.
- **Audience response systems:** These are easy and quick ways to connect with learners and gauge their learning in order to adjust the pace of teaching to learner requirement. This was usually done through clickers in a traditional classroom. A more popular option now is with use of software and applications which enable one to embed interactive polls between presentations, and gather responses through smart phones, which can be displayed in real-time to learners.
- **Lecture-capture tools:** Instructors are able to record their lectures on their local devices without additional requirements and upload them for learners. Such tools are useful for their ability to provide the learner with opportunities to review the content at their own time, pace and frequency. Studies have shown that such tools only augment the teaching-learning process rather than diminish student attendance.

## Best practices in selecting appropriate technology

Radical changes in application of technology are already reshaping all areas of teaching and learning.<sup>29</sup> Traditional forms are being challenged and massive online open courses (MOOCs) are paving their way in. Nevertheless, a visible disconnect exists between technologies, research, design and practice.<sup>30</sup>

Quite often, you will find instructors using fancy technology simply because it exists. There might be no need to use complex technology where a simple discussion or a simple reading might suffice. Technology is generally effective when the application directly supports the objectives and the purpose of the curriculum. Multimedia which simulates real-life situations will always be preferred, and it is best if they are tailored to the local context.

Here is a list of do's and don'ts that can help one use technology in an optimal manner (Table 9):

<b>Table 9: Some do's and don'ts when using technology in online teaching</b>	
<b>Do's</b>	<b>Don'ts</b>
Choose and integrate appropriate technology that supports overall educational goals and curricular objectives.	Avoid using technology for the sake of using it, if it doesn't support the lesson plan. It is a costly mistake which must be avoided.
Train and encourage teachers to make judicious use of technology in their classrooms.	The role of technology should be to empower teachers and learners rather than to replace them.
Technology should be adjustable in terms of students' skills and abilities, provide feedback on progress, and give them enough opportunities to collaborate in the teaching-learning process.	Instructors should not be over-dependent on technology. No technology is foolproof, and technology depends on multiple external factors.
Ensure that teachers and learners are actively involved with a range of relevant and practical engagement techniques. Such strategies should become standard practice.	Mere use of technology doesn't necessarily guarantee engagement. Student engagement strategies will need to be built in while designing a lesson plan.
An optimal level of fidelity (realism) is preferred when using simulations. The degree to which technology simulates the intended task or environment must preferably match with the learner's expertise and the educational objectives of the module.	Every technology requires a minimum level of infrastructure, in terms of hardware and software tools or internet accessibility. Students with limited access to these technologies must also be considered during planning. Fair and equal access to all students is a pre-requisite for use of technology.

## Implementing Online Teaching

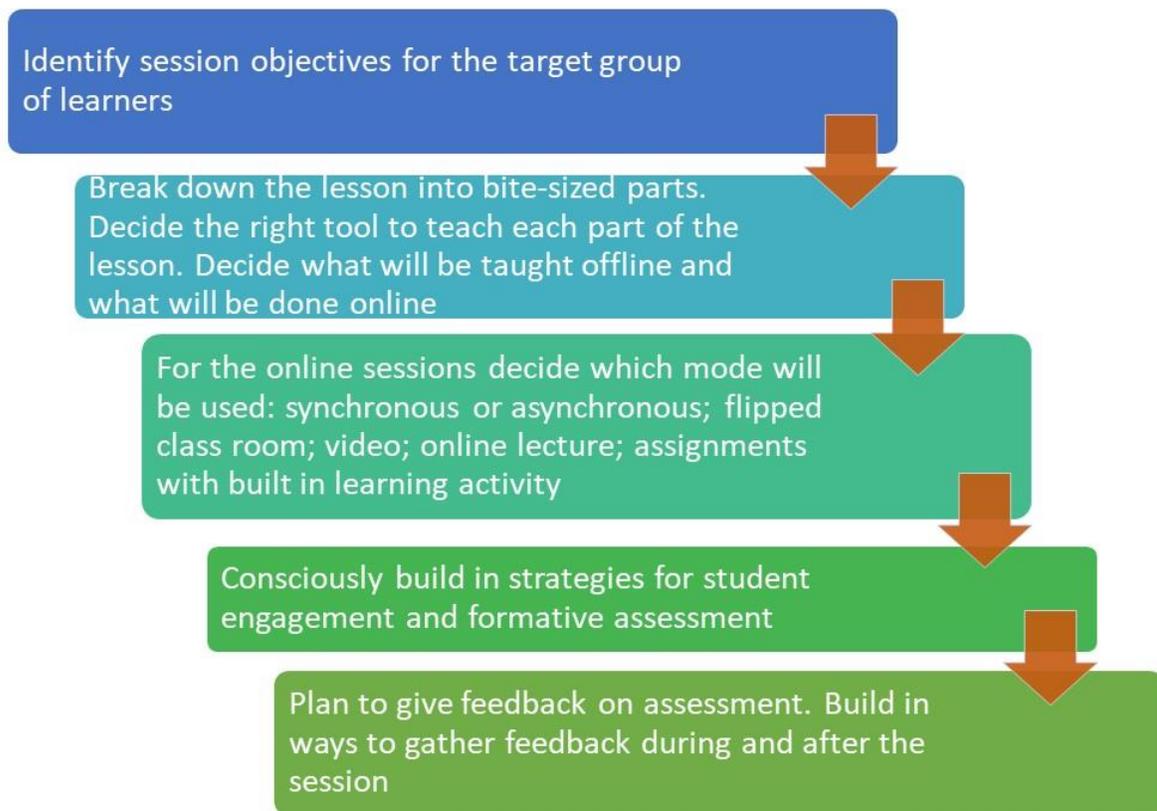
Once the basic infrastructural requirements are in place, online learning can be implemented at institutions for individual batches. Preparation for online teaching at the level of the individual class can be divided into the following phases:

- (a) Lesson planning
- (b) Conducting online sessions
  - Keeping students engaged
  - Facilitating online discussions
  - Managing Online classroom
- (c) Post-session assessment and evaluation

## A. LESSON PLANNING FOR ONLINE TEACHING

A well-designed lesson plan is key to the conduct of an effective online teaching session. Similar to any other teaching plan, if one identifies and aligns the 'golden triangle' of learning objectives, teaching-learning methods and assessment, the subsequent conduct of online teaching session will be a smooth affair. The following flow chart (Fig. 2) will help in preparing a lesson plan before actual conduct of online teaching session.

**Fig. 2: Lesson planning for online teaching session**



It is important to break the lesson into small bite-sized parts. It is important to be prepared with Plan B in case of technology glitches. Never feel embarrassed to accept the failure of technology system and be ready to plan the session on another day or with some other mode. Not everything needs to be delivered in the synchronous online mode. It is important to explore ways other than online lectures. It is best to use a mix of suitable methods to deliver content and make the content more relevant and interesting.

Table 10 lists some of the asynchronous methods to teach students online.

<b>Table 10: Examples of asynchronous online teaching methods</b>
<ul style="list-style-type: none"><li>• Send reading material and ask them to take a self-assessment</li><li>• Assign video to watch and ask to submit related assessment</li><li>• Ask learners to teach the class or conduct quiz</li><li>• Share resources and ask learners to submit a project</li><li>• Send learners on an online scavenger hunt: Ask them to search for credible literature on a specific topic</li><li>• Give paper case and have a discussion online</li><li>• Have a debate</li><li>• Start a wiki</li><li>• Give an experiential activity and ask learners to write reflections</li></ul>

The **flipped classroom** concept uses valuable synchronous time to clarify concepts, clear doubts and discuss the more in-depth issues of the topic, after the learners have learnt the basics on their own.

## **CONDUCTING ONLINE SESSIONS**

### **Keeping students engaged**

Keeping learners engaged is the most challenging part of online teaching as there is no face to face contact.

Table 11 lists some of the tips and strategies to keep learners engaged during the actual session.

**Table 11: Tips and strategies to keep learners engaged**

- Try and learn learners' names and use them
- Build a rapport with learners: use formal and informal ways of interaction, model disclosure
- Create the right environment for the class; build trust
- Be available to answer questions and solve doubts
- Introduce interactivity through online tools which enable conduct of polls, and gather real-time response
- Embed multiple choice questions or quizzes between the session to gauge learning understanding
- Ask how and why questions to challenge learners like you would be in a traditional classroom
- Give opportunities for learners to ask questions and clarify their doubts
- Check if the pace of the lesson is fine with the class
- Use break-out rooms and give group work
- Encourage discussions online

**Questioning** is one of the simplest ways of engaging with students. The art of questioning has to be learnt for use both in online and offline modes. Broadly, these questions are not meant to be graded, but used only as a tool to generate attention, promote thinking, link knowledge and promote application. Some of the types of questions used for this purpose (Table 12) are as follows:<sup>31</sup>

**Table 12: Type of questions that can be used for student engagement**

<b>Format of question</b>	<b>Example</b>
Rhetorical question	Have you seen blood pressure being recorded? Let me show you.
Questions which generate interest	What would happen if you don't eat carbohydrates for 3 days?
Questions to ascertain baseline knowledge	Can someone tell the route of administration of BCG vaccine?
Questions to help the class recall already learnt facts	What is the daily protein requirement for a normal adult male?
Redirecting questions	We learnt of some drugs which can decrease blood sugar level. Can you tell me some drugs which will increase blood sugar?
Bridge questions' (i.e. questions which bridge the gap between knowledge and its application)	How can the clinical differences in diarrhea originating from small intestine and large intestine help you to decide on the need for antibiotics in a child with diarrhea?

## Facilitating good online discussions

Online discussions have high pedagogical value as they promote interactivity, engage students and build in social presence. Gao et al<sup>32</sup> have suggested that online discussions should aim at promoting higher order thinking. This can be done by questioning, elaborating, interpreting and relating information to prior knowledge. Discussions should help students to construct their own knowledge. Presenting and discussing conflicting perspectives (e.g. role of statins in cutting down risk of myocardial infarction, differing views on ethics) helps in generation of knowledge which is long lasting.

At first, it may appear difficult but most of the nuances of good face-to-face discussions can be applied online as well. Some of the techniques of good facilitation are as follows:<sup>33</sup>

- a. Involving all students in discussions is important. If the groups are very large, it makes sense to divide them into manageable sub-groups with facilitators in each group. In case enough faculty are not available, residents can be trained in facilitation skills.
- b. Teachers should make an effort to identify non-responders and encourage them to contribute. Similarly, one should not allow a few students to dominate the discussion.
- c. All contributions must be acknowledged. This opportunity should be utilized to provide feedback to students.
- d. A good facilitator knows when to speak and when to go silent. While the facilitator may have to take the lead in the beginning, a good discussion means that students interact with each other with the facilitator taking a back seat.
- e. Students tend to be callous and abrasive with each other in online settings. This might lead to friction and others might not participate enthusiastically. Therefore, it is important to set ground rules in the beginning and intervene when any untoward incident occurs
- f. Allow students to lead the discussion after they get used to the format. This helps them to develop ownership of the process and brings out new ideas, new way of looking at existing situations, and a much-needed change from monotony.

## Online classroom management

One of the key differences between conventional and online classes is classroom management. In a conventional classroom, the teacher can 'see' all students, notice their body language, ask/answer questions from specific students and move around in the class. In online classes, however, this functionality is limited. Several software packages allow conversion of a large class into smaller groups (breakaway groups). But the best

method is to manage the group as a whole. Just like conventional classes, it may be good idea to keep the class size small. Students generally remain 'anonymous', especially when the online class size is large. This usually helps otherwise shy students to ask doubts using the chat box function.

Another important difference lies in the learning environment. While mobile devices are generally discouraged in conventional classes, they play an important role in online classes. As both teachers and students are getting used to the new behavioural norms, it may take some time to adjust when f2f classes start again.

A concern voiced by many teachers is the 'disappearance' of students after logging in. While asking all students to keep "*camera on-mike muted*" might be one option, online assessment provides an important tool to ensure presence. The online teacher lacks the opportunity to see the expressions of her students to gauge their understanding. This is where role of ongoing assessment comes in. This will be discussed more under the assessment section.

Table 13 lists some online classroom management techniques:

<b>Table 13: Online classroom management techniques</b>
<ol style="list-style-type: none"><li>1. Lay down ground rules for the classroom</li><li>2. Encourage students to develop their own ground rules</li><li>3. Emphasize interaction. Try to identify non-responders</li><li>4. Use breakaway groups to encourage interaction</li><li>5. Be a roving facilitator when using breakaway groups</li><li>6. Avoid information overload</li><li>7. Pose probing and application-oriented questions</li><li>8. Provide immediate feedback</li><li>9. Use techniques like flipped classroom to promote active learning</li><li>10. Don't read from your slides</li><li>11. Link attendance to participation in class</li><li>12. Use more than one technology to promote interaction.</li></ol>

## **B. POST-SESSION ASSESSMENT AND EVALUATION**

Wherever possible, plan to conduct online summative assessment after an online teaching session. It does not stand to reason that the learners trained through one type of learning environment are assessed through a different one. Where online assessment is not possible, traditional methods of assessment can be used.

Some simple informal classroom assessment techniques such as polls, muddiest point or one-minute paper can help in knowing whether the concepts just taught have been understood by students or not. For formal assessment, MCQ tests can be carried out using Google Forms or other interactive tools.

Evaluation must be carried out as part of quality assurance practices. Evaluation of both the learning process and outcomes must form a part of any online teaching program. Student feedback can help in improving the manner of delivery of this content. More on this topic can be read in the section on Quality Assurance of online learning.

## Teaching Procedural Skills Online

Teaching procedural skills online is a formidable challenge to medical educators. E-learning has been shown to be effective in supporting skills teaching. Fitts and Posner's<sup>34</sup> three-stage theory of motor skill acquisition is a popular method used in teaching surgical and motor skills. These three stages of acquisition of a skill are:

- (a) **Cognition** or understanding the task: This needs explanations about the activity.
- (b) **Integration** or comprehension and performing the mechanics of the task: This needs provision of feedback and deliberate practice.
- (c) **Automation** or ability to perform a task with efficiency, speed and precision: This needs little cognitive input but automated performance. The focus is on refining performance.<sup>35</sup>

While the stage of cognition can be fostered by online interactive sessions, the stages of integration and automation require specific planning. Complex procedural skills can be taught by breaking them down into small steps. Peyton<sup>36</sup> suggested a four-step approach to introduce skills to new trainees as follows:

**Step 1: Demonstrate:** The instructor shows the skill at a normal pace. No additional comments are offered at this step.

**Step 2: Talk the trainee through:** The instructor describes each sub-step of the procedure while showing the skill again to the students.

**Step 3: Trainee talks trainer through:** Here the trainee describes the steps while the instructor performs the skill for the third time, based on the trainee's description.

**Step 4: Trainee does:** The trainee performs the skill on his or her own.

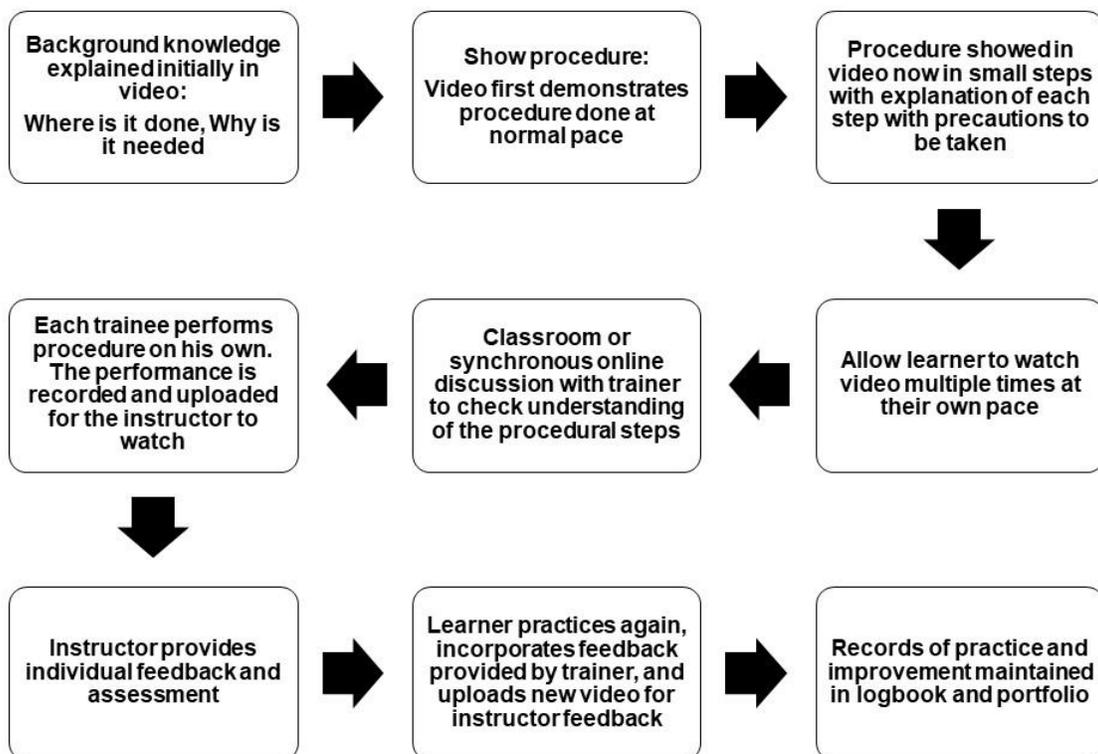
These steps break the task into four components: demonstration, deconstruction, formulation and performance.

**Online instructional videos** provide learners an opportunity to watch the demonstration and to deconstruct different steps of the skill at the trainee's pace. These videos have the flexibility of being paused and being watched repeatedly at multiple occasions. This is said to help learners understand complex procedures better. This process helps in acquisition and retention of the procedural knowledge.<sup>37</sup> Further, if used in a blended manner, this can be combined with actual performance. The performance phase can be recorded and can be used to provide formative feedback. These videos can be used for

supervision, post-procedure debriefing, providing feedback, assessment and promoting reflection.<sup>37</sup>

Alternatively, these videos can be watched in small groups / online break rooms with discussion.

**Fig.3: Suggested training model of how online videos can be used to teach skills**



For example, a simple procedural skill such as tying a knot, or suturing needs task-training models. An instructional video can take the trainee through the steps of demonstration and deconstruction. The comprehension step (“trainee talks the trainer through”) can be done by using synchronous interactive online sessions with the trainer. The next step of performance (“trainee does”) can be recorded. Simple recording devices such as a laptop, smart phone or headgear camera can be used for supervision and recording. The recorded video can be uploaded to obtain feedback and for assessment. The learner can repeat the performance based on the received feedback, and again upload a new video

until he attains the pre-defined level of competence. Feedback provided on these videos have been shown to improve simulation scores, technical skills and even patient safety.<sup>38</sup>

Availability of task training models or kits for all the procedural skills could be a challenge. The learning resource material needs to be developed or acquired depending on the availability, resources and requirements. If common training kits can be made available for all the learners by the institution, it ensures uniformity. For more complex procedural skills, availability of mannequins and online screen-based virtual-reality simulators will be valuable for training, feedback and assessment.

It is possible to prepare peer-reviewed educational videos to teach skills and procedures.<sup>39</sup> People learn effectively from multimedia.<sup>40</sup> Learners have been found to use online videos prepared for conducting OSCEs for self-study of clinical skills.<sup>41</sup>

## Teaching health humanities online

Competencies that focus on imbuing appropriate values, ethical conduct, professionalism, interpersonal and communication skills are an important component of the MBBS program. These skills were previously deemed to be obtained passively by observing and associating with senior colleagues in the profession. However now, with the introduction of modules like AETCOM<sup>42</sup>, the acquisition of these competencies has been mainstreamed. Many of these outcomes lend themselves to online acquisition with correct lesson planning and appropriate use of technology.

It must be remembered that learning needs should drive the use of any technology and not vice versa. Many of the learning outcomes can be attained by fairly low investment in technology and use of free and open-access resources. We have chosen examples from the AETCOM module<sup>42</sup> to demonstrate how the online learning environment may be used and adapted to help learners acquire requisite competencies.

**Example 1.** This example uses a first-year communication module that encompasses large group and small group learning, observation skills, collaborative and self-directed learning and formative assessment. This example uses Module 1.4 of the AETCOM booklet<sup>42</sup>.

<b>S. No.</b>	<b>Component</b>	<b>Online adaptation</b>	<b>Resources</b>
1.1	Introductory session	Online lecture to large group OR Uploaded recorded lecture with online discussion (flipped classroom format)	Online video platform (subscription or open source) Above + Online repository such as YouTube
1.2	Self-directed learning	Provide assignments that require students to: <ul style="list-style-type: none"> <li>- research and compile information individually and in groups</li> <li>- prepare and upload reports</li> </ul> These reports are then reviewed by faculty and shared with students	Group email OR Online word processing platforms that allow documents to be shared or edited together ± Online video platform that allows group calls
1.3	Small group sessions on improving communication skills	A communication video with common mistakes in communication is prepared with standardized patients This is viewed together by learners A discussion (live or chat box), that elicits student observations of these mistakes and how to correct them, follows	Online video platform (subscription or open source)
1.4	Closure session	A discussion in small groups that summarizes learning and future learning to be done	Online video platform
1.5	Assessment	Students are graded for <ul style="list-style-type: none"> <li>- Participation in activity and</li> <li>- assessment of self-directed learning</li> </ul>	Spreadsheet or an electronic form with components

**Example 2.** The second example adds the complexity of a skill session. This example uses Module 3.1 of the AETCOM booklet<sup>42</sup>.

<b>S.No.</b>	<b>Component</b>	<b>Online adaptation</b>	<b>Resources</b>
2.1	Introductory session	Same as in example 1.1	Same as in example 1
2.2	Small group sessions	Same as in example 1.3	
2.3	Skills lab sessions	<p>A standardized patient is available online for real-time communication. A communication task is provided to the student which is done online. (Ideally the session is recorded and uploaded to the server for retrieval by the student designated peer and preceptor)</p> <p>The standardized patient assesses learners using a check list and comment form and submits it online. He can also be available for the debrief.</p> <p>After the task is completed, the student retrieves the recording of the encounter and records observation, comments and points for improvement</p> <p>The preceptor can view the interaction live OR can retrieve the recorded encounter and review.</p> <p>A debrief opportunity is created between the student and the preceptor where the performance is reviewed and a plan for improvement is made through guided reflection.</p>	<p>Online video platform (subscription or open source) with recording facility (ideal) and ability to retrieve and view (ideal)</p> <p>Online form to collect patient-preceptor and learner impressions of encounter</p>

**Example 3:** This example describes a way to emulate a team tag-along session. This example uses Module 2.4 of the AETCOM booklet<sup>42</sup>.

S.No.	Component	Online adaptation	Resources
3.1	Tag-along session	<p>An identified member of the health care team joins on a video call with the group of students and facilitator. After an initial goal-setting discussion, the member of the health care team does a walkthrough of his or her area talking and taking questions from the students.</p> <p>A front facing camera fixed to the upper garment and earphones are simple and cost-effective workarounds (as opposed to having another person accompanying the team member with a camera).</p> <p>It is important to brief patients and colleagues involved in this session and get necessary permissions for use of videos and images.</p>	<p>Online video platform (subscription or open source)</p> <p>Smart phone to transmit the walk - through to the online platform</p>
3.2	Small group discussion	Can be done immediately following the walk through or later to elicit observations, reflections, summaries and learning	Online video platform (subscription or open source)

**Example 4:** This example provides a way to emulate a session on empathy. This example uses Module 2.8 of the AETCOM booklet<sup>42</sup>.

<b>S.No.</b>	<b>Component</b>	<b>Online Adaptation</b>	<b>Resources</b>
4.1	Patient interviews	With suitable and appropriate permissions students may be allowed to interview family members of patients through an online platform. (If needed, faculty observer can be present to ensure comfort and safety). Logins from different locations of family members allows exploration of feelings of relatives - not proximate to the patient.	Online video platform (subscription or open source)
4.2	Large group discussion	After suitable permissions have been taken, family members are asked to join, speak and answer questions from participants in a large group discussion on a moderated online platform.	Online video platform (subscription or open source)
4.3	Self-directed learning	Lists of online resources such as videos or movies are provided. Students can view them offline - write a report and submit them.	Ability to submit through email or an online submission process
4.4	Closure	Same as in 1.4	
4.5	Formative assessment	Submission of items in 4.3	

**Example 5:** This example provides an example for emulating an online-case based discussion on medical ethics. This example uses Module 3.2 of the AETCOM booklet<sup>42</sup>.

<b>S.No.</b>	<b>Component</b>	<b>Online Adaptation</b>	<b>Resources</b>
5.1	Introduction of the case	A paper case may be posted ahead of time and introduced through a small group online session. Innovation could include a video recording of a patient interview followed by discussion.	Online video platform (subscription or open source)
5.2	Self-directed learning	Same as in 1.2 based on the case provided	
5.3	Anchoring lecture	Same as in 1.1	
5.4	Discussion and closure of case	Same as in 1.4 Additionally, an online role play can be done with two students. Remaining students can identify issues and critique them.	Online video platform (subscription or open source)

From these examples, it may be evident that a good approximation of learning which occurs in a physical environment, can be emulated in an online environment. This requires adequate planning and use of resources even if limited creatively. It must be emphasized that, remote learning is not a substitute to proximal guided learning that a master teacher provides. The use of webcams and phone cams reduce the amount of detail that can be captured in an online system and do not completely replace the aesthetics and immersive experience of a skills lab or patient care setting. However, planning, practice and wise use of technology allows skill acquisition to proceed in an uninterrupted fashion.

## Online assessment

Online assessment involves the use of electronic or digital devices to construct or deliver assessment tasks. This may also be used to monitor progress of learners, to mark or grade assessments, and for record keeping of these data. The digital devices can range from simple devices such as smart phones or tablets, to laptops and desktop computers, and can go up to complex simulators and gaming devices.

### Role of assessment in online teaching

Assessment can be used in different ways in online teaching. Some of them are as follows:

1. **Assessment before teaching:** Using short quizzes or tests before starting a topic can be useful for teachers to gauge the baseline knowledge and skills of the students. This can be used to subsequently tailor the teaching according to the level of the learners. This can even be done informally by asking questions before the session starts using the poll option or chat box. Teachers need to know the level of the group as a whole and not individual performance in this situation.
2. **Assessment during teaching:** This can be done at the level of a course or at the level of a teaching session.
  - a. Tests conducted midway between a course help students to self-assess their learning and keep up with the deadlines. They help teachers to make mid-course corrections and give feedback to learners.
  - b. It is always a good idea to break up long teaching sessions into smaller sections. This helps students to concentrate. Several simple classroom assessment techniques<sup>42</sup> exist and these are useful as these are quick, anonymous, and non-graded. Techniques such as polls, muddiest point or one-minute paper can help in assessing knowledge, recall, and understanding. Several of these techniques can be adapted to online settings with use of interactive applications. Here key messages from the topic just taught can be asked in an applied form. This helps teachers in knowing whether the concepts just taught have been assimilated by students or not. Again, here group performance will be important rather than individual performance. If most of the students have got the answers wrong, the concept will have to be revisited and explained. Concept maps and one sentence papers can be used to test ability to synthesize knowledge.

Breaks such as these, also give students a chance to ask for clarifications, which they otherwise hesitate to ask.

3. **Assessment after teaching:** This can be done at the level of a unit or at the level of a course:
  - a. After completion of a unit (or some units), formative assessment can be done. Here the purpose will be to assess the performance of the learners, as well as to give feedback about what they have done well and what can be improved.
  - b. After the completion of a course, summative assessment is performed to make pass/fail decisions for certification.
  
4. **Assessment as learning:** It is customary to classify assessment as formative (assessment *for* learning) and summative (assessment *of* learning). The contemporary trend is to use assessment to facilitate learning. This involves giving students an assessment task which will require them to go through an authentic experience or perform an activity, and thereafter submit a report. For example, students could be asked to go into the community or a hospital ward, interact with certain subjects, read about the topic, and compile their findings and submit their learning in the form of a report. This kind of assessment erases the artificial divide between learning and assessment. This also promotes self-directed learning.

## Formats for e-assessment

When online assessments first started, they merely involved transfer of paper-based questions to an online format. However, much of that has now changed. With e-assessment, a whole range of different question formats are possible.

These include multiple choice questions and their variations such as extended matching or assertion-reason type questions. But besides these, there is the possibility of using audiovisual triggers such as clinical photographs, X-rays, gross or microscopic images, graphs, or auscultation sounds. Simulations can be used to develop electronic patient management problems and virtual patient scenarios.

Live interactivity is possible in online assessment which makes it possible to perform virtual OSCE, where students can be assessed using standardized patients or videos. This is useful for assessment of communication skills and history taking skills.

Electronic portfolios can be used to gather evidence of learning. Activity based assessment such as project-based assessment or reflective writing are useful methods

which can assess behavioural competencies which are usually considered 'immeasurable'.

The different question formats that can be used in online assessment are summarized in Table 14.<sup>44-45</sup>

**Table 14: Different question formats that can be used in online assessment**

- Multiple choice questions and its variants
- Short answer questions
- Online polls
- Picture based questions based on audiovisual clues
- Electronic Patient Management Problems
- Objective structured video examination (OSVE)
- Projects
- Reflections
- Portfolios

### **Advantages of automation**

Use of well-designed online assessment formats brings in efficiency and ease in marking assignments. Several assessment formats can be automated during their construction phase, reducing subsequent faculty workload. Use of well-constructed rubrics and standard marking formats can make most assessment formats more reliable and fair to learners, by reducing inter-rater variability. It is possible to verify whether students are adhering to deadlines and submitting assessments on time. Monitoring learner progress is simplified as record keeping is much more meticulous and at one's fingertips.

### **Rethinking the concept of what to ask**

Since online assessment first began by replicating paper-based assessment to computer-based settings, most people presume that it can be used only to test objective assessment questions. However, this is not true. The way students learn, depends heavily on what kind of mental processes are activated by the questions asked during assessment. If questions merely test rote learning, students will veer towards surface learning. When questions asked are more complex, students will start learning deeply and try to connect the dots between different mechanisms. The kind of trigger that we use to ask questions influences the learner's way of studying differently. This can be done by the following ways (Table 15):

**Table 15: How to ask questions differently**

What to ask	How to do this and what this does	Example
<p><b>Ask higher order questions</b></p>	<p>Rather than asking questions from the lower levels of Bloom's Taxonomy which encourage rote learning, ask questions from the higher levels such as comprehension, application, analysis, synthesis and evaluation.</p> <p>These could be in the form of problem-solving exercises, projects, surveys, or case studies.</p>	<p>Instead of asking:</p> <p><i>Enumerate the morphological changes seen in the heart in rheumatic heart disease.</i></p> <p>convert it into a higher-order question by simply using a clinical scenario.</p> <p><i>If a child with rheumatic fever is not treated, what are the changes that can be expected to be seen in the heart 15 years later?</i></p>
<p><b>Ask integrated questions</b></p>	<p>Ask questions based on pathophysiology and mechanisms in clinical subjects. Similarly, when teaching basic subjects, the applied relevance must be emphasized.</p> <p>This will help students to form neural connections in their mind and study a subject deeply by understanding the basics rather than merely memorizing it by rote.</p>	<p>Instead of asking:</p> <p><i>'What is the action of cyclooxygenase on inflammation?'</i></p> <p>the student can be given a scenario like,</p> <p><i>'After watching too many webinars, a student has a headache and takes an aspirin to relieve the pain. Which steps of inflammation will be affected by the medication?'</i></p>

<p><b>Build authenticity into questions</b></p>	<p>When students will finally encounter patients, they are likely to face complex situations. So instead of restricting questions to one chapter or topic, it may be useful to expose them to scenarios where they need to explore their learning beyond unit-wise or department-wise boundaries.</p> <p>Authentic scenarios will help in preparing students for real life patients.</p>	<p>If a question about a treatment of a condition is asked, it may be possible to include details about a co-morbid condition, which could lead to side effects or contradiction to use of a routine drug.</p> <p>If a patient is poor, and a drug cannot be afforded, then that kind of situation can be built into the question.</p> <p>If a patient might not be expected to comply with a regimen, then what choices would a physician have to alter his management?</p>
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**Assessment in clinical settings**

When it comes to assessing clinical competencies, cognitive parts of competencies such as clinical reasoning and communication skills can be assessed online. It is also possible to test heart sounds or visual signs through online platforms. Simple electronic patient management problems or complex AI technology-based virtual patients (computer-based simulations) can be used to test clinical reasoning skills.<sup>46-48</sup>

There have been reports where Objective Structured Video Examinations (OSVE) have been used with some evidence of being valid.<sup>49</sup> In an OSVE, different clinical scenarios were chosen depending upon the clinical and communication skill competencies to be tested. Short patient-clinician interactions, less than 10 minutes long, were scripted and filmed. Each scenario included some deliberate communication skills elements such as greeting the patient, checking for the identity, use of open and closed questions, eye contact, displaying empathy, clearing doubts, summarizing and closing. Some obvious errors in communication were included in the script. Students were expected to watch the video. Thereafter, they were given answer sheets where they had to identify what was done right and what was done badly in the patient-doctor interaction.

However, Holmboe<sup>50</sup> stated that “although simulated patients and other simulation technologies were important and reliable tools for teaching clinical skills and evaluating competence, they cannot substitute direct observation of students’ clinical skills on real patients by the faculty”.

Now, with the availability of software which permits real time interactivity such as Google Meet, Zoom or Skype, students can be observed and assessed on history taking or communication skills using real or standardized patients. These sessions can be recorded easily and assessed. Assessment of communication skills, professionalism and attitudes can be done through use of simulations, standardized patients and online viva. This has been discussed earlier. Use of hypothetical scenarios can help in assessing a student's competence in managing complex clinical situations.

With the availability of break-out rooms, several institutes are experimenting with conduct of online or electronic OSCEs. This, however, requires a great deal of coordination and planning so that students move in and out of online OSCE sessions seamlessly. Each room needs presence of cameras and recording equipment. Faculty and standardized patients are needed depending on the stations. Proctoring devices and encryption of data may be essential. This is an expensive affair, and needs involvement of a whole team of faculty, assistants and IT specialists to run smoothly.

## **Choosing the right assessment tools**

The assessment clock model<sup>51</sup> provides educators practical guidance about how to determine the key characteristics of assessment and decide the most suitable assessment tool in a normal or crisis situation. This model is based on van der Vleuten's<sup>52</sup> empirical formula:

$$\text{Utility of assessment} = \text{Validity} \times \text{Reliability} \times \text{Cost-effectiveness} \times \text{Acceptability} \times \text{Educational Impact}$$

The model can be interpreted to suggest that in normal circumstances, when one is developing a low-stakes examination, more weightage should be given to features like the cost, acceptability and educational impact. For high stakes examinations, validity and reliability are more important characteristics. However, in crisis situations like the Covid-19 pandemic, weightage would be on acceptability and cost issues, especially as we are transitioning to a new method of assessment, and there are issues of fairness and security.<sup>53</sup> Validity and reliability will remain the most important issues for high-stakes examinations like selection examinations and high-quality items must be chosen carefully for inclusion into question banks.

## **Feedback in online settings**

Feedback is a two-way process. Students need to get feedback on how they are performing, while teachers need feedback from students on how their teaching is being received.

When learners are provided with formative feedback, assessment becomes a learning opportunity. Online assessment enables provision of individualized feedback which plays a very important role in enhancing student learning. This can be done using several formats. In case of assessment-related feedback, examples and model answers provide excellent opportunity for the student to compare his performance. This can help one to reflect on the assessment process also.<sup>54</sup> Feedback can be built into assessment, using automation in certain cases. For example, in case of self-assessment modules to be administered at the end of every unit, specific feedback can be built into each option chosen by the learner. Automation easily enables this to be shown to the learner as soon as they have submitted their responses. Another way of providing feedback is to design automated feedback statements based on scores obtained by the learner. This might not be very specific but can provide some guidance to the learner. For faculty, common feedback responses can be designed in the form of macros which need to be inserted by ticking a box, enabling faster marking and provision of specific individualized feedback.

Feedback related to psychomotor skills can be given after viewing recorded videos as explained earlier. The logbook can also be maintained electronically with options for locking after each loop. This can also serve as a permanent record of the progress made by the learner.

If time permits some personal time devoted to each student can be very productive. However, personalized feedback requires lot of time and effort from teachers. To be available to students for voice interactions outside the scheduled sessions can be very helpful, but taxing for the teachers. It may be a good idea to provide fixed time slots for personalized interactions through virtual or telephonic modes.

Group feedback is another technique, where all assignments and feedback are available for all members to view and correct themselves. This also makes the whole process transparent.

One advantage of using online tools is that feedback can be given in the form of small doses which are spaced out throughout the course. Small doses of frequent formative feedback will be more easily accepted and assimilated by learners. Faculty will need to be trained in providing constructive feedback. Use of rubrics and macros can enable specific feedback to be delivered efficiently and at fixed periods, depending on the pace at which learners are progressing.

## **The issue of plagiarism**

A common complaint among teachers is that students tend to copy and paste from online sources. Plagiarism is a universal phenomenon among learners. It will be important to spread awareness about what constitutes plagiarism and why it should not be practiced

among both students and faculty. Use of anti-plagiarism software should become a routine practice. A strict non-tolerance policy against plagiarism needs to be enforced and a culture of academic integrity needs to be slowly encouraged on all campuses.

## **The cost of online assessment**

While there are several free or low-cost software and applications which permit one to conduct low-stakes examinations and classroom assessment easily, using online tools for high-stakes examinations comes at a high cost. However, as the number of users increase, the cost of these software applications is likely to come down.

Proctoring devices are required to eliminate the possibility of student cheating and manipulation. These need to be installed at the level of the Universities and institutions, to prevent copying. Electronic software is available which block the use of other screens when the examination is on. There are ways to monitor eye movement and time away from the camera. These tools can enable examinations to be carried out under surveillance of web cameras. This will incur massive costs and will require storage of huge amounts of electronic data.

It must be remembered that online assessment is not the ultimate solution to all our woes. It must be used in conjunction with face-to-face assessment. However, it does help in reducing faculty workload through automation. To be fully acceptable, we will have to seek tools which make assessment valid, reliable, cost-effective and acceptable.<sup>55</sup> Overall, one cannot ignore the educational impact of using assessment on student learning. Online assessment is now an integral part of the assessment toolbox. It is not a substitute, but a complement to regular face to face assessment.

## Quality assurance in online learning

As the use on online modes of teaching and learning increases, it becomes important to monitor the quality of educational processes and determine if the intended educational outcomes have been attained.

Several processes need to be evaluated for quality assurance in online learning.<sup>56-57</sup> These are listed below:

- (a) Leadership and management: Policy, vision, mission, goals, planning
- (b) Faculty profile and faculty development
- (c) Availability of technology, infrastructure and learning resources
- (d) Curriculum design
  - i. Competencies, learning outcomes and learning objectives
  - ii. Instructional methods
  - iii. Course activities and learner engagement
  - iv. Assessment
  - v. Continuous quality improvement and evaluation
- (e) Learner support and feedback: learner profile
- (f) Learner accessibility and experience

Just as in the traditional classroom, some **benchmarks** are essential to the conduct of online teaching. These include<sup>58</sup>:

- clear planning,
- good infrastructure,
- faculty support to conduct online learning,
- clear standards for good course design,
- clear instructions for students,
- open communication channels between faculty and students,
- regular feedback to students on their progress,
- regular feedback from students on their experience, and
- continuous monitoring and evaluation.

## How to conduct blended learning sessions

It is predicted that online learning will continue to be a part of our regular teaching armamentarium even when the pandemic ends, albeit in a blended learning format. **Blended learning is the “thoughtful integration of classroom face-to-face learning experiences with online learning experiences”.**<sup>59</sup> Given the experience of online learning that has been gained during the pandemic, it may be useful to continue using it in the post-pandemic phase, in a blended learning format, subject to further deliberations and consensus.

Blending the advantages of face-to-face interactions with online sessions enhances the learning process. Blended learning can:<sup>60</sup>

- Expand the opportunities available for learning,
- Provide information and resources for learners,
- Streamline course management activities,
- Facilitate student engagement through interactivity and group work.

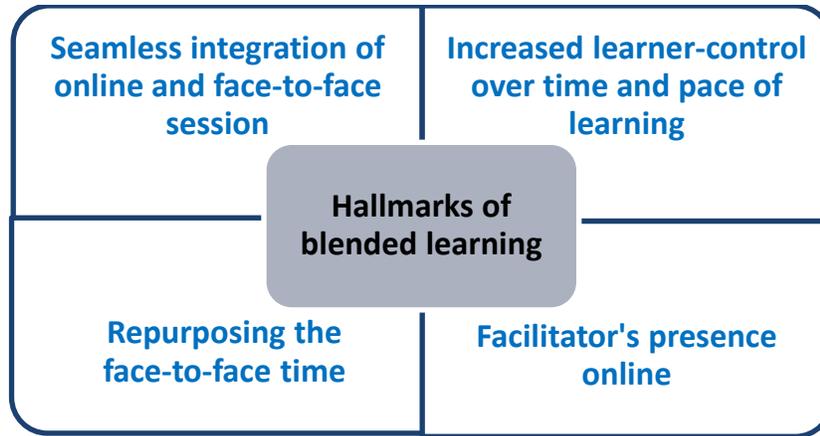
### Hallmarks of blended learning:

There are four hallmarks of blended learning (Fig.4). These are:

- 1. Seamless integration of online and face-to-face session:**  
The facilitator integrates the face-to-face session with online activities by summarizing the online activity and linking it with the face-to-face session.
- 2. Increased learner control over time and pace of learning:**  
Learners should be able to access the online contents at the time and place of their convenience. There should be flexibility in learning.
- 3. Online presence of facilitators:**  
Facilitators should be visible through the online activities. This is possible by providing timely feedback and participation in discussions.
- 4. Repurposing the face-to-face time:**  
Traditional class time is replaced with time taken by students to carry out their online learning activities. It is ideal to use the face-to-face learning time to impart higher-order learning and skills, while using the online sessions to recall or deliver basic knowledge and carry out collaborative activities. Blended learning provides

possibilities to repurpose the contact time to facilitate deeper thinking and in-depth learning.

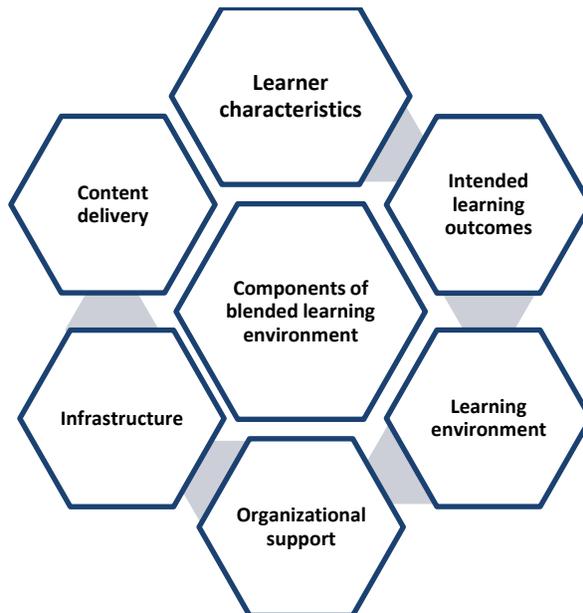
**Fig. 4: Hallmarks of blended learning**



## Components of blended learning

Fig. 5 shows the main components which make up the blended learning environment.

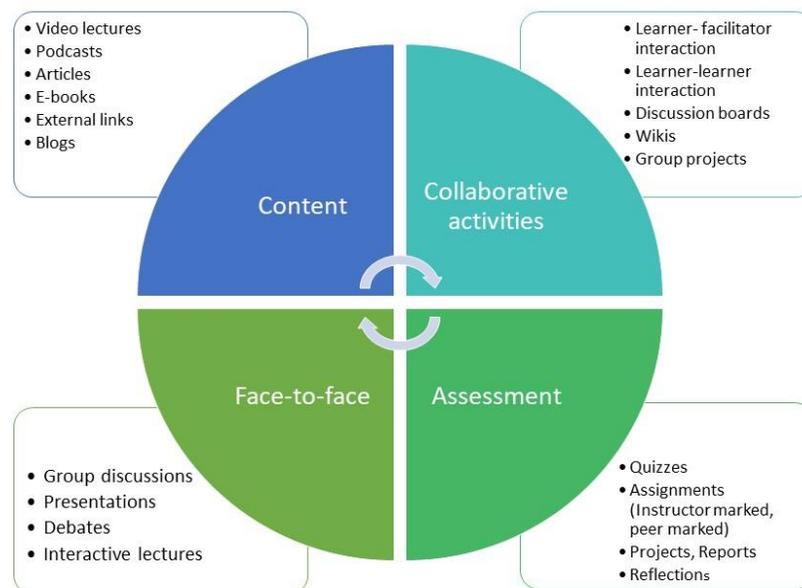
**Fig. 5: Main components of the blended learning environment**



## Designing a blended learning session

The process of blended learning goes through the following steps in a cyclical manner: planning, designing, implementing, reviewing and improving. Fig. 6 shows some of the activities that can be incorporated into blended learning sessions:

**Fig. 6: Examples of activities which can be included in blended learning**



### Questions to be asked while designing online activities

1. How will the learning activity support the intended learning outcomes?
2. What will motivate the learners to engage in online activities?
3. How can the facilitator motivate the learners and encourage to support one another in online learning?
4. Can a learner's activities and tasks be incorporated into continuous assessment, so that the learning activities can conform to the principles of student-centred learning?

## **EXAMPLE**

Here is an example of a blended learning module for undergraduate students of final MBBS (Part II):

### **BLENDED LEARNING MODULE ON CORONARY ARTERY DISEASE**

#### **Learning objectives:**

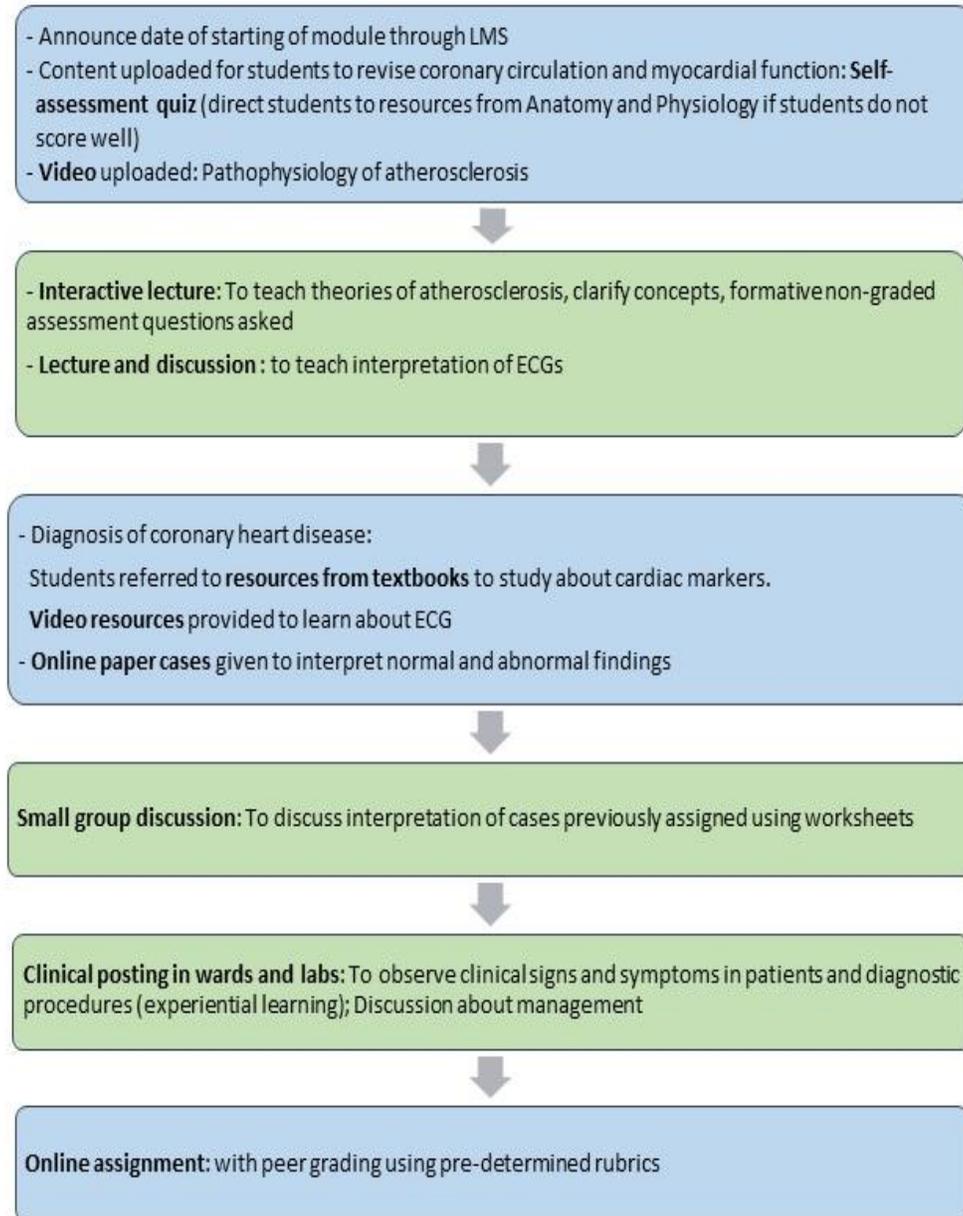
On the completion of this module, the learner should be able to:

- Describe the etiopathogenesis of coronary artery disease
- Choose the correct approach to diagnose coronary artery disease
- Apply the right medical and surgical approaches to manage a case of coronary artery disease

**Fig. 6: Online and face-to-face components of a blended learning module on coronary artery disease**

■ - Face-to-face

■ - Online component



## **Advantages of Blended Learning**

1. Improved content access to the learners,
2. Learner-centered teaching,
3. Improves communication, creativity, collaboration and critical thinking among learners,
4. Inculcate life-long learning skills,
5. Provides greater flexibility to the learners.

## **Challenges:**

1. Creating infrastructure to deliver online contents,
2. Training faculty members in the process,
3. Providing accessibility to the learners,
4. Organizational culture and support.

Blended learning is an effective method which is student centric and provides flexibility to learners. It must be adapted to meet the needs of the new digitally savvy learners.

## EPILOGUE

### The concept of triage

During the Covid- 19 pandemic, most faculty have been involved in clinical care, and learners had to be off campus due to safety concerns. Medical education had to take a back seat. Clinical teaching, specially, has been disrupted in these unprecedented circumstances. At a time like this, we will have to take some difficult decisions to cater to our immediate needs and mitigate the long-term negative consequences. We will have to evaluate the feasibility of what can be done and triage our resources. At all levels, we will have to determine: (a) what activities can be continued, (b) what activities should be postponed, (c) what activities can be adapted to another format and what remedial action/s need to be taken, (d) what activities should be dropped, and (e) what new activities need to be added.<sup>61</sup> For example, if clinical teaching cannot be conducted during the pandemic, one has to assess which parts can be converted into video or online teaching, and what needs to be postponed for later. Batches of students who have missed certain competencies must be taught and assessed on those competencies, once the campus is safe for on-site classes. If Covid- 19 related competencies were not being taught earlier, they have to be added to the curriculum. This kind of mapping of competencies where sacrifices and difficult choices to be made are charted out, is useful in a crisis. These kinds of negotiations must be made reflecting on the ultimate impact on medical education in the future.

### Sharing resources

Since most institutes face a resource crunch, it is advisable to share resources such as instructional videos and skills laboratories between institutes. Preparing instructional videos is time consuming and needs trained resource faculty. Once these instructional videos are prepared, they can be reused, and a library of such videos can be developed as collaborative project between the institutions or Universities for common use. Colleges of one region can collaborate and create electronic question banks using the concept of consortia. All participating institutes will need to contribute good quality questions which are validated to the question bank. Administrative costs of maintaining the question bank can be shared between all participating institutes.

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Established u/s 3 of the UGC Act, 1956  
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Government of India, in Notification No.F-9-2/2003-U.3, dated 13.06.2007  
**GHAZIABAD, INDIA.**

**REVISED REGULATIONS AND SYLLABUS FOR THE  
BACHELOR OF DENTAL SURGERY DEGREE COURSE - 2011**

**CHAPTER - I**

In exercise of the powers conferred under Clause (J) sub-rule (5) of Rules 27 of the Rules and Bye Laws – 2010 of the Santosh University, Ghaziabad the Academic Council is hereby framed the following regulations and syllabus:

**1. SHORT TITLE OF THE COURSE :**

These regulations shall be called "**REVISED REGULATIONS AND SYLLABUS FOR THE BACHELOR OF DENTAL SURGERY DEGREE COURSE – 2011**" of the Santosh University, Ghaziabad".

The regulations framed are subject to modification by the Academic Council of the Santosh University, Ghaziabad from time to time.

**2. COMMENCEMENT :**

These regulations, curriculum and syllabi are framed as per the guidelines of Dental Council of India's BDS Regulations and are made applicable to the students admitted to the I year BDS degree course under Santosh University from the academic year 2008-09.

**3. ELIGIBILITY CRITERIA :**

**(1) Age limit:**

No candidate shall be allowed to be admitted to the Dental curriculum of First year Bachelor of Dental Surgery (BDS) Degree Course until he / she shall complete the age of 17 years on or before 31st December of the year of admission to the BDS course.

*[ Santosh University - Revised BDS Regulations 2011 – Short Title of the Course – Applicability – Eligibility – Age Limit]*

**(2) Qualifying Examination :**

No candidate shall be allowed to be admitted to the Bachelor of Dental Surgery (BDS) Degree Course until he / she has passed a qualifying examination as under:

- (a) The higher secondary examination or the Indian School Certificate Examination which is equivalent to 10+2 higher Secondary Examination after a period of 12 years study, the last two years of study comprising of Physics, Chemistry, Biology and Mathematics or any other elective subjects with English at a level not less than the core course for English as prescribed by the National Council for Educational Research and Training after the introduction of the 10+2+3 years Educational structure as recommended by the National Committee on education;

**Note:** Where the course content is not as prescribed for 10+2 education structure of the National Committee, the candidates will have to undergo a period of one year pre-professional training before admission to the dental colleges;

or

- (b) The intermediate examination in science of an Indian University/Board or other recognised examining body with Physics, Chemistry and Biology which shall include a practical test in these subjects and also English as a compulsory subject;

or

- (c) The pre-professional / pre-medical examination with Physics, Chemistry and Biology, after passing either the higher secondary school examination, or the pre-university or an equivalent examination. The professional / pre-medical examination shall include a practical test in Physics, Chemistry and Biology and also English as a compulsory subject;

or

- (d) The first year of the three years degree course of a recognised university, with Physics, Chemistry and Biology including a practical test in three subjects provided the examination is a "University Examination" and candidate has passed 10+2 with English at a level not less than a core course;

or

- (e) B.Sc. examination of an Indian University, provided that he/she has passed the B.Sc. examination with not less than two of the following subjects Physics, Chemistry, Biology (Botany, Zoology) and further that he/she has passed the earlier qualifying examination with the following subjects – Physics, Chemistry, Biology and English;

*[ Santosh University - Revised BDS Regulations 2011– Qualifying Examinations ]*

or

- (f) Any other examination which, in scope and standard is found to be equivalent to the intermediate science examination of an Indian University / Board, taking Physics, Chemistry and Biology including practical test in each of these subjects and English.

or

- (g) Candidates who have studied abroad, the equivalent qualification has determined by the Association of Indian Universities, New Delhi, shall form the guidelines to determine the eligibility and should have passed in the subjects of the Physics, Chemistry, Biology (Botany and Zoology) and English up to the 12<sup>th</sup> Standard level with 50% marks aggregate;

**Note:**

~ Marks obtained in Mathematics are not to be considered for admission to BDS Course.

~ After 10+2 course is introduced, the integrated courses should be abolished.

- \* (h) The eligibility criteria for admission to persons with locomotory disability of lower limbs will be minimum of 45% marks instead of 50% taken together in qualifying examination and competitive entrance examination for admission in BDS course.

*\* As per DCI Revised BDS Course [2<sup>nd</sup> Amendment] Regulation, 2010, dated 22<sup>nd</sup> October 2010.*

**4. SELECTION OF STUDENTS ;**

- (a) The selection of students to the Dental College shall be based solely on merit of the candidate on the basis of common entrance examination conducted by the Santosh University. The candidate for admission to the BDS course must have passed in the subjects of Physics, Chemistry, Biology and English individually and must have obtained a minimum of -

(i) 50% marks taken together in Physics, Chemistry and Biology at the qualifying examination and in addition must have come in the merit list prepared as a result of such competitive entrance examination by securing not less than 50% marks in Physics, Chemistry and Biology taken together in the competitive examination.

(ii) In respect of candidates belonging to Scheduled Castes, Scheduled Tribes or Other Backward Classes, the marks obtained in Physics, Chemistry and Biology taken together in qualifying examination and competitive entrance examination be 40% instead of 50% as above and must have qualifying marks in English.

*[ Santosh University - Revised BDS Regulations 2011– Selection of Students ]*

- \* (iii) In respect of persons with locomotory disability of lower limbs will be minimum of 45% marks instead of 50% taken together in qualifying examination and competitive entrance examination for admission in BDS course.

*Provided that a candidate who has appeared in the qualifying examination the result of which has not been declared, he may be provisionally permitted to take up the competitive entrance examination and in case of selection for admission to the BDS course, he shall not be admitted to that course until he fulfills the eligibility criteria as per the above regulations.*

**\* As per DCI Revised BDS Course [2<sup>nd</sup> Amendment] Regulation, 2010, dated 22<sup>nd</sup> October 2010.**

- \*(b) 3% seats of the annual sanctioned intake capacity shall be filled up by candidates with locomotory disability of lower limbs between 50% to 70%.

*Provided that in case any seat in this 3% quota remains unfilled on account of unavailability of limbs between 50% to 70% then any such unfilled seat in this 3% quota shall be filled up by persons with locomotory disability of lower limbs between 40% to 50% before they are included in the annual sanctioned seats for General Category candidates.*

*Provided further that this entire exercise shall be completed by each Dental College as per the statutory time schedule for admissions and in no case any admission will be made in the BDS course after 30<sup>th</sup> of September."*

**\* As per DCI Revised BDS Course [2<sup>nd</sup> Amendment] Regulation, 2010, dated 22<sup>nd</sup> October 2010.**

## **5. ELIGIBILITY CERTIFICATE :**

No candidate shall be admitted to the 1 year BDS degree course unless the candidate has obtained and produced Eligibility Certificate issued by this University. The candidate has to make an application to the University with the original certificates and Xerox copies of the following documents along with the prescribed fee:

- a. HSC or equivalent (10+2) examination Mark Sheet;
- b. Transfer Certificate;
- c. Community Certificate for SC/ST/OBC candidates and ;
- d. Locomotive Disability of Lower Limbs Certificate.

The candidates should obtain eligibility certificate from the University before the last date for admission to the course and submit the same to the Principal, Santosh Dental College.

**[ Santosh University - Revised BDS Regulations 2011– Eligibility Certificate ]**

## **6. CUT-OFF DATE FOR ADMISSION :**

The candidates admitted up to 30th September shall be registered to take up their I year examination on 1st August/September of the next year and the next examination during August/September of the subsequent year. All kinds of admissions shall be completed on or before 30<sup>th</sup> September of the academic year. There shall not be any admissions after 30th September even if seats are vacant.

## **7. SUBMISSION OF ANTI – RAGGING UNDERTAKING :**

The candidates admitted to the course of study shall furnish, duly countersigned by his/her parent/guardian, an undertaking to the Principal of the college, as per the directions of the Hon'ble Supreme court of India and as per the DCI Anti – Ragging Regulations, that the student shall not indulge in any Ragging activities during his/her period of study and accepting the consequences of such involvement as in **Annexure – I** of this Regulation.

## **8. REGISTRATION OF CANDIDATES :**

A candidate admitted to the 1<sup>st</sup> year BDS degree course of this University shall Register his / her name by submitting the prescribed application form for Registration duly filled along with the original documents, prescribed fee and a Declaration/Undertaking in the formats, as in **Annexure - I, II, III** to the University through the Principal, Santosh Dental College within 60 days from the cut-off date prescribed for admission to the BDS degree course.

## **9. DURATION OF THE COURSE :**

The Undergraduate dental programme leading to BDS Degree Course shall be of 4 [Four] academic years, with 240 teaching days in each academic year, plus one year rotating Internship in a Dental College. Every candidate will be required, after passing the final BDS Examination, to undergo one year paid rotating Internship in a dental college. The internship shall be compulsory and BDS Degree shall be granted after completion of one year paid internship.

**Note:** As per “DCI Revised BDS Course [3<sup>rd</sup> amendment] Regulations, 2011”, dated 25<sup>th</sup> August 2011, all the students admitted from the academic year 2008-09 shall undergo one year Internship after passing final BDS 4 year curriculum.

## **10. SUBJECTS OF STUDY:**

The subjects of study of BDS degree course is divided into five Academic years as follows:

### **(i) I YEAR :**

- a) General Anatomy including Embryology and Histology.
- b) General Human Physiology and Bio Chemistry, Nutrition and Dietics.
- c) Dental Anatomy, Embryology and Oral Histology.
- d) Dental Materials.
- e) Pre-clinical Prosthodontics and Crown & Bridge.

### **(ii) II YEAR :**

- a) General Pathology and Microbiology.
- b) General and Dental Pharmacology and Therapeutics.
- c) Dental Materials.
- d) Pre Clinical Conservative Dentistry.
- e) Pre-Clinical Prosthodontics and Crown & Bridge.
- f) Oral Pathology & Oral Microbiology.

### **(iii) III YEAR :**

- a) General Medicine.
- b) General Surgery.
- c) Oral Pathology and Oral Microbiology
- d) Conservative Dentistry and Endodontics
- e) Oral & Maxillofacial Surgery.
- f) Oral Medicine and Radiology
- g) Orthodontics & Dentofacial Orthopaedics
- h) Paediatrics & Preventive Dentistry
- i) Periodontology
- j) Prosthodontics and Crown & Bridge.

### **(iv) IV YEAR:-**

- a) Orthodontics & Dentofacial Orthopaedics.
- b) Oral Medicine and Radiology.
- c) Paediatrics & Preventive Dentistry.
- d) Periodontology
- e) Oral & Maxillofacial Surgery.
- f) Prosthodontics and Crown & Bridge.
- g) Conservative Dentistry and Endodontics
- h) Public Health Dentistry.

#### **11. COMMENCEMENT OF THE COURSE :**

From 1st September of the Academic year.

#### **12. CURRICULUM:**

The Curriculum and the Syllabi for the course shall be as specified in these Regulations.

#### **13. MEDIUM OF INSTRUCTION :**

English shall be the medium of instruction for all the subjects of study and for examinations.

#### **14. WORKING DAYS IN AN ACADEMIC YEAR:**

Each academic year shall consist of not less than 240 minimum teaching days of eight hours each day of the college working time, including one hour of lunch, is mandatory, vide DCI Amendment Notification dated 25<sup>th</sup> August, 2011..

#### **15. ATTENDANCE REQUIRED FOR ADMISSION TO EXAMINATION :**

- (1) No candidate shall be permitted to anyone of the parts of I BDS Examinations unless he/she has attended the course in the subject for the prescribed period and produces the necessary certificate of study, attendance and progress from the Principal of the College.
- (2) A candidate is required to put in minimum 75% of attendance in both theory and Practical / Clinical separately in each subject before admission to the examination. An undertaking from the student and the parent should be obtained as in **Annexure – III**.
- (3) In case of a subject in which there is no examination at the end of the academic year/semester, the percentage of attendance shall not be less than 70%. However, at the time of appearing for the professional examination in the subject, the aggregate percentage of attendance in the subject should satisfy subject, the aggregate percentage of attendance in the subject should satisfy condition (2) above.
- (4) A candidate lacking in the prescribed attendance in any one subject in the first appearance shall be denied admission to the entire examination.
- (5) Failed candidates who are not promoted to the next phase of study are required to put in minimum 75% of attendance during the extended period of study before appearing for the next examination.

*[ Santosh University - Revised BDS Regulations 2011– Commencement of the Course – Curriculum – Medium of Instruction – Working days in a year – Attendance requirement ]*

- (6) Attendance earned by the student should be displayed on the Notice Board of the concerned Department and college at the end of every 3 months and a copy of the same should be sent to the University and parent of the student concerned.
- (7) The monthly attendance of the students shall be received by the Principal of the college from the HODs concerned on or before second day of every month and the consolidated percentage of attendance of all the candidates shall be displayed on the college notice board and a copy sent to the Controller of Examinations of the University within 5 days from the date of completion of the internal theory/practical examinations.
- (8) The parents of the candidate who have secured less than 75% of attendance in the first internal examination shall be informed. If such candidate has not improved his/her attendance in the subsequent internal examinations also, the parent concerned may be called for to meet the Principal of the college along with the student concerned to get an undertaking as in both from the parent/guardian and the student concerned stating that his/her ward will improve the attendance at 75% failing which the student will not be eligible to apply for the University examination.

#### **16. CONDONATION OF LACK OF ATTENDANCE :**

The Condonation of shortage of attendance up to a maximum of 5% in the prescribed eligible attendance for admission to an examination rests with the discretionary powers of the Vice Chancellor. A candidate lacking the attendance shall submit an application in the prescribed form along with the stipulated fee as prescribed from time to time, 15 days prior to the commencement of theory examinations. The Head of the Department and the Principal of the College should satisfy themselves on the reasonableness of the candidate's request while forwarding the application with their endorsement to the Controller of Examination who would obtain the Vice-Chancellor's approval for Condonation of attendance and admission to the examination. No application would be reviewed if it is not forwarded through proper channel.

The Condonation for lack of attendance shall be taken up for consideration under the following circumstances:

- (1) Any illness afflicting the candidate, the candidate should submit to the Principal of the college a Medical Certificate from a registered Medical Practitioner soon after he/she returns to the institutions after treatment.

*[ Santosh University - Revised BDS Regulations 2011– Condonation of Attendance ]*

- (2) Any unforeseen tragedy in the family. The parent/guardian should give in writing the reasons for the ward's absence to the Principal of the college;
- (3) 50% of marks in Internal Assessment is compulsory for Condonation of lack of attendance.

## **17. EXAMINATIONS:**

### **(1) Preface:**

- (a) Evaluation is a continuous process, which is based upon criteria developed by the concerned authorities with certain objectives to assess the performance of the learner. This also indirectly helps in the measurement of effectiveness and quality of the concerned BDS Programme.
- (b) Evaluation is achieved by two processes –
  - (i) Formative or internal assessment;
  - (ii) Summative or University examinations.
    - Formative evaluations done through a series of tests and examinations conducted periodically by the Institution.
    - Summative evaluation is done by the University through examination conducted at the end of the specified course.

### **(2) Methods of Evaluation:**

Evaluation may be achieved by the following tested methods :

- a. Written Test ;
- b. Practical ;
- c. Clinical examination ;
- d. Viva voce.

## **18. INTERNAL EVALUATION :**

- (1) The Internal Evaluation should be done for all the years of study as detailed below: -

First IA Examination	-	December
Second IA Examination	-	April
Pre-Professional Examination	-	July
- (2) The Internal Evaluation consists of the following points -
  - a) Theory
  - b) Practical / Clinical
  - c) Viva Voce

All the details regarding Internal Evaluation and Attendance should be sent to the University at the end of I, and II Internal Evaluation and similarly after the Pre-Professional Examination. The average of the Theory / Practical / Clinical & Oral should be added and the aggregate must be taken and sent to the University as Internal Assessment Marks. Minimum 50% Internal Assessment marks and minimum 75% attendance are required to become eligible to apply for the University examinations.

- (i) After completion of the each Internal Examination, the marks and the attendance percentage scored must be exhibited periodically on the Notice Board of the College for information of the student and a copy sent to his / her parent / guardian for their knowledge on the performance of their son / daughter / ward.
- (ii) A failed candidate in any subject should be provided an opportunity to improve his / her internal assessment marks by conducting a minimum of two examinations in theory and practical separately and the average, be considered for improvement.
- (iii) The consolidated Internal Assessment marks scored out of the total marks (both in theory, practical and viva taken together) should be submitted to the Controller of Examinations of the University duly endorsed by the Principal of the College, fifteen days prior to the commencement of the theory examinations.
- (iv) A candidate should obtain a minimum of 50% marks in Internal Assessment in a subject to permit him / her to appear for the University examination in that subject.
- (v) 10% of the total marks in each subject for both theory, practical and clinical examination separately should be set aside for the internal assessment examinations.

## **19. UNIVERSITY EXAMINATIONS:**

### **(1) Commencement of Examination :**

- a. September 1st / March 1st.
- b. Theory examinations not to be held on Sunday. If the date of commencement of the examination falls on a public holiday, the next working day will be the date of commencement of examination.

*[ Santosh University - Revised BDS Regulations 2011 – University Examinations – Commencement of Examination ]*

## **(2) Scheme of Examination :**

The examination shall be open to a candidate who satisfies the requirements of attendance, progress and other rules laid down by the University. Certificate to the above effect should be produced from the Principal of the Santosh Dental College by the candidate along with the application for examination and the prescribed fee. The Scheme of Examination for the B.D.S. degree course shall be divided into five Professional Examinations, namely -

**(a) I BDS -** Professional Examinations consist of the following subjects at the end of one year from the date of commencement of the 1<sup>st</sup> year course -

- i) Paper I - General Anatomy including Embryology and Histology.
- ii) Paper II - General Human Physiology and Bio Chemistry.
- iii) Paper III - Dental Anatomy, Embryology and Oral Histology.

**(b) II BDS -** Professional Examinations consist of the following subjects at the end of one year from the date of commencement of the 2<sup>nd</sup> year course -

- i) Paper I - General Pathology and Microbiology.
- ii) Paper II - General and Dental Pharmacology and Therapeutics.
- iii) Paper III - Dental Materials.
- iv) Paper IV - Pre Clinical Conservative – Only Practical and Viva Voce.
- v) Paper V - Pre-Clinical Prosthodontics – Only Practical and Viva Voce.

**(c) III BDS –** Professional Examinations consist of the following subjects at the end of one year from the date of commencement of the 3<sup>rd</sup> year course.

- i) Paper I - General Medicine.
- ii) Paper II - General Surgery.
- iii) Paper III - Oral Pathology and Oral Microbiology.

**(d) IV BDS –** Professional Examinations consist of the following subjects at the end of one year from the date of commencement of the 4<sup>th</sup> year course -

- i) Paper I - Public Health Dentistry.
- ii) Paper II - Periodontology.
- iii) Paper III - Orthodontics & Dentofacial Orthopaedics.
- iv) Paper IV - Oral Medicine and Radiology.
- v) Paper V - Oral and Maxillofacial Surgery.
- vi) Paper VI - Conservative Dentistry and Endodontic
- vii) Paper VII - Prosthodontics and Crown & Bridge.
- viii) Paper VIII - Paediatric & Preventive Dentistry.

### **(3) Written Examination:**

- (a) The written examination in each subject shall consist of one paper of three hours duration and shall have maximum marks of 70.
- (b) In the subjects of Physiology & Biochemistry and Pathology & Microbiology each paper will be divided into two parts – Part- A and Part-B of equal marks.
- (c) The question paper should contain different types of questions like essay, short answer and objective type / MCQs.
- (d) The nature of questions set, should be aimed to evaluate students of different standards ranging from average to excellent.
- (e) The questions should cover as broad an area of the content of the course. The long questions should be properly structure and the marks specifically allotted.
- (f) The University may set up a question bank.

### **(4) Records Book / Log Book :**

The candidate should be given credit for his records based on the scores obtained in the record. The marks obtained for the record in the first appearance can be carried over to the subsequent appearance, if necessary.

### **(5) Objective Structured Clinical Evaluation:**

The clinical and practical examination should provide a number of chances for the candidate to express one's skills. This can include 4 clinical procedures, laboratory experiments, spotters etc. Evaluation must be made objective and structured. The method of objective and structured clinical examinations should be followed. This will avoid examiner bias because both the examiner and the examinee are given specific instructions on what is to be observed at each station.

### **(6) Scheme of Clinical and Practical Examinations:**

The specific scheme of clinical and practical examinations, the type of clinical procedure / experiments to be performed and marks allotted for each are to be discussed and finalized by the Chairman and other examiners and it is to be published prior to the conduct of the examinations along with the publication of the time table for the practical examinations. This scheme should be brought to the notice of the external examiner as and when the examiner reports. The practical and clinical examinations should be evaluated by two examiners of which one shall be an external examiner appointed from other universities preferably outside the State. Each candidate should be evaluated by each examiner independently and marks computed at the end of the examination.

### **(7) Viva Voce:**

Viva voce is an excellent mode of assessment because it permits a fairly broad coverage and it can assess the problem solving capacity of the student. An assessment related to the affective domain is also possible through viva voce. It is desirable to conduct the viva voce independently by each examiner. In order to avoid vagueness and to maintain uniformity of standard and coverage, questions can be pre-formulated before administering them to each student. Twenty marks are exclusively allotted for viva voce and that can be divided equally amongst the examiners, i.e. 10 marks per examiners.

### **20. QUALIFICATION AND EXPERIENCE TO BE ELIGIBLE FOR EXAMINERSHIP FOR BDS:**

1. MDS degree from a recognised Institution;
2. 4 years teaching experience in the subject in a dental college after MDS;
3. Should be holding the post of a Reader or above in a Dental Institution approved / recognised by the Dental Council of India for B.D.S.

#### **Note:**

- (a) In case of Public Health Dentistry, as there is acute shortage of teachers one examiner from Public Health Dentistry and the second one could be from Periodontics / Pedodontics.
- (b) In case of Physiology and Biochemistry if Internal Examiner is from Physiology, the External Examiner should be from Biochemistry or vice versa.
- (c) In case of Pathology and Microbiology, if Internal Examiner is from Pathology, External Examiner should be from Microbiology or vice versa.
- (d) In case of Dental Materials, if Internal is from Prosthodontics, external should be from Conservative Dentistry and vice versa.
- (d) 50% of Examiners appointed shall be external from a recognised Dental Institutions approved / recognised by the Dental Council of India for the BDS course from other University, preferably from outside the State.
- (e) Reciprocal arrangement of Examiners should be avoided. i.e. the Internal Examiner in a subject should not accept examinership for a college from which the External Examiner is appointed in his subject for the corresponding period.
- (f) No person shall be an External Examiner to the same University for more than 3 consecutive years. However, if there is a break of one year the person can be reappointed.

*[ Santosh University - Revised BDS Regulations 2011– University Examinations – Viva Voce – Qualification & Experience for Examinership ]*

## **21. UNIVERSITY EXAMINATION :**

**(1) ALLOCATION OF MARKS:** Each subject shall have a maximum of 200 marks:

1. Theory	...	...	...	100 Marks
2. Practical / Clinical	...	...	...	100 Marks

**(2) DISTRIBUTION OF MARKS :**

			<u>Theory</u>	<u>Practical/ Clinical</u>
University exam	...	...	70 Marks	90 Marks
Viva Voce	...	...	20 Marks	-
Internal Assessment (Written)	...	...	10 Marks	10 Marks
			----	----
Total	...	...	100 Marks	100 Marks
			----	----

**(3) PRACTICAL AND VIVA VOCE ONLY IN UNIVERSITY EXAMINATION:**

In respect of Pre – Clinical Prosthodontics and Pre – clinical Conservative Dentistry the Marks distribution is as follows:

Internal Assessment	..	..	20 Marks
Practical	..	..	60 Marks
Viva Voce	..	..	20 Marks
			-----
Total	..	..	100 Marks
			-----

## **22. CRITERIA FOR A PASS:**

(1) Fifty percent of the total marks in any subject computed as aggregate for theory, i.e. written, viva voce and internal assessment and practical including internal assessment separately are essential for a pass in all years of study.

(2) For declaration of pass in a subject, a candidate shall secure 50% marks in the University examination both in Theory and Practical / Clinical examinations separately, as stipulated below :

~ A candidate shall secure 50% marks in aggregate in University theory including viva voce and Internal assessment obtained in University written examination combined together.

~ In the University Practical – clinical examination, a candidate shall secure 50% of University practical marks and Internal Assessment combined together.

50% Marks in the University Written (Theory) including IA	...	50/100
50% Marks in the University Practical examination including IA	...	<u>50/100</u>
Total for a pass in a subject	...	<u>100/200</u>

*[ Santosh University - Revised BDS Regulations 2011– University Examinations – Allocation of Marks – Criteria for a pass – Grace Marks ]*

~ In case of Pre-clinical Prosthetic Dentistry and Pre-Clinical Conservative Dentistry in II BDS, where there is no written examination, minimum for pass is 50% of marks in Practical and Viva voce combined together in University examination including Internal Assessment i.e. 50/100.

**(3) Grace Marks:** Grace marks up to a maximum of 5 marks may be awarded to the students who have failed only in one subject but passed in all other subjects.

### **23. RE-TOTALING:**

There is no provision for re-evaluation of answer papers. However, only re-totalling is allowed in the failed subjects. The objective of re-totalling is to ensure to minimize human error in extenuating circumstances.

The University on application and remittance of a stipulated fee shall be allowed for Re-totalling the marks received for various questions in an answer paper / papers for theory of all subjects for which the candidate has appeared in the University examination. Any error in addition of the marks awarded if identified should be suitably rectified.

However, re-totalling is allowed on payment of prescribed fee within 15 days from the date of receipt of Mark Sheet through the Principal of the college.

### **24. EXEMPTION IN PASSED SUBJECTS :**

Any candidate who fails in an examination but obtain pass mark in any subject(s), shall be exempted from re-examination in that subject (s).

### **25. CARRY OVER OF FAILED SUBJECTS:**

- (a) Any candidate who fails in one subject in an Examination is permitted to go to the next higher class and appears for the said failed subject and complete it successfully before he is permitted to appear for the next higher examination.
- (b) **In the subjects of Pre-Clinical Prosthodontics and Pre-Clinical Conservative** - Any candidate who fails in one subject in an Examination is permitted to go to the next higher class and appears for the said failed subject and complete it successfully before he is permitted to appear for the next higher examination.
- (c) **In the subject of Oral Pathology and Oral Microbiology** - Any candidate who fails in one subject in an Examination is permitted to go to the next higher class and appears for the subject and complete it successfully before he is permitted to appear for the next higher examination.
- (d) A Declaration in this regard to abide the Rules and Regulations of the Dental Council of India and the Santosh University as in **Annexure III** shall be furnished.

*[ Santosh University - Revised BDS Regulations 2011– University Examinations – Re-Totalling – Exemption in passed subjects – Carry over of failed subjects ]*

## **26. RE-ADMISSION AFTER BREAK OF STUDY :**

As per the procedure laid down in a common Regulation for all the Under-graduate and Post-graduate courses of this University.

## **27. CLASSIFICATION OF SUCCESSFUL CANDIDATES:**

Successful candidates who obtain 65% of the total marks or more shall be declared to have passed the examination in First Class. Other successful candidates will be placed in Second Class. A candidate who obtain 75% and above is eligible for Distinction. Only those candidates who pass the whole examination in the first attempt will be eligible for distinction or class.

## **28. MIGRATION / TRANSFER OF CANDIDATES:**

- (1) Migration from one recognised Dental College to another recognised Dental College is not a right of a student. However, migration of students from one recognised Dental College to another recognised Dental College within India may be considered by the Dental Council of India only in exceptional cases on extreme compassionate grounds, provided the following criteria are fulfilled. Routine migrations on other grounds shall not be permitted.
- (2) Both the Colleges, i.e. one at which the student is studying at present and the one to which the Migration is sought for are recognised by the Dental Council of India.
- (3) The applicant candidate should have passed first professional B.D.S. examination.
- (4) The application candidate submits his application for Migration, complete in all respects, along with the Proforma as in **Annexure-IV** to all the authorities concerned within a period of one month of passing the First Professional Bachelor of Dental Surgery (B.D.S.) Examination, the period being counted from the date of declaration of the results.
- (5) The applicant must submit an affidavit (as in **Annexure - V**) duly sworn in before the 1st Class Magistrate stating that he / she will pursue 240 days of prescribed study before appearing for the II professional Bachelor of Dental Surgery (B.D.S.) Examination at the transferee Dental College. The affidavit should be duly certified by the Registrar of the concerned University to which he/she is seeking transfer. The transfer will be applicable after receipt of the affidavit.

**NOTE:**

- (a) Migration is permitted only in the beginning of 2<sup>nd</sup> year BDS course in recognised Institution.
- (b) All applications for migration will be referred to Dental Council of India by the college authorities. No Institution / University shall allow migrations directly without the prior approval of the Council.
- (c) The Council reserved the right, not to entertain any application which is not under the prescribed following compassionate grounds and also to take independent decisions where applicant has been allowed to migrate without referring the same to the Council:
  - i) Death of supporting guardian;
  - ii) Disturbed conditions as declared by Government in the Dental College area.

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## **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN ANATOMY**

### **Preamble:**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

These guidelines would help to achieve a uniform level of training of MD Anatomy to post graduate students throughout the country. The student, after undergoing the training, should be able to deal effectively with the needs of the medical community and should be competent to handle all problems related to the specialty of Anatomy and recent advances in the subject. The post graduate student should also acquire skills in teaching anatomy to medical and para-medical students and be able to integrate teaching of Anatomy with other relevant subjects, while being aware of her/his limitations.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

### ***SUBJECT SPECIFIC LEARNING OBJECTIVES***

The **Goal** of MD Anatomy is to train a doctor to become a competent teacher and researcher in Anatomy who:

1. Is aware of *contemporary advances and developments* in the field of Anatomy.
2. Has *acquired the competencies* pertaining to the subject of Anatomy that are required to be practiced at all levels of health system.
3. Is able to discharge responsibilities and participate in National Health Education Programme.
4. Is oriented to the *principles of research methodology*.
5. Has acquired *skills in educating* medical and paramedical professionals.
6. Has acquired *skills in effectively communicating* with the students and colleagues from various medical and paramedical fields.
7. Has acquired skills of integrating anatomy with other disciplines as and when needed.
8. Has acquired qualities of a good teacher capable of innovations in teaching methodology.

9. Has been able to demonstrate adequate management skills to function as an effective leader of the team engaged in teaching and research.

After completing the three year course in MD Anatomy the student should have achieved competence in the following:

### **1. Knowledge of Anatomy**

- 1.1. Acquire competencies in gross and surface anatomy, neuroanatomy, embryology, genetics, histology, radiological anatomy, applied aspects and recent advances of the above mentioned branches of anatomy to clinical practice. These are given in detail in subsequent sections.

### **2. Practical and Procedural skills**

- 2.1 Acquire mastery in dissection skills, embalming, tissue preparation, staining and museum preparation.

### **3. Training skill in Research Methodology**

- 3.1 Acquire skills in teaching, research methodology, epidemiology & basic information technology.
- 3.2 Acquire knowledge in the basic aspects of Biostatistics and research methodology.
- 3.3 Has knowledge to plan the protocol of a thesis, carry out review of literature, execution of research project and preparation of report.
- 3.4 Has ability to use computer applications Microsoft office (Microsoft word, excel, power point), Internet, Searching scientific databases (e.g. PubMed, Medline, Cochrane reviews).
- 3.5 Acquire skills in paper & poster preparation, writing research papers and Thesis.

### **4. Professionalism, attitude and communication skills:**

- 4.1 Develop honest work ethics and empathetic behavior with students and colleagues.
- 4.2 Acquire capacity of not letting his/her personal beliefs, prejudices, and limitations come in the way of duty.
- 4.3 Acquire attitude and communication skills to interact with colleagues, teachers and students.

### **5. Teaching Anatomy**

- 5.1 Practicing different methods of teaching-learning.
- 5.2 Making presentations of the subject topics and research outputs.

### **6. Problem Solving**

- 6.1 Demonstrate the ability to identify applied implications of the knowledge of anatomy and discuss information relevant to the problem, using consultation, texts, archival literature and electronic media.
- 6.2 Demonstrate the ability to correlate the clinical conditions to the anatomical/ embryological/hereditary factors.
- 6.3 Demonstrate the ability to evaluate scientific/clinical information and critically analyze conflicting data and hypothesis.

### ***SUBJECT SPECIFIC COMPETENCIES***

**At the end of the course, the student should have acquired following competencies:**

#### **A. Cognitive domain**

1. Describe gross anatomy of entire body including upper limb, lower limb, thorax, abdomen, pelvis, perineum, head and neck, brain and spinal cord.
2. Explain the normal disposition of gross structure, and their interrelationship in the human body. She/He should be able to analyze the integrated functions of organs systems and locate the site of gross lesions according to deficits encountered.
3. Describe the process of gametogenesis, fertilization, implantation and placenta formation in early human embryonic development along with its variation and applied anatomy.
4. Demonstrate knowledge about the sequential development of organs and systems along with its clinical anatomy, recognize critical stages of development and effects of common teratogens, genetic mutations and environmental hazards. She/He should be able to explain developmental basis of variations and congenital anomalies.
5. Explain the principles of light, transmission and scanning, compound, electron, fluorescent and virtual microscopy.
6. Describe the microscopic structure of various tissues & organs and correlate structure with functions as a prerequisite for understanding the altered state in various disease processes.
7. Demonstrate knowledge about cell and its components, cell cycle, cellular differentiation and proliferation.
8. Describe structure, number, classification, abnormalities and syndromes related to human chromosomes.
9. Describe important procedures in cytogenetics and molecular genetics with its application.
10. Demonstrate knowledge about single gene pattern inheritance, intermediate pattern and multiple alleles, mutations, non-mendelian inheritance, mitochondrial inheritance, genome imprinting and parental disomy.
11. Describe multifactorial pattern of inheritance, teratology, structure gene, molecular screening, cancer genetics and pharmacogenetics.
12. Demonstrate knowledge about reproduction genetics, assisted reproduction, prenatal diagnosis, genetic counseling and ethics in genetics.

13. Explain principles of gene therapy and its applied knowledge.
14. Describe immune system and cell types involved in defense mechanisms of the body. Also explain gross features, cytoarchitecture, functions, development and histogenesis of various primary and secondary lymphoid organs in the body.
15. Demonstrate knowledge about common techniques employed in cellular immunology and histocompatibility testing.
16. Demonstrate applications of knowledge of structure & development of tissue-organ system to comprehend deviations from normal.
17. Demonstrate knowledge about recent advances in medical sciences which facilitate comprehension of structure function correlations and applications in clinical problem solving.
18. Explain collection, maintenance and application of stem cells, cryobanking and principles of organ donation from recently dead bodies.
19. Demonstrate knowledge about surface marking of all regions of the body.
20. Able to interpret various radiographs of the body, normal CT Scan, ultrasound and MRI.
21. Demonstrate knowledge about different anthropological traits and use of related instruments.
22. Demonstrate knowledge about outline of comparative anatomy of whole body and basic human evolution
23. Demonstrate knowledge about identification of human bones, determination of sex, age, and height for medico legal application of anatomy

## **B. Affective domain**

1. Demonstrate self-awareness and personal development in routine conduct. (*Self-awareness*)
2. Communicate effectively with peers, students and teachers in various teaching-learning activities. (*Communication*)
3. Demonstrate
  - a. Due respect in handling human body parts & cadavers during dissection. (*Ethics & Professionalism*)
  - b. Humane touch while demonstrating living surface marking in subject/patient. (*Ethics & Professionalism*)
4. Acquire capacity of not letting his/her personal beliefs, prejudices and limitations come in the way of duty.
5. Appreciate the issues of equity and social accountability while exposing students to early clinical exposure. (*Equity and social accountability*)

## **C. Psychomotor domain**

At the end of the course the student should be able to:

1. Identify, locate and demonstrate surface marking of clinically important structures in the cadaver and correlate it with living anatomy.
2. Acquire mastery in dissection skills, embalming, tissue preparation, staining and museum preparation.
3. Locate and identify clinically relevant structures in dissected cadavers.
4. Locate and identify cells & tissues under the microscope.
5. Identify important structures visualized by imaging techniques, specifically radiographs, computerized tomography (CT) scans, MRI and ultrasonography.
6. Demonstrate various movements at the important joints and actions of various groups of muscles in the human body.
7. Demonstrate anatomical basis of common clinical procedures expected to be performed by a basic medical doctor.
8. Demonstrate different methods of teaching-learning and make presentations of the subject topics and research outputs.

**Specific practice based competencies:**

<b>Name/Description of practice based competencies</b>
<p><b>1. Gross anatomy:</b></p> <ol style="list-style-type: none"> <li>1.1 Procurement, Embalming and Preservation of human cadavers</li> <li>1.2 Preparation of tanks for preserving bodies</li> <li>1.3 Dissection of cadaver</li> <li>1.4 Window dissection of important regions</li> <li>1.5 Preparation of specimens for museum with display               <ol style="list-style-type: none"> <li>a) soft parts</li> <li>b) models</li> <li>c) charts</li> </ol> </li> <li>1.6 Preparation and preservation of human bones / skeleton as assigned by the faculty</li> </ol>
<p><b>2. Histology</b></p> <ol style="list-style-type: none"> <li>2.1 Preparation of common fixatives embalming fluid 10% formalin, Bouin's fluid etc</li> <li>2.2 Making paraffin blocks and section cutting and mounting</li> <li>2.3 Preparation of staining set for H and E staining and staining paraffin sections with the stain</li> <li>2.4 Making celloidin, araldite, gelatin blocks and their section cutting</li> <li>2.5 Processing hard tissues, decalcification of bones, block making and sectioning, preparation of ground sections of calcified bones.</li> <li>2.6 Frozen section cutting on freezing microtome and cryostat</li> <li>2.7 Honing and Stropping of microtome knives, including sharpening by automatic knife sharpener</li> <li>2.8 Histology file in which LM and EM pictures of all the organs and tissues of the body should be drawn and a small description of salient features written</li> </ol>

<p><b>3. Histochemical Methods</b></p> <p>3.1 Practical classes for staining of glycogen, mucopolysaccharides, alkaline phosphatase acid phosphatase, and calcium</p>
<p><b>4. Cytogenetics</b></p> <p>4.1 Preparation of media, different solutions, stains etc.</p> <p>4.2 Preparation of buccal smear for sex chromatin Human chromosome preparation from peripheral blood and karyotyping.</p> <p>4.3 Banding techniques ( G and C)</p> <p>4.4 Making of Pedigree charts for study of patterns of inheritance.</p> <p>4.5 Chromosomal Analysis.</p>
<p><b>5. Neuroanatomy:</b></p> <p>5.1 Dissection of brain and spinal cord for teaching and learning purpose</p> <p>5.2 Preparation of brain and spinal cord macroscopic and microscopic sections and identification of different parts in them.</p> <p>5.3 Discussions on clinical problems related to neurological disorders and anatomical explanation for the same.</p>

## *Syllabus*

A post graduate student, after three years of training in M.D. (Anatomy) should have acquired knowledge in the following aspects of anatomy:

### **Gross anatomy**

#### **Section - I**

Gross Anatomy of entire body including upper limb, lower limb, thorax, abdomen, pelvis, perineum, head and neck, brain and spinal cord

#### **Section - 2**

#### **Developmental anatomy/embryology**

- General embryology: gametogenesis, fertilization, implantation and placenta, early human embryonic development.
- Systemic embryology: development of organ systems and associated common congenital abnormalities with teratogenesis.
- Physiological correlations of congenital anomalies.

#### **Section - 3**

#### **Histology and histochemistry**

##### **Cell Biology:**

- Cytoplasm - cytoplasmic matrix, cell membrane, cell organelles, cytoskeleton, cell inclusions, cilia and flagella.
- Nucleus - nuclear envelope, nuclear matrix, DNA and other components of chromatin, protein synthesis, nucleolus, nuclear changes indicating cell death.
- Cell cycle - mitosis, meiosis, cell renewal.
- Cellular differentiation and proliferation.
- **Microscopic structure of the body:**
- Principles of light, transmission and scanning, electron, fluorescent, confocal and virtual microscopy.
- The systems/organs of body - Cellular organization, light and electron microscopic features, structure - function correlations, and cellular organization.

#### **Section - 4**

##### **Neuroanatomy:**

- Brain and its environment, Development of the nervous system, Neuron and Neuroglia, Somatic sensory system, Olfactory and optic pathways, Cochleovestibular and gustatory pathways, Motor pathways, Central autonomic pathways, Hypothalamo-hypophyseal system, Limbic system, Basal ganglia, Reticular system, Cross Sectional anatomy of brain and spinal cord.
- Detailed structure of the central nervous system and its applied aspect.

#### **Section - 5**

##### **Genetics**

- Human Chromosomes - Structure, number and classification, methods of chromosome preparation banding patterns. Chromosome abnormalities, Autosomal and Sex chromosomal abnormalities syndromes, Molecular and Cytogenetics.
- Single gene pattern inheritance: Autosomal and Sex chromosomal pattern of inheritance, Intermediate pattern and multiple alleles, Mutations, Non-Mendelian inheritance, Mitochondrial inheritance, Genome imprinting, parental disomy.
- Multifactorial pattern of inheritance: Criteria for multifactorial inheritance, Teratology, Structure gene, Molecular Screening, Cancer Genetics - Haematological malignancies, Pharmacogenetics.

- Reproduction Genetics - Male and Female Infertility, Abortuses, Assisted reproduction, Preimplantation genetics, Prenatal diagnosis, Genetic Counseling and Ethics of Genetics.
- Principles of Gene therapy and its applied knowledge.

## **Section - 6**

### **Immunology**

- Immune system and the cell types involved in defense mechanisms of the body. Gross features, cytoarchitecture, functions, development and histogenesis of various primary and secondary lymphoid organs in the body.
- Biological and clinical significance of the major histocompatibility complex of man including its role in transplantation, disease susceptibility/resistance and genetic control of the immune response.
- Common techniques employed in cellular immunology and histocompatibility testing.
- Molecular hybridization and PCR technology in immunology research particularly mechanism of antigen presentation, structural and functional relevance of the T cell receptor, genetic control of the immune response. Molecular basis of susceptibility to disease.

## **Section - 7**

### **Applied anatomy and recent advances**

- Clinical correlations of structure and functions of human body. Anatomical basis and explanations for clinical problems.
- Applications of knowledge of development, structural (microscopy), neuro anatomy to comprehend deviations from normal.
- Recent advances in medical sciences which facilitate comprehension of structure function correlations and applications in clinical problem solving.
- Collection, maintenance and application of stem cells, cryobanking and principles of organ donation from recently dead bodies.

## **Section - 8**

- **Surface Marking and Radiology**

Surface marking of all regions of the body. Interpretation of normal radiographs of the body including special contrast procedures including barium studies, cholecystography, pyelography, salphingography. Normal CT Scan, MRI and Ultrasound.

- **Anthropology**  
Different anthropological traits, Identification and use of Anthropological instruments.
- **Forensic Medicine:**  
Identification of human bones from their remains and determination of sex, age, and height. for medico legal application of Anatomy.
- **Outline of comparative anatomy of the whole body and basic human evolution**

### **Departmental Resources:**

It is mandatory for the department of Anatomy to develop at least three of the following laboratories, in addition to the other facilities. The laboratory should be involved in active research in at least one well defined field.

1. Histology
2. Immunology
3. Electronmicroscopy/ Fluorescence microscopy/ confocal and other forms of microscopy laboratories
4. Developmental anatomy
5. Anthropometry
6. Neuroanatomy
7. Cytogenetics
8. Imaging technique for Radiological Anatomy

## ***TEACHING AND LEARNING METHODS***

### **Teaching methodology**

During the course, students should have formal training in teaching and research. The sessions should be in the form of:

1. **Didactic Teaching**  
Topics in gross, surface and cross sectional anatomy, microanatomy, embryology, neuroanatomy, histochemistry, and genetics taught by faculty members.
2. **Training in communication skills** - journal club, seminars, demonstrations, tutorials, lectures, quizzing.
3. Hands-on experience - techniques in microanatomy, neuroanatomy, gross anatomy, embryology, histochemistry, genetics, microscopy. Embalming and preservation of cadavers
4. Teaching: participate in the teaching and training programme of undergraduate students and interns.
5. Participate in seminars, symposia, group-discussions and Journal clubs.

6. Educational technology - preparation of Audio Visual aids for teaching, posters/manuscripts for presentation in conferences/workshops and publication in journals.
7. Participation in formulating evaluation methods: Setting objective questions, Short Answer Questions, Multiple Choice Questions and Objective Structured Practical Examination (OSPE).
8. Prepare teaching modules and museum specimens.
9. Participation in organization of symposia/workshops
10. Explain and interpret normal radiological anatomy and sectional anatomy of the human body as studied by various imaging techniques.
11. Comprehend and demonstrate surface and living anatomy of the human body.
12. Relate forensic anatomy to the study with medico-legal aspects of bone in particular.
13. Explain the general principles of Anatomy Act and Organ Transplantation Act.
14. Comprehend ethical aspects of biomedical research.
15. Comprehend the basis of disposal of biomedical waste.
16. Comprehend horizontal integration of various subdivisions of anatomy with relevant physiology and biochemistry.
17. **Log Book:** Every student should maintain a logbook in which a record of the practical exercises completed should be entered. The Log books shall be checked and assessed periodically by the faculty members imparting the training.
18. A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
19. Department should encourage e-learning activities.

## ***ASSESSMENT***

### **FORMATIVE ASSESSMENT:**

**Formative assessment should be continual and should assess medical knowledge, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

During the three year training period,

- A record of all theoretical, practical and experimental work done by the post graduate student and its assessment will be kept and shall be available for examiners at the time of the final practical and viva voce examination and
- There will be periodical examinations during the course of training. The pre-final theory and practical examination will be conducted by the faculty of the

concerned college. During last six months the post graduate student will have weekly assessment tutorials conducted by the faculty. All activities will be evaluated.

### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

**Quarterly assessment during the MD training should be based on:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).**

### **SUMMATIVE ASSESSMENT:**

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

**The Post Graduate examination will be in three parts:**

#### **1. Thesis:**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory

and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

## **2. Theory**

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

**There shall be four theory papers.**

**Paper I:** Gross Anatomy

**Paper II:** Embryology, Microscopic Anatomy and Genetics

**Paper III:** Neuroanatomy

**Paper IV:** Applied Human Anatomy and recent advances in anatomical Sciences

### **Theory Papers**

#### **Paper I: Gross Anatomy**

- a). Gross Anatomy of whole human body i.e. upper limb, lower limb thorax, abdomen, pelvis, head and neck
- b). Method of preservation of human body and its parts, radiological anatomy, sectional anatomy.

#### **Paper II: Embryology, Microscopic Anatomy and genetics**

- a). General Principles of genetics, Cytogenetic as applicable to medicine and different genetic disorders, gene therapy.
- b). General Embryology, Systemic Embryology, methods of experimental embryology, clinically oriented embryology and teratology
- c). Histology (including fine structure) of tissues and organs of the body.
- d). Principles of light, transmission and scanning electron microscopy, confocal, virtual microscopy.

#### **Paper III: Neuroanatomy**

Neuroanatomy - gross and applied aspects

#### **Paper IV: Applied Human Anatomy and recent advances in medical sciences**

- (a) Clinical and applied aspect of Anatomy
- (b) Recent advances in the application of knowledge of anatomy on human

- body
- (c) Collection, maintenance and uses of stem cells
- (d) Cryobanking
- (e) Basics of principles of organ donation from recently dead bodies.

### **3. Practicals: spread over a minimum of 2 days**

#### **First Day Practical:**

**(a): Gross Anatomy**

Dissection and related viva voce

**(b): Histology**

Spotting (10 spots) and viva voce

Techniques paraffin block making, section cutting. Staining (H and E stain) with related viva

#### **Second Day Practical:**

- a) Microteaching of a short topic to assess teaching skills
- b) A short synopsis of the thesis work should be presented by the post graduate student
- c) Grand viva including Gross anatomy, cross sectional anatomy, radiological Anatomy, Surface Anatomy, Embryology

### **Practical and Oral/Viva-Voce Examination**

#### **Practical Examination to be organized as per details given below:**

Dissection on cadaver

Histology spotting

Histological techniques

Surface Marking

Radiology

Teaching ability

Thesis presentation

#### **Oral/Viva-voce Examination**

##### **Grand viva**

On dissected parts of the whole human body including nervous system, and Embryology models, teratology, skeletal system including short bones, embalming techniques and genetics, radiographs, MRI, CT & ultrasonographs.

### **Recommended reading:**

#### **Books (latest edition)**

### **Gross Anatomy:**

1. Susan Strandring: Gray's Anatomy: The anatomical basis of clinical practice, Churchill Livingstone Elsevier.
2. Dutta A.K. Human Anatomy vol. I-III Current Publisher.
3. Dutta A.K. Principle of General Anatomy. Current Publisher.
4. Romanes. Cunningham's Manual of Practical Anatomy vol. I-III, Oxford.
5. Keith and Moore Clinical Oriented Anatomy. Lippincot Williams and Willkins.
6. R.S Snell. Clinical Anatomy by regions. Lippincot Williams and Wilkins.
7. J.V. Basmajin. Grant's Method of Anatomy. Williams and Wilkins.
8. R.J. Last. Anatomy Regional and Applied. Churchill Livingston.
10. Lee McGregar. Surgical Anatomy. K.M. Varghese.
11. A.G. R Deckeg, D.J du Pless Lee. Mc Gregor's Synopsis of Surgical Anatomy. Varghese Publishing House.
12. Snell. Clinical anatomy by regions. Lippincotts, Williams and Wilkins.
13. S. Chummy Sinnatanmy. Last's Anatomy Regional and Applied. Churchill Livingston.
14. Hollinshed W Henry. Anatomy for surgeons. Vol. I-III Lippincotts, Williams and Wilkins.
15. Vishram Singh. Clinical and Surgical Anatomy. Elsevier.
16. Vishram Singh. Textbook of general anatomy. Elsevier.
17. Frank H. Netter. Atlas of Human Anatomy. Saunders Elsevier.

### **Histology**

1. Young B. and Heath J. Wheater's Functional Histology. Churchill Livingstone.
2. M.H. E Ross. Histology: A textbook and atlas. Williams and Wilkins.
3. V. Bharihoke. Text book of human histology. Delhi AITBS.
4. Difiore's. Atlas of histology with functional co-relation.
5. Bloom and Fawcett. Text book of histology.
6. Carlton's. Histology Technique.
7. E.C. Clayden. Practical of section cutting and staining.
8. D W Cormack. Ham's Histology. Lippincotts, Williams and Wilkins.
9. Bloom and Fawcett. Textbook of Histology.

### **Genetics**

1. J.S Thompson and Thompson . Genetics in medicine. W.B. Saunders and Co. Philadelphia, London.
2. George Fraser and Oliver Mayo. Text book of Human Genetics. Blackwell Scientific Publications London, Oxford Edinburg, Melbourne.
3. Hann Sellwerger and Jame Simpson. Chromosomes of Man. Sparsher's International Medical Publications.

## **Embryology**

1. Hamilton, Boyd. and Mossman. Human Embryology.
2. TW Sadler. Langman's Medical Embryology. Lippincotts, Williams and Wilikins.
3. Keith L Moore and T.V.N. Persaud. The Developing Human. Saunders.
4. Rani Kumar. Text book of embryology. I.K. International New Delhi

## **Neuroanatomy**

1. Richard S. Snell. Clinical Neuroanatomy for Medical Students. Williams and Wilkins.
2. A. Parent. Carpenter's Human neuroanatomy. Williams and Wilkins.
3. Vishram Singh. Clinical Neuroanatomy. Elsevier.
4. A. K. Dutta. Essentials of Neuroanatomy. Current books international.
5. John A. Kiernan. Barr's the human nervous system, Lippincott, Williams and Wilkins.

## **Statistics**

1. David E. Matthews and Vernon T. Farewell. Using and Understanding Medical Statistics. Karger.

## **Radiology**

1. T.B. Moeller et.al. Sectional Anatomy CT and MRI Vol. I, II, III New York. Theme Stuttgart.
2. J.B. Walter et.al. Basic Atlas of Sectional Anatomy with correlated imaging. Saunders Elsevier.

## **Surface anatomy**

1. SP John, Lumley editors. Surface Anatomy, The Anatomical basis of clinical examination. London: Churchill Livingstone.
2. A. Halim. and A.C. Das. Surface Anatomy Lucknow. ASI, KGMC.

## **Journals**

03-05 international Journals and 02 national (all indexed) journals

**Postgraduate Students Appraisal Form  
Pre / Para /Clinical Disciplines**

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

**Publications**

**Yes/ No**

Remarks\* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

\*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE of ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN ANAESTHESIOLOGY**

## **Preamble**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A post graduate specialist having undergone the required training in anesthesiology should be able to recognize the health needs of the community. He or she should be competent to handle effectively medical problems and should be aware of the recent advances pertaining to his/her specialty. She/he should be highly competent anesthesiologist with broad range of skills that will enable him/her to practice anesthesiology independently. The PG student should also acquire the basic skills in teaching of medical/para-medical students. She/he is also expected to know the principles of research methodology and modes of consulting library. She/he should attend conferences, workshops and CMEs regularly to upgrade his/her knowledge.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC LEARNING OBJECTIVES***

The training should have clear objective, is competency based, is well planned & evaluated, is supervised and delivered by well trained teachers. It will have special emphasis on attitude and behavior, safety, communication, presentation, audit, teaching, ethics and law and management.

No limit can be fixed and on the number of topics that can be prescribed as course contents. The student is expected to know his/her subject in depth from various text books and journals; however more emphasis should be on the diseases/health problems most prevalent in that area. Knowledge of recent advances and basic sciences as applicable to his/her specialty should get high priority. Competency in anaesthesia skills commensurate with the specialty (actual hand on training) must be ensured.

**Specific learning objectives:**

1. **Theoretical knowledge:** The student should have fair knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology, Pharmacology, Statistics and Physics) as applied to Anaesthesia. The student should acquire in-depth knowledge including recent advances. He/she should be fully conversant with the bedside procedures (diagnostic and therapeutic) and have knowledge of latest diagnostics and therapeutics procedures available including radiological methods.
2. **Teaching:** The student should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students. The student should be familiar with the latest teaching (computer and power point presentation) modes including simulators training and evidence based medical education.
3. **Attitude development:** The student should develop attitude that leads to appropriate communication with colleagues to function in a group in Operating Room /Intensive Care Unit, and develop the ability to function as a leader in the operating room.

### ***SUBJECT SPECIFIC COMPETENCIES***

**The student during the training programme, should acquire the following competencies:**

#### **A. Cognitive domain**

- Demonstrate knowledge of Anatomy related to;
  - ❖ Diaphragm, upper and lower airway, heart and coronary circulation ,
  - ❖ Regional anaesthesia - field block, central neuraxial, blockade, block for acute pain states
  - ❖ Procedures like -Intramuscular injections, arterial and venous cannulations and
  - ❖ Patient Positioning under anaesthesia
- Demonstrate knowledge of Physiology of various systems (respiratory, cardiovascular, hepatobiliary, renal, endocrine, pregnancy, haematological, neuromuscular, regulation of temperature and metabolism, stress response, cerebral blood flow and ICP, central, autonomic and peripheral nervous systems, metabolic response to stress and trauma) in detail and translate its application in a problem solving manner.
- Demonstrate knowledge of Biochemistry relevant to fluid balance and blood transfusion, perioperative fluid therapy, acid base homeostasis in health and diseases.
- Demonstrate knowledge of commonly used drugs in anaesthesia practice (premedication, induction agents - intra-venous and inhalational, neuromuscular blocking agents and reversal of muscle relaxants) - general principles, concepts of

pharmacokinetics and pharmacodynamics, drug interactions with the other drugs taken concomitantly by the patient and anaphylactoid reactions.

- Demonstrate knowledge of gas laws, medical gas supply system, fluidics, electricity, diathermy and oxygen therapy.
- Demonstrate knowledge of 'principles of physics' that govern functions of basic anaesthesia delivery equipment, airway devices – (laryngoscopes, airways etc), breathing systems and monitors, fiber optics, Lasers, Pacemakers and defibrillators, monitoring equipments (used for assessment of cardiac functions, temperature, respiratory functions, blood gases, intracranial pressure, depth of anaesthesia and neuromuscular block), Sterilization of equipments, manufacture, filling and transport of gases and liquid oxygen. etc.
- Demonstrate knowledge of importance of pre-anaesthetic assessment and optimization of a patient; consisting of evaluation, interpretation of laboratory investigation as applied to the care of the patients in planning and conduct of general anaesthesia.
- Demonstrate knowledge of basic life support, advanced cardiac, trauma life support, and neonatal resuscitation according to latest guidelines.
- Demonstrate knowledge of principles of sterilization and universal precautions, selection, maintenance and sterilization of anaesthesia and related equipment, Infection control, cross contamination in OT and ICU. Immune response and anaesthesia.
- Describe the development and history of anaesthesia as a specialty with knowledge of important personalities who have contributed towards it.
- Demonstrate knowledge of principles of artificial ventilation, management of unconscious patients, oxygen therapy, shock- (pathophysiology and management) and various protocols related to Intensive Care Unit.
- Demonstrate knowledge of post-operative care in the post-anaesthesia recovery room, in terms of management of
  - ❖ Post-operative pain: various modalities
  - ❖ Nausea and vomiting
  - ❖ Identified emergencies and postoperative complications.
  - ❖ Special precautions to be taken in specific surgical patients.
- Demonstrate knowledge of acute pain management, chronic pain therapy & therapeutic nerve blocks, acupuncture, acupressure and other non-conventional methods of treatment.
- Describe documentation, medico-legal aspects of anaesthesia and concept of informed consent.
- Demonstrate knowledge of research methodology and basics of biostatistics relevant to data collection, analysis, record keeping in anaesthesia, comparison and estimation of significance.

- Demonstrate ability to interpret blood gas analysis and other relevant biochemical values, various function tests and basics of measurement techniques, ECG.
- Explain blood coagulation mechanism, and their disturbances, rational use of blood and blood components.
- Demonstrate knowledge pertaining to special anaesthetic techniques as relevant to:
  - ❖ Outpatient anaesthesia, hypotensive anaesthesia, anaesthesia in abnormal environments including rural area and calamitous situations
  - ❖ Associated medical disorders in surgical patients
  - ❖ Geriatric and pediatric anaesthesia, Emergency, ENT, orthopedic, ophthalmology, obstetrics, dental, radio-diagnosis and radiotherapy.
  - ❖ Induced hypothermia, incidental, environmental safety of patient.
  - ❖ Malignant hyperthermia, myasthenia gravis, GB syndrome and other neuromuscular diseases, obesity, COPD, Diabetes mellitus, bronchial asthma and hypertensive crises..
  - ❖ Principles of anaesthetic management of neuro/cardiac/thoracic/vascular/transplantation/burns and plastic surgery.
  - ❖ Anaesthesia for patients with severe cardiac, respiratory, renal and hepatobiliary disorder posted for unrelated surgery
  - ❖ Shock, types, pathogenesis and management of patients in shock, renal failure, critically ill and/or on ventilator, Multiple organ failure
- Demonstrate knowledge pertaining to care of terminally ill, Hospices management, Do not resuscitate orders.
- Demonstrate knowledge of general principles of medical audit and Critical incident reporting.
- Demonstrate knowledge of Ethics and clinical trial.
- Demonstrate knowledge of Hospital, ICU and OT design and planning.
- Demonstrate knowledge of Medical education including evidence based medical education.
- Demonstrate knowledge of principles of human resources and material management.

## **B. Affective Domain:**

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

## **C. Psychomotor domain**

**At the end of the course, the student should acquire skills in the following broad areas and be able to:**

- Demonstrate ability **as a perioperative physician**, in terms of
  - ❖ Acquiring mastery in careful and relevant history taking, physical examination in clinical evaluation of the patient preoperatively.
  - ❖ Collecting and synthesizing preoperative data from parent hospital and other sources and to develop a rational strategy for the peri-operative care of the patient.
  - ❖ Thorough and systematic approach to preoperative evaluation of patients with and without systemic diseases, undergoing different types of operations.
  - ❖ Prioritizing problems, present cases clearly and systematically to attending consultants.
  - ❖ Developing working relationships with consultants in other specialties to assist in preoperative evaluation and get a good consultation.
  - ❖ Interacting with preoperative patients and developing effective counseling techniques for different anaesthetic techniques and peri-operative procedures.
  - ❖ Assessing and explaining risk of procedure and taking informed consent.
  - ❖ Managing information in preoperative evaluation and outcome enhancement and communication skill to patients and relatives.
  - ❖ Ability to choose and order the required investigations to be done in a particular patient peri operatively
- Demonstrate ability in performing
  - ❖ Pre-operative equipment check
  - ❖ selection of drugs
  - ❖ Preparation of work table etc.
- Identify conditions like difficult airway by following difficult airway algorithms.
- Demonstrate ability to establish topical airway anaesthesia for awake intubation
- Demonstrate management of a Failed intubation drill on a Mannequin according to latest guidelines
- Demonstrate ability to monitor and assess depth of anaesthesia
- Demonstrate abilities to manage body fluid composition; volume status; replacement of fluid and blood loss; use of whole blood and blood components.

- Demonstrate abilities to manage Electrolyte and acid base derangements; osmolarity and osmolality.
- Demonstrate acquisition of skills to initiate mechanical ventilation; select appropriate type and mode of ventilator; and monitor proper functioning of ventilator.
- Identify the need to perform intra-operative laboratory tests, blood gases, coagulation profile and interpret the results with clinical correlation
- Demonstrate ability to manage co-morbid conditions and anaesthesia
- Demonstrate ability to perform cannulation of arteries, central and peripheral veins.
- Demonstrate ability in using and interpreting the following routine non-invasive and invasive monitors intra-operatively:
  - a. Electrocardiogram with ST-segment analysis
  - b. Noninvasive blood pressure
  - c. Capnograph: values and changes in values and waveform.
  - d. Pulse oximetry: values and changes in values
  - e. Neuromuscular blockade monitor
  - f. Invasive arterial pressure: waveform and changes in the waveform
  - g. Central venous pressure: values and waveform
  - h. Pulmonary artery pressure: Values and waveforms, pulmonary capillary wedge tracing.
    - i) Cardiac output
    - ii) Mixed venous oxygen saturation
    - iii) Evoked potential
    - iv) Transesophageal echocardiography: basic understanding
- Demonstrate skills in providing basic life support, advanced cardiac life support, trauma life support and paediatric-neonatal life support, train medical and paramedical staff in BLS and ALS.
- Demonstrate mastery in common procedures like vascular access, use of latest invasive and non-invasive monitoring equipment, lumbar puncture, management of appropriate mechanical ventilation and total care of Intensive Care Patient.
- Demonstrate ability to administer general anaesthesia and regional anaesthesia for ASA I to V, under supervision.
- Demonstrate ability to give extradural block (EDB) lumbar and thoracic, Spinal Block, and Peripheral Nerve Blocks under supervision.
- Demonstrate ability to use ultrasound machine for giving blocks and venous cannulation.
- Demonstrate ability to plan and administer anaesthesia to all emergency patients under supervision including patients for Cardiac, Neurosurgery, Pediatric surgery,

and for all major surgeries, able to manage critically ill patients and treat intractable pain.

- Demonstrate following abilities in **Emergency Anaesthesia, Trauma and Resuscitation:**
  - ❖ Organize resources in case of mass casualty.
  - ❖ Perform triage.
  - ❖ Assess, transport and manage mass casualties / disaster management and camp anaesthesia.
  - ❖ Manage massive haemorrhage and massive blood transfusion.
  - ❖ Transport critically ill patient.
  - ❖ Perform anaesthetic management of geriatric patients with fracture neck of femur
  - ❖ Manage severe burns patients, rapidly progressing spinal compression, massive haemoptysis and lobectomy, peritonitis from various suspected causes, preparation and management of bowel obstruction, septicaemic shock, acute upper airway obstruction such as foreign body, epiglottitis, infections, cardiac tamponade from examples post cardiac surgery, malignant pericardial effusion, peri-operative management of rupture aneurysm of abdominal aorta
  - ❖ Basic Cardiac Life Support and Advanced Cardiac Life Support, Basic Trauma Life Support, Advanced Trauma Life Support, and Cerebral preservation.
  - ❖ Management of intra-operative cardiac arrest
  - ❖ Management of intra-operative bronchospasm
  
- Demonstrate ability to document a Medico-legal aspect.
- Demonstrate ability to provide special sedation /**anaesthesia requirements outside operating Room**, eg **Radiology**: for CT, MRI (especially in relation to dye allergy and embolization, **Oncho radiotherapy**, **Electroconvulsive shock therapy** (modified ECT. **Non-invasive cardio-radiologic procedures** including balloon angioplasty and cardiac catheterization, **Non-invasive neuro-radiologic procedures, lithotripsy** etc .
- Demonstrate ability to analyze data and write a thesis, present scientific data, participate in anaesthesia audit.
- Demonstrate ability to critically review and acquire relevant knowledge from the journals about the new development in the specialty
- Demonstrate following abilities in the **Post Anaesthesia Care Unit (PACU)**
  - ❖ Assess the patient's recovery and condition for a safe discharge or transfer.
  - ❖ Observe, recognize and treat the commonly occurring problems likely to arise in the Post-anaesthesia Care Unit (PACU) especially those in relation to cardio-respiratory systems:
    1. Airway integrity and compromise.

2. Arrhythmia
  3. Hypertension
  4. Hypotension
  5. Pain prevention and pain relief
  6. Nausea and vomiting
  7. Decreased urine output
  8. Emergence delirium
  9. Delayed emergence from anaesthesia
  10. Shivering
  11. Post-obstructive pulmonary edema.
- ❖ Assess patient recovery and the parameters for transfer from the PACU to the ward, ICU, home.
  - ❖ Score the patient's condition according to the Aldrete system, including fast tracking after out-patient surgery.
- Demonstration of following abilities in **Intensive Care Unit**
    - ❖ **Understanding the spectrum of critical illnesses requiring admission to ICU.**
    - ❖ Recognizing the critically ill patient who needs intensive care -Trauma, burns, all types of shock, Sepsis, SIRS and ARDS, Poisoning, infectious patient (HIV, Hepatitis) and patients with metabolic disturbances.
    - ❖ Monitoring progress of patients by physiological scoring systems
    - ❖ Practicing infection control practices and control of nosocomial infections.
    - ❖ Inserting central venous lines, arterial lines using ultrasound and interpreting the data.
    - ❖ Managing cardiovascular instability, respiratory failure and postoperative pulmonary complications
    - ❖ Understanding of the operation of mechanical ventilators including different ventilatory modalities non-invasive ventilation, complications and modes of weaning.
    - ❖ Principles and application of Oxygen Therapy
    - ❖ Glycemic control in the critically ill patient
    - ❖ Practice of Hypothermia and prevention of cerebral injury after cardiac arrest
    - ❖ Delivering appropriate nutritional support - enteral and parenteral.
    - ❖ Proper use of sedative/hypnotic drugs in the ICU.
    - ❖ Practicing ethical and legal aspects of critical care
    - ❖ Good communication skills with patient and relatives.
    - ❖ Proper Sterilization of ICU equipment.

- Demonstration of following abilities in **Acute and Chronic Pain Management**
  - ❖ Assessment of patients with pain including: history taking, physical examination, and interpretation of investigations.
  - ❖ Classify types of pain - acute chronic, traumatic, cancer pain, etc. with the knowledge of Pain pathways in detail.
  - ❖ Practice the different modalities of physical therapy that may relieve both acute and chronic pain
  - ❖ Practice the acute pain, cancer pain guidelines and WHO treatment ladder.
  - ❖ Practice routes of administration and risk/benefits of drugs used for acute and chronic pain relief, patient controlled analgesia and treat the common pain syndromes.
  - ❖ Demonstrate practice of pain management in patients with problem drug use, drug dependency and addiction and identify the parameters for referral to a pain medicine specialist.
- Demonstrate Organization of acute pain service and role of acute pain nurse for pain assessment in various groups of patients, Physiological changes secondary to Pain, practice different modalities of pain control. Pharmacology and side effects of opioid analgesia and non-opioid analgesia, principle of patient-controlled analgesia and assessment of its efficacy, Pharmacology and side effects of epidural/intra-thecal opioid. Neurological assessment of epidural blockade and management of failed block. Management of regional blockade – brachial plexus, para-vertebral and intra-pleural block. Management of epidural abscess. Substance abuse and acute pain control. Pain control in concurrent medical diseases – COAD, IHD, bleeding tendency, geriatric. Pain control in burns patients. Pain control in trauma patients included multiple rib fracture
- Demonstration of abilities to manage **Chronic Pain**
  - ❖ Practice different modalities of chronic pain management - physical therapy, psychotherapy, (including cognitive behavioural approaches), neuro-ablation, neuro-augmentation, spinal opioid, interventional neuro-blockade, non-opioid analgesia.
  - ❖ Anatomy, indication, technique and complication of chemical sympathectomy (lumbar sympathectomy, stellate ganglion block, celiac plexus block).
  - ❖ Practice principles of management of cancer pain, principle of management of non-cancer neuropathic pain - phantom limb pain, post-herpetic neuralgia, complex regional pain syndrome, trigeminal neuralgia. Principle of management of non-cancer nociceptive pain - myofascial pain, lower back pain, intractable angina, burns, chronic pancreatitis, PVD.
  - ❖ Practice Epidural steroid injection (all levels) and long-term epidural catheterization.
  - ❖ Observe and practice following blocks: Infra-orbital nerve, Intercostal nerve

- ❖ Recognize complications associated with each blocks and know appropriate treatment of each
  - ❖ Know the indications for stimulation techniques such as transcutaneous electrical nerve stimulation (TENS), dorsal column stimulation, and deep brain stimulation.
  - ❖ Mechanisms and side effects of other therapies used for treating pain.
  - ❖ The principles of pain management in special patient groups including the elderly, children, disabled, intellectually handicapped and those unable to communicate.
  - ❖ Awareness of the principles for insertion and management of implantable drug delivery pumps.
  - ❖ Awareness of the basic principles of palliative care.
- **Demonstrate practice of Regional Anaesthesia**
    - ❖ Applying general principles of pharmacology of local anaesthetics and various adjuvants.
    - ❖ Familiarizing with the relevant anatomy for regional techniques.
    - ❖ Application of indications and contraindications to regional anesthetic technique including central neuraxial blocks, peripheral nerve blocks and sympathetic nerve blocks.
    - ❖ Assessing adequacy of regional anaesthesia, and learn techniques of supplementation of inadequate blocks.
    - ❖ Providing effective anxiolytics and sedation of patients by both pharmacologic and interpersonal technique.
    - ❖ Performing the following regional anaesthesia techniques:
      - Brachial plexus, cervical plexus, stellate ganglion block, lumbar plexus, lumbar sympathetic, Sciatic nerve block, Femoral nerve block, 3 in 1 block, Wrist block, Popliteal Nerve block, Trigeminal nerve block, Retro bulbar blocks, Paravertebral blocks, Intercostal blocks, Caudal block – adult and pediatric, Ankle block, Epidural block/Catheter, Subarachnoid block, Bier's block, All peripheral nerves of the upper and lower limbs.
- **Demonstrate practice of Thoracic Anaesthesia**
    - ❖ Pre-operative assessment of patients undergoing Thoracotomy (lung resection), thoracoscopy, video assisted thoracoscopy and mediastinoscopy
    - ❖ Various approaches and their relevant equipments for lung isolation.
    - ❖ Various double lumen tubes and their placement.
    - ❖ Application of Principle of chest drain.
    - ❖ Respiratory Physiology and management of one lung ventilation (OLV). Indications, contraindications and hazards of OLV.

- ❖ Application of the knowledge of Anatomy of lung and broncho-pulmonary segments.
  - ❖ Anatomy and techniques for intercostals nerve block and thoracic epidural. Management of thoracic epidural anaesthesia and analgesia
  - ❖ Anatomy, techniques and placement of paravertebral block/catheter.
  - ❖ Post-operative care of patients after lung surgery.
  - ❖ Peri-operative management of patients with myasthenia gravis.
  - ❖ Peri-operative management of patients with mediastinal mass.
  - ❖ Anaesthetic management of mediastinoscopy, major airway stenting.
  - ❖ Lung volume reduction surgery and problems.
- **Demonstrate practice of Cardiovascular Anaesthesia:**
    - ❖ Application of the knowledge of Anatomy and physiology of valvular disease, coronary arteries and their territories. Pulmonary circulation, coronary circulation, cerebral circulation, visceral circulation.
    - ❖ Application of the knowledge of Distribution of blood volume to different organs and systems and their control. Microcirculation. Venous system, venous pressure, its influence on various functions.
    - ❖ Regulation of blood pressure, hypotensive anaesthesia.
    - ❖ Anatomy and physiology of all operable congenital heart disease like ASD, VSD, PDA, TOF, transposition of great vessels.
    - ❖ Application of the knowledge of anatomy and physiology of vascular heart disease like co-actation of aorta.
    - ❖ Assessment of cardiac patient with ischaemic heart, valvular heart disease and other diseases listed above. Understanding of cardiac catheterization, echocardiography, stress testing, and radio-nucleide imaging.
    - ❖ Application of Principle and complication of cardiopulmonary bypass
    - ❖ Application of Principle of trans-esophageal echocardiography
    - ❖ Application of Principle of circulatory support: inotropes, IABP, pacing
    - ❖ Coagulation and management of coagulopathy.
    - ❖ Off pump bypass
    - ❖ Intra-operative management of aortic surgery and major peripheral vascular surgery, aneurysm grafts, recanalisation procedures.
    - ❖ Understanding of the adult patient with congenital heart disease and their management during anaesthesia.
    - ❖ Postoperative cardiac critical care, including cardiovascular problems, analgesia.
    - ❖ Insertion of invasive monitoring for arterial monitoring, central venous pressure monitoring, pulmonary artery catheter insertion and interpretation.
    - ❖ Robotic cardiac surgery.

- **Demonstrate practice of Paediatric Anaesthesia**
  - ❖ Application of knowledge of Anatomical changes in paediatric patient and neonates.
  - ❖ Application of knowledge of Physiology and pharmacology in paediatric patient.
  - ❖ Guideline for pre-operative fasting in children and pre-medication.
  - ❖ Anaesthetic equipment: laryngoscopes, airways, endotracheal tubes, LMAs, PLMA and breathing circuit for children.
  - ❖ Anaesthesia management for premature and newborn.
  - ❖ Emotional problems for parent and child and principles of premedication. Consent by parents and their presence during induction. To become skilled in communicating with children, parents and other relatives.
  - ❖ Problems of transporting a sick pediatric patient from the ward to the operating room and back with regard to temperature maintenance, cardiovascular stability, ventilation and oxygenation.
  - ❖ Estimate preoperatively blood volume, hourly fluid requirements, fluid deficit, third space loss, acceptable blood loss and apply principles of fluid and blood replacement in the perioperative period.
  - ❖ Induce and maintain anaesthesia by inhalation, intravenous, intramuscular and rectal routes and monitor pediatric patients.
  - ❖ Understand the benefits, risks and techniques of regional anaesthesia in children. Anatomy and techniques of caudal, dorsal penile and inguinal regional block, spinal and epidural block
  - ❖ Learn to recognize and treat post anaesthesia complications like apnea, laryngospasm, acid-base and electrolyte disturbances, febrile and convulsing child and bleeding child.
  - ❖ Common problems related to common congenital syndromes presenting for surgery. Anaesthetic management of a child with concurrent disease – Down's, Pierre Robin syndrome, von Willebrand's disease, Goldenhar's, Sturge-Weber, Tracher-Colin, Prune-Belly, and cyanotic and non-cyanotic congenital heart disease.
  - ❖ Paediatric resuscitation: drugs, doses and defibrillation of children of all ages, from the very premature neonates to those children with complex coexisting disease.
  - ❖ Management of patients requiring paediatric intensive care, ventilatory management, and support of circulation.
  - ❖ Resuscitation of neonates and children of all ages. A period of one to two months in a PICU is recommended for all post graduate students undergoing advanced training in paediatric anaesthesia.
  - ❖ Paediatric pain management
  - ❖ Assessment of a child with URTI, with a heart murmur.
  - ❖ Management of fluid and electrolytes in children.

- ❖ Anaesthetic management of a malignant hyperthermia susceptible child.
- ❖ Anaesthetic management of FB bronchus, oesophagus, Wilm's tumour, congenital diaphragmatic hernia, tracheo-oesophagus fistula, thoracotomy.
- ❖ Anaesthesia for Fetal Surgery.
- ❖ Sedation techniques including the selection, management and monitoring of children for diagnostic and therapeutic procedures, with particular attention to working in areas outside the theatre suite.
- **Demonstrate practice of Transplant anaesthesia**
  - ❖ Application of knowledge of basic pathophysiology of renal and liver failure. Principles of anesthetizing an immuno-compromised patient.
  - ❖ Principles of anesthetizing patient with end stage renal/liver disease and patient with organ transplantation. Perioperative management.
- **Demonstrate practice of Neuroanaesthesia**
  - ❖ Application of basic knowledge of cerebral circulation and intra cranial pressure and its implications
  - ❖ Anaesthesia to patients with neurologic disease, head injury undergoing neurologic or non-neurologic surgery and for diagnostic procedures requiring anaesthesia.
  - ❖ Anesthetic implications of the most common neurosurgical procedures, transnasal, trans-sphenoidal pituitary surgery. Posterior fossa surgery. Surgery for supratentorial pathology.
  - ❖ Application of basic concepts behind electrophysiologic monitoring of the brain and spinal cord.
  - ❖ Application of knowledge of general principles of positioning the patient for surgery and the advantages and disadvantages of each position.
  - ❖ Effects of anaesthesia on the electroencephalogram (EEG) and evoked potentials.
  - ❖ Differential diagnoses and treatment alternatives of intraoperative intracranial hypertension ("tight brain")
  - ❖ Management of Head Trauma, and its anesthetic management and various protocols regarding their management and associated trauma.
  - ❖ Intracranial surgery and spinal surgery, both routine and emergency.
  - ❖ Monitoring: techniques for detection and management of air embolism.
  - ❖ Lumbar puncture and CSF drainage.
  - ❖ Non-surgical management of the head trauma patient, Systemic complications of severe brain injury.
  - ❖ Management of subarachnoid haemorrhage and vasospasm.
  - ❖ Diagnosis and management of patients with brainstem death; and dealing with patient's relatives

- **The following are special procedures which the post graduate student must be able to perform**

Sr. No.	Name of procedure
1.	Blind Nasal intubation
2.	Failed intubation drill (includes Fiberoptic Laryngo/ Bronchoscope)
3.	Double Lumen Tube
4.	Bronchial Blocker placement
5.	Jet Ventilation
6.	Suctioning and physiotherapy of wet lung
7.	Intubation in Neonates
8.	Initiation and management of ventilation
9.	Combined Spinal Epidural
10.	Brachial Plexus Block
11.	Intravenous Regional Anaesthesia
12.	Elbow, Wrist, Digital, Sciatic, Femoral, Lateral Cutaneous Nerve of thigh, Ankle - each
13.	Cervical-Superficial and Deep, Stellate, Splanchnic - each
14.	Central Venous Line by Brachial, Jugular and Subclavian veins
15.	Radial and Femoral Artery cannulation
16.	CVP monitoring
17.	Pulmonary Capillary Wedge Pressure
18.	Neuro-muscular transmission Monitoring
19.	Anaesthetic Depth eg. BIS monitoring

- Demonstration of anesthetic abilities in the intraoperative period keeping into consideration the specific requirement of the surgical procedure – ENT, Orthopaedic, Gynaecology – Obstetrics, General surgery, Onchosurgery, replacement surgeries, urosurgery, vascular, plastic, Thoracic, Dental etc

### **Suggested Time Frame for Training the PG Students:**

The student should be taught as per the following schedule to acquire the skills:

#### **1. First 6 months:**

- During the first 6 months, the student should be taught expertise in the management of uncomplicated cases not belonging to any super specialty (ASA I and II cases). To start with, the student will observe and slowly become independent in giving general anaesthesia and spinal anaesthesia to ASA I and II cases for minor and major surgery, under graded supervision.
- The postgraduate student should learn the basic principles of safe and effective anaesthesia, resuscitation, and both the prevention and treatment of pain,

perioperative care of the surgical patient, care of handling equipments, basic techniques in anaesthesia, and anaesthetic pharmacology, and electrical safety.

- He/she should select the thesis topic and submit the protocol for his thesis.

## **2. Next 18 months**

- The student should widen his experience and should be able to undertake anaesthetic care of all routine cases, assist in the anaesthetic care for routine obstetric practice, understand basic principles of critical care, pain management, and participate in audit.
- The student should be trained in administration of general anaesthesia and regional anaesthesia for ASA I to V under supervision. The student should be able to give extradural block (EDB) lumbar and thoracic, Spinal Block, and Peripheral Nerve Blocks under supervision, and use of Ultrasound machine for giving blocks and venous cannulation. The student should learn paediatric and trauma life supports and maintain skills for basic and advanced cardiac life support.
- It is advised that they should be posted in the following specialties: general surgery including gastrointestinal surgery, transplant, ENT, Urology, Obstetrics, Dental Surgery, Eye, ICU, Pain Clinic and peripheral theatres like ECT, radiodiagnostic and therapeutic procedures (CT scan, MRI scan, angiography).
- The student should be able to analyze data and write a thesis. He/she should be able to present scientific data.

## **3. Last 12 months**

- Thesis should be submitted minimum of 6 months before the final MD examination.
- The post graduate student should be given experience of various super-specialties like cardiothoracic and vascular surgery, neurosurgery and transplantation, and paediatric surgery. The student should be able to plan and administer anaesthesia to all emergency patients under supervision including patients for Cardiac, Neurosurgery, Pediatric surgery, and for all major surgeries. The aim at the end is to be competent and independent soon after the third year of junior residency in providing anaesthesia to elective and emergency cases.
- The post graduate student should be able to manage critically ill patients and treat intractable pain. They should also know how to organize resources in case of mass casualty. The curriculum should be able to provide 04 months of elective Intensive Care Unit posting (2 months during initial years under supervision and 2 months independently in the last six months).

## **4. At the end of 3 years, the post graduate student should have the skills to:**

- Plan and conduct anaesthesia and provide post-operative care including pain relief for elective and emergency surgical procedures related to all surgical specialties.

- Carry out basic life support (BLS) and advanced life support (ALS) and train medical and paramedical staff in BLS and ALS.
- Manage patients admitted to an intensive care unit with the help of latest equipment.
- Manage patients suffering from acute and chronic intractable pain.
- Organize the hospital environment to manage mass casualty situation and camp anaesthesia.
- Critically review and acquire relevant knowledge from the journals about the new development in the specialty.
- Should be able to participate in anaesthesia audit.

Overall the student should acquire skills in the following practical competencies:

- ❖ Information management in preoperative evaluation and outcome enhancement and communication skill to patient and relatives.

## *Syllabus*

The course content of **1<sup>st</sup> year** should cover the following:

### 1. **Anatomy related to:**

- Diaphragm, upper and lower airway
- Regional anaesthesia, field block, central neuraxial, blockade, block for acute pain states
- Intramuscular injections, arterial and venous cannulations and positioning.

### 2. **Physics related to:**

- Anaesthesia machine - assembly of necessary items.
- Airway equipment including laryngoscopes, airway devices
- Breathing systems
- Monitoring in anaesthesia with concepts of minimum monitoring
- Gas laws, medical gas supply system
- Fluidics
- Electricity and diathermy
- Oxygen therapy

### 3. **Physiology related to:**

- Theories of anaesthesia
- Respiratory, cardiovascular, hepatobiliary, renal and endocrine system, pregnancy, blood, muscle and N-M junction, Nerve impulse transmission, ECG, regulation of temperature and metabolism, stress response, cerebral blood flow and ICP.

- Central, autonomic and peripheral nervous systems.
- Metabolic response to stress and trauma.

#### 4. **Pharmacology related to**

- General principles, concepts of pharmacokinetics and pharmacodynamics
  - Drug interactions in anaesthesiology, anaphylactoid reactions
  - Drugs used for premedication, induction of anaesthesia, general anaesthetics-intra-venous and inhalational, neuromuscular block and reversal of muscle relaxants.
5. **Biochemistry** relevant to fluid balance and blood transfusion, perioperative fluid therapy, acid base homeostasis in health and diseases.
  6. Theoretical background of the commonly used anaesthetic techniques of general and regional anaesthesia, general principles of pre-anesthetic assessment and medication, recovery from anaesthesia and post operative care, effects of positioning during anaesthesia.
  7. Introduction to the operation theatre, post-anaesthesia care rooms
  8. Introduction to acute, chronic pain and pain management.
  9. Documentation and medico-legal aspects of anaesthesia. Defensive anaesthesia. Concept of informed consent.
  10. Resuscitation - basic and advanced life support (cardiac and trauma life support), neonatal resuscitation.
  11. Intensive care of critical patients with introduction to artificial ventilation, management of unconscious patients, oxygen therapy, shock - pathophysiology and management.
  12. Introduction to Research methodology, basics of biostatistics.

The course content of **2<sup>nd</sup> year** should cover the following:

Anatomy related to blocks for chronic pain, chemical neurolysis and different organ systems.

#### 1. **Physics related to:**

- equipments used in anaesthesia monitors, ventilators, vaporizers,
- fiberoptics.
- Laser
- Pacemaker and defibrillator
- Monitoring equipment used for assessment of cardiac functions, temperature, respiratory functions, blood gases, intracranial pressure, depth of anaesthesia and neuromuscular block.
- Sterilization of equipment
- Computers in anaesthesia

2. Pharmacology of drugs used in cardiovascular, respiratory, endocrine, renal diseases and CNS disorders.
3. Interpretation of blood gases and other relevant biochemical values, various function tests and basics of measurement techniques, ECG.
4. Blood coagulation mechanism, disturbances, blood components.
5. Special anaesthetic techniques as relevant to –
  - Outpatient anaesthesia, hypotensive anaesthesia, anaesthesia in abnormal environments including rural area and calamitous situations
  - Associated medical disorders in surgical patients
6. Geriatric and pediatric anaesthesia
7. Emergency, ENT, orthopedic, ophthalmology, obstetrics, dental, radio-diagnosis and radiotherapy.
8. Medical statistics relevant to data collection, analysis, record keeping in anaesthesia, comparison and estimation of significance.
9. Care of terminally ill, Hospices management. Do not resuscitate orders.
10. Postures and anaesthesia.
11. Induced hypothermia, incidental, environmental safety of patient.
12. Malignant hyperthermia, myasthenia gravis, GB syndrome and other neuromuscular diseases, obesity, COPD, Diabetes mellitus, bronchial asthma and hypertensive crises..
13. Third world anaesthesia.
14. Inherited metabolic diseases and anaesthesia.

The course contents of **3<sup>rd</sup> year** should cover the following:

1. Principles of anaesthetic management of neuro/cardiac/thoracic/vascular/transplantation/burns and plastic surgery.
2. Anaesthesia for patients with severe cardiac, respiratory, renal and hepatobiliary disorder posted for unrelated surgery
3. Shock, types, pathogenesis and management of patients in shock, renal failure, critically ill and/or on ventilator.
4. Multiple organ failure
5. Infection control, cross contamination in OT and ICU.
6. Immune response and anaesthesia.
7. Concept of cytokines, and other enzymes.
8. Selection, maintenance and sterilization of anaesthesia and related equipment
9. Chronic pain therapy and therapeutic nerve blocks.
10. Acupuncture, acupressure and other non-conventional methods of treatment.
11. Principles of neonatal resuscitation, ventilation and critical care.
12. Principles of human resources and material management.

13. General principles of medical audit. Critical incident reporting
14. Ethics and clinical trial.
15. Hospital, ICU and OT design and planning.
16. Medical education including evidence based medical education.

## ***TEACHING AND LEARNING METHODS***

### **Postgraduate Training**

#### **Teaching methodology**

Didactic lectures are of least importance.

- Teaching should include seminars, journal clubs, symposia, tutorials, case discussions, and research presentations.
- Reviews and guest lectures should get priority for theoretical knowledge.
- Bedside teaching, grand rounds, interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning.
- Student should have hands-on training in performing various procedures (medical/surgical concerning his specialty) and ability to interpret various tests/investigations.
- Exposure to newer specialized diagnostic/therapeutic procedures concerning his/her subject should be given.
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- Log books shall be maintained regularly and should be checked and assessed periodically by the faculty members imparting the training.
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- Department should encourage e-learning activities.

#### **Thesis: Supervision**

- The postgraduate is responsible to a Faculty member and the latter should be available to advise and assist the student in his clinical assignments
- Departmental teaching committee will be responsible for the educational activities of the department and the teaching schedule.
- This involves providing services for emergencies and it makes different demands upon the anaesthesiologist. It should be learned through experience, with reduced staff. The clinical work during emergency should have a close supervision. The standards should be maintained of the agreed competence on schedule. The

emergency duties should be properly arranged with duty off. The postgraduates may have to do emergency duty as per schedule

**During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.**

**Simulators:**

Simulators should be used for the events of high importance but infrequent occurrence and where there may be high risks to the patients. The simulators can also be used for assessment purposes.

**Rotation:**

**Schedule for three years of MD Anaesthesia postings:**

The post graduate student should be exposed to the following areas of clinical anaesthesia practice:

1. Pre-anaesthesia clinic
2. Pain clinic
3. Recovery and Post anaesthesia Care Unit ( PACU )
4. Intensive Care Units
5. Dialysis and transplant
6. All specialty theatres
7. Peripheral areas: Radiology, MRI, ECT and other interventional laboratories

**The suggested schedule of the Operating Theatre can be as follows:** This may change as per availability of specialities.

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<b>Operation theatre</b>	<b>Months</b>
General Surgery	6
Urology	1
Ophthalmology	1
Otorhinology	2
Dental	1
Orthopedics/Trauma/casualty	3
Gynecology	3
Obstetrics	3
Pediatrics surgery	2
Burns/Plastic	1
CTVS	2
Neurosurgery	2

ICU	4
Pain	1
Recovery	1
Organ Transplant posting in the other areas. ECT, Cardiac Cath)	(Radiology,Radiotherapy)

## ***ASSESSMENT***

### **FORMATIVE ASSESSMENT, during the training programme**

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

#### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination. The thesis is assessed separately.

**Quarterly assessment during the MD training should be based on:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I)**

### **SUMMATIVE ASSESSMENT ie., assessment at the end of training**

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

#### **Post graduate Examination**

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

The final examination consists of three parts:

- 1) Thesis
- 2) Theory evaluation
- 3) Practical/Clinical and Oral evaluation

### **1. Thesis**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

**2. Theory** consists of four papers of 3 hours each having 10 short structured questions with 10 marks each:

**Paper I:** Basic Sciences as applied to Anaesthesiology

**Paper II:** Practice of Anaesthesia: Anaesthesia in relation to associated systemic and medical diseases.

**Paper III:** Anaesthesia in relation to subspecialties/superspecialties

**Paper IV:** Intensive Care Medicine, Pain Medicine and Recent advances.

**3. Practical/Clinical Examination:** will consist of: 3 clinical cases,

Long case: One, duration 30 min (history, examination, Diagnosis and Management, Discussion)

Short cases: Two, 15 minutes each for short case. In short cases only relevant history important to anaesthesia to be taken (history, clinical examination and diagnosis, discussion).

**Oral/Viva-voce** should be conducted preferably on four tables with one examiner on each table:

Table one: ECG, X-rays, ABG Cards, Pulmonary function tests, Capnographs, clinical exercises card. Table two: Anaesthetic Drugs, Emergency Drugs, IV Fluids, Nerve Blocks (skeleton) .

Table three: Anaesthesia machine including circuits and Vaporizers, ETT, Supraglottic Airway devices, ICU Ventilator and oxygen therapy equipment.

Table four: Resuscitation equipments, resuscitation demonstration, Difficult Airway Equipment, monitoring equipments.

Alternatively,

1. One long case, viva voce at one station with all examiners, and : 150 marks
2. 28 OSCE station covering two stations of short cases, drugs ECG, X-rays, PFT, ABG, Respiratory loops, Resuscitation etc.,: 150 marks

### **Recommended Reading**

#### **Books (latest edition)**

1. Lee's Synopsis of Anaesthesia
2. Clinical Anesthesiology by Morgan
3. Cardiac Anaesthesia By Joel Kaplan
4. Clinical Anaesthesia by Barash, Cullen and Stoelting
5. Textbook of Anaesthesia by Aitkenhead Rowbotham and Smith
6. Anaesthesia for neonates and infants by Smith
7. Pharmacology and Physiology for Anaesthetists by Stoelting
8. Principles of Obstetric Anaesthesia by Craford
9. Miller's Anesthesia
10. Stoelting RK, Miller RD Basics of Anaesthesia
11. ICU Book, Paul Marino
12. Text Book of Critical Care, by Fink et al
13. Regional Anaesthesia, P Prithviraj
14. Practical Management of Pain, Raj
15. Stoelting and Dierdorf: Anaesthesia and Co-existing Disease
16. Dorsch and Dorsch: Understanding Anaesthesia Equipments
17. ECG by Shamroth/Goldman
18. Anatomy for Anaesthetists by Harold Ellis
19. Clinical Anesthesia by P.G.Barash
20. Longneckers Anaesthesiology- Mcgraw Hill

#### **Must refer:**

1. Cucchiara and Michenfelder: Clinical Neuroanaesthesia
2. Cottrell and Smith: Anaesthesia and Neurosurgery
3. Complications in Anaesthesiology by Orkin
4. Complications in Anaesthesia by Raven
5. Airway management by JL Benumof
6. Obstetric Anaesthesia by Chestnut

#### **Journals**

03-05 international Journals and 02 national (all indexed) journals

**Postgraduate Students Appraisal Form  
Pre / Para /Clinical Disciplines**

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks\* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**\*REMARKS:** Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING FOR MD IN BIOCHEMISTRY**

## **Preamble**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The student who has obtained MD degree in Biochemistry should be well-versed in basic concepts and recent advances in the subject and should have acquired skills and expertise in various laboratory techniques applicable to metabolic and molecular aspects of medicine and in research methodology. Training during the course should equip the student with skills to become an effective teacher, able to plan and implement teaching programmes for students in medical and allied health science courses, set up/manage a diagnostic laboratory, generate, evaluate and interpret diagnostic laboratory data, interact with clinicians to contribute to more effective patient care and carry out a research project and publish its results.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SPECIFIC LEARNING OBJECTIVES***

At the end of the MD training programme in Biochemistry, the post graduate student should have acquired competencies in the following areas, as detailed below.

### **1. Acquisition of knowledge**

The student should be able to explain clearly concepts and principles of biochemistry and cell biology, including correlations of these with cellular and molecular processes involved in health and disease.

## **2. Teaching and training**

The student should be able to effectively teach undergraduate students in medicine and allied health science courses so they become competent health care professionals and able to contribute to training of postgraduate post graduate students.

## **3. Diagnostic services**

The student should be able to set up/supervise/manage a diagnostic laboratory in Biochemistry in a hospital, ensuring quality control, and providing a reliable support service. The student should be able to provide clinicians with consultation services for diagnostic tests in biochemistry and in interpretation of laboratory results.

## **4. Research**

The student should be able to carry out a research project from planning to publication and be able to pursue academic interests and continue life-long learning to become more experienced in all the above areas and to eventually be able to guide postgraduates in their thesis work.

# ***SUBJECT SPECIFIC COMPETENCIES***

**The student during the training programme should acquire the following competencies:**

## **A. Cognitive domain**

1. Describe and apply biochemical principles to explain the normal state, abnormal disease conditions and mechanism of action used in the perception, diagnosis and treatment of diseases.
2. Explain energy transactions in a living system, and describe importance of biomolecules in sustaining the life process.
3. Describe pathways of the intermediary metabolism along with their individual and integrated regulation and apply that in understanding the functioning of the body.

4. Describe and apply the concept of nutrition in health and disease, micro- and macro-nutrition and essential nutrients, and interlinks of nutrients with metabolism and functions of a living system.
5. Apply and integrate knowledge of molecular and metabolic conditions in normal and disease states for clinical problem solving and research
6. Acquire knowledge on application of various aspects of genetic engineering in medicine
7. Acquire knowledge and apply the principle of statistics, biostatistics and epidemiology to the evaluation and interpretation of molecular and metabolic disease states.
8. Evaluate, analyze and monitor disease states by applying relevant biochemical investigations and interpreting the clinical and laboratory data.
9. Able to integrate principles of immunology in biochemistry.
10. Demonstrate knowledge of basics of research methodology, develop a research protocol, analyse data using currently available statistical software, interpret results and disseminate these results and to have the potential ability to pursue further specializations and eventually be competent to guide students.
11. Describe the principles of teaching - learning technology towards application and take interactive classroom lectures, prepare modules for PBL, organize and conduct PBLs, case discussions, small group discussions, Seminars, Journal club and research presentations
12. Demonstrate knowledge of principles of Instrumentation.
13. Demonstrate knowledge about recent advances and trends in research in the field of clinical biochemistry.

## **B. Affective domain**

1. Effectively explain to patients from a variety of backgrounds, the molecular and metabolic basis of disease states and lifestyle modifications.
2. Communicate biochemical reasoning effectively with peers, staff and faculty, and other members of the health care team.
3. Demonstrate empathy and respect towards patients regardless of the biochemical nature of their disease.
4. Demonstrate respect in interactions with patients, families, peers, and other healthcare professionals.

5. Demonstrate ethical behavior and integrity in one's work.
6. Demonstrate effective use of nutrition, lifestyle and genetic counseling.
7. Be aware of the cost of diagnostic tests and economic status of patients.
8. Acquire skills for self-directed learning to keep up with developments in the field and to continuously build to improve on skills and expertise

### **C. Psychomotor domain**

1. Able to select, justify, and interpret the results of clinical tests in biochemistry.
2. Develop differential diagnoses for molecular and metabolic causes of diseases.
3. Suggest preventive, curative, and/or palliative strategies for the management of disease.
4. Predict effectiveness and adverse effects associated with disease intervention.
5. Demonstrate skills for clinical diagnosis, testing, understanding of biochemical conditions and diagnostic service.
6. Perform important biochemical, immunological and molecular biology techniques.
7. Observed working of important advanced techniques.
8. Demonstrate standard operating procedures of various methods and techniques used in clinical biochemistry.
9. Determination of enzyme activity and study of enzyme kinetics. Ideally it should be accompanied by purification (partial) of the enzyme from a crude homogenate to emphasise the concepts of specific activity, yield and fold purification
10. Demonstrate and report routine investigations in hematology and microbiology
11. Demonstrate presentation skills at academic meetings and publications.

**By the end of the course, the post graduate student should have acquired practical skills in the following:**

- Performance of reactions of carbohydrates, amino acids and proteins, and lipids
- Experiments to demonstrate constituents of milk
- Experiments to demonstrate normal and abnormal constituents of urine
- Determination of iodine number and saponification number of fats
- Estimation of ammonia and amino acids by Sorenson formal titration

- Estimation of nitrogen estimation in a given amino acid solution by micro Kjeldahl method
- Estimation of phosphorus by Fiske Subbarao method
- Estimation of ascorbic acid in lime
- Estimation of calcium content in milk
- Estimation of proteins by Folin's method and dye binding method.
- Two-dimensional paper chromatography for separation of amino acids
- Preparation and estimation of starch, glycogen, cholesterol, casein (phosphorus in casein) and hemoglobin from biological samples Determination of enzyme activity and study of enzyme kinetics, using any 2 suitable enzymes (eg, catalase from rat liver and acid phosphatase from potatoes).
- Estimation of clinical analytes as detailed below:
  - blood glucose, glycated haemoglobin; performance of glucose tolerance test
  - electrolytes, arterial blood gas analysis
  - cholesterol, triglycerides, free fatty acids, phospholipids, Lp (a), urea, creatinine, uric acid, ammonia, microalbuminuria
  - parameters of liver function tests (bilirubin, hepato-biliary enzymes such as AST, ALT, ALP, GGT, serum proteins/albumin and prothrombin time)
  - Calcium, magnesium, copper (and ceruloplasmin), serum iron, TIBC and ferritin
  - markers of myocardial damage (CK, CK MB, troponins, LDH)
  - other enzymes of diagnostic relevance (eg. phosphatases, amylase etc)
  - vitamins D and B<sub>12</sub> and folate
- Electrophoresis of serum proteins
- Electrophoresis of lipoprotein (*Optional*)
- Electrophoretic separation of LDH isozymes or any other isoenzymes
- Clearance tests
- CSF analysis
- Thyroid function tests and other hormone assays by ELISA/RIA
- Preparation of buffers.

### ***Clinical Laboratory***

- Taking any one parameter, students should prepare a Levy Jennings chart and plot inter-assay and intra-assay variation for the laboratory.
- Implementation of Westgard rules.

### ***Optional:***

- Determination of reference values for any one parameter for the clinical laboratory

*In addition, all efforts should be made to ensure that students at least see a demonstration of the following techniques.*

- Separation of peripheral blood lymphocytes using Ficoll Hypaque
- Subcellular fractionation/marker enzymes for organelles to demonstrate fractionation
- Ultracentrifugation
- Isolation of high molecular weight DNA from tissues/blood
- Isolation of RNA; synthesis of cDNA by reverse transcription; PCR (both conventional and real-time)
- Isolation of plasmids and agarose gel electrophoresis for proteins and nucleic acids
- Basic techniques in cell culture
- High performance liquid chromatography (HPLC)

## ***SYLLABUS***

**The course contents are outlined below:**

### **Paper I**

**Biomolecules, cell biology, biochemical techniques, biostatistics and research methodology, basics of medical education in teaching and assessment of biochemistry.**

### ***Biomolecules:***

Properties of water

Concept of an acid, a base, pH, pK, buffer and buffering capacity

Classification, structure and functions of amino acids and peptides

Structural organization of proteins and relationship with their functions

- primary, secondary, tertiary and quaternary structure of proteins
- protein folding and denaturation

#### Structure-function relationship of proteins

- Structure and functions of hemoglobin and myoglobin
- Structure and function of collagen
- Structure and function of immunoglobulins

#### Classification, functions, properties and reactions of carbohydrates

#### Classification, properties and importance of lipids

- Fatty acids - nomenclature, classification, properties, reactions
- Mono, di- and triacylglycerols
- Trans fats
- Cholesterol - structure, properties and functions
- Phospholipids - definition, types, properties, s and importance
- Glycolipids - definition, types, functions, examples.
- Lipoproteins - definition, structure, types, functions, role of apoproteins, importance in health and disease.
- Biological membranes - structure, function, properties and importance.
- Micelles and liposomes

#### Nucleotides and nucleic acids

- purine and pyrimidine bases in DNA and RNA
- nucleosides and nucleotides
- physiologically important nucleotides
- synthetic analogues of purine/pyrimidine bases and nucleosides used as therapeutic agents (anti-cancer drugs, anti-viral drugs)
- Watson and Crick model of DNA structure
- Structure and functions of different types of RNA.

### ***Cell biology***

- Structure of the cell and different subcellular organelles
- Structure and functions of cell membrane, solute transport across biological membranes
- Intracellular traffic and sorting of proteins

- Intracellular signaling pathways, membrane receptors and second messengers  
Extracellular matrix: composition, importance and biomedical importance, cellular adhesion molecules and intercellular communication
- Cytoskeleton, muscle contraction and cell motility
- Cell cycle, mitosis, meiosis and mechanisms of cell death
- Red and white blood cells

### ***Analytical techniques in biochemistry***

- Spectrophotometry (UV and visible spectrophotometry),
- atomic absorption spectrophotometry
- Flame photometry
- Fluorometry
- Turbidimetry and nephelometry
- Gravimetry
- Electrochemistry (pH electrodes, ion-selective electrodes, gas-sensing electrodes)
- Chemiluminescence
- Water testing
- Electrophoresis (principle, types, applications; isoelectric focusing capillary electrophoresis; 2-D electrophoresis)
- Chromatography (principle, types [including high performance liquid chromatography and gas chromatography])
- Techniques in molecular biology: Blotting techniques, polymerase chain reaction (PCR), DNA and protein sequencing, microarrays and DNA chip technology, cloning techniques, genomics, proteomics and metabolomics

### ***Nanotechnology and microfabrication***

### ***Techniques to study in vivo metabolism - NMR, SPECT, PET scans, etc***

### ***Radioisotope-based techniques and its applications***

### ***Biostatistics and research methodology***

- Basic concepts of biostatistics as applied to health science

- Statistical tests: t-test, analysis of variance, chi-square test, non-parametric tests, correlation and regression
- Statistical methods of validation of diagnostic tests
- Basics of epidemiological study designs and sampling methodologies
- Meta-analysis and systematic reviews

### **Basics of medical education in teaching and assessment of biochemistry**

Principles of adult learning, taxonomy of learning, educational objectives, principles of assessment and question paper setting, methods of assessing knowledge, appropriate use of media, microteaching, small group teaching.

Environmental Biochemistry:

Health and pollution.

### **Paper II:**

#### **Enzymes, bioenergetics, biological oxidation, intermediary metabolism and regulation, inborn errors of metabolism and nutrition**

##### *Enzymes:*

Properties, classification, mechanism of action, coenzymes and cofactors, kinetics of enzyme activity, regulation of enzyme activity, isoenzymes, diagnostic and therapeutic enzymes, principles of assays of enzymes, enzymes as therapeutic targets of drugs.

##### *Biological oxidation*

Basic concepts of thermodynamics and its laws, as applied to living systems,

Exergonic and endergonic reactions and coupled reactions, redox potential

High energy compounds

Classification and role of oxidoreductases

Cytochromes; cytochrome P450 system

##### *Respiratory chain and oxidative phosphorylation*

- Components, complexes and functioning of the respiratory chain
- Process of oxidative phosphorylation
- Mechanisms of ATP synthesis and regulation
- Mitochondrial transport systems and shuttles
- Inhibitors, uncouplers and ionophores
- OXPHOS diseases

## ***Overview of metabolism and intermediary metabolism***

### ***Metabolism of carbohydrates***

- Digestion and absorption
- Glycolysis and TCA cycle, including regulation
- Glycogen metabolism and its regulation
- Cori cycle, gluconeogenesis and control of blood glucose
- Metabolism of fructose and galactose
- Pentose phosphate and uronic acid pathways and their significance
- Polyol pathway
- Regulation of blood glucose levels
- Diabetes mellitus (including gestational diabetes mellitus) – classification, pathogenesis, metabolic abnormalities, diagnostic criteria, principles of treatment, pathogenesis of complications, laboratory tests
- Metabolism of ethanol

### ***Metabolism of lipids***

- Digestion and absorption, including role of bile salts
- Biosynthesis and oxidation of fatty acids
- Ketone bodies – formation, utilisation and regulation
- Metabolism of unsaturated fatty acids and eicosanoids
- Metabolism of triacylglycerol; storage and mobilisation of fats
- Metabolism of cholesterol
- Metabolism of lipoproteins
- Metabolism in adipose tissue
- Role of liver in lipid metabolism
- Role of lipids in atherogenesis
- Metabolism of phospholipids and associated disorders

### ***Metabolism of amino acids and proteins***

- Digestion and absorption
- Pathways of amino acid degradation - transamination, oxidative deamination
- Transport and metabolism of ammonia

- Metabolism of individual amino acids.
- Plasma proteins

### ***Metabolism of nucleotides***

- De novo synthesis of purine nucleotides
- Salvage pathway for purines
- Degradation of purines
- De novo synthesis of pyrimidine nucleotides
- Degradation of pyrimidine
- Synthetic analogues of purine/pyrimidine bases and nucleosides used as therapeutic agents

### ***Metabolism of haem***

- Biosynthesis of heme and associated disorders
- Degradation of heme and associated disorders

### ***Metabolism in individual tissues and in the fed and fasting states***

Liver, adipose tissue, brain, RBCs

### ***Nutrition***

- Principal food components
- General nutritional requirements
- Energy requirements
- Biological value of proteins
- Thermogenic effect of food
- Balanced diet, diet formulations in health and disease, mixed diet
- Nutritional supplements
- Food toxins and additives
- Parenteral nutrition
- Disorders of nutrition, obesity, protein and protein energy malnutrition, dietary fibers, under-nutrition, laboratory diagnosis of nutritional disorders
- National Nutrition Programme.

### ***Vitamins***

Classification, biochemical role, sources, RDA and deficiency state of each vitamin (including diagnostic tests for deficiency and treatment)

### ***Minerals***

Classification, biochemical role, sources, requirement and deficiency state of each mineral (including diagnostic tests for deficiency and treatment)

### ***Metabolism of xenobiotics***

***Free radicals and anti-oxidant defence systems in the body and associations with disease processes***

### **Paper III:**

**Molecular biology, molecular and genetic aspects of cancer, immunology and effects of environmental pollutants on the body**

### ***Structure and organization of chromosomes and chromatin re-modelling***

#### ***DNA replication***

- DNA replication in prokaryotes and eukaryotes (including important differences between the two):
- Roles of DNA polymerase, helicase, primase, topoisomerase and DNA ligase
- Replication fork
- Okazaki fragments and its importance in replication.
- Overview of role of major DNA repair mechanisms – mismatch repair, base excision repair, nucleotide excision repair and double strand break repair.
- Diseases associated with abnormalities of DNA repair systems
- DNA recombination

#### ***Transcription***

- Structure of a gene - exons and introns, promoter, enhancers/repressors and response elements.
- Process of transcription in prokaryotes and eukaryotes – initiation, elongation and termination (including important differences).
- Post-transcriptional processing – capping, tailing and splicing.

#### ***Genetic code and mutations***

- Characteristics of the genetic code
- Molecular basis of degeneracy of the genetic code (Wobble hypothesis)
- Mutagens- examples of physical, chemical and biological mutagens.
- Types of mutations – point mutations and chromosomal mutations
- Relationship of mutations with specific diseases

### ***Translation***

- Basic structure of prokaryotic and eukaryotic ribosomes.
- Structure of tRNA (diagram of clover leaf model of tRNA structure) and its function in protein synthesis.
- Function of aminoacyl tRNA synthase.
- Process of protein synthesis (translation) – initiation, elongation and termination (including important differences between prokaryotic and eukaryotic translation).
- Inhibition of prokaryotic translation by antibiotics.
- Post-translational modifications

### ***Regulation of gene expression in prokaryotes and eukaryotes***

- The operon concept in prokaryotes
- Role of general and gene specific transcription factors
- Small interference RNA (siRNA) and micro RNA (miRNA).
- Other modes of regulation of gene expression: alternative splicing, alternative promoter usage, DNA methylation, Histone acetylation / deacetylation, RNA editing, alterations of RNA stability

### ***Recombinant DNA technology and its applications in modern medicine***

- Concepts of recombinant DNA, genetic engineering, biotechnology and cloning.
- Restriction endonucleases.
- Vectors for cloning – plasmids and phages.
- Genomic and cDNA libraries.
- Applications of recombinant DNA technology in medicine.
- Gene therapy

- Diagnosis of genetic diseases and genetic counseling
- DNA fingerprinting
- DNA sequencing
- Microarrays
- Fluorescent in situ hybridization (FISH)
- DNA vaccines
- Transgenic animals
- Application of molecular techniques in forensic investigation and medico-legal cases

### ***Overview of Human Genome Project***

#### ***Basics of bioinformatics***

#### ***Principles of human genetics***

- Alleles, genotypes and phenotypes
- Patterns of inheritance: monogenic and polygenic inheritance
- Population genetics
- Genetic factors in causation of diseases
- Types of genetic diseases: Chromosomal, monogenic and polygenic disorders, mitochondrial disorders, nucleotide repeat expansion disorders, imprinting disorders
- Screening for genetic diseases and prenatal testing
- Ethical and legal issues related to medical genetics

#### ***Stem cells in clinical medicine***

- Basic concepts regarding stem cells
- Types of stem cells: embryonic and induced pluripotent stem cells (iPSC)
- Potential applications in the clinical medicine
- Ethical and legal issues related to use of stem cells in medicine

#### ***Cancer***

- Carcinogens: physical, chemical and biological
- Clonal origin of cancers

- Genetic basis of carcinogenesis
- Role of oncogenes and tumour suppressor genes
- Familial cancer syndromes
- Cancer stem cells
- Epigenetic regulation in cancer
- Gene expression profiling in cancer
- Cancer cell biology: cell cycle abnormalities, telomerase activity, proliferative capacity and decreased apoptosis
- Metastasis
- Tumor markers
- Biochemical basis of cancer chemotherapy and drug resistance
- New methods of anti-cancer therapy: targeted cancer therapy, cancer immunotherapy.

### *Immunology*

- Innate and acquired immunity
- Humoral and cell-mediated immunity
- Cells and organs of the immune system - T and B cells, macrophages, dendritic cells, NK cells, granulocytes
- Antigens, epitopes and haptens
- Immunoglobulin classes, isotypes, allotypes, idiotypes, monoclonal antibodies, organization and expression of immunoglobulin genes, immunoglobulin gene rearrangement, class switching
- Antigen-antibody interaction - immunochemical techniques
- Major histocompatibility complex, antigen processing and presentation,
- T cell and B cell receptor, toll like receptors
- T cell maturation/activation/differentiation
- B cell generation/activation/differentiation
- Cytokines
- Complement system, cell
- Immune response to infections
- Hypersensitivity reactions
- Vaccines
- Immuno-deficiency syndromes

- Autoimmunity
- Transplantation immunology
- Cancer and immune system,
- Immunodiagnostics
- Immunotherapy

#### **Paper IV**

#### **Clinical biochemistry and molecular diagnostics related to different body systems/organs, endocrinology, and recent advances in biochemistry**

##### ***Basic principles and practice of clinical biochemistry***

Units of measure, reagents, clinical laboratory supplies, basic separation techniques, laboratory calculations, specimen collection and processing, safety in the laboratory, clinical utility of laboratory tests (including sensitivity, specificity, ROC curves, etc), analysis in the laboratory, selection and evaluation of methods (including statistical techniques), evidence-based laboratory medicine, establishment and use of reference values, pre-analytical variables and biological variations, quality management, clinical laboratory informatics

##### ***Analytical techniques and instrumentation***

Principles of basic techniques used in a clinical biochemistry laboratory (spectrophotometry, electrochemistry, electrophoresis, osmometry, chromatography, mass spectrometry, immunochemical techniques, molecular techniques, automation, point of care testing,

##### ***Clinical correlates and analytical procedures***

- Amino acids, peptides and proteins; non-protein nitrogenous compounds
- enzymes
- carbohydrates
- lipids, lipoproteins and apolipoproteins and other cardiovascular risk factors
- electrolytes
- blood gases and pH
- hormones and associated disorders
- catecholamines and serotonin
- vitamins; trace and toxic elements
- hemoglobin, and bilirubin

- porphyrins and associated disorders
- bone and mineral metabolism
- tumour markers
- assessment of organ functions (hypothalamus and pituitary, adrenal glands, gonads, thyroid, parathyroid, liver, kidney, heart, stomach, pancreas, intestine, etc) and associated disorders
- pregnancy and maternal and fetal health
- reproduction related disorders – infertility
- newborn screening
- inborn errors of metabolism
- hemostasis
- therapeutic drug monitoring
- clinical toxicology
- molecular diagnostics
- body fluid analyses

***Regulation of fluid and electrolyte balance and associated disorders***

***Regulation of acid-base balance and associated disorders***

***Biochemistry of the endocrine system***

- Classification and general mechanism of action of hormones
- Biosynthesis, secretion, regulation, transport and mode of action of hypothalamic peptides, adenohipophyseal and neurohypophyseal hormones, thyroid and parathyroid hormones, calcitonin, pancreatic hormones, adrenocortical and medullary hormones, gonadal hormones, gastrointestinal hormones, opioid peptides, parahormones.
- Biochemistry of conception, reproduction and contraception
- Endocrine interrelationship and their involvement in metabolic regulation
- Neuro-modulators and their mechanism of action and physiological significance
- Biochemical aspects of diagnosis and treatment of endocrinal disorders:

***Hematopoietic disorders***

- Iron deficiency and other hypoproliferative anaemias - iron metabolism, laboratory tests of iron status, iron therapy
- Anaemia of chronic disease, anaemia of renal disease
- Hemoglobinopathies - sickle cell anaemia, methaemoglobinemias, thalassemia syndromes, Megaloblastic anaemia
- RBC membrane and metabolism
- Hemolytic anaemia - inherited defects in RBC membrane and enzymes (G6PD deficiency), immunologic causes of hemolysis
- ABO blood group system - biochemical basis, transfusion biology.
- Plasma cell disorders - multiple myeloma.

### ***Hemostasis and thrombosis***

Biochemical mechanisms, related laboratory tests, antiplatelet/anticoagulant/fibrinolytic therapy

### ***Cardiovascular system***

Atherosclerosis - pathogenesis, risk factors, prevention and treatment

Cardiac failure, acute coronary syndrome, cardiac biomarkers

### ***Respiratory system***

Gaseous exchange in lungs - physiological features and disturbances, arterial blood gases

Pathogenesis of cystic emphysema, alpha-1 anti-trypsin deficiency

### ***Kidney***

Kidney function tests; pathophysiology, biochemistry, laboratory findings and management in acute kidney injury and chronic kidney disease; estimation of GFR; glomerular diseases - pathogenesis and mechanisms of glomerular injury, nephrotic syndrome, diabetic nephropathy; tubular disorders - renal tubular acidosis, proteinuria, nephrolithiasis, kidney transplant; biochemical aspects of renal stones.

### ***Gastrointestinal system***

- Gastric physiology
- Pathophysiology of peptic ulcer disease, including role of *H. pylori*; gastric function tests; Zollinger-Ellison syndrome

- Digestion and absorption of nutrients; evaluation of malabsorption (steatorrhea, lactose intolerance)
- Celiac disease
- Inflammatory bowel disease
- Protein losing enteropathy
- Regulatory peptides in the gut
- Neuroendocrine tumours

### ***Liver***

- Liver function tests
- Hyperbilirubinemias
- Viral hepatitis
- Serologic/virologic markers
- Alcoholic liver disease, fatty liver, chronic liver disease, cirrhosis and its complications
- Pathogenesis of ascites
- Hepatic encephalopathy
- Metabolic diseases affecting liver
- Reye's syndrome
- Diseases of gall bladder/bile ducts - pathogenesis of gallstones
- Pancreas - acute and chronic pancreatitis, cystic fibrosis, pancreatic function tests.

### ***Bone and mineral metabolism***

Bone structure and metabolism; metabolism of calcium, phosphate and magnesium; regulation and abnormalities of bone metabolism; vitamin D; parathyroid hormone; calcitonin; parathyroid hormone-related (PTHrP); osteoporosis – pathophysiology; markers of bone turnover

### ***Nervous system***

- Neurotransmitters and their receptors
- Ion channels and channelopathies
- Neurotrophic factors
- Protein aggregation and neurodegeneration

- Alzheimer's disease, Parkinson's disease, Huntington's disease, multiple sclerosis
- Prions and prion diseases
- Guillain-Barre syndrome – immunopathogenesis
- Myasthenia gravis – pathophysiology
- Hereditary myopathies - Duchenne muscular dystrophy
- Inherited disorders of muscle energy metabolism
- Mitochondrial myopathies
- Pathophysiology of psychiatric disorders such as anxiety, depression and schizophrenia

## ***TEACHING AND LEARNING METHODS***

### **Teaching methodology**

Active and interactive learning should be the mainstay of the program. The following methods are to be used to facilitate learning by and training of MD students.

1. **Interactive lectures, tutorials, problem-based learning, case discussions, seminars, guest lectures, E-learning**

The above teaching learning methods should be employed for the post graduate students to acquire updated knowledge on various aspects of basic and clinical biochemistry, immunology and molecular biology, and their application in modern medicine and also to learn to communicate effectively.

2. **Journal club**

Journal club sessions should be used by post graduate students to learn to search medical literature, to learn how scientific data is to be disseminated, to develop skills in presentation of research papers, to critically analyse and evaluate data, to become familiar with research methodologies, to keep oneself updated on new developments/emerging trends in biochemistry and to learn to communicate effectively

3. **Practical exercises**

These exercises should be used by post graduate students to equip themselves with knowledge and hand-on skills in various techniques used for laboratory bench-work in

biochemistry and molecular biology and in a diagnostic laboratory, and to learn to analyze and interpret data obtained.

4. **Thesis**

Under the supervision of a Professor or Associate Professor in the Department of Biochemistry, each PG student is expected to generate a hypothesis/research question and design a research protocol to test/answer it. The protocol should have clearly defined objectives and a work plan. The post graduate student will carry out the experimental research work proposed, analyze data, interpret results and write a thesis/dissertation based on the work done and results obtained.

5. **Presentation of work done on thesis to peers**

A post graduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

6. **Teaching of undergraduates**

Postgraduate students in Biochemistry shall be required to participate in teaching and training programmes of undergraduate students. They should learn how to organize, conduct and co-ordinate UG laboratory teaching in practical classes, to participate in clinical case-based teaching sessions and small group discussions (as part of a team that includes faculty members and senior residents of the department), to develop skills of self-directed learning, effective communication and leadership. They should learn how to work as part of a team and to facilitate learning by students.

7. **Horizontal and vertical integration of teaching of Biochemistry with other pre-clinical, para-clinical and clinical departments**

The post graduate students should take part in integrated teaching of undergraduates by participation in joint teaching sessions and seminars with different departments, participation in clinical rounds for discussing cases of interest and by small group discussions of case-based problems.

**8. Training in the basics of medical education and technology**

The post graduate students may be provided with training in the basics of medical education and technology through workshops at the departmental and/or institutional level.

**9. Development of communication skills**

The post graduate students should develop effective communication skills by making presentations at seminars and journal club sessions and by teaching undergraduates.

**10. Training in clinical Biochemistry:**

The post graduate students should receive hands-on training in a diagnostic laboratory in Biochemistry; such training should be extensive and rigorous enough for each post graduate student to acquire adequate skills and expertise to manage and supervise such a laboratory. The post graduate students should be posted in all sections of the laboratory in the institution, starting from sample collection and processing. They should become proficient in working with the autoanalysers in the laboratory, in quality control methods, setting up of a clinical biochemistry laboratory, specialized assays and statistical analysis of data. It would also be desirable for them to acquire experience in running a 24-hours diagnostic laboratory; towards this end, it would help if they are posted in the laboratory out of regular hours as well.

**11. Rotation in clinical departments**

It would be desirable for the post graduate students to be posted in clinical departments after their training period in the diagnostic laboratory, for up to 3 months of the course. Suggested departments and durations of postings are as follows:

General medicine (1 month which includes endocrinology and intensive care units),  
Hematology (1 month),  
Routine Microbiology (1 month),  
Pediatrics (10 days).

These postings will help post graduate students get a better perspective on diagnostic tests in clinical practice and will enable them to contribute more effectively to patient care.

**12. Log Book:**

All post graduate students should maintain a log book that documents all the work that they have done during their years of training. This log book should be checked and assessed periodically by the faculty members involved in the training programme.

**13. Department should encourage e-learning activities.**

**During the training programme, patient safety is of paramount importance, therefore skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.**

## **ASSESSMENT**

### **Formative assessment during the training**

#### **FORMATIVE ASSESSMENT, ie., during the training**

#### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

#### **Quarterly assessment during the MD training should be based on:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).**

## **SUMMATIVE ASSESSMENT at the end of training,**

The summative examination will be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

The postgraduate examination shall be in three parts.

### **1. Thesis**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognized post-graduate teacher. The results of the work done shall be written up and submitted in the form of a thesis. The aim of doing a thesis is to contribute to development of aspirit of enquiry, to familiarize the post graduate students with research methodology, literature searches, laboratory techniques, analysis of data, interpretation of results and skills in scientific writing.

The thesis shall be submitted at least six months before the theory and clinical / practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for theory and clinical examinations. A post graduate student shall be allowed to appear for the theory and practical/clinical examination only after the acceptance of the thesis by the examiners.

### **2. Theory examination**

The examinations shall be organized on the basis of a 'Grading' or 'Marking' system to evaluate and certify a post graduate student's level of knowledge, skills and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' and 'Practical' examinations separately shall be mandatory for passing the examination as a whole. The examination for MD/MS shall be held at the end of the 3rd academic year.

There shall be 4 theory papers each of three hours duration:

**Paper I: Biomolecules, cell biology, biochemical techniques, biostatistics and research methodology, basics of medical education in teaching and assessment of biochemistry**

**Paper II: Enzymes, bioenergetics, biological oxidation, metabolism of biomolecules, intermediary metabolism and regulation, inborn errors of metabolism and nutrition**

**Paper III: Molecular biology, molecular and genetic aspects of cancer, immunology and effects of environmental pollutants on the body**

**Paper IV: Clinical biochemistry and molecular diagnostics related to different body systems/organs, endocrinology, and recent advances in biochemistry**

### **3. Practical and oral/viva voce examination:**

This should be held over two days.

#### **Practical examination**

The practical examinations will be held over 2 days; one day will be mainly for the practical exercises and the second day for the oral/ viva voce. The practical examinations will have the following components:-

- A. A clinical case for which an actual patient or a paper-based case may be used, as per the facilities available in each institution running the course. The clinical features of the patient and relevant laboratory investigation of biochemical abnormalities present will be discussed
- B. Identification the carbohydrate/amino acid provided and confirm of its identity by paper chromatography, Urine analysis.
- C. Performance of an electrophoresis for serum proteins and discussion of electrophoretic pattern.
- D. Quality Control, its interpretation and Method validation

#### **Viva-voce Examination**

- E. Thesis presentation (of about 15 mins duration)
- F. Pedagogy (20 mins duration plus 10 mins for questions)

### **Suggested reading material:**

## **Books (latest edition)**

1. Lehninger Principles of Biochemistry, David L. Nelson, Michael M. Cox. W H Freeman & Co (Sd).
2. Biochemistry (Stryer), Jeremy M. Berg , John L. Tymoczko , Lubert Stryer, W. H. Freeman.
3. Biochemistry (Voet & Voet), Donald Voet , Judith G. Voet, John Wiley & Sons Inc.
4. Textbook of Biochemistry with Clinical Correlations, Thomas M. Devlin, John Wiley & Sons.
5. Kuby Immunology, Judy Owen, Jenni Punt , Sharon Stranford, W. H. Freeman.
6. Clinical Chemistry: Principles, Techniques, and Correlations, Michael L Bishop, Edward P Fody, Larry E Schoeff, Lippincott Williams and Wilkins.
7. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, Carl A. Burtis, Edward R. Ashwood , Saunders.
8. Harpers Illustrated Biochemistry, Victor W. Rodwell , David Bender, Kathleen M. Botham, Peter J. Kennelly, P. Anthony Weil , McGraw-Hill Education / Medical.
9. Biochemistry (Lippincott's Illustrated Reviews), Denise R Ferrier , Lippincott Williams and Wilkins.
10. Harrison's Principles of Internal Medicine, Dennis L. Kasper, Anthony S. Fauci, Stephen L. Hauser, Dan L. Longo, J. Larry Jameson, Joseph Loscalzo, McGraw-Hill Education / Medical.
11. Davidson's Principles and Practice of Medicine, Walker, Elsevier Health Sciences – UK.
12. Clinical Biochemistry: Metabolic and Clinical Aspects, William J. Marshall & Márta Lapsley & Andrew Day & Ruth Ayling, Imprint - Churchill Livingstone.
13. Biochemistry: A Case-oriented Approach, Rex Montgomery, Thomas W. Conway, Arthur A. Spector, David Chappell, Mosby.
14. Interpretation of Diagnostic tests, Jacques Wallach, Lippincott Williams & Wilkins.

## **Journals**

03-05 international Journals and 02 national (all indexed) journals

**Postgraduate Students Appraisal Form**  
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks\* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE of ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN COMMUNITY MEDICINE**

## **Preamble**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

Community Medicine is an academic subject, a branch of Medicine which deals with promotion of health and prevention of diseases, involving people's participation, utilizing professional management skills. The Community Medicine specialist, will inculcate a holistic view of health and medical interventions primarily focused on Community Health/Population Health. Thus, he/she should be equipped with the knowledge, skills, competencies in primary, secondary & tertiary care, control and prevention of outbreaks/epidemics, community diagnosis, health needs assessment, epidemiological assessment, research and planning evidence-based health policies and programmes.

The Guidelines for teaching Community Medicine, therefore, should be designed to create a cadre of professionals who are competent to meaningfully contribute their expertise in planning, implementation, co-ordination, monitoring, evaluation of Primary Health Care Programs based on scientific evidence. The competencies must cover a wide spectrum of skills viz., technical, managerial, administrative, organizational skills, applied skills in Health Information Management, software application and soft skills of communication, motivation, decision-making, team building, training in scientific communication and medical writing.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of "domains of learning" under the heading "competencies".

## ***SUBJECT SPECIFIC OBJECTIVES***

1. To create a skilled cadre of medical professionals having expertise in application of principles of Public Health, Community Medicine and applied epidemiology, contributing meaningfully in formulating National Health Policies & Programmes with a systems approach for overall human development.
2. To standardize the teaching & training approaches at post- graduate level, for Community Medicine

3. Research: To formulate research questions, do literature search, conduct study with an appropriate study design and study tool; conduct data collection and management, data analysis and report.

## ***SUBJECT SPECIFIC COMPETENCIES***

**At the end of the course the student should be able to acquire the following competencies under the three domains, Cognitive, Affective and Psychomotor:**

### **A. Cognitive domain (The student should be able to:)**

1. Describe conceptual (and applied) understanding of Public Health, Community Medicine, clinical and disease-oriented approach, preventive approach & health promotion, disease control & promotion.
2. Have knowledge about communicable and non-communicable diseases, emerging and re-emerging diseases, their epidemiology, control and prevention.
3. Apply the principles of epidemiology, health research and Bio-statistics, application of qualitative research methods
4. Calculate Odds Ratio, Relative Risk, Attributable risk and other relevant health and morbidity indicators.
5. To describe nutritional problems of the country, role of nutrition in health and disease and to describe common nutritional disorders
6. Develop nutrition plan for an individual based on his requirements and with concerns to special situations if applicable
7. Plan comprehensive programme to address issue of malnutrition in a given area for a specific group
8. To describe the concept of Environmental Health and its various determinants.
9. Identify environmental health issues in a given area/community
10. Assess impact of adverse environmental conditions on health of human beings
11. Plan awareness programmes at various levels on environmental issues and mobilize community resources and participation to safeguard from local adverse environmental conditions
12. Should be able to provide technical advice for water purification, chlorination, installing go-bar gas plant, construction of soakage pits etc.
13. Be a technical expert to advice on protection measures from adverse environmental exposure
14. To describe the working of Primary Health Care system, Panchayat Raj system, National Health Programmes, urban/rural differences, RCH, Demography and Family Welfare.
15. Do orientation of the inter-linkage of health sector and non-health sector for promotion of Health & control and prevention of diseases.
16. Have familiarity with administrative procedures and protocols
17. Have knowledge about role of media and its use in health.

18. Have knowledge of Health Care Administration, Health Management and Public Health Leadership
19. To describe Health Policy planning, Medical Education technology, Information Technology and integration of alternative Health system including AYUSH.
20. To describe the intricacies of Social & Behavioral sciences and their applications.
21. To describe Public Health Legislations
22. To understand and describe International Health & Global Diseases surveillance.
23. To relate the history of symptoms with specific occupation, diagnostic criteria, preventive measures, identification of various hazards in a specific occupational environment and legislations.
24. To keep abreast of recent advances in Public Health & formulate feasible, optimal, sustainable, cost effective strategies in response to the advances in public health & development.
25. To describe the principles of Health Economics and apply it in various public health settings.
26. To explain and correlate common health problems (medical, social, environmental, economic, psychological) of urban slum dwellers, organization of health services in urban slum areas
27. Develop workable interventions for control and prevention of emerging and re-emerging diseases at local, national and global level.
28. Identify behavior pattern of individual or group of individuals detrimental or adversely affecting their health
29. Define and identify vulnerable, under-privileged high risk communities and their special needs
30. To create awareness about various public health laws
31. Evaluate cost effectiveness and cost benefits of a Health Program
32. Understand and express implications of 'Poverty Line', 'Social Inclusion', 'Equity', 'taxations', 'Insurance' on Health care management.
33. To categorize hospital waste and be able to guide for proper disposal.
34. To provide a comprehensive plan for disaster management and mitigation of sufferings.

**B. Affective domain:**

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

**A. C. Psychomotor domain: ((The student should be able to:))**

**The student should be able to perform independently the following :**

- Conduct community surveys for assessment of health & morbidity profile, epidemiological determinants, assessment of health needs, disease surveillance, evaluation of health programmes and community diagnosis
- Conduct epidemic investigations, spot maps, predict disease trends, preparation of reports, planning and implementation of control measures
- Demonstrate clinical skills of preparing case history, examination, provisional diagnosis, treatment and clinical case management and interpretation of laboratory findings. Conduct common procedures such as incision, drainage, dressings & injections.
- Do data collection, compilation, tabular and graphical presentation, analysis and interpretation, applying appropriate statistical tests, using computer-based software application for validation of findings
- Conduct epidemiological research studies to establish cause-effect relationships in elaborating the epidemiology of diseases and health events
- Develop appropriate IEC Material, assessment of community communication needs, training skills, counseling skills, conduct Health Education Programmes in urban and rural settings
- Conduct dietary surveys, assessment of nutritional status, nutritive values of common food menus, detection of food adulterants, use of lactometer, recording and interpretation of growth and development charts.
- Use and apply various instruments and processes concerned with environmental health and biological waste management eg. waste collection, segregation and disposal as per protocols, needle-disposers, disinfection procedures. Also use of Dosi-meters, Kata / Globe Thermometer, Slings Psychrometer, Gobar Gas Plant, Soakage pit, Solar Energy, functioning of ILRs, Deep Freezers, Cold Boxes, Vaccine Carriers.
- identify different types of mosquitoes, detect vector breeding places and orientation of the methods of elimination of breeding places and placement of a mosquito-proof water tank.
- Conduct clinical screening of various diseases and organize community health camps involving community participation in urban and rural settings. Use of Snellen charts for vision, Ishihara's chart for colour blindness, tourniquet tests for dengue diagnosis in fever, BMI and other physical measurements of infants, children and adults etc., copper-T insertions and preparation of pap smear.
- Conduct tests for assessment of chlorine demand of water (Horrock's Apparatus), procedure of well-water and urban water-tank chlorination, assessment of chlorination levels, physical examination of water, methods domestic water purification, oriented in use of water filters.
- Prepare health project proposals with budgeting based on the project objectives.

**Miscellaneous skills: (The student should be able to)**

1. Devise appropriate health education messages for public health awareness using various health communications strategies.

2. Identify family level and community level interventions and facilitate the implementation of the same e.g. food hygiene, food storage, cooking demonstrations, community kitchen, kitchen garden, empowerment of women for promoting nutritional health etc.
3. Demonstrate counselling skills for family planning services.
4. Plan and execute BCC strategy for individuals.
5. Conduct measurement of occupational exposure to harmful influences.
6. Diagnose occupational hazards and undertake surveys to identify occupational exposures as and when necessary.
7. Elicit appropriate response at individual and community level to prevent occupational hazards including IEC activities at different levels.
8. Use modern IT applications especially internet & internet-based applications.

## *Syllabus*

### **Course contents:**

- 1. Conceptual (and applied) understanding of Public Health, Community Medicine, clinical disease-oriented approach, Preventive approach & Health promotion, disease control & promotion.**

### **Learning objectives:**

At the end of this course topic, the student should be able to:-

- i. Understand and explain the concept & application and give suitable analogies/examples related to Public Health/Community Medicine (with differences), Disease-oriented v/s Preventive approach, health promotion disease control & prevention.
- ii. Explain correlation between health and human development with analogies/ examples.
- iii. Explain concept of Primordial, Primary, Secondary and Tertiary prevention with examples.
- v. Evolutionary History and mile-stones in Public Health – National and International levels.

- 2. Communicable and Non-Communicable diseases, emerging and re-emerging diseases**

### **Learning objectives:**

At the end of this course, the student should be able to:-

- i. Understand and explain Epidemiology of Communicable/Non-communicable diseases- its causes, precipitating factors, social & other non- health causes, mechanisms of transmission, signs/systems, management, control & prevention measures, related national Health Programmes & national Guidelines, Directives, special projects, if any.
- ii. Explain application of Disease surveillance system in control of Communicable/Non-communicable diseases.
- iii. Explain & undertake steps to investigate & control outbreaks, epidemics and take measures to prevent the same.
- iv. Evolve prevention & control measures based on local & regional epidemiological funding, synchronizing with National guidelines.

### **3. Applied Epidemiology, Health research, Bio-statistics**

#### **Learning objectives:**

At the end of this course, the student should be able to:-

- i. Explain the concept & application of Epidemiology of Disease and Health giving suitable examples.
- ii. Explain Epidemiological approach, the terms Distribution & Determinants, uses, types of Epidemiological studies, interpretation, merits/demerits and limitations, odds ratio, relative risk, attributable & population attributable risks, Hybrid designs (with examples), validity of Epidemiological Data and application in practice at field level.
- iii. Explain Epidemiological Research methods, Research related protocols, Literature review, estimating sample size, data collection/ compilation/Analysis/ Research, interpretation.
- iv. Develop Health interventional programs based on Epidemiological Finding & create evidence for Public Health action.
- v. Understand difference between data, information & intelligence, types of data, survey methods, formulating questionnaires, interview schedule, data presentation types & analysis.
- vi. Apply computer based software application for data designing, data management & collation analysis e.g. SPSS, Epi-info, MS office and other advanced versions.

### **4. Nutrition**

#### **Learning objectives:**

At the end of this course, the student should be able to:-

- i. Identify various nutritional problems in the region, state and country and contributing factors for the same, with due emphasis on ecology perspectives.
- ii. Explain importance of various nutrients (including micronutrients) in health, their sources, requirements and problems associated with their deficiencies as well as over consumption.
- iii. Plan balanced diet and dietary requirements of various age and sex groups.
- iv. Dietary/nutritional concerns of vulnerable groups – young children, adolescents, ANC/PNC/Lactating mothers/senior citizens/individuals with various health problems e.g hypertension, diabetes, renal problems etc.
- v. Classification of food, food additives, food fortification, food enrichment, food toxins and food adulteration.
- vi. Explain Food production, Food hygiene and safety, food storage, food preparation, food wastage and feeding practices.
- vii. Assessment of nutritional status of a community by adopting different methodologies.
- viii. Nutritional supplementation, surveillance, education and rehabilitation.
- ix. National programmes in nutrition and their evaluation
- x. National nutrition policy.

### **5. Environmental health**

#### **Learning objectives:**

At the end of this course, the student should be able to:-

- i. Highlight importance of external environment (air, water, noise, radiation, temperature, ventilation, solid waste disposal, insects and vectors, domestic and country yard pests, industrial waste disposal etc. and its impact on ecology and human health.
- ii. Elaborate on health issues related to housing, air, water, noise, radiation pollution i.e. size of problems, area and specific groups affected, measurement of pollution levels and health impact of the same, corrective measures
- iii. Elaborate on requirements of water, water chlorination and household purification measures, measurement of chlorine demand, Break-point chlorination levels, water quality.
- iv. Assessment of quality of water and air, control of air pollution
- v. Explain environmental sanitation and control measures (including appropriate technologies) – modern methods of sewage disposal, mechanical ventilation, soakage pits, gobar gas plants, smokeless Chula, solar energy, rainwater harvesting, sewage water recycling plants at society level etc.
- vi. Explain global warming and its health impact.
- vii. Elaborate on forest reserves, social forestry and health
- viii. Study vectors of medical importance and integrated control measures against them.
- ix. Explain dynamics of transmission of vector borne diseases
- x. Explain pest control measures
- xi. Explain environmental health issues in urban and rural areas
- xii. Understand functioning of public sector measures to safeguard environmental health e.g water purification plant
- xiii. Explain Legislative measures for protection of environmental health

## **6. Primary Health Care System, Panchayat Raj, National Health Programmes including RCH, Demography & Family Welfare:**

### **Learning Objectives**

At the end of this course, the student should be able to:-

- i. Explain the meaning of Primary Health Care with suitable analogies with reference to India, and be able to define the systems approach for implementation of Primary Health Care.
- ii. Enumerate the elements, principles, population coverage norms, staff patterns, day to day activities, programme schedule, stakeholders at PHC level.
- iii. Explain the scope and implications of 3-tier system of Primary Health Care.
- iv. Understand functioning of Rural Panchayat Raj system of development and its co-relation with health.
- v. Promote community participation in Primary Health Care programme and motivate various stakeholders for the same.
- vi. Understand and comply with medico-legal procedures related to Primary Health Care activities.
- vii. Integrate, coordinate both health and non-health sectors for implementing various national health programmes.

- viii. Deliver the provisions of various health schemes to eligible beneficiaries such as Janani Suraksha Yojana, Rashtriya Swasthya Beema Yojana, Rajiv Gandhi Jeevandayi Arogya Yojana etc.
- ix. Impart training in health programmes for paramedical workers, lab technicians, community health volunteer's, interns and provide health education in the community.
- x. Implement Public Health Skills for investigations and containment of outbreaks & epidemics.
- xi. Understand history of evolution of public health, important milestones in the world and in India.
- xii. Enumerate the various health committees established and their major recommendations since 1947-48 to till date.

## **7. Health Care Administration, Health Management and Public Health Leadership**

### **Learning Objectives:**

At the end of this course, the student should be able to:-

- i. Explain the conceptual difference between Administration and Management, Power and Authority with reference to health care.
- ii. Explain the role of fundamental principles of constitution, principles of Democracy and its correlation with health care administration.
- iii. Explain the role of Bureaucracy, Technocracy, Political system, Judiciary, Media and people in health care administration.
- iv. Explain and identify the key positions and their role in health administration at State, District, Taluka (Tehsil block) and village level.
- v. Explain the frame work of health care system at State, District, Taluka & village level and understand the mechanism of coordination between bureaucrats, technocrats, political, judiciary and media at each of these levels.
- vi. Enumerate functions of a manager, explain concepts of management and leadership styles, various management techniques, planning process, monitoring & evaluation skills.
- vii. Should be sensitive to quality issues in health care management and comply with relevant quality management techniques.
- viii. Formulate and manage team approach for implementing health programmes.
- ix. Apply skills of effective human resource management and identify relevant roles, responsibilities and duties of functionaries.
- x. Implement skills of motivation, communication, negotiation and conflict management at PHC level.
- xi. Develop budgetary statements based on evidence of needs assessment and be able to maintain account of expenditure as per norms.
- xii. Undertake community health needs survey, conduct training & communication needs assessment of paramedical and health workers, identify vulnerable, underprivileged communities, implements high risk approach.

## **8. Health Policy, Medical Education, Integrating Alternative system of Medicine**

## **Learning Objectives**

At the end of this course, the student should be able to:-

- i. Understand and elaborate implications of the policy provision with reference to the current health scenario in the country.
- ii. Explain the role of health policy in promotion of Primary Health care, ensuring equity, inter-sectoral co-ordination, appropriate technology and community participation.
- iii. Explain the various provisions for promotion of preventive and curative health services including National Health Mission, National Health Programs, Quality Hospital based services, Medical Education and AYUSH.
- iv. Critically appreciate merits and demerits of the Health Policy.
- v. Explain SWOT analysis of the policy and debate on evidence based recommendations, additions, deletions.
- vi. Debate on suggestions or recommendations for future inclusions.

## **9. Social and behavioral sciences**

### **Learning objectives:**

At the end of this course, the student should be able to:-

- i. Understand influence of social and behavioral practices on health.
- ii. Understand principles of behavior change of an individual and community. Clearly understand difference between knowledge, attitude and practices..
- iii. Understand importance of social medicine and health.
- iv. Importance of behavior change communication (BCC).
- v. Socio-cultural factors influencing behavior change.
- vi. Formal and informal organizations in the community.
- vii. Influence of peer pressure.
- viii. Know the health problems, where BCC interventions are necessary.
- ix. Understand factors promoting and detrimental to BCC.

## **11. Public Health Legislations**

### **Learning objectives:**

At the end of this course, the student should be able to:-

- i. Explain public health legislations and need for the same.
- ii. Know in detail each public health law – when, why, implementation, impact, issues etc.
- iii. Enforcement of various public health laws.
- iv. Judiciary mechanism for ensuring proper implementation of public health laws.
- v. Scope for integrated approach for implementation of public health laws.

## **12. International Health**

### **Learning Objectives:**

At the end of this course, the student should be able to:-

- i. Understand the need and scope for international health measures.
- ii. Enlist and understand functioning of various UN agencies (including WHO) playing key role in international health.
- iii. Enlist and understand functioning of bilateral vs multilateral international donor agencies.
- iv. Provide advice to international travelers and vaccination requirements,
- v. Understand International health control measures e.g. quarantine, airport management etc.
- vi. Understand the management of international ports from health perspectives.

### **13. Occupational Health**

#### **Learning Objectives:**

At the end of this course, the student should be able to:-

- i. Understand the concept of occupational health and its importance, Occupational environment and work dynamics.
- ii. Know different types of occupational exposures at various settings.
- iii. Enlist various occupational hazards and their relative magnitude.
- iv. Understand measurement of exposure levels to harmful influences during occupation.
- v. Understand preventive and control measures against various occupational hazards – global, national and local level measures.
- vi. Understand individual and community responses towards preventing exposure to occupational hazards.
- vii. Understand and advise occupational safety measures.
- viii. Understand legislative measures to prevent exposures to occupational hazards.
- ix. Advise compensation provisions to persons exposed to various occupational hazards.
- x. Understand occupational health problems amongst people in unorganized sector
- xi. Understand and advise social security and welfare provisions for workers – ESIS, Factory's Act, Role of ILO, Ministry of Labor, DGFASLI.

### **14. The recent advances in Public Health & miscellaneous issues**

#### **Learning Objectives:**

At the end of this course, the student should be able to:-

- i. identify & enlist events at local, district, national & global levels influencing or adversely affecting health /medical issues of the population.
- ii. Adopt & practise skills related to utilization of modern technology, software, IT application in the interest of health promotion & disease prevention.

### **15. Health Economics**

#### **Learning Objectives:**

At the end of this course, the student should be able to: -

- i. Describe the scope of health economics.

- ii. Understand health market & its characteristics.
- iii. Understand & apply economic evaluation techniques.
- iv. Assess the mechanism of Funding Health Care services, especially health insurance.
- v. Advise on allocation of resources appropriately in their work area.

## ***TEACHING AND LEARNING METHODS***

### **Teaching methodology**

The following is a rough guideline to various teaching/learning activities that may be employed:

- **Journal Club** : Critical appreciation and discussion of research articles in indexed journals
- **Seminar**
- **Lecture/Discussion** : Lectures on newer topics by faculty
- **Case presentation** : Communicable disease case presentation (focus on epidemiology, control, prevention) or Family case ( focus on health needs assessment, SWOT analysis of family, social determinants and social empowerment, community management, role of primary health care and mobilizing resources for empowerment of the family). PG students will present the cases in presence faculty and discuss various modalities of management.
- **Public Health Management training** in Immunization clinics, Disease Surveillance Units, General Preventive OPD, hands-on training in management of national health programs at urban health centre and rural health centre along with orientation in health administrative system.
- The PG student shall be required to participate in the teaching and training programme of Undergraduate students and interns.
- The PG student must have attended Mandatory training in Research Methodology during his tenure.
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- **Special Seminars / Workshops:** conducted by External Faculty on cross-cutting subjects directly or indirectly concerned with Health. eg. Critical appreciation of National Developmental Budget, delivered by prominent Economist.
- **Log Book:** Postgraduate students shall maintain a log book of the work carried out by them and the training programme undergone during the period of training including details of work experience during their postings, including programs implemented under supervision and those performed independently. The log book shall be checked and assessed periodically by the faculty members imparting the training.
- Department should encourage e-learning activities.
- **Postings are given below:**

**Recommended schedule for three years training:**

**Orientation Training/Field postings  
for students of MD Community Medicine**

<b>No.</b>	<b>Field Posting and work</b>	<b>Duration</b>
01	Posting at Sub-centers & PHCs Under & at RHTC and UHTC attached to Dept of Community Medicine as per MCI norm	Total period of ONE year during the 3 year period of PG course. Posting at RHTC should be residential.
02	Posting in the teaching hospital for exposure to clinical departments namely Pediatrics, OBGY & General medicine to acquire clinical skills for diagnosis and management of Communicable and Non-Communicable Diseases	Total - One month General Medicine-2 wks Pediatrics -1 wk Ob. & Gy. -1 wk Time of posting shall be at the discretion of local feasibility
03	Work attachment to gain hands- on skills based, training in public health department & orientation in Health Administration and Management of various National Health Programmes and aspects of public health management at the offices of the DHO/DHS/THO/DTO/DMO/CDPO/MOH of Local Civic Body or district health authorities.	Total - One month Place & time of 2 postings of 2 wks each shall be at discretion of local feasibility.
04	Short duration posting in various camps, melas, public health emergencies, investigation of epidemics, implementation of NHP, linen dept of hospital, Hospital kitchen, Hospital record section, central drug store, Medical Supdt. Office, blood bank, casualty dept., CCL, Hospital waste management, ART-VCTC, Matron Office (HRD), HMIS etc.	Total - one month Minimum of four postings of 1wk duration each shall be done subject to local feasibility.
05	Visits to various institutions of Public Health Importance	Subject to local feasibility

**During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.**

***ASSESSMENT***

**FORMATIVE ASSESSMENT, ie., during the training may be as follows:**

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

**Quarterly assessment during the MD training should be based on:**

- 1. Journal based / recent advances learning**

2. Patient based /Laboratory or Skill based learning
3. Self directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

#### **SUMMATIVE ASSESSMENT, ie., at the end of training**

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination shall be in three parts:

##### **1. Thesis**

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

##### **2. Theory Examination:**

The Post Graduate examination shall be in three parts: -

1. **Thesis:** It should be submitted to the University by each post graduate student at least 6 months before the theory and clinical/practical examination. The thesis shall be examined by a minimum of three examiners, one internal and two external examiners, appointed by the university and who shall not be the examiners for theory and practical. A post graduate student shall be allowed to appear for the theory and practical/clinical examination only after the acceptance of the thesis by two examiners.

##### **2. Theory:**

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student 's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers as follows:

- Paper I :** Conceptual (and applied) understanding of Public Health, Community Medicine, Communicable and Non- Communicable diseases, emerging and re-emerging diseases, Applied Epidemiology, Health research, Bio-statistics.

- Paper II:** Nutrition, Environmental Health, Primary Health Care system, Panchayat Raj system, National health Programs, RCH, Demography and Family Welfare, Health Care Administration, Health Management and Public Health Leadership.
- Paper III:** Social & Behavioral sciences- applied aspects, Scientific communications & Medical writing, Research Methodology, Public Health Legislations, International Health & Global Diseases surveillance.
- Paper IV:** Health Policy planning, Medical Education technology, Information Technology, Integration of alternative Health system including AYUSH, Occupational Health, Recent advances in Public Health & Miscellaneous issues, Health Economics.

**Practical/Clinical and oral examination:**

The practical examination should be conducted over two days, not more than 8 post graduate students per batch, per day as follows :

**1. One long Family case from the community:**

Socio-economic, demographic, cultural and holistic history taking, of the family to understand the various risk factors affecting health and quality of life, assessment of social support system, assessment of present morbidity and its implications, evolve interventions for medical relief and social empowerment and role of family, community and primary health care system in resolving family issues. This shall be conducted preferably in the community setting.

**2. One long Case (30 minutes), 2 short cases (20 minutes each) – Cases with Communicable Diseases**

Students will elaborate on clinico-epidemiological case history to assess the epidemiological factors, precipitating factors, probable source of infection and evolve measures for diagnosis, treatment, management with reference to the case as well as major public health concerns, i.e. Control, prevention of the diagnosed disease and interventions in case of eminent outbreak / epidemic situations. Short cases may be assessed without presentation of detailed history, beginning with Differential Diagnosis in the given time.

**3. Epidemiology and Statistics problem-solving exercises (5):**

**(Epidemiological – 3, Statistical – 2)**

**4. Public Health Spots (5) :** including interpretation of analytical reports of water, food, environmental assessment and public health micro-biology

**5. Viva-voce Examination**

Oral/ Viva-Voce Examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject.

**Recommended reading:**

**A. Books (latest edition)**

1. *Public Health and Preventive Medicine* (Maxcy-Rosenau-Last Public Health and Preventive Medicine) by Robert B. Wallace
2. *Basic Epidemiology*. R Bonita, R Beaglehole, T Kjellstrom. World Health Organization Geneva.
3. *Epidemiology*, by Leon Gordis.
4. *Oxford Textbook of Public Health*. Holland W, Detel R, Know G.
5. *Practical Epidemiology*, by D.J.P Barker
6. *Park's Textbook of Preventive and Social Medicine*, by K.Park
7. *Principles of Medical Statistics*, by A. Bradford Hill
8. *Interpretation and Uses of Medical Statistics*, by Leslie E Daly, Geoffrey J Bourke, James MC Gilvray.
9. *Epidemiology, Principles and Methods*, by B. MacMahon, D. Trichopoulos
10. *Hunter's Diseases of Occupations*, by Donald Hunter, PAB Raffle, PH Adams, Peter J. Baxter, WR Lee.
11. *Epidemiology and Management for Health Care*, by Sathe PV and Doke PP.
12. *Vaccines*, by Stanley A. Plotkin.
13. All reports and documents related to all National Programmes from the Ministry of Health and Family Welfare.

#### **B. Journals**

03-05 international Journals and 02 national (all indexed) journals

Postgraduate Students Appraisal Form

Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks\* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

\*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN DERMATOLOGY, VENEREOLOGY & LEPROSY**

## **Preamble:**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A post graduate specialist having undergone the required training should be able to recognize the health needs of community, should be competent to handle effectively the medical problems and aware of recent advances pertaining to the discipline. The PG student should acquire basic skills in teaching medical/para-medical students. The student should be able to counsel patients and relatives in infectious diseases like HIV/AIDS, STDs, cutaneous tuberculosis, leprosy and any event of serious illness or death.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC OBJECTIVES***

### **At the end of 3 years of post graduate training in Dermatology, Venereology & Leprosy:**

- Student should have knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to dermatology. The student should acquire in-depth knowledge of his subject including recent advances. The student should be fully conversant with the bedside procedures (diagnostic and therapeutic) and having knowledge of latest diagnostics and therapeutics available.
- Student should have acquired practical and procedural skills related to the subject.
- Critically evaluate, initiate investigation and clinically manage cases in Dermatology, Venereology and Leprosy with the help of relevant investigations.

- Should plan and advise measures for the prevention and rehabilitation of patients with various dermatological conditions.
- Able to ensure the implementation of National Health Programmes, particularly in sexually transmitted diseases (STD) and leprosy.
- Acquire training skills in research methodology, professionalism, attitude and communication skills, as below:
  - Student must know basic concepts of research methodology, plan a research project, consult library and online resources, has basic knowledge of statistics and can evaluate published studies.
  - Should be able to practice the specialty of dermatology ethically.
  - Recognize the health needs of patients and carry out professional obligations in keeping with principles of National Health Policy and professional ethics.
- Teaching skills in the subject
  - Student should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students.
- Should have acquired Problem Solving skills

### ***SUBJECT SPECIFIC COMPETENCIES***

**By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:**

#### **A. Cognitive domain**

**At the end of the course, the student should have acquired following theoretical competencies:**

- Describe structure, functions and development of human skin.
- Describe ultrastructural aspects of epidermis, epidermal appendages, dermo-epidermal junction, dermis, and sub-cutis.
- Describe basic pathologic patterns and reactions of skin.
- Demonstrate the knowledge of common laboratory stains and procedures used in the histopathologic diagnosis of skin diseases and special techniques such as immunofluorescence, immunoperoxidase and other related techniques.
- Describe the basics of cutaneous bacteriology, mycology, virology, parasitology and host resistance.
- Describe papulosquamous and vesiculobullous disorders.
- Describe disorders of epidermal appendages and related disorders.
- Describe inflammatory and neoplastic disorders of dermis.
- Describe skin lesions in nutritional, metabolic and heritable disorders.

- Describe pharmacokinetics and principles of topical and systemic therapy.
- Describe drug reaction, its diagnosis and management.
- Describe cutaneous manifestations of systemic disorders.
- Describe anatomy of male and female genitalia, epidemiological transmission, clinical aspects and management of STDs and HIV.
- Describe clinical features, reactions, treatment and rehabilitation in leprosy.
- Describe etiology, pathophysiology, principles of diagnosis and management of common problems in dermatology including emergencies in adults and children.
- Describe indications and methods for fluid and electrolyte replacement therapy including blood transfusion in dermatological conditions.
- Describe common dermatological malignancies in the country and their management including prevention.
- Should be expert in evaluation of ECG, chest X-ray (CXR), biochemical, haematology and immunology reports related to dermatology.
- Acquire knowledge of common laboratory stains and procedures used in the histopathologic diagnosis of skin diseases and special techniques such as immuno-fluorescence, immuno-peroxidase and other related techniques.
- Acquire knowledge of the basics of laser operation and precautions which needs to be taken.
- Demonstrate competence in basic concepts of research methodology and interpretation of data in medical literature/publications.
- Skilled as a self-directed learner, recognize continuing educational needs; use appropriate learning resources and critically analyze relevant published literature in order to practice evidence-based dermatology;
- Should also have a broad idea how to approach an uncommon dermatological disease.

## **B. Affective Domain**

**At the end of the course, the student should have acquired the following attitudinal competencies:**

- Demonstrate self-awareness and personal development in routine conduct.
- **Behavior and Emotional Stability:** Dependable, disciplined, dedicated, stable in emergency situations and shows positive approach.
- **Motivation and Initiative:** Is innovative, enterprising, does not shirk duties or leave any work pending and motivates team members.
- **Honesty and Integrity:** Is truthful, admits mistakes, does not cook up information, has ethical conduct and exhibits good moral values.
- **Interpersonal Skills and Leadership Quality:** Has compassionate attitude towards patients and attendants, gets on well with colleagues and paramedical staff, is respectful to seniors, has good communication skills.

- Should be able to maintain confidentiality with regards to history, physical examination and management of patients.
- Identify social, economic, environmental, biological and emotional determinants of patients, and institute diagnostic, therapeutic, rehabilitative, preventive and promotive measures to provide holistic care to patients at individual and community level against skin, venereal disease and leprosy.
- Recognize the emotional and behavioral characteristics of patients and keep these fundamental attributes in focus while dealing with them.
- Demonstrate empathy and humane approach towards patients and their families and respect their sensibilities.
- Demonstrate communication skills of a high order in explaining management and prognosis, providing counseling and giving health education messages to patients, families and communities.
- Organize and supervise the desired managerial and leadership skills.
- Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
- Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

### **C. Psychomotor Domain**

**A student at the end of training of 3 years of MD programme, must acquire the following practical skills:**

- General medical skills as learnt in MBBS to be maintained:
  - Should be able to provide basic life support (BLS).
  - Should be expert in blood pressure measurement, intravenous access, blood sampling, fluid electrolytes therapy, pleural and cerebrospinal; fluid (CSF) fluid examination.
  - Should be able to provide basic and advanced life-saving support services in emergency situations.
  - Should be able to undertake complete monitoring of the patient and identify social, economic, environmental and emotional determinants in a given case and take them into account for planning therapeutic measures.
- Recognize conditions that may be outside the area of his specialty/competence and refer them to the proper specialist.

### **Dermatology, Venereology and Leprosy, HIV/AIDS Skills**

**The student should:**

- Acquire skills in history taking, physical examination, diagnosis and management of patients in dermatology, venereology and leprosy.
- Be able to identify, classify and differentiate cutaneous findings in dermatological terms in a systematic way.
- Be able to perform systemic examination (chest, cardiac, abdomen, neurological, genitals, oral, eye and gynaecological examination) relevant to dermatologic condition.
- Be competent to manage dermatologic emergencies like angioedema, toxic epidermal necrolysis (TEN), Stevens-Johnson syndrome (SJS), pemphigus, drug reaction and necrotic erythema nodosum leprosum (ENL).
- Be able to plan and deliver comprehensive treatment for diseases using principles of rational drug therapy.
- Be able to plan and advice measures for the prevention of infectious disease.
- Be able to plan rehabilitation of patient suffering from chronic illness and disability and those with special needs like leprosy.
- Demonstrate skills in documentation of case details and of morbidity/mortality data relevant to the assigned situation.

### **Laboratory Skills**

#### **The student:**

- Should be able to perform common laboratory procedures like potassium hydroxide (KOH) mount, Gram stain, Giemsa stain, acid fast bacilli (AFB) stain, Woods lamp examination, stains, culture media etc. related to the cutaneous diagnosis independently.
- Should be able to order relevant investigations and interpret them to reach to a diagnosis.
- Should be familiar with other recent investigations.

#### **Dermatopathology - Student should be competent enough to:**

- To interpret histopathology of common skin diseases.
- To diagnose common skin diseases by examining slides under microscope.

### **Surgery in dermatology**

#### **At the end of training following skills should be performed independently by the student:**

1. Should able to give incisions, take stitches and sutures.
2. Should be trained in taking skin biopsy and nail biopsy.
3. Should be able to perform chemical peels, manual dermabrasion, skin punch grafting and wound dressing independently.

4. Should be able to perform cryosurgery, nail surgery and acne surgery.
5. Able to perform chemical cauterization, cryotherapy, patch and photopatch test, slit smears and tissue smears.

### **Venereology**

1. Should be competent in the clinical approach to the patient of STDs and HIV/AIDS.
2. Should be able to interpret the histopathological diagnosis including laboratory aids related with venereology.
3. Able to perform dark ground illumination, gram stain, Bubo aspiration and tissue smear.
4. Able to manage the patient according to syndromic approach for treatment of STDs.

### **Leprosy**

#### **The student should be:**

1. Able to diagnose and approach the case of leprosy.
2. Perform AFB smear.
3. Able to manage cases of lepra reaction.
4. Identify, judge and decide when to refer the patients at appropriate level for surgery or rehabilitation. Should be able to manage pediatric cases with skin diseases.

## ***Syllabus***

### **Course contents**

#### **Topics related to allied basic sciences**

- The structure, functions and development of human skin.
- Ultrastructural aspects of epidermis, epidermal appendages, dermo-epidermal junction, dermis, and sub-cutis.
- Immunology, molecular biology and genetics in relation to the skin.
- Epidermal cell kinetics and keratinization.
- Lipids of epidermis and sebaceous glands.
- Percutaneous absorption.
- Skin as an organ of protection and thermoregulation.
- Biology of eccrine and apocrine sweat glands.
- Biology of melanocytes and melanin formation.
- Biology of hair follicles, sebaceous glands and nails.
- Epidermal proteins.
- Dermal connective tissue: collagen, elastin, reticulin, basement membrane and ground substance.
- Metabolism of carbohydrates, proteins, fats and steroids by the skin.
- Cutaneous vasculature and vascular reactions.

- Mechanism of cutaneous wound healing.
- Cellular and molecular biology of cutaneous inflammation and arachidonic acid metabolism.
- Immunologic aspects of epidermis.
- Human leukocyte antigen (HLA) system.
- Immunoglobulins.
- Cytokines and chemokines.
- Lymphocytes, neutrophils, eosinophils, basophils and mast cells.
- Complement system.
- Hypersensitivity and allergy.
- Cutaneous carcinogenesis (chemical, viral and radiation).
- Basics of cutaneous bacteriology, mycology, virology, parasitology and host resistance.
- Common laboratory procedures, stains, culture media etc. related to the cutaneous diagnosis.
- Basic pathologic patterns and reactions of skin.
- Common laboratory stains and procedures used in the histopathologic diagnosis of skin diseases and special techniques such as immunofluorescence, immunoperoxidase and other related techniques.

### **Clinical dermatology**

- Epidemiology of cutaneous disease.
- Psychologic aspects of skin disease and psycho-cutaneous disorders.
- Pathophysiology and clinical aspects of pruritus.

### **Papulosquamous diseases**

- Psoriasis, pityriasis rubra pilaris, pityriasis rosea.
- Parapsoriasis, lichen planus, lichen nitidus.
- Palmo-plantar keratodermas, Darier's disease, porokeratosis.
- Ichthyoses and ichthyosiform dermatoses.
- Kyrle's disease and other perforating disorders.

### **Vesiculo - bullous disorders**

- Erythema multiforme, Stevens-Johnson syndrome, Toxic epidermal necrolysis.
- Bullous pemphigoid, Pemphigus.
- Chronic bullous disease of childhood.
- Herpes gestationis (pemphigoid gestationis).
- Hereditary epidermolysis bullosa.
- Epidermolysis bullosa acquisita.
- Dermatitis herpetiformis.
- Familial benign pemphigus.

- Subcorneal pustular dermatoses.
- Pustular eruptions of palms and soles.

### **Disorders of epidermal appendages and related disorders**

- Disorders of hair and nails.
- Disorders of sebaceous glands.
- Rosacea, Perioral dermatitis, acne.
- Disorders of eccrine and apocrine sweat glands.
- Follicular syndromes with inflammation and atrophy.

### **Epidermal and appendageal tumours**

- Precancerous lesions, squamous cell carcinoma and basal cell carcinoma
- Keratoacanthoma, benign epithelial tumours, appendageal tumours
- Merkel cell carcinoma, Paget's disease

### **Disorders of melanocytes**

- Disorders of pigmentation, albinism, benign neoplasia and hyperplasias of melanocytes, dysplastic melanocytic nevi, cutaneous malignant melanoma.

### **Inflammatory and neoplastic disorders of the dermis**

- Acute febrile neutrophilic dermatosis (Sweet's syndrome)
- Erythema elevatum diutinum
- Cutaneous eosinophilic diseases
- Granuloma faciale
- Pyoderma gangrenosum
- Erythema annulare centrifugum and other figurate erythemas
- Granuloma annulare
- Malignant atrophic papulosis (Dego's Disease)
- Neoplasms, pseudoneoplasms and hyperplasias of the dermis
- Vascular anomalies
- Kaposi's Sarcoma
- Anetoderma and other atrophic disorders of the skin
- Ainhum and pseudoainhum
- Neoplasias and hyperplasias of neural and muscular origin
- Elastosis perforans serpiginosa and reactive perforating collagenosis

### **Lymphomas, pseudolymphomas and related conditions**

#### **Disorders of subcutaneous tissue**

- Panniculitis

- Lipodystrophy
- Neoplasms of the subcutaneous fat

### **Disorders of the mucocutaneous integument**

- Biology and disorders of the oral mucosa
- Disorders of the anogenitalia of males and females

### **Cutaneous changes in disorders of altered reactivity**

- Genetic immunodeficiency diseases
- Urticaria and Angioedema
- Disorders associated with complement abnormalities
- Graft-versus-host Disease
- Mucocutaneous manifestations in immunosuppressed host other than HIV-infection
- Contact dermatitis
- Auto-sensitization dermatitis
- Atopic dermatitis (atopic eczema)
- Nummular eczematous dermatitis
- Seborrhoeic dermatitis
- Vesicular palmoplantar eczema

### **Skin changes due to mechanical and physical factors**

- Occupational skin disease
- Radiobiology of the skin
- Skin problems in amputee
- Sports dermatology
- Skin problems in war field
- Decubitus ulcers

### **Photomedicine, photobiology and photo immunology in relation to skin**

- Acute and chronic effects of ultraviolet radiation and sun light on the skin
- Narrow-band ultraviolet B (NB-UVB) therapy, phototherapy, photochemotherapy

### **Disorders due to drugs and chemical agents**

- Cutaneous reactions to drugs
- Mucocutaneous complications of anti-neoplastic therapy
- Cutaneous manifestations of drug abuse

### **Dermatology and the ages of man**

- Neonatal dermatological problems
- Pediatric and adolescent dermatological problems

- Ageing of skin
- Geriatric dermatological problems

### **Skin lesions in nutritional metabolic and heritable disorders**

- Cutaneous changes in nutritional disease
- Acrodermatitis enteropathica and other zinc deficiency disorders
- Cutaneous changes in errors of amino acid metabolism: Tyrosinemia II, phenylketonuria, arginine succinic aciduria, and alkaptonuria
- Amyloidosis of the skin
- The porphyrias
- Xanthomatosis and lipoprotein disorders
- Fobry's Disease; galactosidase - a deficiency (Angiokeratoma corporis diffusum universale)
- Lipid proteinosis
- Cutaneous mineralisation and ossification
- Heritable disorders of connective tissue with skin changes
- Heritable disease with increased sensitivity to cellular injury
- Basal cell Naevus syndrome

### **Skin manifestations of hematologic disorders**

- Skin changes in hematological disease
- Langerhans cell and other cutaneous histiocytoses
- The Mastocytosis syndrome

### **Skin manifestations of systemic disease**

- The skin and disorders of the alimentary tract
- The hepatobiliary system and the skin
- Cutaneous changes in renal disorders, cardiovascular, pulmonary disorders and endocrinal disorders
- Skin changes and diseases in pregnancy
- Skin changes in the flushing disorders and the carcinoid syndrome

### **Skin manifestations of rheumatologic disease**

- Lupus Erythematosus
- Dermatomyositis
- Scleroderma
- Systemic Necrotizing Arteritis
- Cutaneous Necrotising venulitis
- Cryoglobulinemia and Cryofibrinogenemia
- Relapsing Polychondritis
- Rheumatoid Arthritis, Rheumatic Fever and Gout

- Sjogren's syndrome
- Raynaud's phenomenon
- Reiter's syndrome
- Multicentric Reticulohistiocytosis

### **Cutaneous manifestations of disease in other organ systems**

- Sarcoidosis of the skin
- Cutaneous manifestations of Internal Malignancy
- Acanthosis Nigricans
- Scleredema
- Papular Mucinosis
- Neurocutaneous disease
- Tuberous Sclerosis Complex
- The Neurofibromatosis
- Ataxia Telangiectasia
- Behcet's disease

### **Bacterial diseases with cutaneous involvement**

- General considerations of bacterial diseases
- Pyodermas: Staphylococcus aureus, Streptococcus, and others
- Staphylococcal Scalded-Skin syndrome
- Soft Tissue Infections: Erysipelas, Cellulitis, Septicemia and Gangrenous Cellulitis
- Gram-Negative Coccal and bacillary infections
- Bartonellosis
- Miscellaneous bacterial infections with cutaneous manifestations
- Tuberculosis and other myopacterial infections
- Actinomycosis, Necardiosis, and Actinomycetoma
- Lyme Borreliosis
- Kawasaki Disease

### **Fungal diseases with cutaneous involvement**

- Superficial fungal infection: Dermatophytosis, Tinea Nigra, Piedra
- Yeast Infections: Candidiasis, Pitryiasis (Tinea) Versicolor
- Deep Fungal Infections

### **Viral and ricketisial disease**

- Viral Diseases: general consideration
- Rubella (German Measles)
- Measles
- Hand, Foot and Mouth Disease
- Herpangina

- Erythema Infectiosum and Parvovirus B 19 infection
- Herpes simplex
- Varicella and Herpes Zoster
- Cytomegalovirus Infection
- Epstein - Barr Virus Infections
- Human Herpes virus 6 & 7 infections and Exanthem subitum (Roseola Infantum or Sixth Disease)
- Smallpox and Complications of small pox vaccination
- Contagious Pustular Dermatitis, Contagious Ecthyma: Orf virus infection
- Milluscum Contagiosum
- Miller's Nodules
- Warts
- Human Retroviral Disease: Human T-Lymphotropic Virusviruses

## **Therapeutics**

### **Topical therapy**

- Pharmacokinetics principles intopical applications of drugs.
- Principles of topical therapy.

### **Topical agents**

- Glucocorticoids, Acne therapies, Analgesics, Anesthetics, Anti-inflammatory, Anti hair loss, Anti-microbial, Anti-parasitic, Anti-perspirants, Anti-pruritic, Anti-viral, Astringents, Bleaching agents, Keratolytics, Psoriasis therapies, Wart therapies, Topical Retinoids, Topical Antibiotics, Topical Anti-fungal Agents, Sun-protective Agents, Keratolytic Agents, Topical Cytotoxic Agents, Cosmetics and Skin care in practice.

### **Systemic therapy**

- Systemic glucocorticoids, Sulfoes, Aminoquinolines, Cytotoxic and Antimetabolic Agents, Oral Retinoids, Antihistamines, Antibiotics, Antiviral Drugs, Oral Antifungal Agents, Immunosuppressive and Immunomodulatory drugs, Thalidomide, photo-chemotherapy and photo-therpay, electric cautery, cryotherapy, electrolysis, tattooing, intra-lesional injections etc.

### **Surgery in dermatology**

- Dermatologic Surgery: Introduction and Approach
- Skin Resurfacing: Chemical Peels
- Skin Resurfacing: Dermabrasion
- Skin Resurfacing: Laser
- Skin punch grafting
- Wound Dressings
- Cryosurgery

- Nail Surgery

### **Venereology**

- Clinical approach to the patient of sexually transmitted disease
- Anatomy of male and female genitalia
- Epidemiological aspects of STDs
- Viral STDs including HIV, Herpes, Human Papilloma virus (HPV), Molluscum contagiosum, Espirito Santo virus (ESV) etc.
- Bacterial STD's: Syphilis, Gonorrhoea, Chancroid, Donovanosis
- Chlamydial infections: Lymphogranuloma venereum, urethritis, cervicitis, nongonococcal urethritis (NGU), non-specific vaginitis etc.
- Fungal: Candidiasis
- Protozoal: Trichomoniasis
- Ectoparasitic: Scabies, Pediculosis infestations.
- Syndromic management of STDs
- HIV/AIDS - Epidemiology, transmission, patient load, High risk groups, cutaneous manifestations of HIV, treatment of opportunistic infections, antiretroviral therapy, management of STDs in HIV positive cases
- STDs in reproduction health and Pediatrics
- STDs and HIV
- Prevention, counselling and education of different STDs including HIV
- National Control Programmes of STDs and HIV infection
- Medico-legal, social aspects of STDs including psychological and behavioural abnormalities in STD patients

### **Leprosy**

- Approach to the patient with leprosy
- Epidemiological aspects
- Structure, biochemistry, microbiology of Mycobacterium leprae
- Animal models
- Pathogenesis
- Classification
- Immunology and molecular biological aspects
- Histopathology and diagnosis including laboratory aids
- Clinical features
- Reactions
- Systemic involvement (Ocular, bone, mucosa, testes and endocrine etc.)
- Pregnancy and leprosy
- HIV infection and leprosy

## ***TEACHING AND LEARNING METHODS***

A post graduate student pursuing the course should work in the institution as a full time student. No candidate should be permitted to run a clinic/laboratory/nursing home while studying postgraduate course. Each year should be taken as a unit for the purpose of calculating attendance. Every student shall attend teaching and learning activities during each year as prescribed by the department and should not be absent from work without valid reasons.

### **Teaching methodology:**

A list of teaching and learning activities designed to facilitate students acquire essential knowledge and skills outlined is given below.

1. **Lectures:** Lectures are to be kept to a minimum. They may, however, be employed for teaching certain topics. Lectures may be didactic or integrated.

a) **Didactic Lectures:** Few topics are suggested as examples:

- 1) Bio-statistics
- 2) Use of library
- 3) Research Methodology
- 4) Medical code of Conduct and Medical Ethics
- 5) National Health and Disease Control Programmes
- 6) Communication Skills

These topics may preferably be taken up in the first few weeks of the first year.

b) **Integrated Lectures:** Some of the topics may be taken up by multidisciplinary teams eg. Jaundice, Diabetes mellitus, Thyroid etc.

2. **Journal Club & Subject seminars:** Both are recommended to be held once a week. All PG students are expected to attend and actively participate in discussion and enter relevant details in the Log Book. Further, every post graduate student must make a presentation from the allotted journal(s), selected articles at least four times a year. The presentations would be evaluated and would carry weightage for internal assessment.

3. **Student Symposium:** Recommended as an optional multi-disciplinary programme. The evaluation may be similar to that described for subject seminar.

4. **Ward Rounds:** Ward rounds may be service or teaching rounds.

a) **Service Rounds:** Post graduate students and Interns should be responsible for everyday care of the patients. Newly admitted patients should be worked up by the PGs and presented to the seniors the following day.

b) **Teaching Rounds:** Every unit should have 'grand rounds' for teaching purpose. A diary (log book) should be maintained for day to day activities by the students.

Entries of (a) and (b) should be made in the Log book. Log books shall be checked and assessed periodically by the faculty members imparting the training.

5. **Clinical Case Presentations:** Minimum of 5 cases to be presented by every post graduate student each year. They should be assessed using check lists and entries made in the log book
6. **Clinico-Pathological Conference (CPC):** Recommended once a month for all post graduate students. Presentation is to be done by rotation. If cases are not available, it could be supplemented by published CPCs.
7. **Inter-Departmental Meetings:** Strongly recommended particularly with Departments of Pathology and Radio-Diagnosis at least once a week. These meetings should be attended by post graduate students and relevant entries must be made in the Log Book.

**Pathology:** A dozen interesting cases may be chosen and presented by the post graduate students and discussed. The staff of Pathology department would then show the slides and present final diagnosis. In these sessions, the advances in immuno-histochemical techniques can be discussed.

**Radiodiagnosis:** Interesting cases and imaging modalities should be discussed.

8. **Teaching Skills:** The post graduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
9. The post graduate students should undertake audit, use information technology tools and carry out research, both basic and clinical, with the aim of publishing the work and presenting the same at various scientific fora.
10. **Continuing Medical Education Programmes (CME):** At least two CME programmes should be attended by each student during the MD programme.
11. **Conferences:** The student should attend courses, conferences and seminars relevant to the speciality.
12. A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
13. Department should encourage e-learning activities.
14. Rotation:

#### **Clinical Postings**

A major tenure of posting should be in the Department of Dermatology. It should include care of in-patients, out-patients, special clinics like STD clinic, leprosy clinic, vitiligo clinic and maintenance of case records for both in- and out-patients.

A short posting for 2-4 weeks in the Department of Medicine is to be arranged for exposure to Emergency Medicine and Resuscitation.

#### **15. Clinical meetings:**

There should be intra - and inter- departmental meetings for discussing uncommon / interesting medical problems. Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. These should be entered in a Log Book; log books should be checked and assessed periodically by the faculty members imparting the training.

#### **16. Thesis writing:**

Thesis writing is compulsory. All MD students are required to carry out work on a selected research project under the guidance of a recognized post graduate teacher, the result of which shall be written up and submitted in the form of a Thesis.

**During the training programme, patient safety is of paramount importance, therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in medical colleges is mandatory.**

### *ASSESSMENT*

**FORMATIVE ASSESSMENT, i.e., during the training may be as follows:**

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

**Quarterly assessment during the MD training should be based on:**

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs

**SUMMATIVE ASSESSMENT, i.e., at the end of training**

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination shall be in three parts:

#### **1. Thesis**

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

## **2. Theory Examination:**

There shall be four papers each of three hours duration. Each paper shall consist of two long essay questions, three short essay questions and four short notes. These are:

**Paper – I Basic Science as applied to Dermatology, STDs and Leprosy**

**Paper – II Dermatology**

**Paper – III STD & Leprosy**

**Paper – IV Recent advances in field of Dermatology, Applied Sciences pertaining to skin /VD & internal medicine and skin**

## **3. Clinical / Practical and viva voce Examination**

**Practical examination** should be taken to assess competence and skills of techniques and procedures and should consist of two long cases, two short cases and 10 spots.

During oral/viva voce examination, student should be evaluated for Interpretation of data, instruments, clinical problems, radiological and biochemical investigations, slides, drugs, X-rays etc.

## **Recommended Reading:**

### **Books (latest edition)**

- Sexually Transmitted Diseases - Sharma V K
- IADVL Text book of Dermatology - R G Walia
- IAL Textbook of Leprosy - H Kar
- Bologna "Textbook of Dermatology"
- Text Book of Dermatology, Wilkinson/Ebling/Rook, 4 Volumes, Oxford
- Text Book of Dermatology, Samuel L. Moschelia M.D. Harry J. Hurllay M.D., 2 Volumes
- Histopathology of the Skin, Walter - F. Lever- Gundula Schaumburg Lever
- Atlas of Dermatology, 2 Volumes, Bhalani Publishing House, Dadar, Mumbai.
- Diseases of the skin, I Iarry L Arnold Richard 13-Dom William D. James, Andrews
- Differential Diagnosis in Dermatology, Satish S. Savant, Radha Atalshah, Deepak Gore, Richard Ashan, Barbara Lepdard

- Leprosy, Dharmendra, 2 Volumes, Samant and Company, Mumbai.
- Recent Advances in Dermatology, Champion, R.H. Pye, R.J. 8<sup>th</sup> Volumes.
- Venereal Diseases, Amborse King Claude Nicol Philip Rodin, ELBS English Language Book Society/ Baillere Tindal, East Sussex.
- Sexually Transmitted Diseases, King K Holmes, McGraw-Hill Health profession
- Hand Book of leprosy, Jopling W.H, William Hethgunnah Medical Book Ltd., London.
- Dermatology in General Medicine, Thomas B. Fitzpatrick, McGraw Hill Book Company.
- Fundamentals of Pathology of skin, Mysore Venkataram

### **Journals**

**Three international and two national journals (all indexed)**

**Postgraduate Students Appraisal Form  
Clinical Disciplines**

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

**Publications**

**Yes/ No**

Remarks\* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**\*REMARKS:** Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN FORENSIC MEDICINE**

## **Preamble:**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

This programme is meant to standardize and strengthen Forensic Medicine teaching at the post graduate level throughout the country so that it will benefit the judiciary and the legal system of the country in providing justice which will ultimately benefit the community at large. It will also help in achieving uniformity in undergraduate teaching.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC LEARNING OBJECTIVES***

The **Goal** of MD Forensic Medicine is to train a doctor to become a competent medico-legal expert, teacher and researcher in the subject who:

1. is aware of medico legal aspects in various settings
2. *is aware of contemporary advances and developments* in the field of Forensic Medicine.
3. has *acquired the competencies* pertaining to the subject of Forensic Medicine that are required to be practiced at all levels of health system.
4. is oriented to the *principles of research methodology*.
5. has acquired *skills in educating* and imparting training to medical, paramedical and allied professionals.

A post graduate student, upon successfully qualifying in the M.D (Forensic Medicine) examination, should be able to:

1. Become an expert in Forensic Medicine.
2. Identify and define medico-legal problems as they emerge in the community and work to resolve such problems by planning, implementing, evaluating and modulating Medico-legal services.
3. Undertake medico-legal responsibilities and discharge medico-legal duties in required settings.

4. Keep abreast with all recent developments and emerging trends in Forensic Medicine, Medical Ethics and the law.
5. Deal with general principles and practical problems related to forensic, clinical, emergency, environmental, medico-legal and occupational aspects of toxicology.
7. Deal with medico-legal aspects of Psychiatry, mental health and drug addiction.
8. Impart education in Forensic Medicine and Toxicology to under-graduate and post-graduate students with the help of modern teaching aids.
9. Assess the students' knowledge and skills in the subject of Forensic Medicine
10. Oriented to research methodology and conduct of research in the subject

### ***SUBJECT SPECIFIC COMPETENCIES***

**By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:**

#### **A. Cognitive domain**

1. Describe the legal and medico-legal system in India.
2. Acquire knowledge on the philosophy and guiding principles of Forensic Medicine course.
3. Describe the programme goals and objectives of the Forensic Medicine course.
4. Acquire knowledge on conduct of medico-legal autopsy independently with required physical assistance, prepare report and derive inferences.
5. Outline the principles and objectives of postmortem examination.
6. Describe the formalities and procedures of medico-legal autopsies in accordance with existing conventions and the law.
7. Identify the role of anatomy, physiology, biochemistry, microbiology, pathology, blood bank, psychiatry, radiology, forensic science laboratory as well as other disciplines of medical science to logically arrive at a conclusion in medico-legal autopsies and examination of medico-legal cases.
8. Describe the principles of the techniques used in toxicological laboratory namely TLC (Thin Layer Chromatography), GLC (Gas Liquid Chromatography), AAS (Atomic Absorption Spectrophotometry), HPLC (High Performance Liquid Chromatography) and Breath Alcohol Analyzer.
9. Describe relevant legal/court procedures applicable to medico-legal/medical practice.
10. Describe the general forensic principles of ballistics, serology, analytical toxicology and photography.
11. Interpret, analyze and review medico-legal reports prepared by other medical officers at the time of need.
11. Describe role of DNA profile and its application in medico-legal practice.
12. Describe the law/s relating to poisons, drugs, cosmetics, narcotic drugs and psychotropic substances.

13. Describe the legal and ethical aspects of Forensic Procedures including Narco-analysis, Brain mapping and Polygraph etc.
14. Describe the medico-legal aspects of Psychiatry, addiction and mental health.

## **B. Affective domain**

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the clinician or other colleagues to provide the best possible opinion.
2. Should be able to follow ethical principles in dealings with patients, police personnel, relatives and other health personnel and to respect their rights.
3. Follow medical etiquettes in dealing with each other.
4. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

## **C. Psychomotor domain**

**At the end of the course, the student should acquire following skills and be able to:**

1. Perform medico-legal autopsy independently with required physical assistance, prepare report and derive inferences.
2. Perform medico-legal examination of users of alcohol, drugs and poisons and prepare report.
3. Perform medico-legal examination in cases of sexual offences and prepare report.
4. Interpret histo-pathological, microbiological, radiological, chemical analysis, DNA profile and other investigative reports for medico-legal purposes.
5. Perform medico-legal examination of bones, clothing, wet specimens and weapons.
6. Depose as an expert witness in a court of Law on medico-legal matters.
7. Examine, identify, prepare reports and initiate management on medico-legal cases in emergency set up.
8. Identify and discharge all legal responsibilities in medico-legal matters.
9. Plan, organize and supervise medico-legal work in general/teaching/district hospitals and in any health care set up.
10. Collect, preserve and dispatch various samples and trace evidences to the concerned authorities in appropriate manner.
11. Help and Advise authorities on matters related to medical ethics and medico-legal issues.
12. Discharge duties in respect of forensic, clinical, emergency, environmental, medico-legal and occupational aspects of toxicology.
13. Plan, organize and manage toxicological laboratory services in any health care set up.
14. Provide information and consultation on all aspects of toxicology to professionals, industry, Government and the public at large.

15. Manage medico-legal responsibilities in mass disasters involving multiple deaths like fire, traffic accident, aircraft accident, rail accident and natural calamities.
16. Do interaction with allied departments by rendering services in advanced laboratory investigations and relevant expert opinion.
17. Participate in various workshops/seminars/journal clubs/demonstration in the allied departments, to acquire various skills for collaborative research.

### **Time frame to acquire knowledge & skills:**

#### **First year of PG programme:**

1. Orientation Programme
2. Basic autopsy skills.
3. Orientation to the applied aspects of Anatomy, Physiology, Biochemistry
4. General principles of Forensic Medicine.
5. Introduction to Medical Toxicology.
6. Assisting in scheduling of teaching sessions.
7. Participation in undergraduate teaching.
8. Posting for autopsy work, clinical forensic medicine and toxicology.
9. Participation in departmental activities
10. Participation in seminar, CME, workshop etc.
11. Orientation to organization and functioning of toxicology/research laboratory.
12. Preparation of thesis protocol.
13. Being self-updated with recent advances in the subject

#### **Second year of PG programme:**

1. Conduct of autopsy examination without supervision in routine autopsy cases
2. Conduct of autopsy examination with supervision in expert opinion cases.
3. Conduct of theory and practical sessions for undergraduates
4. Thesis and other research work
5. Clinical forensic medicine work for practical experience in medico-legal procedures and on-the-job practical training in medico-legal aspects of emergency medicine, radiology and other clinical disciplines.
6. Orientation to the applied aspects of Microbiology, Pathology, Blood Bank, Psychiatry as related to forensic sciences.
7. Posting for autopsy work, clinical forensic medicine and toxicology laboratory.
8. Attend court summons for cases conducted by themselves or where deputed to attend in cases where an expert is required to depose by Court of Law

#### **Third year of PG programme:**

1. Organize teaching sessions and thesis work.
2. Submission of thesis six months prior to examination.

3. Posting for autopsy work, clinical forensic medicine and toxicology laboratory to continue.
4. The PG trainee shall be required to conduct minimum of 100 autopsy cases and minimum of 100 clinical cases during the entire training period.
5. Attend Court summons for cases conducted by themselves or when deputed where an expert is required to depose by the Court of Law.
6. The PG trainee shall be required to attend or accompany an expert to attend a minimum of 20 court summons, of which at least 5 should pertain to clinical cases.

## *Syllabus*

### **Course contents:**

#### **I. General Principles of Forensic Medicine and Toxicology**

- i. Identify the role of anatomy, physiology, biochemistry, microbiology, pathology, blood bank, psychiatry, radiology, forensic science laboratory as well as other disciplines of medical science to logically arrive at a conclusion in medico-legal autopsies and examination of medico-legal cases.
- ii. Describe the basic principles of techniques used in toxicological laboratory namely TLC, GLC, ASS, HPLC and Breath Alcohol Analyzer.
- iii. Execute the skills and knowledge expected at undergraduate level.

#### **II. Basic Sciences and allied Subjects**

##### **A. Anatomy:** Anatomy of parts and organs of the body which are important from the medico-legal aspect.

- i. Describe surface and regional anatomy of head, neck, chest and abdomen.
- ii. Describe gross anatomy and blood supply of heart, brain, lungs, spleen, liver and kidneys.
- iii. Describe gross anatomy of male and female genitalia.
- iv. Describe the comparative anatomy of male and female skeleton.
- v. Perform histological examination of various tissues.
- vi. Describe the development of foetus.

##### **B. Physiology and Biochemistry:** Mechanism of phenomena that are important in the body from the medico-legal viewpoint.

- i. Describe mechanism of fluid and electrolyte balance, thermoregulation in newborn and adults, endocrine functions.
- ii. Describe physiology of sexual behavior.
- iii. Describe physiological functioning of circulatory system, digestive system, respiratory system, haemopoietic system, central nervous system and reproductive system including pregnancy.

**C. Pathology:** Pathophysiology of vital processes and response mechanisms that modulate tissue and organ reaction to all forms of injury and have a bearing on antemortem and postmortem appearance in medico-legal cases, assessment of the duration of injuries and correlate trauma and disease.

- i. Describe pathology of inflammation and repair, immunity and hypersensitivity, Thrombosis and embolism, electric and ionizing radiation injuries, genetic factors in disease, deficiency disorders and malnutrition.
- ii. Describe pathology of myocardial infarction, congenital heart diseases, tuberculosis of lungs, cirrhosis of liver, diseases of glomeruli and tubules and interstitial; tissues of Kidney, tumours, endocrine disorders, venereal diseases, spontaneous intracranial hemorrhages.
- iii. Describe the pathology of sudden death.
- iv. Describe local and systemic response to trauma and patho-physiology of shock.
- v. Describe pathology of common infections and infestations of medico-legal significance.

**D. Dentistry:** Adequate knowledge of dentistry for solution of medico-legal problems like, injuries, age determination and identification

**E. Radiology:** Adequate knowledge of radiological procedures for solution of medico-legal problems.

**F. Fundamentals of Forensic Medicine:**

- i. Describe the general forensic principle of ballistics, serology, analytical toxicology and photography.
- ii. Interpret the scene of crime.
- iii. Describe role of DNA profile and its application in medico-legal practice.
- iv. Examine bloodstains for blood grouping, nuclear sexing, HLA typing, seminal stains and hair for medico-legal purpose.
- v. Describe ethical aspects of Forensic Procedures including Narco-analysis, Brain mapping and Polygraph

### **III. Medical Ethics and Law (Medical Jurisprudence)**

- i. Describe the history of Forensic Medicine.
- ii. Describe the legal and medico-legal system in India.
- iii. Describe medical ethics and the law in relation to medical practice, declarations, oath, etiquette, Medical Council of India, disciplinary control, rights and duties of a registered medical practitioner's professional misconduct, consent, confidentiality, medical negligence (including all related issues) and Consumer Protection Act.
- iv. Describe medical ethics and law in relation to organ transplantation, biomedical human research and experimentation, human rights, cloning, genetic engineering, human genome, citizen's charter and International codes of medical ethics.
- v. Describe the ethics and law in relation to artificial insemination, abortion, antenatal sex, foetus, genetics and euthanasia.

- vi. Interpret the ethics and law applicable to the human (clinical trials) and animal experimentation.
- vii. Describe ethics in relation to elderly, women and children.
- viii. Describe medical ethics and law in relation to nursing and other medical services/practices.
- ix. Understanding about bio-ethics

#### **IV. Clinical Forensic Medicine**

- i. Examine, assess legal implications and prepare report or certificate in cases of physical assault, suspected drunkenness, sexual offences, consummation of marriage and disputed paternity.
- ii. Collect, preserve and dispatch the specimen/material to the concerned authority and interpret the clinical and laboratory findings which are reported.
- iii. Examine injured person, prepare medico-legal report and initiate management.
- iv. Determine the age and establish identity of an individual for medico-legal purpose.
- v. Examine a person and assess disability in industrial accidents and diseases.
- vi. Perform examination and interpret findings for medico-legal purposes in cases pertaining to pregnancy, delivery, artificial insemination, abortion, sterilization, Impotence, AIDS and infectious disease.
- vii. Describe normal and abnormal sexual behavior and its medico-legal implications.
- viii. Examine and assess the medical fitness of a person for insurance, government service, sickness and fitness on recovery from illness.
- ix. Examine medico-legal problems related to clinical disciplines of medicine and allied subjects, Pediatrics, Surgery and allied subjects, ENT, Ophthalmology, Obstetrics and Gynecology, Dermatology and Anesthesiology.
- x. Examine medico-legal problems related to children, women and elderly.
- xi. Identify the cases of torture and violation of human rights and issues thereto

#### **V. Forensic Pathology**

- i. Apply the principles involved in methods of identification of human remains by race, age, sex, religion, complexion, stature, hair, teeth, anthropometry, dactylography, foot prints, hairs, tattoos, poroscopy and superimposition techniques.
- ii. Perform medico-legal postmortem and be able to exhume, collect, preserve and dispatch specimens or trace evidence to the appropriate authority.
- iii. Diagnose and describe the pathology of wounds, mechanical and regional injuries, ballistics and wound ballistics, electrical injuries, lightning, neglect and starvation, thermal injuries, deaths associated with sexual offences, pregnancy, delivery, abortion, child abuse, dysbarism and barotraumas.
- iv. Describe patho-physiology of shock and neurogenic shock.

- v. Describe patho-physiology of asphyxia, classification, medico-legal aspects and postmortem findings of different types of asphyxial deaths.
- vi. Diagnose and classify death, identify the signs of death, postmortem changes, interpret autopsy findings, artifacts and results of the other relevant investigations to logically conclude the cause, manner (suicidal, homicidal and accidental) and time of death.
- vii. Manage medico-legal responsibilities in mass disasters involving multiple deaths like fire, traffic accident, aircraft accident, rail accident and natural calamities.
- viii. Demonstrate postmortem findings in infant death and to differentiate amongst live birth, still birth and dead born.
- ix. Perform postmortem examination in cases of death in custody, torture and violation of human rights.
- x. Perform postmortem examination in cases of death due to alleged medical negligence as in operative and anesthetic deaths.

## **VI. Toxicology**

- i. Describe the law relating to poisons, drugs, cosmetics, narcotic drugs and
  - a. psychotropic substances.
- ii. Examine and diagnose poisoning cases and apply principles of general management and organ system approach for the management of poisoning cases.
- iii. Describe the basic principles of pharmacokinetics and pharmacodynamics of poisonous substances.
- iv. Describe the toxic hazards of occupation, industry, environment and the principles of predictive toxicology.
- v. Collect, preserve and dispatch material/s for analysis, interpret the laboratory findings and perform the Medico-legal formalities in a case of poisoning.
- vi. Demonstrate the methods of identification and analysis of common poisons
- vii. Describe the signs, symptoms, diagnosis and management of common acute and chronic poisoning due to:
  - a. Corrosives
  - b. Nonmetallic substances
  - c. Insecticides and weed killers
  - d. Metallic substances
  - e. Vegetable and organic irritants
  - f. Somniferous compounds
  - g. Inebriant substances
  - h. Deliriant substances
  - i. Food Contamination/adulteration.
  - j. Substances causing spinal and cardiac toxicity
  - k. Substances causing asphyxia (Asphyxiants)
  - l. Household toxins
  - m. Toxic envenomation

- n. Biological and chemical warfare
- o. Environmental intoxicants
- P. Occupational intoxicants

## **VII. Forensic Psychiatry**

- i. Explain the common terminologies of forensic importance in Psychiatry.
- ii. Describe the medico-legal aspects of Psychiatry and mental health.
- iii. Describe medico-legal aspects of drug addiction.
- iv. Describe role of Psychiatry in criminal investigation, punishment and trial.
- v. Describe the civil and criminal responsibilities of a mentally ill person.
- vi. Describe the role of Psychology in criminal investigation, punishment and trial

## ***TEACHING AND LEARNING METHODS***

### **Teaching methodology**

1. **Lectures:** Lectures are to be kept to a minimum. They may, however, be employed for teaching certain topics. Lectures may be didactic or integrated.

The course shall be of three years, organized in six units (0-5). This modular pattern is a guideline for the department, to organize training. Training programme can be modified depending upon the work load and academic assignments of the department.

2. **Journal Club & Subject seminars:**

Both are recommended to be held once a week. All the PG students are expected to attend and actively participate in discussion and enter in the Log Book relevant details. Further, every PG trainee must make a presentation from the allotted journal(s), selected articles and a total of 12 seminar presentations in three years. The presentations would be evaluated and would carry weightage for internal assessment.

3. **Case Presentations:** Minimum of 5 cases to be presented by every PG trainee each year. They should be assessed using check lists and entries made in the log book

4. **Clinico-Pathological correlation \ Conference:** Recommended once a month for all post graduate students. Presentation is to be done by rotation. If cases are not available, it could be supplemented by published CPCs.

5. **Inter-Departmental Meetings:** These meetings should be attended by post graduate students and relevant entries must be made in the Log Book.

6. **Teaching Skills:** The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

7. Undertake audit, use information technology tools and carry out research, both basic and clinical, with the aim of publishing his work and presenting his work at various scientific fora.

8. **Continuing Medical Education Programmes (CME):** At least two CME programmes should be attended by each student in 3 years.
9. **Conferences:** The student to attend courses, conferences and seminars relevant to the speciality.
10. A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
11. **Rotation:**  
Other than the Department of Forensic Medicine, student may be posted for training in the following clinical disciplines for a given period of time on rotational basis:

	Place of posting	First year	Second year	Third year
01	Trauma & Emergency/ Casualty / Emergency medicine department	1 month	15 days	15 day
02	Radiology	7 days	5 days	3 days
03	Psychiatry	5 days	3 days	2 days
04	Forensic science lab	7 days	15 days	Not required
05	Histopathology	7 days	5 days	3 days

12. Department should encourage e-learning activities.

## ***ASSESSMENT***

### **FORMATIVE ASSESSMENT, ie., during the training**

#### **General Principles**

**Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.**

**Quarterly assessment during the MD training should be based on following educational activities:**

1. **Journal based / recent advances learning**
2. **Patient based /Laboratory or Skill based learning**
3. **Self directed learning and teaching**
4. **Departmental and interdepartmental learning activity**

## 5. External and Outreach Activities / CMEs

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

### **SUMMATIVE ASSESSMENT, ie., assessment at the end of training**

The Postgraduate examination shall be in three parts:

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

**The examination shall be in three parts:**

#### **1. Thesis**

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and practical examination. A PG trainee shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

#### **2. Theory:**

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify PG trainee's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D. shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four papers each of three hours duration. These are:

#### **2. Theory Examination:** There shall be four theory papers.

**Paper I:** Basic of Forensic Medicine, basic sciences and allied subjects.

**Paper II:** Clinical Forensic Medicine and medical jurisprudence.

**Paper III:** Forensic pathology and toxicology.

**Paper IV:** recent advances in Forensic Medicine, Forensic Psychiatry and Medical Toxicology, applied aspects of clinical disciplines and forensic sciences

#### **3. Practical Examination:**

Practical examination would be spread over two days and should be as follows:

##### **Day 1**

- **Clinical Cases** - (any 4) Age estimation, injury report, examination of an insane person to evaluate criminal/civil responsibility, examination of an intoxicated person, examination of a suspected case of poisoning (acute/chronic), disputed paternity case and sexual offences (accused and victim).

- Spots - (10) Histopathology slides, photographs, exhibit material, X-rays, mounted specimens, bones, poisons and weapons, charts etc.
- Toxicology Exercises - (02) Identification and details of common poisons or chemical tests etc.
- Laboratory Tests - (01) Identification of biological stains (Semen, Blood, Body fluids), Histopathology slides of medico legal relevance, gram and acid fast staining etc.

## **Day 2**

- Postmortem Examination.
- Thesis/Seminar Presentation - For assessment of research/teaching ability
- Discussion on a case for expert opinion
- Grand Viva Voce.

## **Recommended Reading**

### **Books (latest edition)**

1. Subramanyam BV. Modi's Medical Jurisprudence and Toxicology. Butterworths India, New Delhi.
2. Nundy A. Principles of Forensic Medicine, New Central Book Agency Calcutta.
3. Lyon's Medical Jurisprudence for India. Delhi Law House, Delhi.
4. Reddy KSN. The Essentials of Forensic Medicine and Toxicology, K. Saguna Devi Publishers, Hyderabad.
5. Parikh CK. Parikh's Textbook of Medical Jurisprudence, Forensic Medicine and Toxicology, CBS Publishers and Distributors, New Delhi.
6. Bernard Knight. Forensic Pathology. Arnold Publishers London.
7. + Di Maio VJ, Di Maio D. Forensic Pathology. CRC Press New York.
8. Camps FE. Gradwohl's legal Medicine. Bristol: John Wright and Sons Ltd.
9. American College of Legal Medicine Textbook Committee. Legal Medicine Mosby Publishers, USA.
10. Di Maio VJM. Gunshot Wounds, CRC Press USA.
11. Gordon I, Shapiro HA, Berson SD. Forensic Medicine – A Guide to Principle. Churchill Livingstone New York.
12. Mant AK. Taylor's Principles and Practice of Medical Jurisprudence, Churchill Livingstone, New York.
13. Parikh CK. Medicolegal Postmortems in India. Medical Publications, Bombay.
14. Gresham GA, Turner AF. Postmortem Procedures An illustrated Text Book. Wolfe Medical Publications.
15. Ludwig J. Current Methods of Autopsy Practice. WB Saunders Company, London.
16. Gordon I, Turner R. Medical Jurisprudence E and S Livingstone Ltd. London.

17. Spitz WU, Fisher RS. Medico-legal Investigation of Death. Charles Thomas Publishers.
18. Schroeder O.C. Dental Jurisprudence. PSG Publishing Company, Littleton, Massachusetts.
19. Stark MM. A Physicians Guide to Clinical Forensic Medicine. Humana Press Totowa, New Jersey.
20. Olshakar JS, Jackson JS. Jackson MC, Smock WS. Forensic Emergency Medicine. Lippincott William and Wilkins, Philadelphia.
21. Norah Rudin, Keith Inman. An introduction to Forensic DNA Analysis. CRC Press, London.
22. Robertson J, Ross AM, Burgoyne LA. DNA in Forensic Science - Theory, Technique and Application. Ellis Horwood, UK
23. Curry AS. Method of Forensic Science Vol. I-III. Inter-science Publishers London.
24. Clement JG, Ranson DL. Craniofacial Identification in Forensic Medicine. Arnold Publishers, London.
25. Sellier GK, Kneubuechl BP. Wound Ballistics and the scientific background. Elsevier, Amsterdam.
26. Bernard Knight. Simpson's Forensic Medicine. Arnold Publishers London.
27. Bernard Knight. Legal aspects of Medical Practice. Churchill Livingstone New York.
28. Gunn and Taylor. Forensic Psychiatry Clinical, Legal and Ethical issues. Butterworth Heinemann
29. G Gustafson. Forensic Odontology. Staples Press.
30. Gonzalez TA. Legal Medicine, Pathology and Toxicology- Appleton Century-Crofts Inc. New York.
31. Hirsch CS, Morris RC, Moritz AR. Handbbok of Legal Medicine. CV Mosby Company London.
32. Lincoln PJ, Thomas J. Forensic DNA Profiling Protocols. Methods in Molecular Biology, Vol. 98, Humana Press, Totowa, New Jersey.
33. Lee HC, Gaensslen RE. DNA and other polymorphism in Forensic Science. Yearbook Medical Publishers, London.
34. Bergaus G, Brinkmann B, Rittner C. Staak M. (Eds.). DNA Technology and its Forensic Application. Springer- Verlag. Berlin
35. Beveridge A. Forensic Investigation of Explosions. Taylor and Francis USA.
36. Jay Dix. Colour Atlas of Forensic Pathology. CRC Press New York.
37. Bernard Knight. (ed.) The Estimation of Time since Death in the early Post Mortem Period. Arnold Publishers London.
38. Mant AK. Modern Trends in Forensic Medicine 1-3. Butterworth, London.
39. Luntz and Luntz. Handbook for Dental Identification. JB Lippincott. Toronto.
40. Buttler JM. Forensic DNA Typing. Academic Press New York.
41. Mason JK. Forensic Medicine- an illustrated reference. Chapmann and Hall, London.

42. Mason JK. Paediatric Forensic Medicine and Pathology. Chapman and Hall, London.
43. Patnaik VP. MKR Krishnan's handbook of Forensic Medicine. Paras Publishing.
44. Lundquist Frank. Methods of Forensic science, vol. II, Interscience publishers.
45. Mehta HS. Medical, Law and Ethics in India. The Bombay Samachar Pvt. Ltd.
46. Gaur's firearms, Forensic Ballistics, Forensic Chemistry and Criminal Jurisprudence. Law Publishers (India) Pvt. Ltd. Allahabad.
47. Tedeschi Eckert. Forensic Medicine Vol. I -IV, WB Saunders Company.
48. Polson, Gee, Knight. The Essentials of Forensic Medicine. Pergomann Press, UK.
49. Redsicker DR. Forensic Photography, CRC Press USA.
50. Krogmann. Human skeleton in Forensic Medicine.
51. Abdullah Fateh. Handbook of Forensic Pathology
52. Simpson K. Taylor's Principle and Practice of Medical Jurisprudence. Vol. I-II.
53. Krishan Vij. Textbook of Forensic Medicine and Toxicology, Churchill Livingstone.
54. Pillay VV. Textbook of Forensic Medicine and Toxicology, Paras Publishing, Hyderabad.
55. Mukherjee JB. Textbook of Forensic Medicine and Toxicology, Arnold's Publishers, London.
56. Henry J, Wiseman H. Management of Poisoning. Published by WHO, UNEP and ILO.
57. Flanagan RJ et al. Basic Analytical Toxicology. Published by WHO, UNEP and ILO.
58. Guidelines for Poison Control. Published by WHO, UNEP and ILO
59. Genetics in Medicine – J. S. Thompson and M.W. Thompson.
60. Research – How to plan, speak and write about it – C. Hawkins and M. Sorgi.

### **Journals**

03-05 international Journals and 02 national (all indexed) journals

**Postgraduate Students Appraisal Form**

**Pre / Para /Clinical Disciplines**

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks\* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**\*REMARKS:** Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE    SIGNATURE OF CONSULTANT    SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN GENERAL MEDICINE**

## **Preamble:**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The competency based training programme aims to produce a post-graduate student who after undergoing the required training should be able to deal effectively with the needs of the community and should be competent to handle all problems related to his/her specialty including recent advances. The student should also acquire skill in teaching of medical/para-medical students in the subject that he/she has received his/her training. He She should be aware of his/her limitations. The student is also expected to know the principles of research methodology and modes of accessing literature.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC OBJECTIVES***

The postgraduate training should enable the student to:

1. Practice efficiently internal medicine specialty, backed by scientific knowledge including basic sciences and skills
2. Diagnose and manage majority of conditions in his specialty (clinically and with the help of relevant investigations
3. Exercise empathy and a caring attitude and maintain professional integrity, honesty and high ethical standards
4. Plan and deliver comprehensive treatment using the principles of rational drug therapy
5. Plan and advise measures for the prevention and rehabilitation of patients belonging to his specialty;
6. Manage emergencies efficiently by providing Basic Life Support (BLS) and Advanced Life Support (ALS) in emergency situations
7. Recognize conditions that may be outside the area of the specialty/ competence and refer them to an appropriate specialist

8. Demonstrate skills in documentation of case details including epidemiological data
9. Play the assigned role in the implementation of National Health Programs
10. Demonstrate competence in basic concepts of research methodology and clinical epidemiology; and preventive aspects of various disease states
11. Be a motivated 'teacher' - defined as one keen to share knowledge and skills with a colleague or a junior or any learner
12. Continue to evince keen interest in continuing education irrespective of whether he/she is in a teaching institution or is practicing and use appropriate learning resources
13. Be well versed with his medico-legal responsibilities
14. Undertake audit, use information technology tools and carry out research - both basic and clinical, with the aim of publishing the work and presenting the work at scientific forums.
15. The student should be able to recognize the mental condition characterized by self absorption and reduced ability to respond to the outside world (e.g. Autism), abnormal functioning in social interaction with or without repetitive behaviour and/or poor communications, etc.

The intended outcome of a competency based program is a consultant specialist who can practice medicine at a defined level of competency in different practice settings. i.e. ambulatory (outpatient), inpatient, intensive care and emergency medicine.

No limit can be fixed and no fixed number of topics can be prescribed as course contents. The student is expected to know his subject in depth; however, emphasis should be on the diseases/health problems most prevalent in that area. Knowledge of recent advances and basic sciences as applicable to his/her specialty should get high priority. Competence in skills commensurate with the specialty (actual hands-on training) must be ensured.

## ***SUBJECT SPECIFIC COMPETENCIES***

### **A. Cognitive domain**

**By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:**

#### **Basic Sciences**

1. Basics of human anatomy as relevant to clinical practice e.g. surface anatomy of various viscera, neuro-anatomy, important structures/organs location in different anatomical locations in the body; common congenital anomalies.

2. Basic functioning of various organ-system, control of vital functions, patho-physiological alteration in diseased states, interpretation of symptoms and signs in relation to patho-physiology.
3. Common pathological changes in various organs associated with diseases and their correlation with clinical signs; understanding various pathogenic processes and possible therapeutic interventions possible at various levels to reverse or arrest the progress of diseases.
4. Knowledge about various microorganisms, their special characteristics important for their pathogenetic potential or of diagnostic help; important organisms associated with tropical diseases, their growth pattern/life-cycles, levels of therapeutic interventions possible in preventing and/or eradicating the organisms.
5. Knowledge about pharmacokinetics and pharmaco-dynamics of the drugs used for the management of common problems in a normal person and in patients with diseases kidneys/liver etc. which may need alteration in metabolism/excretion of the drugs; rational use of available drugs.
6. Knowledge about various poisons with specific reference to different geographical and clinical settings, diagnosis and management.
7. Research Methodology and Studies, epidemiology and basic Biostatistics.
8. National Health Programmes.
9. Biochemical basis of various diseases including fluid and electrolyte disorders; Acid base disorders etc.
10. Recent advances in relevant basic science subjects.

#### **Systemic Medicine**

1. Preventive and environmental issues, including principles of preventive health care, immunization and occupational, environmental medicine and bio-terrorism.
2. Aging and Geriatric Medicine including Biology, epidemiology and neuro-psychiatric aspects of aging.
3. Clinical Pharmacology - principles of drug therapy, biology of addiction and complementary and alternative medicine.
4. Genetics - overview of the paradigm of genetic contribution to health and disease, principles of Human Genetics, single gene and chromosomal disorders and gene therapy.
5. Immunology - The innate and adaptive immune systems, mechanisms of immune mediated cell injury and transplantation immunology.

6. Cardio-vascular diseases - Approach to the patient with possible cardio-vascular diseases, heart failure, arrhythmias, hypertension, coronary artery disease, valvular heart disease, infective endocarditis, diseases of the myocardium and pericardium and diseases of the aorta and peripheral vascular system.
7. Respiratory system - approach to the patient with respiratory disease, disorders of ventilation, asthma, Congenital Obstructive Pulmonary Disease (COPD), Pneumonia, pulmonary embolism, cystic fibrosis, obstructive sleep apnoea syndrome and diseases of the chest wall, pleura and mediastinum.
8. Nephrology - approach to the patient with renal diseases, acid-base disorders, acute kidney injury, chronic kidney disease, tubulo-interstitial diseases, nephrolithiasis, Diabetes and the kidney, obstructive uropathy and treatment of irreversible renal failure.
9. Gastro-intestinal diseases - approach to the patient with gastrointestinal diseases, gastrointestinal endoscopy, motility disorders, diseases of the oesophagus, acid peptic disease, functional gastrointestinal disorders, diarrhea, irritable bowel syndrome, pancreatitis and diseases of the rectum and anus.
10. Diseases of the liver and gall bladder - approach to the patient with liver disease, acute viral hepatitis, chronic hepatitis, alcoholic and non-alcoholic steatohepatitis, cirrhosis and its sequelae, hepatic failure and liver transplantation and diseases of the gall bladder and bile ducts.
11. Haematologic diseases - haematopoiesis, anaemias, leucopenia and leucocytosis, myelo-proliferative disorders, disorders of haemostasis and haemopoietic stem cell transplantation.
12. Oncology - epidemiology, biology and genetics of cancer, paraneoplastic syndromes and endocrine manifestations of tumours, leukemias and lymphomas, cancers of various organ systems and cancer chemotherapy.
13. Metabolic diseases - inborn errors of metabolism and disorders of metabolism.
14. Nutritional diseases - nutritional assessment, enteral and parenteral nutrition, obesity and eating disorders.
15. Endocrine - principles of endocrinology, diseases of various endocrine organs including diabetes mellitus.
16. Rheumatic diseases - approach to the patient with rheumatic diseases, osteoarthritis, rheumatoid arthritis, spondyloarthropathies, systemic lupus erythematosus (SLE), polymyalgia, rheumatic fibromyalgia and amyloidosis.

17. Infectious diseases - Basic consideration in Infectious Diseases, clinical syndromes, community acquired clinical syndromes. Nosocomial infections, Bacterial diseases - General consideration, diseases caused by gram - positive bacteria, diseases caused by gram - negative bacteria, miscellaneous bacterial infections, Mycobacterial diseases, Spirochetal diseases, Rickettsia, Mycoplasma and Chlamydia, viral diseases, DNA viruses, DNA and RNA respiratory viruses, RNA viruses, fungal infections, protozoal and helminthic infections .
18. Neurology - approach to the patient with neurologic disease, headache, seizure disorders and epilepsy, coma, disorders of sleep, cerebrovascular diseases, Parkinson's disease and other movement disorders, motor neuron disease, meningitis and encephalitis, peripheral neuropathies, muscle diseases, diseases of neuromuscular transmission and autonomic disorders and their management.
19. The mental condition characterized by complete self absorption with reduced ability to communicate with the outside world (Autism), abnormal functioning in social interaction with or without repetitive behaviour and/or poor communication etc.
20. Dermatology - Structure and functions of skin, infections of skin, papulo-squamous and inflammatory skin rashes, photo-dermatology, erythroderma, cutaneous manifestations of systematic diseases, bullous diseases, drug induced rashes, disorders of hair and nails, principles of topical therapy.

#### **B. Affective Domain:**

1. Should be able function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

#### **C. Psychomotor domain**

##### **Clinical Assessment Skills**

- ┌ Elicit a detailed clinical history
- ┌ Perform a thorough physical examination of all the systems

##### ***Procedural skills***

Test dose administration

- ┆ Mantoux test
- ┆ Sampling of fluid for culture
- ┆ IV- Infusions
- ┆ Intravenous injections
- ┆ Intravenous canulation
- ┆ ECG recording
- ┆ Pleural tap
- ┆ Lumbar puncture
- ┆ Cardiac
  - TMT
  - Holter Monitoring
  - Echocardiogram
  - Doppler studies
- ┆ Cardio Pulmonary Resuscitation (CPR)
- ┆ Central venous line insertion, CVP monitoring
- ┆ Blood and blood components matching and transfusions
- ┆ Arterial puncture for ABG
- ┆ Fine needle aspiration cytology (FNAC) from palpable lumps
- ┆ Bone marrow aspiration and biopsy
- ┆ Abdominal paracentesis - diagnostic
- ┆ Aspiration of liver abscess
- ┆ Pericardiocentesis
- ┆ Joint fluid aspiration
- ┆ Liver biopsy
- ┆ Nerve/ muscle/ skin/ kidney/ pleural biopsy
- ┆ Ultrasound abdomen, echocardiography
- ┆ Upper GI endoscopy, procto-sigmoidoscopy

***Respiratory management***

- ┆ Nebulization
- ┆ Inhaler therapy
- ┆ Oxygen delivery

***Critically ill person***

- ┆ Monitoring a sick person
- ┆ Endotracheal intubation
- ┆ CPR
- ┆ Using a defibrillator
- ┆ Pulse oximetry
- ┆ Feeding tube/Ryle's tube, stomach wash
- Naso-gastric intubation
- ┆ Urinary catheterization – male and female

┆ Prognostication

┆ Haemodialysis

### **Neurology- interpret**

- **Nerve Conduction studies**
- **EEG**
- Evolved Potential interpretation
- Certification of Brain death

┆ Intercostal tube placement with underwater seal Thoracocentesis

┆ Sedation

┆ Analgesia

### **Laboratory-Diagnostic Abilities**

┆ Urine protein, sugar, microscopy

┆ Peripheral blood smear

┆ Malarial smear

┆ Ziehl Nielson smear-sputum, gastric aspirate

┆ Gram's stain smear-CSF, pus

┆ Stool pH, occult blood, microscopy

┆ KOH smear

┆ Cell count - CSF, pleural, peritoneal, any serous fluid

### **Observes the procedure**

┆ Subdural, ventricular tap

┆ Joint Aspiration – Injection

┆ **Endoscopic Retrograde Cholangio- Pancreatography (ERCP)**

┆ Peritoneal dialysis

### **Interpretation Skills**

Clinical data (history and examination findings), formulating a differential diagnosis in order of priority, using principles of clinical decision making, plan investigative work-up, keeping in mind the cost-effective approach i.e. problem solving and clinical decision-making.

┆ Blood, urine, CSF and fluid investigations - hematology, biochemistry

┆ X-ray chest, abdomen, bone and joints

┆ ECG

┆ Treadmill testing

┆ ABG analysis

┆ Ultrasonography

┆ CT scan chest and abdomen

- ┆ CT scan head and spine
- ┆ MRI
- ┆ Barium studies
- ┆ IVP, VUR studies
- ┆ Pulmonary function tests
- ┆ Immunological investigations
- ┆ Echocardiographic studies

***Interpretation under supervision***

Hemodynamic monitoring

- ┆ Nuclear isotope scanning
- ┆ MRI spectroscopy/SPECT
- ┆ Ultrasound guided aspiration and biopsies

***Communication skills***

- ┆ While eliciting clinical history and performing physical examination
- ┆ Communicating health, and disease
- ┆ Communicating about a seriously ill or mentally abnormal
- ┆ Communicating death
- ┆ Informed consent
- ┆ Empathy with patient and family members
- ┆ Referral letters, and replies
- ┆ Discharge summaries
- ┆ Death certificates
- ┆ Pre-test counseling for HIV
- ┆ Post-test counseling for HIV
- ┆ Pedagogy -teaching students, other health functionaries-lectures, bedside clinics, discussions
- ┆ Health education - prevention of common medical problems, promoting healthy life-style, immunization, periodic health screening, counseling skills in risk factors for common malignancies, cardiovascular disease, AIDS
- ┆ Dietary counseling in health and disease
- ┆ Case presentation skills including recording case history/examination, preparing follow-up notes, preparing referral notes, oral presentation of new cases/follow-up cases
- ┆ Co-coordinating care - team work (with house staff, nurses, faculty etc.)

- └ Linking patients with community resources
- └ Providing referral
- └ Genetic counseling

**Others**

- └ *Demonstrating*
  - professionalism
  - ethical behavior (humane and professional care to patients)
- └ *Utilization of information technology*
  - Medline search, Internet access, computer usage
- └ *Research methodology*
  - designing a study
  - interpretation and presentation of scientific data
- └ *Self-directed learning*
  - identifying key information sources
  - literature searches
  - information management
- └ *Therapeutic decision-making*
  - managing multiple problems simultaneously
  - assessing risks, benefits and costs of treatment options
  - involving patients in decision-making
  - selecting specific drugs within classes
  - Rational use of drugs

**Syllabus**

**Course contents:**

**Basic Sciences**

1. Basics of human anatomy as relevant to clinical practice
  - surface anatomy of various viscera
  - neuro-anatomy
  - important structures/organs location in different anatomical locations in the body
  - common congenital anomalies
2. Basic functioning of various organ-system, control of vital functions, patho-physiological alteration in diseased states, interpretation of symptoms and signs in relation to patho-physiology.
3. Common pathological changes in various organs associated with diseases and their correlation with clinical signs; understanding various pathogenic processes and possible therapeutic interventions possible at various levels to reverse or arrest the progress of diseases.

4. Knowledge about various microorganisms, their special characteristics important for their pathogenetic potential or of diagnostic help; important organisms associated with tropical diseases, their growth pattern/life-cycles, levels of therapeutic interventions possible in preventing and/or eradicating the organisms.
5. Knowledge about pharmacokinetics and pharmaco-dynamics of the drugs used for the management of common problems in a normal person and in patients with diseases kidneys/liver etc. which may need alteration in metabolism/excretion of the drugs; rational use of available drugs.
6. Knowledge about various poisons with specific reference to different geographical and clinical settings, diagnosis and management.
7. Research Methodology and Studies, epidemiology and basic Biostatistics.
8. National Health Programmes.
9. Biochemical basis of various diseases including fluid and electrolyte disorders; Acid base disorders etc.
10. Recent advances in relevant basic science subjects.

### **Systemic Medicine**

11. Preventive and environmental issues, including principles of preventive health care, immunization and occupational, environmental medicine and bio-terrorism.
12. Aging and Geriatric Medicine:
  - Biology
  - epidemiology
  - neuro-psychiatric aspects of aging
13. Clinical Pharmacology:
  - principles of drug therapy
  - biology of addiction
  - complementary and alternative medicine
14. Genetics:
  - overview of the paradigm of genetic contribution to health and disease
  - principles of Human Genetics
  - single gene and chromosomal disorders
  - gene therapy
15. Immunology:
  - innate and adaptive immune systems
  - mechanisms of immune mediated cell injury
  - transplantation immunology

16. Cardio-vascular diseases:

- Approach to the patient with possible cardio-vascular diseases
- heart failure
- arrhythmias
- hypertension
- coronary artery disease
- valvular heart disease
- infective endocarditis
- diseases of the myocardium and pericardium
- diseases of the aorta and peripheral vascular system

17. Respiratory system:

- approach to the patient with respiratory disease
- disorders of ventilation
- asthma
- Congenital Obstructive Pulmonary Disease (COPD)
- Pneumonia
- pulmonary embolism
- cystic fibrosis
- obstructive sleep apnoea syndrome and diseases of the chest wall, pleura and mediastinum

18. Nephrology:

- approach to the patient with renal diseases
- acid-base disorders
- acute kidney injury
- chronic kidney disease
- tubulo-interstitial diseases
- nephrolithiasis
- Diabetes and the kidney
- obstructive uropathy and treatment of irreversible renal failure

19. Gastro-intestinal diseases:

- approach to the patient with gastrointestinal diseases
- gastrointestinal endoscopy
- motility disorders
- diseases of the oesophagus
- acid peptic disease
- functional gastrointestinal disorders
- diarrhea
- irritable bowel syndrome
- pancreatitis and diseases of the rectum and anus

20. Diseases of the liver and gall bladder:

- approach to the patient with liver disease
- acute viral hepatitis
- chronic hepatitis
- alcoholic and non-alcoholic steatohepatitis
- cirrhosis and its sequelae
- hepatic failure and liver transplantation
- diseases of the gall bladder and bile ducts

21. Haematologic diseases:

- Haematopoiesis
- Anaemias
- leucopenia and leucocytosis
- myelo-proliferative disorders
- disorders of haemostasis and haemopoietic stem cell transplantation

22. Oncology:

- Epidemiology
- biology and genetics of cancer
- paraneoplastic syndromes and endocrine manifestations of tumours
- leukemias and lymphomas
- cancers of various organ systems and cancer chemotherapy

23. Metabolic diseases - inborn errors of metabolism and disorders of metabolism.

24. Nutritional diseases - nutritional assessment, enteral and parenteral nutrition, obesity and eating disorders.

25. Endocrine - principles of endocrinology, diseases of various endocrine organs including diabetes mellitus.

26. Rheumatic diseases:

- approach to the patient with rheumatic diseases
- osteoarthritis
- rheumatoid arthritis
- spondyloarthropathies
- systemic lupus erythematosus (SLE)
- polymyalgia
- rheumatic fibromyalgia and amyloidosis

27. Infectious diseases:

- Basic consideration in Infectious Diseases

- clinical syndromes
- community acquired clinical syndromes
- Nosocomial infections
- Bacterial diseases - General consideration, diseases caused by gram - positive bacteria, diseases caused by gram - negative bacteria
  - miscellaneous bacterial infections
  - Mycobacterial diseases
  - Spirochetal diseases
  - Rickettsia
  - Mycoplasma and Chlamydia
  - viral diseases
  - DNA viruses
  - DNA and RNA respiratory viruses
  - RNA viruses
- fungal infections, protozoal and helminthic infections .

28. Neurology - approach to the patient with neurologic disease, headache, seizure disorders and epilepsy, coma, disorders of sleep, cerebrovascular diseases, Parkinson's disease and other movement disorders, motor neuron disease, meningitis and encephalitis, peripheral neuropathies, muscle diseases, diseases of neuromuscular transmission and autonomic disorders and their management.

29. The mental condition characterized by complete self absorption with reduced ability to communicate with the outside world (Autism), abnormal functioning in social interaction with or without repetitive behaviour and/or poor communication etc.

30. Dermatology:

- Structure and functions of skin
- infections of skin
- papulo-squamous and inflammatory skin rashes
- photo-dermatology
- erythroderma
- cutaneous manifestations of systematic diseases
- bullous diseases
- drug induced rashes
- disorders of hair and nails
- principles of topical therapy

### ***TEACHING AND LEARNING METHODS***

Didactic lectures are of least importance; seminars, journal clubs, symposia, reviews, and guest lectures should get priority for acquiring theoretical knowledge. Bedside teaching, grand rounds, interactive group discussions and clinical demonstrations should be the

hallmark of clinical/practical learning. Students should have hands-on training in performing various procedures and ability to interpret results of various tests/investigations. Exposure to newer specialized diagnostic/therapeutic procedures should be given.

Importance should be attached to ward rounds especially in conjunction with emergency admissions. Supervision of work in outpatient department should cover the whole range of work in the unit. It is particularly necessary to attend sub-specialty and symptom specific clinics. The development of independent skills is an important facet of postgraduate training. Joint meetings with physician colleagues, e.g. radiologists and pathologists play a valuable part in training.

The training techniques and approach should be based on principles of adult learning. It should provide opportunities initially for practicing skills in controlled or simulated situations. Repetitions would be necessary to become competent or proficient in a particular skill. The more realistic the learning situation, the more effective will be the learning. Clinical training should include measures for assessing competence in skills being taught and providing feedback on progress towards a satisfactory standard of performance. Time must be available for academic work and audit.

The following is a rough guideline to various teaching/learning activities that may be employed:

- Intradepartmental and interdepartmental conferences related to case discussions.
- Ward rounds along with emergency admissions.
- Attendance at sub-specialty and symptom specific clinics
- external rotation postings in departments like cardiology, neurology and other subspecialties
- Skills training
- Conferences, Seminars, Continuing Medical Education (CME) Programmes.
- Journal Club
- Research Presentation and review of research work.
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- Participation in workshops, conferences and presentation of papers etc.
- Maintenance of records. **Log books** should be maintained to record the work done which shall be checked and assessed periodically by the faculty members imparting the training.
- Postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

- Department should encourage e-learning activities.

### Illustration of Structured Training

Time Period	Description/Levels	Content	Responsibilities
I <sup>st</sup> Month	Orientation	Basic cognitive skills	- Combined duties - Supervised procedures
I year	Beginners	Procedural abilities OPD & ward work	- History sheet writing - Clinical abilities, - Procedural abilities (PA, PI)*, - Laboratory-diagnostic (All PI) - Communication skills O,A,PA - BLS & ACLS
II <sup>nd</sup> Year	Intermediate	Intermediate degree of cognitive abilities  Specialised procedural skills  Emergency	- Independent duties - All procedures - Respiratory management abilities (All PI) - Communication skills (PA, PI) - Writing thesis - Teaching UGs
III <sup>rd</sup> year		Special skills  Intensive critical care	- Advanced levels of independent duties, - casualty calls, - ICU, NICU, - UG teaching

Specialized skills include exchange transfusions, intercostals drainage, peritoneal dialysis, defibrillation/ cardioversion etc.

Levels of necessary cognitive skills are best illustrated by the following:

**Basic:** history taking, diagnosis/differential diagnosis, points for and against each diagnosis

**Intermediate:** detailed discussion on differential diagnoses, analysis and detailed interpretation of clinical and laboratory data;

**Advanced:** analysis of clinical information and synthesis of reasonable concepts including research ideas.

**During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in the medical colleges is mandatory.**

## ASSESSMENT

**FORMATIVE ASSESSMENT, during the training programme**

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

**Quarterly assessment during the MD training should be based on:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).**

### **SUMMATIVE ASSESSMENT, namely, assessment at the end of training**

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

**The Post graduate examination shall be in three parts:**

#### **1. Thesis**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory

and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

## **2. Theory:**

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3<sup>rd</sup> academic year. An academic term shall mean six month's training period.

There will be four theory papers, as below:

**Paper I:** Basic Medical Sciences

**Paper II:** Medicine and allied specialties including pediatrics, dermatology & psychiatry

**Paper III:** Tropical Medicine and Infectious Diseases

**Paper IV:** Recent Advances in Medicine

## **3. Clinical / Practical and Oral/viva voce Examination:**

The final clinical examination should include:

- cases pertaining to major systems
- stations for clinical, procedural and communication skills
- Log Book Records and day-to-day observation during the training
- Oral/viva voce examination shall be comprehensive enough to test the postgraduate student's overall knowledge of the subject

### **Recommended Reading**

#### **Text Books (latest edition)**

- API Text book of Medicine
- Davidson's Principles and Practice of Medicine
- Harrison's Principles & Practice of Medicine
- Oxford Text book of Medicine
- Kumar & Clark : Book of Clinical Medicine
- Cecil : Text Book of Medicine

#### **Reference books**

- Hurst : The Heart
- Braunwald - Heart Disease: A Textbook of Cardiovascular Medicine
- Marriot's Practical Electrocardiography
- Crofton and Douglas : Respiratory Diseases

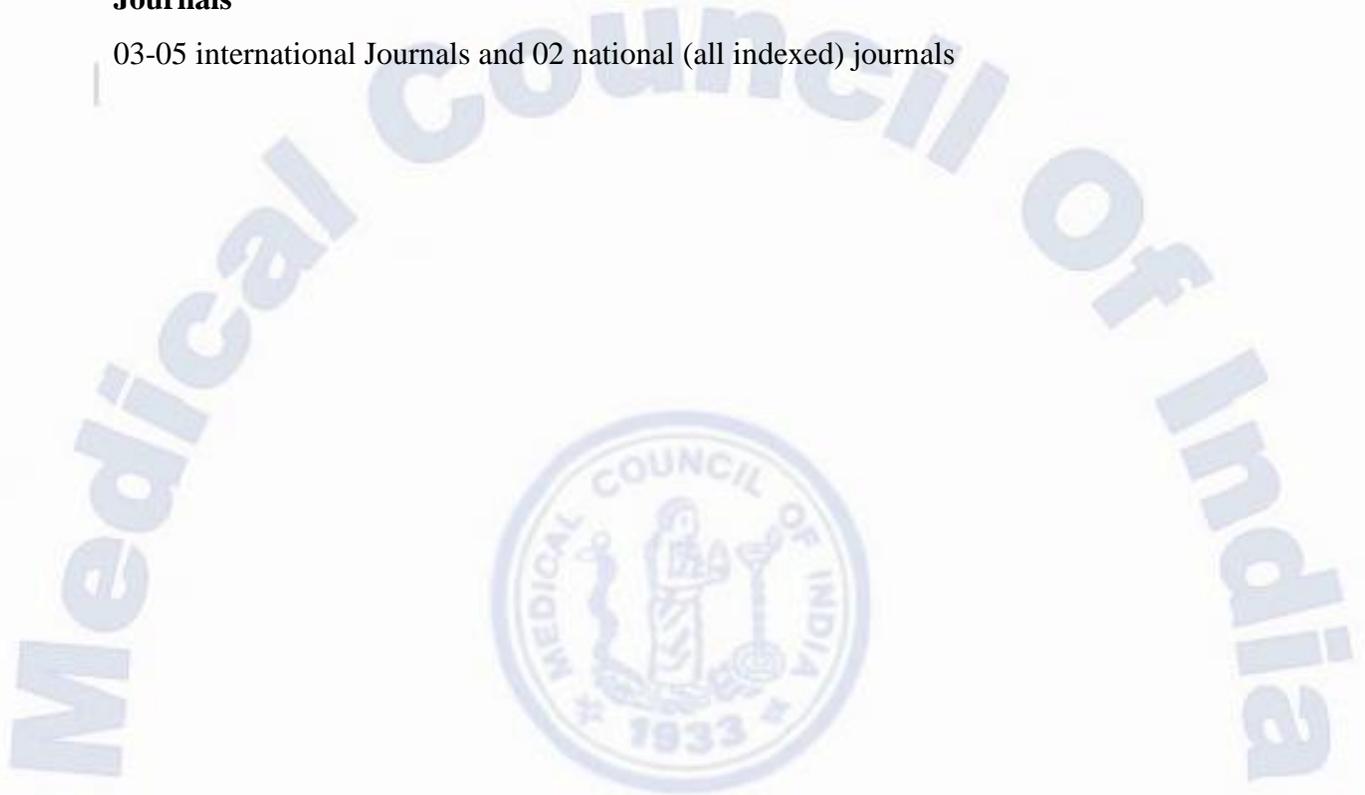
- Brain's Diseases of the Nervous system
- Adam's Principles of Neurology
- William's Text Book of Endocrinology
- De Gruchi's Clinical Hematology in Medical Practice
- Kelly's Text Book of Rheumatology
- Slesenger&Fordtran : Gastrointestinal and Liver disease
- Manson's Tropical Diseases

#### ***Clinical Methods***

- Hutchinson's Clinical Methods
- Macleod's Clinical examination
- John Patten : Neurological Differential Diagnosis
- Neurological examination in Clinical Practice by Bickerstaff

#### **Journals**

03-05 international Journals and 02 national (all indexed) journals



**Postgraduate Students Appraisal Form  
Pre / Para / Clinical Disciplines**

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
1.	Journal based / recent advances learning				
2.	Patient based /Laboratory or Skill based learning				
3.	Self directed learning and teaching				
4.	Departmental and interdepartmental learning activity				
5.	External and Outreach Activities / CMEs				
6.	Thesis / Research work				
7.	Log Book Maintenance				

Publications

Yes/ No

Remarks\* \_\_\_\_\_

\*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN MICROBIOLOGY**

## **Preamble:**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The purpose of preparing these Guidelines is to standardize Microbiology teaching at Post Graduate level throughout the country so that it will achieve uniformity in undergraduate teaching as well.

This document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC OBJECTIVES***

A post graduate student upon successfully qualifying in the MD (Microbiology) examination should be able to:

1. Demonstrate competence as a clinical microbiologist
2. Interact effectively with the allied departments by rendering services in basic as well as advanced laboratory investigations
3. Demonstrate application of microbiology in a variety of clinical settings to solve diagnostic and therapeutic problems along with preventive measures.
4. Play a pivotal role in hospital infection control, including formulation of antibiotic policy and management of biomedical waste.
5. Acquire skills in conducting collaborative research in the field of Microbiology and allied sciences.
6. Conduct such clinical/experimental research as would have significant bearing on human health and patient care
7. Demonstrate effective communication skills required for the practice of clinical microbiology and while teaching undergraduate students
8. Establish good clinical microbiological services in a hospital and in the community in the fields of bacteriology, virology, parasitology, immunology and mycology.
9. Plan, execute and evaluate teaching assignments in Medical Microbiology.

10. Plan, execute, analyze and present the research work in medical microbiology.
11. To acquire various skills for collaborative research.
12. To participate in various workshops/seminars/journal clubs/demonstration in the allied departments
13. Uphold the prestige of the discipline amongst the fraternity of doctors.

### **Post-graduate training**

The post graduate training should include the following components for a holistic approach.

- a. Laboratory and Diagnostic skills in Clinical Microbiology
- b. Teaching Skills
- c. Research Methodology
- d. Communication and attitudinal skills

#### **a. Laboratory and Diagnostic skills in Clinical Microbiology:**

Based on the available facilities, the department should prepare a list of Post Graduate experiments pertaining to basic, diagnostic and applied Microbiology. Active learning should form the mainstay of the postgraduate training. There should be lectures for the postgraduate students (at least 20 per year) along with seminars/symposia/group discussions and journal clubs. The postgraduate student should also attend a minimum of 20 ward rounds, discuss with the faculty, and maintain a log book for the same. They should be able to render consultative and investigative services in microbiology.

#### **b. Teaching Skills**

The Medical Education Department/Unit of the institution should be able to sensitize the postgraduate students in basic concepts of medical education like domains of learning, teaching skills, teaching - learning methods, learning resource material, evaluation techniques etc. The postgraduate students should attend all undergraduate lectures in the subject of Microbiology and participate actively in the undergraduate teaching programme including tutorials, demonstrations and practicals.

#### **c. Research Methodology**

The postgraduate students should be able to plan, design and conduct research in microbiology, as well as collaborate with other departments, analyze data and become familiar with basic biostatistics. They should also be able to write a research paper. All this can be achieved by writing a thesis on a current and relevant topic in Microbiology.

#### **d. Communication and attitudinal skills**

The post graduate student should be able to communicate effectively with patients, their relatives, peers, and consultants for better clinical correlation of laboratory findings as well as research. They should work as an effective team member and leader. They should also demonstrate right kind of attitude while handling clinical material and reports.

### ***SUBJECT SPECIFIC COMPETENCIES***

#### **A) Cognitive Domain:**

**At the end of the course, the student should have acquired knowledge in the following theoretical competencies:**

#### **General Microbiology**

1. Important historical events and developments in microbiology
2. Basic as well as advanced knowledge in various microscopes and microscopic techniques used in diagnostic microbiology
3. Various bio-safety issues including physical and biological containment, universal containment, personal protective equipment for biological agents
4. Various isolation precautions including standard and transmission based precautions
5. In-depth knowledge about various method of Sterilization, disinfection and lyophilization
6. Nomenclature, classification and morphology of bacteria as well as other microorganisms
7. Various types and significance of normal flora of human body in health and disease states.
8. Requirements for growth and nutrition of bacteria along with bacterial metabolism
9. Various types and role of bacterial toxins and bacteriocins
10. Microbiology of air, milk, water as well as hospital environment
11. Various types of host-parasite relationship and their significance
12. Various antimicrobial agents and mechanisms drug resistance
13. Bacterial genetics, bacteriophages and molecular genetics relevant for medical microbiology
14. Applications of quality assurance, quality control in microbiology and accreditation of laboratories

#### **Immunology**

1. Components of immune system, types of immunity (Innate, acquired, mucosal, humoral and cell mediated immunity) and immune response
2. Describes and identifies uses of various antigens, immunoglobulins (antibodies) and antigen and antibody reactions
3. Complement system and Cytokines
4. Various disorders like hypersensitivity, immunodeficiency and auto-immunity involving immune system
5. MHC complex, Immune tolerance, Transplantation and Tumor immunity
6. Various types, techniques, advances, and applications of vaccines and immunotherapy
7. Measurement of immunological parameters
8. Immunological techniques and their applications in diagnostic microbiology as well as research
9. Mechanisms and significance of immune-potential and immune-modulation

### **Systemic bacteriology**

1. Demonstrate knowledge and skills in various techniques for isolation and identification of bacteria
2. Demonstrate knowledge about epidemiology, morphology, biochemical properties, antigenic nature, pathogenesis, complications, laboratory diagnosis treatment and prevention of major bacterial pathogens of medical importance given below-
  - a. Gram positive cocci including *Staphylococcus*, *Micrococcus*, *Streptococcus*, anaerobic cocci etc.
  - b. Gram negative cocci including *Neisseria*, *Branhamella*, *Moraxella* etc.
  - c. Gram positive bacilli including *Lactobacillus*, *Coryneform* bacteria, *Bacillus* and aerobic bacilli, *Actinomyces*, *Nocardia*, *Actinobacillus* and other actinomycetales, *Erysipelothrix*, *Listeria*, *Clostridium* and other spore bearing anaerobic bacilli etc.
  - d. Gram negative bacilli including *Vibrios*, *Aeromonas*, *Plesiomonas*, *Haemophilus*, *Bordetella*, *Brucella*, *Gardnerella*, *Pseudomonas* and other non-fermenters, *Pasteurella*, *Francisella*, *Bacteroides*, *Fusobacterium*, *Leptotrichia* and other anaerobic gram negative bacilli etc.
  - e. *Helicobacter*, *Campylobacter*, *Calymmatobacterium*, *Streptobacillus*, *Spirillum* and miscellaneous bacteria
  - f. *Enterobacteriaceae*
  - g. *Mycobacteria*
  - h. *Spirochaetes*
  - i. *Chlamydia*
  - j. *Mycoplasmatales*; *Mycoplasma*, *Ureaplasma*, *Acholeplasma* and other *Mycoplasmas*.

k. *Rickettsiae, Coxiella, Bartonella* etc.

## **Mycology**

1. Explain general characteristics including morphology, reproduction and classification of fungi
2. Demonstrate knowledge and skills for isolation and identification of fungi
3. Explain tissue reactions to fungi
4. Demonstrate knowledge about epidemiology, morphology, biochemical properties, antigenic nature, pathogenesis, complications, laboratory diagnosis treatment and prevention of major fungal pathogens of medical importance given below-
  - a. Yeasts and yeast like fungi including *Candida, Cryptococcus, Malassezia, Trichosporon, Geotrichum, Saccharomyces* etc.
  - b. Mycelial fungi including *Aspergillus, Zygomycetes, Pseudallescheria, Fusarium, Piedra*, other dematiaceous hyphomycetes and other hyalohyphomycetes etc.
  - c. Dimorphic fungi including *Histoplasma, Blastomyces, Coccidioides, Paracoccidioides, Sporothrix, Penicillium marneffeii* etc.
  - d. Dermatophytes
  - e. Fungi causing Mycetoma, Chromoblatomycosis, Occulomycosis and Otomycosis.
  - f. *Pneumocystis jirovecii* infection
  - g. *Rhinosporidium seeberi* and *Lacazia loboi* (formerly named *Loboa loboi*)
  - h. *Pythium insidiosum*
  - i. *Prototheca*
5. Able to identify laboratory contaminant fungi
6. Explain Mycetism and mycotoxicosis along with agents involved
7. Demonstrates knowledge about antifungal agents and perform *in vitro* antifungal susceptibility tests.

## **Virology**

1. Demonstrates knowledge about general properties, classification, morphology, virus replication and genetics of viruses
2. Explain pathogenesis of viral infections
3. Demonstrates knowledge about isolation and identification of viruses
4. Demonstrate knowledge about epidemiology, morphology, genetics, antigenic nature, pathogenesis, complications, laboratory diagnosis, treatment and prevention of major DNA viruses of medical importance including *Pox viruses*,

*Herpes viruses, Adeno viruses, Hepadna virus, Papova viruses and Parvo viruses* etc.

5. Demonstrate knowledge about epidemiology, morphology, genetics, antigenic nature, pathogenesis, complications, laboratory diagnosis, treatment and prevention of major RNA viruses of medical importance including *Enteroviruses, Toga viruses, Flavi viruses, Orthomyxo viruses, Paramyxo viruses, Reo viruses, Rhabdo viruses, Arena viruses, Bunya viruses, Retro viruses, Filo viruses, Human Immunodeficiency Virus, Arbo viruses, Corona viruses, Calci viruses* etc.
6. Demonstrate knowledge about epidemiology, morphology, genetics, antigenic nature, pathogenesis, complications, laboratory diagnosis, treatment and prevention of major *Hepatitis viruses*
7. Demonstrate knowledge about epidemiology, morphology, genetics, antigenic nature, pathogenesis, complications, laboratory diagnosis, treatment and prevention of unclassified viruses and slow viruses including prions
8. Demonstrate knowledge about viral vaccines and anti-viral drugs.

### **Parasitology**

1. Demonstrate knowledge about general characters, classification and methods of identification of parasites.
2. Demonstrate knowledge about epidemiology, morphology, antigenic nature, life cycle, pathogenesis, complications, laboratory diagnosis, treatment and prevention of Protozoan parasites of medical importance including *Entamoeba, Free living amoebae, Giardia, Trichomonas, Leishmania, Trypanosoma, Plasmodium, Toxoplasma, Sarcocystis, Cryptosporidium, Microsporidium, Cyclospora Isospora, Babesia, Balantidium*, etc.
3. Demonstrate knowledge about epidemiology, morphology, antigenic nature, life cycle, pathogenesis, complications, laboratory diagnosis, treatment and prevention of helminthes of medical importance including those belonging to Cestoda (*Diphyllobothrium, Taenia, Echinococcus, Hymenolepis, Dipylidium, Multiceps* etc.), Trematoda (*Schistosomes, Fasciola, Fasciolopsis, Gastrodiscoides, Paragonimus, Clonorchis, Opisthorchis* etc.) and Nematoda (*Trichiuris, Trichinella, Strongyloides, Ancylostoma, Necator, Ascaris, Toxocara, Enterobius, Filarial worms, Dracunculus* etc. )
4. Demonstrate knowledge about common arthropods and other vectors viz. mosquito, sand fly, ticks, mite, cyclops, louse, myasis of medical importance.
5. Demonstrate knowledge about anti-parasitic vaccine and drugs.

### **Applied Microbiology**

1. Demonstrate knowledge about epidemiology of infectious diseases
2. Demonstrate knowledge about antimicrobial prophylaxis and therapy

3. Demonstrate knowledge about hospital acquired infections
4. Demonstrate knowledge about management of biomedical waste
5. Effectively investigate an infectious outbreak in hospital and community
6. Demonstrate knowledge about infections of various organs and systems of human body viz. respiratory tract infections, urinary tract infections, central nervous system infections, congenital infections, reproductive tract infections, gastrointestinal infections, hepatitis, pyrexia of unknown origin, infections of eye, ear and nose, septicaemia, endocarditis, haemorrhagic fever etc.
7. Demonstrate knowledge about opportunistic infections
8. Demonstrate knowledge about various sexually transmitted diseases
9. Demonstrate knowledge about principles, methods of preparation, administration and types of vaccines
10. Effectively use information technology (Computers) in microbiology
11. Demonstrate knowledge and applications of Automation in Microbiology
12. Demonstrate knowledge and applications about molecular techniques in the laboratory diagnosis of infectious diseases
13. Demonstrate knowledge in statistical analysis of microbiological data and research methodology
14. Demonstrate knowledge in animal and human ethics involved in microbiology
15. Demonstrate knowledge in safety in laboratory and Laboratory management

**B) Affective Domain:**

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopts ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and students for effective teaching.

**C) Psychomotor domain:**

1. Collection/transportation of specimens for microbiological investigations
2. Preparation, examination and interpretation of direct smears from clinical specimens
3. Plating of clinical specimens on media for isolation, purification, identification and quantification purposes.
4. Preparation of stains viz. Gram, Albert's, Ziehl Neelsen (ZN), Silver impregnation stain and special stains for capsule and spore etc.

5. Preparation and pouring of media like Nutrient agar, Blood Agar, Mac-Conkey agar, Sugars, Kligler iron agar/Triple sugar iron agar (TSI), Robertson's cooked meat broth, Lowenstein Jensens medium, Sabouraud's dextrose agar etc.
6. Preparation of reagents-oxidase, Kovac etc.
7. Quality control of media, reagents etc.
8. Operation of autoclave, hot air oven, filters like Seitz and membrane filters etc
9. Care and operation of microscopes
10. Washing and sterilization of glassware (including plugging and packing)
11. Care, maintenance and use of common laboratory equipments like autoclave, hot air oven, water bath, centrifuge, refrigerators, incubators etc.
12. Aseptic practices in laboratory and safety precautions. Selection of Personal Protective Equipment according to task and donning (gloves, mask, eye protection, gown etc).
13. Sterility tests
14. Identification of bacteria of medical importance up to species level (except anaerobes which could be up to generic level).
15. Techniques of anaerobiosis
16. Tests for Motility: hanging drop, Cragie's tube, dark ground microscopy for *spirochaetes*
17. Routine and Special tests - Catalase test, Oxidase test, slide and tube coagulase tests, niacin and catalase tests for *Mycobacterium*, bile solubility, chick cell agglutination, sheep cell haemolysis, satellitism, CAMP test, and other biochemical tests.
18. Preparation of antibiotic discs; performance of antimicrobial susceptibility testing eg. Kirby-Bauer, Stoke's method, Estimation of Minimal Inhibitory/Bactericidal concentrations by tube/plate dilution methods.
19. Tests for  $\beta$ -lactamase production.
20. Screening of gram negative isolates for ESBL and MBL
21. Screening of *Staphylococci* for Methicillin Resistance.
22. Screening of *Enterococci* for Vancomycin resistance.
23. Testing of disinfectants.
24. Quantitative analysis of urine by pour plate method and semi quantitative analysis by standard loop tests for finding significant bacteriuria
25. Disposal of contaminated materials like cultures
26. Disposal of infectious waste
27. Bacteriological tests for water, air and milk
28. Maintenance and preservation of bacterial cultures

➤ **Time frame to acquire knowledge & skills:**

○ **Knowledge :**

End of 1 <sup>st</sup> year	End of 2 <sup>nd</sup> year	End of 3 <sup>rd</sup> year
<b>GENERAL MICROBIOLOGY:</b> 1. History and Pioneers in Microbiology 2. Microscopy 3. Nomenclature and classification of microbes 4. Morphology of bacteria and other micro-organisms 5. Growth and Nutrition of bacteria 6. Bacterial metabolism 7. Sterilization and disinfection 8. Culture media and culture methods 9. Identification of bacteria 10. Bacterial toxins 11. Bacterial antagonism : Bacteriocins 12. Bacterial genetics 13. Gene cloning 14. Antibacterial substances used in the treatment of infections and drug resistance in bacteria 15. Bacterial ecology - Normal flora of human body, Hospital environment, Air, Water and Milk 16. Host-parasite relationship	<b>IMMUNOLOGY :Clinical</b> 1. Hypersensitivity 2. Immunodeficiency 3. Auto-immunity 4. Immune tolerance 5. Transplantation immunity 6. Tumour immunity 7. Immunoprophylaxis and immunotherapy 8. Measurement of immunity	<b>GENERAL MICROBIOLOGY &amp; IMMUNOLOGY:</b>  <b>All</b>
<b>IMMUNOLOGY :</b> 1. Innate and acquired immunity 2. Antigens 3. Immunoglobulins 4. Antigen and antibody Reactions 5. Complement System 6. The normal immune system: structure and function 7. Immune Response	<b>SYSTEMATIC BACTERIOLOGY</b> 1. <i>Streptococcus and Lactobacillus</i> 2. <i>Staphylococcus and Micrococcus</i> 3. <i>Pseudomonas</i> 4. <i>The Enterobacteriaceae</i> 5. <i>Mycobacteria</i> 6. <i>Corynebacterium</i> and other Coryneform bacteria 7. <i>Vibrios, Aeromonas, Plesiomonas, Campylobacter &amp; Spirillum</i> 8. <i>Neisseria, Branhamella &amp; Moraxella</i> 9. <i>Haemophilus and Bordetella</i> 10. <i>Bacillus</i> : the aerobic spore-	<b>SYSTEMATIC BACTERIOLOGY (2<sup>nd</sup> year) :</b> <b>plus</b> 1. <i>Actinomycetes, Nocardia and Actinobacillus</i> 2. <i>Erysipelothrix and Listeria</i> 3. The <i>Bacteroidaceae</i> : <i>Bacteroides, Fusobacterium and Leptotrichia</i> 4. <i>Chromobacterium, flavobacterium, Acinetobacter and</i>

	bearing bacilli 11. <i>Clostridium</i> : the spore-bearing anaerobic bacilli 12. Non-sporing anaerobe 13. The <i>Spirochaetes</i>	<i>Alkaligenes</i> 5. <i>Pasteurella</i> , <i>Francisella</i> 6. <i>Brucella</i> 7. <i>Chlamydia</i> 8. <i>Rickettsiae</i> 9. <i>Mycoplasmatales</i> : <i>Mycoplasma</i> , <i>Ureaplasma</i> and <i>Acholeplasma</i> 10. Miscellaneous bacteria
<b>MICROBIOLOGY APPLIED TO TROPICAL MEDICINE AND RECENT ADVANCES</b>  1. Normal Microbial flora 2. Epidemiology of infectious diseases 3. Hospital acquired infections & Hospital waste disposal 4. Bacteriology of water milk and air	<b>VIROLOGY:</b> 1. The nature of viruses 2. Classification of viruses 3. Morphology: virus structure 4. Virus replication 5. The genetics of viruses 6. The pathogenicity & lab diagnosis of viruses 7. Epidemiology of viral infections 8. Anti-viral drugs 9. Bacteriophages 10. <i>Herpes viruses</i> 11. <i>Paramyxoviruses</i> 12. <i>Influenza virus</i> 13. <i>Hepatitis viruses</i> 14. <i>Rabies virus</i> 15. <i>Human immunodeficiency viruses</i>	<b>VIROLOGY (2<sup>nd</sup> year): plus</b> 1. Vaccines 2. <i>Pox viruses</i> 3. <i>Vesicular viruses</i> 4. <i>Toga viruses</i> 5. <i>Bunya viruses</i> 6. <i>Arena viruses</i> 7. <i>Marburg and Ebola viruses</i> 8. <i>Rubella virus</i> 9. <i>Orbi viruses</i> 10. Respiratory diseases : <i>Rhinoviruses</i> , <i>adenoviruses</i> and <i>corona viruses</i> 11. Enteroviruses; <i>Polio</i> , <i>Echo</i> , and <i>Coxsackie viruses</i> 12. Other enteric viruses 13. Slow viruses 14. Oncogenic viruses 15. Teratogenic viruses
	<b>PARASITOLOGY:</b> 1. General Parasitology 2. <b>Protozoan parasites of medical importance:</b> <i>Entamoeba</i> , <i>Giardia</i> , <i>Trichomonas</i> , <i>Leishmania</i> , <i>Trypanosoma</i> , <i>Plasmodium</i>	<b>PARASITOLOGY (2<sup>nd</sup> year): plus</b> 1. <b>Protozoan parasites of medical importance:</b> <i>Toxoplasma</i> , <i>Sarcocystis</i> , <i>Cryptosporidium</i> , <i>Babesia</i> , <i>Balantidium</i> etc. 2. <b>Helminthology:</b> All those medically important helminthes belonging to Cestoda, Trematoda and Nematoda. 3. <b>Cestodes:</b> <i>Diphyllobothrium</i> , <i>Taenia</i> , <i>Echinococcus</i> , <i>Hymenolepis</i> , <i>Dipylidium</i> ,

		<p><i>Multiceps</i> etc.</p> <p><b>4. Trematodes:</b> <i>Schistosomes,</i> <i>Fasciola,</i> <i>Gastrodiscoides,</i> <i>Paragonimus,</i> <i>Clonorchis,</i> <i>Opisthorchis</i> etc.</p> <p><b>5. Nematodes:</b> <i>Trichuris,</i> <i>Trichinella,</i> <i>Strongyloides,</i> <i>Ancylostoma,</i> <i>Necator, Ascaris,</i> <i>Toxocara,</i> <i>Enterobius,</i> <i>Filarial worms,</i> <i>Dracunculus,</i> etc.</p> <p><b>6. Ecto-parasites:</b> Common arthropods and other vectors viz., Mosquito, Sand fly, Ticks, Mite, Cyclops</p>
	<p><b>MYCOLOGY</b></p> <p>1. The morphology and reproduction in fungi</p> <p>2. Classification of fungi</p> <p>3. <i>Dermatophytes</i></p> <p>4. <i>Candida</i></p> <p>5. <i>Aspergillus</i></p>	<p><b>MYCOLOGY (2<sup>nd</sup> year): plus</b></p> <p>1. Contaminant and opportunistic fungi</p> <p>2. Fungi causing superficial mycoses</p> <p>3. Fungi causing subcutaneous mycoses</p> <p>4. Fungi causing systemic infections</p> <p>5. Anti-mycotic agents</p>
		<p><b>MICROBIOLOGY APPLIED TO TROPICAL MEDICINE AND RECENT ADVANCES</b></p> <p>1. Infections of various organs and systems of human body</p> <p>2. Molecular genetics as applicable to microbiology</p> <p>3. Vaccinology: principle, methods of preparation, administration of vaccines.</p> <p>4. Bio-terrorism</p> <p><b>ALLIED BASIC SCIENCES</b></p>

		<p><b>(a) Biochemistry:</b>  Basic understanding of biochemistry as applied to immunological/ molecular methods for study of microbial diseases and pathogenesis of infections.</p> <ol style="list-style-type: none"> <li>1. Protein purification and estimation</li> <li>2. Protein estimation</li> <li>3. Nucleic acid purification and characterization</li> <li>4. Agarose and polyacrylamide gel electrophoresis - principles</li> <li>5. Ultracentrifugation – principles</li> <li>6. Column chromatography – principles</li> </ol> <p><b>(b) Molecular biology:</b> Basic knowledge as applicable to molecular diagnostics and molecular epidemiology.</p> <ol style="list-style-type: none"> <li>1. Recombinant DNA technology</li> <li>2. Southern, northern and western blotting</li> <li>3. DNA amplification techniques</li> <li>4. Diagnostic PCR, different methods of PCR product detection (liquid hybridization, ELISA).</li> <li>5. Genotyping of microbes and viruses</li> </ol> <p><b>(c) Pathology: (as applied to Microbiology)</b>  Basic knowledge of</p> <ol style="list-style-type: none"> <li>1. Inflammation and repair</li> <li>2. Intercellular substances and</li> </ol>
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		reaction 3. Pathological changes in the body in bacterial, viral, mycotic and parasitic infections 4. Demonstration of pathogen in tissue section
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○ **Skills:**

<b>1<sup>st</sup> year residency-skills list</b>					
Area	Sr. no.	Procedure	Observed no.	Assisted no./ practice on dummy	Performed independently no.(under supervision)
General microbiology	1.	Microscopy for unstained preparations/ wet mount	5	5	10
	2.	Microscopy for stained preparation	5	5	10
	3.	Preparation of direct smears from clinical specimens	5	5	10
	4.	Hanging drop preparation	5	5	10
	5.	Washing, sterilization and packing of glassware	10 sessions	-	-
	6.	Infection control activities-environmental sampling	10	10	-
	7	Identification of HAI	5	5	--
	8	Calculation of HAI quality indicators	5	5	--
	9	Bacteriology of water	5	5	-
	10	Bacteriology of air	5	5	-
	11	Antibiotic disc preparation	-	-	-
	12	Handling of laboratory animal	-	-	-
	13	Methods for preservation of bacteria	10	-	-
	14	Maintenance of stock cultures	10	-	-
Staining	1	Gram staining	10	20	30
	2	Acid fast staining ( Ziehl-Neelsen method)	10	20	30
	3	Albert staining	5	10	10
	4	Modified ZN staining for <i>M. leprae</i>	5	5	5
	5	Modified ZN staining for <i>Nocardia</i>	5	5	5
	6	IQC-staining	5	5	5
Media preparation	1	Preparation of stains	4	4	4
	2	Preparation of reagents	10	10	10
	3	Preparation, plugging, pouring	20	20	30

		& Quality Control (QC) of culture media			
	4	Operation & maintenance of autoclave	10	10	20
Bacteriology	1	Specimen collection for Blood Culture	5	5	5
	2	Inoculation of liquid & solid media	20	20	30
	3	Identification test	20	20	30
	4	Antimicrobial sensitivity testing- modified Kirby-bauer technique	10	20	30
	5	IQC- Antibiotic disc potency	5	5	-
	6	Operation of BacT/ALERT	5	10	20
	7	Operation of Vitek 2 compact	5	10	20
	8	Petroff's concentration technique	10	10	20
	9	AFB culture & sensitivity	5	10	20
Mycology	1	KOH Wet mount	5	10	20
	2	Germ tube test	5	10	20
	3	Slide culture	5	10	20
	4	Negative staining for fungus	5	5	5
	5	LPCB mount	10	10	10
Parasitology	1	Giemsa staining for thick & thin peripheral blood smear	5	-	-
	2	Stool wet mount for R/M	10	20	30
	3	Stool concentration techniques	5	10	5
	4	Modified ZN staining for <i>C. parvum</i>	2	2	2
Serology/ Immunology	1	Phlebotomy & separation of serum	10	10	5
	2	Operation & maintenance of mini-VIDAS	5	10	20
	3	Operation & maintenance of ELISA reader & washer	5	10	--
		<b>Performance of serological tests</b>			
	1	Latex agglutination test(RA, ASO)	10	20	30
	2	RPR card test	10	20	30
	3	Tube agglutination test	10	20	30
	4	Gold conjugate Rapid card test	10	20	30
	5	ANA by IF	5	5	--
	6	ANA by Immunoblot	5	5	--
	7	IQC-serology	5	5	5

<b>2<sup>nd</sup> year residency-skill list</b>					
Area	Sr. no.	Procedure	Observed no.	Assisted no./ practice on dummy	Performed independently no. (under supervision)
General microbiology	1.	Microscopy for unstained preparations/ wet mount	---	--	--
	2.	Microscopy for stained preparation	--	--	--
	3.	Preparation of direct smears from clinical specimens	--	--	--
	4.	Preparation of slit skin smear for lepra bacilli	5	5	5
	5.	Hanging drop preparation	--	--	10
	6.	Washing, sterilization and packing of glassware	05 sessions	-	-
	7	Infection control activities- environmental sampling	--	10	10
	8	Identification of HAI	--	5	5
	9	Calculation of HAI quality indicators	--	5	5
	10	Bacteriology of water	--	5	5
	11	Bacteriology of air	--	5	5
	12	Antibiotic disc preparation	05 lots	-	-
	13	Handling of laboratory animal	-	-	-
	14	Methods for preservation of bacteria	--	05	10
	15	Maintenance of stock cultures	--	05	10
Staining	1	Gram staining	--	--	30
	2	Acid fast staining ( Ziehl-Neelsen method)	--	--	30
	3	Albert staining	--	--	05
	4	Modified ZN staining for <i>M. leprae</i>	--	--	5
	5	Modified ZN staining for <i>Nocardia</i>	--	--	5
	6	IQC-staining	--	--	5
Media preparation	1	Preparation of stains	--	--	5
	2	Preparation of reagents	--	--	15
	3	Preparation, plugging, pouring & Quality Control (QC) of culture media	--	--	50
	4	Operation & maintenance of autoclave	--	--	20
Bacteriology	1	Specimen collection for Blood Culture	--	--	5
	2	Inoculation of liquid & solid media	--	--	30
	3	Identification test	--	--	30
	4	Antimicrobial sensitivity testing- modified Kirby-bauer technique	--	--	30
	5	IQC- Antibiotic disc potency	--	5	5
	6	Operation of BacT/ALERT	--	--	20
	7	Operation of Vitek 2 compact	--	--	20
	8	Petroff's concentration technique	--	--	20
	9	AFB culture & sensitivity	--	--	20
Mycology	1	KOH Wet mount	--	--	20

	2	Germ tube test	--	--	20
	3	Slide culture	--	--	20
	4	Negative staining for fungus	--	--	5
	5	LPCB mount	--	--	10
Parasitology	1	Giemsa staining for thick & thin peripheral blood smear	-	10	-
	2	Stool wet mount for R/M	--	--	30
	3	Stool concentration techniques	--	--	5
	4	Modified ZN staining for <i>C. parvum</i>	--	--	2
Serology/ Immunology	1	Phlebotomy & separation of serum	--	--	5
	2	Operation & maintenance of mini-VIDAS	--	--	20
	3	Operation & maintenance of ELISA reader & washer	--	--	20
		<b>Performance of serological tests</b>			
	1	Latex agglutination test(RA, ASO, CRP)	--	--	30
	2	RPR card test	--	--	30
	3	Tube agglutination test	--	--	30
	4	Gold conjugate rapid card test	--	--	30
	5	ANA by IF	--	--	10
	6	ANA by Immunoblot	--	--	10
	7	IQC-serology	--	--	5

<b>3<sup>rd</sup> year residency-skill list</b>					
Area	Sr. no.	Procedure	Observed no.	Assisted no./ practice on dummy	Performed independently no. (under supervision)
General microbiology	1.	Microscopy for unstained preparations/ wet mount	---	--	--
	2.	Microscopy for stained preparation	--	--	--
	3.	Preparation of slit skin smear for lepra bacilli	--	--	--
	4.	Hanging drop preparation	--	--	--
	5.	Washing, sterilization and packing of glassware	05 sessions	-	-
	6.	Infection control activities-environmental sampling	--	--	10
	7	Identification of HAI	--	--	5
	8	Calculation of HAI quality indicators	--	--	5
	9	Bacteriology of water	-	-	5
	10	Bacteriology of air	-	-	5
	11	Antibiotic disc preparation	-	5 lots	2 lots
	12	Handling of laboratory animal	-	-	10
	13	Methods for preservation of bacteria	-	-	10

	14	Maintenance of stock cultures	-	-	10
Staining	1	Gram staining	--	--	30
	2	Acid fast staining ( Ziehl-Neelsen method)	--	--	30
	3	Albert staining	--	--	05
	4	Modified ZN staining for <i>M. leprae</i>	--	--	5
	5	Modified ZN staining for <i>Nocardia</i>	--	--	5
	6	IQC-staining	--	--	5
Media preparation	1	Preparation of stains	--	--	10
	2	Preparation of reagents	--	--	15
	3	Preparation, pouring & Quality Control (QC) of culture media	--	--	50
	4	Operation & maintenance of autoclave	--	--	20
Bacteriology	1	Specimen collection for Blood Culture	--	--	5
	2	Inoculation of liquid & solid media	--	--	30
	3	Identification test	--	--	30
	4	Antimicrobial sensitivity testing- modified Kirby-bauer technique	--	--	30
	5	IQC- Antibiotic disc potency	--	--	5
	6	Operation of BacT/ALERT	--	--	20
	7	Operation of Vitek 2 compact	--	--	20
	8	Petroff's concentration technique	--	--	20
	9	AFB culture & sensitivity	--	--	20
Mycology	1	KOH Wet mount	--	--	20
	2	Germ tube test	--	--	20
	3	Slide culture	---	---	20
	4	Negative staining for fungus	--	--	5
	5	LPCB mount	--	--	10
Parasitology	1	Giemsa staining for thick & thin peripheral blood smear	--	--	-
	2	Stool wet mount for R/M	--	--	30
	3	Stool concentration techniques	--	--	5
	4	Modified ZN staining for <i>C. parvum</i>	--	--	2
Serology/ Immunology	1	Phlebotomy & separation of serum	--	--	5
	2	Operation & maintenance of mini-VIDAS	--	--	20

	3	Operation & maintenance of ELISA reader & washer	--	--	20
		<b>Performance of serological tests</b>			
	1	Latex agglutination test(RA, ASO, CRP)	--	--	30
	2	RPR card test	--	--	30
	3	Tube agglutination test	--	--	30
	4	Gold conjugate rapid card test	--	--	30
	5	ANA by IF	--	--	10
	6	ANA by Immunoblot	--	--	10
	7	IQC-serology	--	--	5

## *Syllabus*

### Course contents:

#### Paper I: General Microbiology

1. History of microbiology
2. Microscopy
3. Bio-safety including universal containment, personal protective equipment for biological agents
4. Physical and biological containment
5. Isolation precautions including standard precautions and transmission based precautions
6. Sterilization, disinfection and lyophilization
7. Morphology of bacteria and other microorganisms
8. Nomenclature and classification of microorganisms
9. Normal flora of human body
10. Growth and nutrition of bacteria
11. Bacterial metabolism
12. Bacterial toxins
13. Bacteriocins
14. Microbiology of hospital environment
15. Microbiology of air, milk and water
16. Host-parasite relationship
17. Antimicrobial agents and mechanisms drug resistance
18. Bacterial genetics and bacteriophages
19. Molecular genetics relevant for medical microbiology
20. Quality assurance and quality control in microbiology
21. Accreditation of laboratories

## **Immunology**

1. Components of immune system
2. Innate and acquired immunity
3. Cells involved in immune response
4. Antigens
5. Immunoglobulins
6. Mucosal immunity
7. Complement
8. Antigen and antibody reactions
9. Hypersensitivity
10. Cell mediated immunity
11. Cytokines
12. Immunodeficiency
13. Auto-immunity
14. Immune tolerance
15. MHC complex
16. Transplantation immunity
17. Tumor immunity
18. Vaccines and immunotherapy
19. Measurement of immunological parameters
20. Immunological techniques
21. Immunopotential and immunomodulation

## **Paper II: Systematic bacteriology**

1. Isolation and identification of bacteria
2. Gram positive cocci of medical importance including *Staphylococcus*, *Micrococcus*, *Streptococcus*, anaerobic cocci etc.
3. Gram negative cocci of medical importance including *Neisseria*, *Branhamella*, *Moraxella* etc.
4. Gram positive bacilli of medical importance including *Lactobacillus*, *Coryneform organisms*, *Bacillus* and aerobic bacilli, *Actinomyces*, *Nocardia*, *Actinobacillus* and other actinomycetales, *Erysipelothrix*, *Listeria*, *Clostridium* and other spore bearing anaerobic bacilli etc.
5. Gram negative bacilli of medical importance including *Vibrios*, *Aeromonas*, *Plesiomonas*, *Haemophilus*, *Bordetella*, *Brucella*, *Gardnerella*, *Pseudomonas* and other non-fermenters, *Pasteurella*, *Francisella*, *Bacteroides*, *Fusobacterium*, *Leptotrichia* and other anaerobic gram negative bacilli etc.
6. *Helicobacter*, *Campylobacter*, *Calymmatobacterium*, *Streptobacillus*, *Spirillum* and miscellaneous bacteria
7. *Enterobacteriaceae*

8. *Mycobacteria*
9. *Spirochaetes*
10. *Chlamydia*
11. *Mycoplasmatales; Mycoplasma, Ureaplasma, Acholeplasma and other Mycoplasmas.*
12. *Rickettsiae, Coxiella, Bartonella etc.*

### **Mycology**

1. General characteristics and classification of fungi
2. Morphology and reproduction of fungi
3. Isolation and identification of fungi
4. Tissue reactions to fungi
5. Yeasts and yeast like fungi of medical importance including *Candida, Cryptococcus, Malassezia, Trichosporon, Geotrichum, Saccharomyces* etc.
6. Mycelial fungi of medical importance including *Aspergillus, Zygomycetes, Pseudallescheria, Fusarium, Piedra, other dematiaceous hyphomycetes and other hyalohyphomycetes* etc.
7. Dimorphic fungi including *Histoplasma, Blastomyces, Coccidioides, Paracoccidioides, Sporothrix, Penicillium marneffeii* etc.
8. *Dermatophytes*
9. Fungi causing Mycetoma, Chromoblatomycosis, Occulomycosis and Otomycosis.
10. *Pythium insidiosum*
11. *Prototheca*
12. *Pneumocystis jirovecii* infection
13. *Rhinosporidium seeberi* and *Lacazia loboi (Loboa loboi)*
14. Laboratory contaminant fungi
15. Mycetism and mycotoxicosis
16. Antifungal agents and *in vitro* antifungal susceptibility tests.

### **Paper III: Virology**

1. General properties of viruses
2. Classification of viruses
3. Morphology: Virus structure
4. Virus replication
5. Isolation and identification of viruses
6. Pathogenesis of viral infections
7. Genetics of viruses
8. DNA viruses of medical importance including Pox viruses, Herpes viruses, Adeno viruses, Hepadna virus, Papova and Parvo viruses etc.
9. RNA viruses of medical importance including Enteroviruses, Toga viruses, Flavi viruses, Orthomyxo viruses, Paramyxo viruses, Reo viruses, Rhabdo viruses,

- Arena viruses, Bunya viruses, Retro viruses, Filo viruses, Human immunodeficiency virus, Arbo viruses, Corona viruses, Calci viruses etc.
10. Slow viruses including prions
  11. Unclassified viruses
  12. Hepatitis viruses
  13. Virioids, prions
  14. Vaccines and anti-viral drugs.

### **Parasitology**

1. General characters and classification of parasites.
2. Methods of identification of parasites
3. Protozoan parasites of medical importance including *Entamoeba*, *Free living amoebae*, *Giardia*, *Trichomonas*, *Leishmania*, *Trypanosoma*, *Plasmodium*, *Toxoplasma*, *Sarcocystis*, *Cryptosporidium*, *Microsporidium*, *Cyclospora*, *Isospora*, *Babesia*, *Balantidium*, etc.
4. Helminthology of medical importance including those belonging to Cestoda (*Diphyllobothrium*, *Taenia*, *Echinococcus*, *Hymenolepis*, *Dipylidium*, *Multiceps* etc.), Trematoda (*Schistosomes*, *Fasciola*, *Fasciolopsis*, *Gastrodiscoides*, *Paragonimus*, *Clonorchis*, *Opisthorchis* etc.) and Nematoda (etc. )
5. Entomology: common arthropods and other vectors viz. mosquito, sand fly, ticks, mite, cyclops, louse, myasis.
6. Anti-parasitic agents.

### **Paper IV: Applied Microbiology**

1. Epidemiology of infectious diseases
2. Antimicrobial prophylaxis and therapy
3. Hospital acquired infections
4. Management of biomedical waste
5. Investigation of an infectious outbreak in hospital and community
6. Infections of various organs and systems of human body viz. respiratory tract infections, urinary tract infections, central nervous system infections, congenital infections, reproductive tract infections, gastrointestinal infections, hepatitis, pyrexia of unknown origin, infections of eye, ear and nose, septicaemia, endocarditis, haemorrhagic fever etc.
7. Opportunistic infections
8. Sexually transmitted diseases
9. Vaccinology: principles, methods of preparation, administration of vaccines, types of vaccines
10. Information technology (Computers) in microbiology
11. Automation in Microbiology
12. Molecular techniques in the laboratory diagnosis of infectious diseases

13. Statistical analysis of microbiological data and research methodology
14. Animal and human ethics involved in microbiological work.
15. Safety in laboratory and Laboratory management

## ***TEACHING AND LEARNING METHODS***

The training programme should be designed to enable the student to acquire a capacity to learn and investigate, to synthesize and integrate a set of facts and develop a faculty to reason. The curricular programme and scheduling of postings must provide the student with opportunities to achieve the above broad objectives. Much of the learning is to be accomplished by the student himself. Interactive discussions are to be preferred over didactic sessions. The student must blend as an integral part of the activities of an academic department that usually revolves around three equally important basic functions of teaching, research and service. As mentioned earlier, the emphasis recommended under a residency programme is of learning while serving/working.

### **Post Graduate Training programme**

#### **Teaching methodology**

Based on the available facilities, the Department can prepare a list of post graduate experiments pertaining to basic and applied microbiology. Active learning should form the mainstay of post graduate training; there should be lectures for post graduates (at least 20 per year), along with seminars, symposia, group-discussions and Journal clubs. The post graduate students should regularly do the ward rounds of various clinical departments and learn cases of interest for discussion with the clinical faculty. Each college should have a Medical Education Unit to generate teaching resource material for undergraduates and evolving of problem solving modules.

#### **Rotation:**

#### **Postings to laboratories/assignments**

The three-year training programme for the MD degree may be arranged in the form of postings to different assignments/laboratories for specified periods as outlined below. The period of such assignments/postings is recommended for 35 months. Posting schedules may be modified depending on needs, feasibility and exigencies. For facilities not available in the parent institution as well as for additional knowledge and skill, extramural postings may be undertaken.

#### **Suggested schedule of rotation:**

##### **Within Department**

1. Bacteriology
2. Mycobacteriology
3. Serology/Immunology

4. Mycology
5. Virology
6. Parasitology
7. Media preparation

#### **Other Departments**

1. Clinical Pathology
2. Clinical Biochemistry
3. Skin & VD
4. ICTC & RNTCP

#### **Practical training**

Practical training should be imparted by posting the students in various sub-specialties (sections) as detailed in the intrinsic and extrinsic rotation. The student should be actively involved in day to day working of all the sections. He/she should be trained under the guidance of teachers in all the aspects of Clinical Microbiology and applied aspects of laboratory medicine including collection and transport of specimens, receiving of samples, preparation of requisite reagents, chemicals, media and glassware, processing of specimens, performing required antimicrobial susceptibility testing and reporting on the specimens, interpretation of results, sterilization procedures, bio-safety precautions, infection control practices, maintenance of equipments, record keeping and quality control in Microbiology.

#### **Skills & performance**

The student should be given graded responsibility to enable learning by apprenticeship. The faculty throughout the year should assess performance of the student in skills. Area of improvement/remarks should be mentioned for the skill and student should be re-assessed for the skills which are not acquired. To go to the next level, it should be mandatory for the student to acquire lower level skills satisfactorily, i.e only on satisfactory completion of assisted/performed with assistance skills should the student be permitted to perform the skill independently.

#### **Emergency duty**

The student should be posted for managing emergency laboratory services in Microbiology. He/she should deal with all the emergency investigations in Microbiology.

#### **Training in research methodology**

Training in research methodology should be imparted by planning of a research project by the student under the guidance of a recognized guide to be executed and submitted in the form of a thesis.

The thesis is aimed at training the post graduate student in research methods and techniques. It should include identification of a research question, formulation of a hypothesis, search and review of relevant literature, getting acquainted with recent

advances, designing of research study, collection of data, critical analysis of the results and drawing conclusions. The thesis should be completed and submitted by the student six months before appearing for the final university examination.

### **Communication and attitudinal skills**

Post-graduate student is expected to imbibe professional attributes of honesty, integrity, accountability, honour, humanism and excellence and demonstrate the same in the day-by-day conduct and dealings with the teacher, peers, the nursing and paramedical staff and most-importantly patients. To ensure that student is able to acquire these attributes, their personal conduct should be keenly observed by the teachers and student should be counselled as and when required. Personal attributes of the student should be regularly assessed by peers, senior, and junior students and Head of the Unit/ In charge.

The following is a rough guideline to various teaching/learning activities that may be employed.

- Collection of specimens, smear examination, culture and sensitivity analysis
- Discussion during routine activities such as during signing out of cases.
- Presentation and work-up of cases including the identification of special stains and ancillary procedures needed.
- Clinico-microbiological conferences, active involvement with hospital infection control committee
- Intradepartmental and interdepartmental conferences related to case discussions.
- Conferences, Seminars, Continuing Medical Education (CME) Programme.
- Journal Club.
- Research Presentation and review of research work.
- A postgraduate student of a postgraduate degree course in broad specialties/super specialties would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- Participation in workshops, conferences and presentation of papers etc.
- Laboratory work.
- Use and maintenance of equipment.
- Maintenance of records. **Log books** should be maintained to record the work done which shall be checked and assessed periodically by the faculty members imparting the training.
- Postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- Department should encourage e-learning activities.

**During the training programme, patient safety is of paramount importance, therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.**

## ***ASSESSMENT***

### **FORMATIVE ASSESSMENT, i.e., assessment during the training**

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

#### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

#### **Quarterly assessment during the MD programme should be based on:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).**

### **SUMMATIVE ASSESSMENT, i.e., assessment at the end of training**

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

The post-graduate examinations should be in three parts:

#### **1. Thesis.**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognized Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the

post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

## **2. Theory Examination**

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There should be four theory papers:

- Paper I:** General Microbiology and Immunology
- Paper II:** Systematic Bacteriology
- Paper III:** Virology Parasitology and Mycology
- Paper IV:** Applied Microbiology and Recent advances

## **3. Practical and Oral/viva voce Examination**

Practical should be spread over **two** days and include the following components:

- **Bacteriology:**

1. Identification of a pure culture.
2. Isolation and Identification of Bacteria from Clinical Samples

- **Serology:**

Common Serological Tests like ELISA/VDRL/Widal/Brucella Agglutination test etc.

- **Virology:**

1. Preparation of tissue cultures
2. Virus Titration
3. Haemagglutination and its inhibition test
4. Virus Neutralization Test
5. Other rapid tests for diagnosis of viral infections

- **Mycology**
  1. Identification of fungal cultures
  2. Slide culture techniques
  3. Examination of histopathology slides for fungi
  
- **Parasitology**
  1. Processing and Identification of ova and cysts in stool samples
  2. Amoebic Serology
  3. Microscopic Slides
  4. Examination of histopathology slides for parasites
  5. Spots: 10 spots

**Oral/Viva-Voce Examination:**

This must include a component of teaching session of not more than 15 minutes duration.

**Recommended Reading:**

**Books (Latest edition)**

1. Forbes B, Sahm D, Weissfeld A. *Bailey and Scott's Diagnostic Microbiology*, Mosby, St. Louis.
2. Koneman EW, Allen SD, Janda WM, Schreckenberger PC, Winn WC. *Color Atlas and Textbook of Diagnostic Microbiology*, J.B. Lippincott, Philadelphia.
3. Murray PR, Baron EJ, Pfaller MA, Tenover FC, Tenover FC. *Manual of Clinical Microbiology*, American Society for Microbiology.
4. Garcia LS, Bruckner DA. *Diagnostic Medical Parasitology*, American Society for Microbiology.
5. Wiedbrauk DL, Johnston SLG. *Manual of Clinical Virology*, New York, Raven Press.
6. Bailey and Scott's Diagnostic Microbiology.

**Journals**

03-05 international Journals and 02 national (all indexed) journals

**Postgraduate Students Appraisal Form  
Pre / Para /Clinical Disciplines**

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks\* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**\*REMARKS:** Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PATHOLOGY**

## **Preamble**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

This programme is meant to standardize Pathology teaching at post graduate level throughout the country so that it will benefit in achieving uniformity in teaching and resultantly creating suitable manpower with appropriate expertise. The post graduate student should be trained in handling and processing histopathology, clinical pathology, microbiology, biochemistry and transfusion medicine samples with a knowledge of general principles and methodology.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC LEARNING OBJECTIVES***

The learning objectives in the cognitive, psychomotor and affective domains are:

### **A. Cognitive Domain**

1. Diagnose routine and complex clinical problems on the basis of histopathology (surgical pathology) and cytopathology specimens, blood and bone marrow examination and various tests of Laboratory Medicine (clinical pathology, clinical biochemistry) as well as Blood Banking (Transfusion Medicine).
2. Interpret and correlate clinical and laboratory data so that clinical manifestations of diseases can be explained.
3. Advise on the appropriate specimens and tests necessary to arrive at a diagnosis in a problematic case.
4. Correlate clinical and laboratory findings with pathology findings at autopsy, identify miscorrelations and the causes of death due to diseases (apart from purely metabolic causes).
5. Should be able to teach Pathology to undergraduates, postgraduates, nurses and paramedical staff including laboratory personnel.

6. Plan, execute, analyse and present research work.
7. Make and record observations systematically and maintain accurate records of tests and their results for reasonable periods of time. Identify problems in the laboratory, offer solutions thereof and maintain a high order of quality control.
8. Capable of safe and effective disposal of laboratory waste.
9. Able to supervise and work with subordinates and colleagues in a laboratory.

## **B. Affective Domain**

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

## **C. Psychomotor Domain**

1. Able to perform routine tests in a Pathology Laboratory including grossing of specimens, processing, cutting of paraffin and frozen sections, making smears, and staining.
2. Able to collect specimens by routinely performing non-invasive out-patient procedures such as venipuncture, finger-prick, fine needle aspiration of superficial lumps and bone-marrow aspirates, and provide appropriate help to colleagues performing an invasive procedure such as a biopsy or an imaging guided biopsy.
3. Perform an autopsy, dissect various organ complexes and display the gross findings.
4. Should be familiar with the function, handling and routine care of equipments in the laboratory.

### ***SUBJECT SPECIFIC COMPETENCIES***

#### **A. Cognitive domain**

**A post graduate student upon successfully qualifying in the MD (Pathology) examination should have acquired the following broad theoretical competencies and should be:**

1. Capable of offering a high quality diagnostic opinion in a given clinical situation with an appropriate and relevant sample of tissue, blood, body fluid, etc. for the purpose of diagnosis and overall wellbeing of the ill.
2. Able to teach and share his knowledge and competence with others. The student should be imparted training in teaching methods in the subject which may enable the student to take up teaching assignments in Medical Colleges/Institutes.
3. Capable of pursuing clinical and laboratory based research. He/she should be introduced to basic research methodology so that he/she can conduct fundamental and applied research.

## **B. Affective domain**

1. The student will show integrity, accountability, respect, compassion and dedicated patient care. The student will demonstrate a commitment to excellence and continuous professional development.
2. The student should demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.
3. The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.

## **C. Psychomotor domain**

**At the end of the course, the student should have acquired skills, as described below:**

### **Surgical pathology**

#### **Skills**

- Given the clinical and operative data, the student should be able to identify, and systematically and accurately describe the chief gross anatomic alterations in the surgically removed specimens and be able to correctly diagnose at least 80% of the lesions received on an average day from the surgical service of an average teaching hospital.
- A student should be able to demonstrate ability to perform a systematic gross examination of the tissues including the taking of appropriate tissue sections and in special cases as in intestinal mucosal biopsies, muscle biopsies and nerve biopsies, demonstrate the orientation of tissues in paraffin blocks.
- The student should be able to identify and systematically and accurately describe the chief histo-morphological alterations in the tissue received in the surgical pathology service. He/she should also correctly interpret and

correlate with the clinical data to diagnose at least 90% of the routine surgical material received on an average day.

- Be conversant with automatic tissue processing machine and the principles of its running.
- Process a tissue, make a paraffin block and cut sections of good quality on a rotary microtome.
- Stain paraffin sections with at least the following:
  - (i) Haematoxylin and eosin
  - (ii) Stains for collagen, elastic fibers and reticulin
  - (iii) Iron stain
  - (iv) PAS stain
  - (v) Acid fast stains
  - (vi) Any other stains needed for diagnosis.
- Demonstrate understanding of the principles of:
  - (i) Fixation of tissues
  - (ii) Processing of tissues for section cutting
  - (iii) Section cutting and maintenance of related equipment
  - (iv) Differential (special) stains and their utility
- Cut a frozen section using cryostat, stain and interpret the slide in correlation with the clinical data provided.
- Demonstrate the understanding of the utility of various immuno-histochemical stains especially in the diagnosis of tumour subtypes.

## **Cytopathology**

### **Skills**

- Independently prepare and stain good quality smears for cytopathologic examination.
- Be conversant with the techniques for concentration of specimens: i.e. various filters, centrifuge and cytocentrifuge.
- Independently be able to perform fine needle aspiration of all lumps in patients; make good quality smears, and be able to decide on the types of staining in a given case.
- Given the relevant clinical data, he/she should be able to independently and correctly:
  - (i) Diagnose at least 75% of the cases received in a routine laboratory and categorize them into negative, inconclusive and positive.

- (ii) Demonstrate ability in the technique of screening and dotting the slides for suspicious cells.
- (iii) Indicate correctly the type of tumour, if present
- (iv) Identify with reasonable accuracy the presence of organisms, fungi and parasites

## **Haematology**

### **Skills**

- Correctly and independently perform the following special tests, in addition to doing the routine blood counts:
  - (i) Haemogram including reticulocyte and platelet counts.
  - (ii) Bone marrow staining including stain for iron
  - (iii) Blood smear staining
  - (iv) Cytochemical characterization of leukemia with special stains like Peroxidase, Leukocyte Alkaline Phosphatase (LAP), PAS, Sudan Black, etc.
  - (v) Hemolytic anemia profile including HPLC, Hb electrophoresis etc.
  - (vi) Coagulation profile including PT, APTT, FDP.
  - (vii) BM aspiration and BM biopsy
  
- Demonstrate familiarity with the principle and interpretation of results and the utility in diagnosis of the following:
  - (i) Platelet function tests including platelet aggregation and adhesion and PF3 release
  - (ii) Thrombophilia profile: Lupus anticoagulant (LAC), Anticardiolipin Antibody (ACA), Activated Protein C Resistance (APCR), Protein C (Pr C), Protein S (Pr S) and Antithrombin III (AT III)
  - (iii) Immunophenotyping of leukaemia
  - (iv) Cytogenetics
  - (v) Molecular diagnostics.
  
- Describe accurately the morphologic findings in the peripheral and bone marrow smears, identifying and quantitating the morphologic abnormalities in disease states and arriving at a correct diagnosis in at least 90% of the cases referred to the Haematology clinic, given the relevant clinical data.

## **Laboratory Medicine**

### **Skills**

- Plan a strategy of laboratory investigation of a given case, given the relevant clinical history and physical findings in a logical sequence, with a rational explanation of each step; be able to correctly interpret the laboratory data of such studies, and discuss their significance with a view to arrive at a diagnosis.
  - Demonstrate familiarity with and successfully perform:
    - i) routine urinalysis including physical, chemical and microscopic, examination of the sediment.
    - ii) macroscopic and microscopic examination of faeces and identify the ova and cysts of common parasites.
    - iii) a complete examination: physical, chemical and cell content of Cerebrospinal Fluid (C.S.F), pleural and peritoneal fluid.
    - iv) semen analysis.
    - v) examination of peripheral blood for commonly occurring parasites.
- <
- Independently and correctly perform at least the following quantitative estimations by manual techniques and/or automated techniques.
    - (i) Blood urea
    - (ii) Blood sugar
    - (iii) Serum proteins (total and fractional)
    - (iv) Serum bilirubin (total and fractional)
  - Demonstrate familiarity with the following quantitative estimations of blood/ serum by Automated Techniques:  
Serum cholesterol, Uric acid, Serum Transaminases (ALT and AST/SGOT and SGPT), etc.
  - Prepare standard solutions and reagents relevant to the above tests, including the preparation of normal solution, molar solution and buffers.
  - Explain the principles of Instrumentation, use and application of the instruments commonly used in the labs eg. Photoelectric colorimeter, Spectrophotometer, pH meter, Centrifuge, Electrophoresis apparatus, ELISA Reader, flow cytometer, PCR, chemiluminiscence.

## **Transfusion Medicine**

### **Skills**

The student should be able to correctly and independently perform the following:

- Selection and bleeding of donors
- Preparation of blood components i.e. Cryoprecipitates, Platelet concentrate, Fresh Frozen Plasma, Single Donor Plasma, Red Blood Cell concentrates.

- ABO and Rh grouping.
- Demonstrate familiarity with Antenatal and Neonatal work up.
  - (i) Direct antiglobulin test
  - (ii) Antibody screening and titre
  - (iii) Selection of blood for exchange transfusion
- Demonstrate familiarity with principle and procedures involved in:
  - (i) Resolving ABO grouping problems.
  - (ii) Identification of RBC antibody.
  - (iii) Investigation of transfusion reaction.
  - (iv) Testing of blood for presence of:
    - (a) HBV (Hepatitis B Virus Markers).
    - (b) HCV (Hepatitis C Virus Markers)
    - (c) HIV (Human Immunodeficiency Virus Testing)
    - (d) VDRL
    - (e) Malaria

### **Immunohistochemistry**

#### **Skills (desirable)**

- Be able to perform immuno-histochemical staining using paraffin section with at least one of the commonly used antibodies (Cytokeratin or LCA) using PAP method.

## ***Syllabus***

### **Course contents:**

The study of Pathologic Anatomy includes all aspects of Pathology as encompassed in the branches of General and Systemic Pathology. Only the broad outlines are provided.

#### **A) General Pathology:**

Normal cell and tissue structure and function.

The changes in cellular structure and function in disease.

Causes of disease and its pathogenesis.

Reaction of cells, tissues, organ systems and the body as a whole to various sublethal and lethal injuries.

#### **B) Systemic Pathology:**

The study of normal structure and function of various organ systems and the aetiopathogenesis, gross and microscopic alterations of structure of these organ systems in disease and functional correlation with clinical features.

### **C) Haematology**

The study of Haematology includes all aspects of the diseases of the blood and bone marrow. This would involve the study of the normal, and the causes of diseases and the changes thereof.

1. Laboratory Medicine (Clinical Biochemistry/Clinical Pathology including Parasitology).
2. Transfusion Medicine (Blood Banking).
3. The student is expected to acquire a general acquaintance of techniques and principles and to interpret data in the following fields.
  - a) Immunopathology
  - b) Electron microscopy
  - c) Histochemistry
  - d) Immunohistochemistry
  - e) Cytogenetics
  - f) Molecular Biology
  - g) Maintenance of records
  - h) Information retrieval, use of Computer and Internet in medicine.
  - i) Quality control, waste disposal

It is difficult to give a precise outline of the Course Contents for post graduate training. A post graduate is supposed to acquire not only the professional competence of a well-trained specialist but also academic maturity, a capacity to reason and critically analyse scientific data as well as to keep himself abreast of the latest developments in the field of Pathology and related sciences. A brief outline of what is expected to be learnt during the MD Course is given under each head.

### **Surgical Pathology**

#### **Knowledge**

- The student should be able to demonstrate an understanding of the histogenetic and patho-physiologic processes associated with various lesions.
- Should be able to identify problems in the laboratory and offer viable solutions.

### **Autopsy Pathology**

#### **Knowledge**

- Should be aware of the technique of autopsy.
- Should have sufficient understanding of various disease processes so that a meaningful clinico-pathological correlation can be made.
- Demonstrate ability to perform a complete autopsy independently with some physical assistance, correctly following the prescribed instructions. Correctly

identify all major lesions which have **caused, or contributed to the patient's death, on macroscopic examination alone and on microscopy in at least 90% of the autopsies in an average teaching hospital.**

- In places where non-medico-legal autopsies are not available each student should be made to observe at least five medico-legal autopsies.
- Write correctly and systematically Provisional and Final Anatomic Diagnosis reports.

## **Cytopathology**

### **Knowledge**

- Should possess the background necessary for the evaluation and reporting of cytopathology specimens.
- Demonstrate familiarity with the following, keeping in mind the indication for the test.
  - (i) Choice of site from which smears may be taken
  - (ii) Type of samples
  - (iii) Method of obtaining various specimens (urine sample, gastric smear, colonic lavage etc.)
  - (iv) Be conversant with the principles and preparation of solutions of stains

## **Haematology**

### **Knowledge**

- Should demonstrate the capability of utilising the principles of the practice of Haematology for the planning of tests, interpretation and diagnosis of diseases of the blood and bone marrow.
- Should be conversant with various equipments used in the Haematology laboratory.
- Should have knowledge of automation and quality assurance in Haematology.
- Correctly plan a strategy of investigating at least 90% of the cases referred for special investigations in the Hematology Clinic and give ample justification for each step in consideration of the relevant clinical data provided.

## **Laboratory Medicine**

### **Knowledge**

- Possess knowledge of the normal range of values of the chemical content of body fluids, significance of the altered values and its interpretation.
- Possess knowledge of the principles of following specialized organ function tests and the relative utility and limitations of each and significance of the altered values.
  - (i) Renal function tests

- (ii) Liver function tests
  - (iii) Pancreatic function tests
  - (iv) Endocrine function tests
  - (v) Tests for malabsorption
- Know the principles, advantages and disadvantages, scope and limitation of automation in the laboratory.
  - Know the principles and methodology of quality control in the laboratory.

### **Transfusion Medicine (Blood Banking)**

#### **Knowledge**

The student should possess knowledge of the following aspects of Transfusion Medicine.

- Basic immunology
- ABO and Rh groups
- Clinical significance of other blood groups
- Transfusion therapy including the use of whole blood and RBC concentrates
- Blood component therapy
- Rationale of pre-transfusion testing.
- Infections transmitted in blood.
- Adverse reactions to transfusion of blood and components
- Quality control in blood bank

### **Basic Sciences (in relation to Pathology)**

#### **a) Immunopathology**

##### **Knowledge**

- Demonstrate familiarity with the current concepts of structure and function of the immune system, its aberrations and mechanisms thereof.
- Demonstrate familiarity with the scope, principles, limitations and interpretations of the results of the following procedures employed in clinical and experimental studies relating to immunology.
  - (a) ELISA techniques
  - (b) Radioimmunoassay
  - (c) HLA typing
- Interpret simple immunological tests used in diagnosis of diseases and in research procedures.
  - (i) Immuno-electrophoresis
  - (ii) Immunofluorescence techniques especially on kidney and skin biopsies
  - (iii) Anti-nuclear antibody (ANA)
  - (iv) Anti-neutrophil cytoplasmic antibody (ANCA)

**b) Electron Microscopy**

**Knowledge**

- Demonstrate familiarity with the principles and techniques of electron microscopy and the working of an electron microscope (including Transmission and Scanning Electron microscope: TEM and SEM)
- Recognise the appearance of the normal subcellular organelles and their common abnormalities (when provided with appropriate photographs).

**c) Enzyme Histochemistry**

**Knowledge**

- Should be familiar with the principles, use and interpretation of common enzyme histochemical procedures (Alkaline Phosphatase, Acid Phosphatase, Glucose-6-Phosphate Dehydrogenase, Chloroacetate Esterase).

**d) Immunohistochemistry**

**Knowledge**

- Demonstrate familiarity with the principles and exact procedures of various immunohistochemical stains using both PAP (Peroxidase-anti-peroxidase) and AP-AAP (Alk. Phosphatase-anti-Alk. Phosphatase) ABC (Avidin-Biotin Conjugate) systems; employing monoclonal and polyclonal antibodies.
- Be aware of the limitations of immuno-histochemistry.

**e) Molecular Biology**

**Knowledge**

- Should understand the principles of molecular biology especially related to the understanding of disease processes and its use in various diagnostic tests.
- Should be conversant with the principle and steps and interpretation of Polymerase Chain Reaction (PCR), Western Blot, Southern Blot, Northern Blot and Hybridisation) procedures.

**f) Cytogenetics**

**Knowledge**

- Demonstrate familiarity with methods of Karyotyping and Fluorescent in-situ Hybridisation (FISH).

**g) Tissue Culture**

**Knowledge**

- Demonstrate familiarity with methods of tissue culture.

## **h) Principles of Medical Statistics**

### **Knowledge**

- Demonstrate familiarity with importance of statistical methods in assessing data from patient material and experimental studies.

## ***TEACHING AND LEARNING METHODS***

### **Post Graduate Training**

#### **Teaching methodology**

Based on the available facilities, the Department can prepare a list of post graduate experiments pertaining to basic and applied Pathology. Active learning should form the mainstay of post graduate training; there should be lectures for post graduates (at least 20 per year), along with seminars, symposia, group-discussions and Journal clubs. The post graduate students should regularly do the ward rounds of various clinical departments and learn cases of interest for discussion with the clinical faculty. Each college should have a Medical Education Unit to generate teaching resource material for undergraduates and evolving of problem solving modules. Department should encourage e-learning activities.

#### **Rotation:**

#### **Postings to laboratories/assignments**

The three-year training programme for the MD degree may be arranged in the form of postings to different assignments/laboratories for specified periods as outlined below. The period of such assignments/postings is recommended for 35 months. Posting schedules may be modified depending on needs, feasibility and exigencies. For facilities not available in the parent institution as well as for additional knowledge and skill, extramural postings may be undertaken.

Section/Subject	Duration in months
(i) Surgical Pathology and Autopsy and Pathology Techniques	12
(ii) Haematology and Laboratory Medicine	10
(iii) Cytopathology	08
(iv) Transfusion Medicine/Blood Bank	02
(v) Museum techniques and record management	01
(vi) Basic Sciences including Immunopathology, Electron microscopy, Molecular Biology, Research Techniques and cytogenetics etc	02
<b>Total</b>	<b>35</b>

The training programme should be designed to enable the student to acquire a capacity to learn and investigate, to synthesize and integrate a set of facts and develop a faculty to reason. The curricular programmes and scheduling of postings must provide the student with opportunities to achieve the above broad objectives. Much of the learning is to be accomplished by the student himself. Interactive discussions are to be preferred over didactic sessions. The student must blend as an integral part of the activities of an academic department that usually revolves around three equally important basic functions of teaching, research and service. As mentioned earlier, the emphasis recommended under a PG training programme is of learning while serving/working.

The following is a rough guideline to various teaching/learning activities that may be employed.

- Collection of specimens including Fine Needle Aspiration of lumps.
- Grossing of specimens.
- Performing autopsies.
- Discussion during routine activities such as during signing out of cases.
- Presentation and work-up of cases including the identification of special stains and ancillary procedures needed.
- Clinico-pathological conferences.
- Intradepartmental and interdepartmental conferences related to case discussions.
- Conferences, Seminars, Continuing Medical Education (CME) Programmes.
- Journal Club.
- Research Presentation and review of research work.
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- Participation in workshops, conferences and presentation of papers etc.
- Laboratory work.
- Use and maintenance of equipment.
- Maintenance of records. Log books should be maintained to record the work done which shall be checked and assessed periodically by the faculty members imparting the training.
- Postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- Department should encourage e-learning activities.

**During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under**

**supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.**

## ***ASSESSMENT***

**FORMATIVE ASSESSMENT, ie., during the training**

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

**Quarterly assessment during the MD training should be based on:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I)**

**SUMMATIVE ASSESSMENT, ie., assessment at the end of training**

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

### **Post Graduate Examination**

The Post Graduate examination shall be in three parts:-

**1. Thesis:**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis,

acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

## 2. **Theory:**

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers:

**Paper I:** General Pathology, Pathophysiology, Immunopathology and Cytopathology

**Paper II:** Systemic Pathology

**Paper III:** Haematology, Transfusion Medicine (Blood Banking) and Laboratory Medicine

**Paper IV:** Recent advances and applied aspects

## 3. **Practicals/Clinical and Oral/viva voce Examination:**

The practical/clinical examination should consist of the following and should be spread over two days.

### **I. Clinical Pathology:**

- Discussion of a clinical case history.
- Plan relevant investigations of the above case and interpret the biochemistry findings.
- Two investigations should be performed including at least one biochemistry exercise/clinical pathology exercise like CSF, pleural tap etc. analysis and complete urinalysis.

### **II. Haematology:**

- Discuss haematology cases given the relevant history. Plan relevant investigations
- Perform complete hemogram and at least two tests preferably including one coagulation exercise
- Identify electrophoresis strips, osmotic fragility charts etc. Interpretation of data from autoanalysers, HPLC and flow cytometry.

Examine, report and discuss around ten cases given the history and relevant blood smears and/or bone marrow aspirate smears and bone marrow biopsy interpretation.

### **III. Transfusion Medicine:**

- Perform blood grouping
- Perform the necessary exercise like cross matching.
- Coomb's test, gel cards interpretation.

### **IV. Histopathology:**

- Examine, report and discuss 12-15 cases histopathology and 5-8 cytopathology cases, given the relevant history and slides.
- Perform a Haematoxylin and Eosin stain and any special stain on a paraffin section. Should be conversant with histopathology techniques including cryostat.

### **V. Autopsy:**

- Given a case history and relevant organs (with or without slides), give a list of anatomical diagnosis in a autopsy case.

### **VI. Gross Pathology**

- Describe findings of gross specimens, give diagnosis and identify the sections to be processed. The post graduate student should perform grossing in front of the examiners for evaluation.

### **VII. Basic Sciences:**

- 10-15 spots based on basic sciences be included
- Identify electron micrographs
- Identify gels, results of PCR, immunological tests including interpretation of Immunofluorescence pictures.
- Identify histochemical and immuno-histochemistry stains
- Teaching exercise 10 min

All practical exercises are to be evaluated jointly by all the examiners.

An oral question-answer session should be conducted at the end of each exercise.

- (a) Viva on dissertation and research methodology
- (b) General Viva-Voce

### **Recommended Reading:**

#### **Books (latest edition)**

1. Rosai and Ackerman's Surgical Pathology
2. Atlas and Text of Haematology by Tejinder Singh
3. Orell's Atlas of Aspiration Cytology
4. Lever's Dermatopathology
5. Novak's Gynecologic and Obstetric Pathology with Clinical and Endocrine Relations by Edmund R. Novak
6. Bone Pathology by H. Jaffe
7. MacSween's Pathology of the liver
8. Iochim's Lymph Node Pathology
9. Text Book on Breast Pathology by Tavasoli
10. Text Book on Thyroid Pathology by Geetha Jayaram
11. Theory and Practice of Histological Techniques by Bancroft
12. Gray's Diagnostic Cytopathology
13. Sternberg's Diagnostic Surgical Pathology
14. Dacie's Practical Haematology
15. Wintrobe's Haematology
16. Heptinstall's Pathology of the Kidney
17. Enzinger's Soft Tissue Tumours

#### **Journals**

03-05 international Journals and 02 national (all indexed) journals

- 1.—Acta Cytologica
- 2.—Journal of Pathology
- 3.—Histopathology
- 4.—British Journal of Haematology
- 5.—Blood
- 6.—Journal of Clinical Pathology
- 7.—Diagnostic Cytopathology
- 8.—Human Pathology
- 9.—New England Journal of Medicine
- 10.—Indian Journal of Pathology and M
- 11.—Lancet
- 12.—American Journal of Surgical Pathology

13. ~~Cancers~~

14. ~~Modern Pathology~~

**Postgraduate Students Appraisal Form**  
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks\* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE of ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PAEDIATRICS**

## **Preamble**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A post graduate student after undergoing the required training should be able to deal effectively with the needs of the community and should be competent to handle the problems related to his specialty including recent advances. S/He should also acquire skills in teaching of medical/para-medical students.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC OBJECTIVES***

The objectives of MD Course in Paediatrics are to produce a competent pediatrician who:

- Recognizes the health needs of infants, children and adolescents and carries out professional obligations in keeping with principles of the National Health Policy and professional ethics
- Has acquired the competencies pertaining to Paediatrics that are required to be practiced in the community and at all levels of health system
- Has acquired skills in effectively communicating with the child, family and the community
- Is aware of contemporary advances and developments in medical sciences as related to child health
- Is oriented to principles of research methodology
- Has acquired skills in educating medical and paramedical professionals
- Is able to recognize mental conditions and collaborate with Psychiatrists/Child Psychologists for the treatment of such patients

## ***SUBJECT SPECIFIC COMPETENCIES***

### **A. Cognitive domain**

At the end of the MD course in Paediatrics, the students should be able to:

1. Recognize the key importance of child health in the context of the health priority of country
2. Practice the specialty of Paediatrics in keeping with the principles of professional ethics
3. Identify social, economic, environmental, biological and emotional determinants of child and adolescent health, and institute diagnostic, therapeutic, rehabilitative, preventive and promotive measures to provide holistic care to children
4. Recognize the importance of growth and development as the foundation of Paediatrics and help each child realize her/his optimal potential in this regard
5. Take detailed history; perform full physical examination including neuro-development and behavioral assessment and anthropometric measurements in the child and make clinical diagnosis
6. Perform relevant investigative and therapeutic procedures for the paediatric patient
7. Interpret important imaging and laboratory results
8. Diagnose illness based on the analysis of history, physical examination and investigations
9. Plan and deliver comprehensive treatment for illness using principles of rational drug therapy
10. Plan and advice measures for the prevention of childhood disease and disability
11. Plan rehabilitation of children with chronic illness and handicap and those with special needs
12. Manage childhood emergencies efficiently
13. Provide comprehensive care to normal, 'at risk' and sick neonates
14. Demonstrate skills in documentation of case details, and of morbidity and mortality data relevant to the assigned situation
15. Recognize the emotional and behavioral characteristics of children, and keep these fundamental attributes in focus while dealing with them
16. Demonstrate empathy and humane approach towards patients and their families and keep their sensibilities in high esteem
17. Demonstrate communication skills of a high order in explaining management and prognosis, providing counseling and giving health education messages to patients, families and communities
18. Develop skills as a self-directed learner. Recognize continuing educational needs; use appropriate learning resources and critically analyze published literature in order to practice evidence-based Paediatrics
19. Demonstrate competence in basic concepts of research methodology and epidemiology
20. Facilitate learning of medical/nursing students, practicing physicians, paramedical health workers and other providers as a teacher-trainer
21. Implement National Health Programs, effectively and responsibly

22. Organize and supervise the desired managerial and leadership skills
23. Function as a productive member of a team engaged in health care, research and education.
24. Recognize mental conditions, characterized by self absorption, reduced ability to respond, abnormal functioning in social interaction with or without repetitive behavior, poor communication (autism) and collaborate with Psychiatrists/Child Psychologists for the treatment of such patients.

All PG students joining the course should have an orientation session to acquaint them with the requirements and other details. A plan for orientation session has been given at Annexure 1.

### **B. Affective Domain:**

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

### **C. Psychomotor domain**

**At the end of the course, the student should have acquired following skills:**

#### **I. History and Examination**

The student must gain proficiency in eliciting, processing and systemically presenting Paediatrics history and examination with due emphasis of the important and minimization of less important facts. The following skills must be achieved:

- i) Recognition and demonstration of physical findings
- ii) Recording of height, weight, head circumference and mid arm circumference and interpretation of these parameters using growth reference standard assessment of nutritional status and growth
- iii) Assessment of pubertal growth
- iv) Complete development assessment by history and physical examination, and recognizing developmental disabilities, including autism
- v) Systematic examination
- vi) Neonatal examination including gestation assessment by physical neurological criteria

- vii) Examination of the fundus and the ear-drum
- viii) Skills related to IMNCI and IYCF

## **II. Monitoring Skills**

Non-invasive monitoring of blood pressure, pulse and respiratory rates, saturation; ECG

## **III. Investigative Procedures**

- i) Venous, capillary and arterial blood sampling using appropriate precautions
- ii) Pleural, peritoneal, pericardial aspiration; subdural, ventricular and lumbar puncture
- iii) Tuberculin test
- iv) Biopsy of liver and kidney
- v) Urethral catheterization and suprapubic tap
- vi) Gastric content aspiration

## **IV. Therapeutic Skills**

- i) Breast feeding assessment and counseling; management of common problems
- ii) Establishment of central and peripheral vascular access; CVP monitoring
- iii) Administration of injections using safe injection practices
- iv) Determination of volume and composition of intravenous fluids and their administration
- v) Neonatal and Pediatric basic and advanced life support
- vi) Oxygen administration, CPAP and nebulization therapy
- vii) Blood and blood component therapy
- viii) Intraosseous fluid administration
- ix) Phototherapy, umbilical artery and venous catheterization and exchange transfusion
- x) Nasogastric feeding
- xi) Common dressings and abscess drainage; intercostal tube insertion
- xii) Basic principles of rehabilitation
- xiii) Peritoneal dialysis
- xiv) Mechanical ventilation

## **V. Bed side investigations, including**

- i) Complete blood counts, micro ESR, peripheral smear
- ii) Urinalysis
- iii) Stool microscopy and hanging drop
- iv) Examination of CSF and other body fluids
- v) Blood sugar
- vi) Shake test on gastric aspirate

- vii) Gram stain, ZN stain

## **VI. Patient Management Skills**

- i) Proficiency in management of pediatric emergencies, including emergency triaging
- ii) Drawing and executing patient management plan and long term care
- iii) Documenting patient records on day to day basis and problem oriented medical record
- iv) Care of a normal and sick newborn, management of neonatal disorders hypothermia, sepsis, convulsions, jaundice, metabolic problems
- v) Identifying need for timely referral to appropriate departments/health facility and pre-transport stabilization of the sick child

## **VII. Communication Skills; Attitudes; Professionalism**

- i) Communicating with parents/child about nature of illness and management plan prognostication, breaking bad news
- ii) Counseling parents on breast feeding, nutrition, immunization, disease prevention, promoting healthy life style
- iii) Genetic counseling
- iv) Communication and relationship with colleagues, nurses and paramedical workers
- v) Appropriate relation with pharmaceutical industry
- vi) Health economics
- vii) Professional and research ethics

## **VIII. Interpretation of Investigations**

- i. Plan x-ray chest, abdomen, skeletal system
- ii. Contrast radiological studies: Barium swallow, barium meal, barium enema, MCU
- iii. Ultrasound skull and abdomen
- iv. Histopathological, biochemical and microbiological investigations
- v. CT Scan and MRI (skull, abdomen, chest)
- vi. Electrocardiogram, electroencephalogram
- vii. Arterial and venous blood gases
- viii. **Desirable:** Interpretation of radio-isotope studies, audiogram, neurophysiological studies, (BERA, VER, Electromyography [EMG], Nerve Conduction Velocity [NCV]), lung function tests

## **IX. Academic Skills**

- i. Familiarity with basic research methodology, basic IT skills. Planning the protocol of the thesis, its execution and final report
- ii. Review of literature

- iii. Conducting clinical sessions for undergraduates medical students
- iv. Desirable: writing and presenting a paper. Teaching sessions for nurses and medical workers

## *Syllabus*

### **Course contents:**

#### **Guidelines**

During the training period, effort must be made that adequate time is spent in discussing child health problems of public health importance in the country or particular region.

#### **Basic Sciences**

- Principles of inheritance, chromosomal disorders, single gene disorders, multifactorial / polygenic disorders, genetic diagnosis and prenatal diagnosis, pedigree drawing.
- Embryogenesis of different organ systems especially heart, genitourinary system, gastro-intestinal tract. Applied anatomy and functions of different organ systems.
- Physiology of micturition and defecation; placental physiology; fetal and neonatal circulation; regulation of temperature, blood pressure, acid base balance, fluid electrolyte balance and calcium metabolism.
- Vitamins and their functions.
- Hematopoiesis, hemostasis, bilirubin metabolism.
- Growth and development at different ages, growth charts; puberty and its regulation.
- Nutrition: requirements and sources of various nutrients.
- Pharmacokinetics of common drugs, microbial agents and their epidemiology.
- Basic immunology, biostatistics, clinical epidemiology, ethical and medico-legal issues.
- Teaching methodology and managerial skills.

**Understanding the definition, epidemiology, aetiopathogenesis, presentation, complications, differential diagnosis and treatment of the following, but not limited to:**

#### **Growth and development**

- |  |  |
|--|--|
| • principles of growth and development | • normal growth and development,         |
| • normal growth and development        | • sexual maturation and its disturbances |
| • failure to thrive and short stature  | • Autism (as mentioned in objective 24)  |

#### **Neonatology**

- |  |                                 |
|--|---------------------------------|
| • perinatal care                           | • low birth weight              |
| • care in the labor room and resuscitation | • newborn feeding               |
| • prematurity                              | • respiratory distress          |
| • common transient phenomena               | • apnea                         |
| • infections                               | • anemia and bleeding disorders |

- jaundice
- neurologic disorders
- renal disorders
- thermoregulation and its disorders

- gastrointestinal disorders
- malformations
- understanding of perinatal medicine

### **Nutrition**

- maternal nutritional disorders; impact on fetal outcome
- infant feeding including complementary feeding
- protein energy malnutrition
- adolescent nutrition
- nutritional management of systemic illness (GI, hepatic, renal illness)
- nutrition for the low birth weight
- breast feeding
- vitamin and mineral deficiencies
- obesity
- parenteral and enteral nutrition

### **Cardiovascular**

- congenital heart diseases (cyanotic and acyanotic)
- infective endocarditis
- disease of myocardium (cardiomyopathy, myocarditis)
- hyperlipidemia in children
- rheumatic fever and rheumatic heart disease
- arrhythmia
- diseases of pericardium
- systemic hypertension

### **Respiratory**

- congenital and acquired disorders of nose tonsils and adenoids
- congenital anomalies of lower respiratory tract
- foreign body in larynx trachea and bronchus
- subglottic stenosis (acute, chronic)
- bronchial asthma
- acute pneumonia, bronchiolitis
- recurrent, interstitial pneumonia
- atelectasis
- pleural effusion
- infections of upper respiratory tract
- obstructive sleep apnea
- acute upper airway obstruction
- trauma to larynx
- neoplasm of larynx and trachea
- bronchiolitis
- aspiration pneumonia, GER
- suppurative lung disease
- lung cysts, mediastinal mass

### **Gastrointestinal and liver disease**

- disease of oral cavity esophagus
- peptic ulcer disease
- intestinal obstruction disorders
- disorders of deglutition and
- congenital pyloric stenosis
- acute and chronic pancreatic

- malabsorption syndrome
- irritable bowel syndrome
- Hirschsprung disease
- hepatitis
- chronic liver disease
- metabolic diseases of liver

- acute and chronic diarrhea
- inflammatory bowel disease
- anorectal malformations
- hepatic failure
- Budd-Chiari syndrome
- cirrhosis and portal hypertension

### **Nephrologic and Urologic disorders**

- acute and chronic glomerulonephritis
- hemolytic uremic syndrome
- VUR and renal scarring
- renal tubular disorders  
dysfunction
- congenital and hereditary renal disorders
- posterior urethral valves
- undescended testis, hernia, hydrocoele

- xanthema syndrome
- urinary tract infection
- involvement in systemic diseases
- neurogenic bladder, voiding
- renal and bladder stones
- hydronephrosis
- Wilms tumor

### **Neurologic disorders**

- seizure and non-seizure paroxysmal events
- meningitis, encephalitis
- febrile encephalopathies
- neurocysticercosis and other neuroinfestations
- SSPE
- neurometabolic disorders
- neuromuscular disorders
- learning disabilities
- acute flaccid paralysis and AFP surveillance
- movement disorders

- epilepsy, epileptic syndromes
- brain abscess
- Guillain-Barre syndrome
- HIV encephalopathy
- cerebral palsy
- neurodegenerative disorders
- mental retardation
- muscular dystrophies
- malformations
- Tumors

### **Hematology and Oncology**

- deficiency anemias
- aplastic anemia
- thrombocytopenia
- blood component therapy
- bone marrow transplant/stem cell transplant
- myelodysplastic syndrome
- neuroblastoma

- hemolytic anemias
- pancytopenia
- disorders of hemostasis
- transfusion related infections
- acute and chronic leukemia
- Lymphoma
- hypercoagulable states

### **Endocrinology**

- hypopituitarism/hyperpituitarism
- pubertal disorders

- diabetes insipidus
- hypo – and hyper-thyroidism

- adrenal insufficiency
- adrenogenital syndromes
- hypoglycemia
- gonadal dysfunction and intersexuality

- Cushing's syndrome
- diabetes mellitus
- short stature
- obesity

### **Infections**

- bacterial (including tuberculosis)
- fungal
- rickettsial
- protozoal and parasitic
- control of epidemics and infection prevention
- viral (including HIV)
- parasitic
- mycoplasma
- nosocomial infections
- safe disposal of infective material

### **Emergency and Critical Care**

- emergency care of shock
- respiratory failure
- status epilepticus
- fluid and electrolyte disturbances
- poisoning
- scorpion and snake bites
- cardio-respiratory arrest
- acute renal failure
- acute severe asthma
- acid-base disturbances
- accidents

### **Immunology and Rheumatology**

- arthritis (acute and chronic)
- immunodeficiency syndromes
- vasculitides
- systemic lupus erythematosus

### **ENT**

- acute and chronic otitis media
- post-diphtheritic palatal palsy
- allergic rhinitis/sinusitis
- hearing loss
- acute/chronic tonsillitis/adenoids
- foreign body

### **Skin Diseases**

- exanthematous illnesses
- pigment disorders
- infections
- atopic, seborrheic dermatitis
- alopecia
- vascular lesions
- vesicobullous disorders
- Steven-Johnson syndrome
- drug rash
- ichthyosis

### **Eye problems**

- refraction and accommodation
- cataract
- strabismus
- partial/total loss of vision
- night blindness
- conjunctival and corneal disorders

- disorders of retina, including tumors

### **Behavioral and Developmental disorders**

- rumination, pica
- sleep disorders
- breath holding spells
- mood disorders
- attention deficit hyperactivity disorders
- enuresis, encopresis
- habit disorders
- anxiety disorders
- temper tantrums
- autism (as mentioned in objective 24)

### **Social/Community Paediatrics**

- national health programs related to child health
- Vaccines: constituents, efficacy, storage, contraindications and adverse reactions
- rationale and methodology of pulse polio immunization
- child labor, abuse, neglect
- disability and rehabilitation
- National policy of child health and population
- Principles of prevention, control of infections (food, water, soil, vector borne)
- Investigation of an epidemic
- IMNCI
- adoption
- rights of the child
- juvenile delinquency

### **Orthopaedics**

- major congenital orthopedic deformities
- common bone tumors
- bone and joint infections

### **Approach to clinical problems**

#### **Growth and development**

- precocious and delayed puberty
- impaired learning
- developmental delay

#### **Neonatology**

- low birth weight newborn
- sick newborn

#### **Nutrition**

- lactation management and complementary feeding
- failure to thrive
- protein energy malnutrition (underweight, wasting, stunting) and micronutrient deficiencies

#### **Cardiovascular**

- Murmur
- cyanosis

- congestive heart failure
- arrhythmia

- systemic hypertension
- shock

### **GIT and Liver**

- Acute diarrhea
- abdominal pain and distension
- vomiting
- gastrointestinal bleeding
- hepatosplenomegaly

- persistent and chronic diarrhea
- ascites
- constipation
- jaundice
- hepatic failure and encephalopathy

### **Respiratory**

- Cough/chronic cough
- wheezy child

- hemoptysis
- respiratory distress

### **Infections**

- acute onset pyrexia
- recurrent infections
- nosocomial infections

- prolonged pyrexia with and without localizing signs
- fever with xanthema

### **Renal**

- Hematuria/dysuria
- voiding dysfunctions
- hypertension

- bladder/bowel incontinence
- renal failure (acute and chronic)

### **Hematology and Oncology**

- anemia

- bleeding

### **Neurology**

- limping child
- paraplegia, quadriplegia
- macrocephaly and microcephaly
- acute flaccid paralysis

- convulsions
- cerebral palsy
- floppy infant
- headache

### **Endocrine**

- thyroid swelling
- obesity

- ambiguous genitalia
- short stature

### **Miscellaneous**

- skin rash
- epistaxis
- arthralgia, arthritis

- lymphadenopathy
- proptosis

## ***TEACHING AND LEARNING METHODS***

### **Postgraduate teaching programme**

#### **General principles**

Acquisition of practical competencies being the keystone of PG medical education, PG training should be skills oriented. Learning in PG program should be essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

#### **Teaching methodology**

This should include regular bedside case presentations and demonstrations, didactic lectures, seminars, journal clubs, clinical meetings, and combined conferences with allied departments. The post graduate student should be given the responsibility of managing and caring for patients in a gradual manner under supervision. Department should encourage e-learning activities.

#### **Formal teaching sessions**

In addition to bedside teaching rounds, at least 5-hr of formal teaching per week are necessary. The departments may select a mix of the following sessions:

- Journal club t Once a week
- Seminar Once a fortnight
- Case discussions once a month
- Interdepartmental case or seminar Once a month  
[Cardiology, Pediatric Surgery]
- Attend accredited scientific meetings (CME, symposia, and conferences).
- Additional sessions on resuscitation, basic sciences, biostatistics, research methodology, teaching methodology, hospital waste management, health economics, medical ethics and legal issues related to pediatric practice are suggested.
- There should be a training program on Research methodology for existing faculty to build capacity to guide research.
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

- **Log book:** During the training period, the post graduate student should maintain a Log Book indicating the duration of the postings/work done in Pediatric Wards, OPDs and Casualty. This should indicate the procedures assisted and performed, and the teaching sessions attended. The purpose of the Log Book is to:
  - a) Help maintain a record of the work done during training,
  - b) Enable Consultants to have direct information about the work; intervene if necessary,
  - c) Use it to assess the experience gained periodically.

The log book shall be used to aid the internal evaluation of the student. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

### **Rotations**

The postgraduate student should rotate through all the clinical units in the department. In addition, following special rotations should be undertaken:

#### ***Mandatory***

Neonatology, perinatology

Intensive care, emergency

#### ***Desirable***

Posting in Out Patient Services of the following specialties is recommended

Skin

Pediatric Surgery

Physical Medicine and Rehabilitation

Community

**Note:** Additionally, the PG students may be sent to allied specialties (Cardiology, Neurology, nephrology *etc.*) depending on facilities available. It should be ensured that the training conforms to the curriculum.

- **Thesis**

#### **Objectives**

By carrying out a research project and presenting his work in the form of thesis, the student shall be able to:

- identify a relevant research question
- conduct a critical review of literature
- formulate a hypothesis
- determine the most suitable study design
- state the objectives of the study
- prepare a study protocol
- undertake a study according to the protocol

- analyze and interpret research data, and draw conclusions
- write a research paper

### **Guidelines**

While selecting the topic, following should be kept in mind:

- the scope of study is limited to enable its conduct within the resources and time available
- the study must be ethically appropriate
- the emphasis should be on the process of research rather than the results
- the protocol, interim progress and final presentation is made formally to the department
- only one student per teacher/thesis guide

There should be periodic department review of the thesis work, as per following schedule:

End of 6 months	Submission of protocol
During 2 <sup>nd</sup> yr	Mid-term presentation
6 months prior to examination	Final presentation; submission

**During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of skills laboratories in medical colleges is mandatory.**

## ***ASSESSMENT***

**FORMATIVE ASSESSMENT, ie., assessment to improve learning**

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

**Quarterly assessment during the MD training should be based on:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).**

### **SUMMATIVE ASSESSMENT, ie., assessment at the end of training**

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The postgraduate examination shall be in three parts:

1. Thesis

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

2. Theory examination

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers. Each paper should have 10 short essay questions (SEQ).

**Paper I:** Basic sciences as applied to Paediatrics

**Paper II:** Neonatology and community Paediatrics

**Paper III:** General Paediatrics including advances in Paediatrics relating to Cluster I specialties

**Paper IV:** Paediatric Medicine including advances in Paediatrics relating to Cluster II specialties

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Cluster I: Nutrition, Growth and Development, Immunization, Infectious disease, Genetics, Immunology, Rheumatology, Psychiatry and Behavioral Sciences, Skin, Eye, ENT, Adolescent Health, Critical Care, Accidents and Poisoning

Cluster II: Neurology and Disabilities, Nephrology, Hematology and Oncology, Endocrinology, Gastroenterology and Hematology, Respiratory and Cardiovascular disorders

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3. Practical/clinical and Oral/viva voce examination

**Practical examination**

Case I

Case II (Newborn)

Case III

OSCE may be used.

**Oral/Viva voce examination** on defined areas by each examiner separately. Oral examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject.

**Recommended Reading:**

**Books (latest edition)**

1. Nelson's Textbook of Pediatrics, Kliegman et al (Editors)
2. Manual of Neonatal care, Cloherty
3. Nada's Pediatric Cardiology, Kaene
4. PG Textbook of Pediatrics, IAP P Gupta et al (Editors)
5. Clinical Methods in Pediatrics, P Gupta
6. Care of the newborn, Meharban Singh

**Journals**

03-05 international Journals and 02 national (all indexed) journals

**Orientation sessions for PG students joining MD in Paediatrics**

**This could be spread over 4-5 sessions once or twice a week depending on departmental routine and feasibility.**

**For all PG students**

Orientation to the Hospital: Various Departments and facilities available

- Communication skills: Patients and colleagues
- Literature search
- Basic research methodology
- Protocol writing and thesis

**Pediatric PGs**

Introduction to Residency in Paediatrics

- Universal precautions and appropriate disposal of hospital waste
- Management of shock
- Congestive cardiac failure
- Normal fluid and electrolyte requirement and their disorders
- Interpretation and management of disorders of acid-base balance
- Evaluation of a sick newborn
- Management of seizures, hypothermia and hypoglycemia in the newborn
- Management of seizures and status epilepticus
- Management of comatose patients
- Hospital management of severe PEM
- Acute kidney injury
- Fulminant hepatic failure
- Management of respiratory distress
- Management of acute diarrhea
- Approach to a bleeding child and its management
- Rational antibiotic therapy

**Postgraduate Students Appraisal Form**  
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks\* \_\_\_\_\_  
\_\_\_\_\_

\*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PHARMACOLOGY**

## **Preamble**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

Pharmacology consists of both the experimental (basic) and clinical sciences. Experimental pharmacology is essential to understanding of drug action in diseases as well as for the pharmaceutical industry for drug discovery and development. Clinical pharmacology is essential for prescribing practice in medicine, adverse drug reactions, clinical trial and pharmacovigilance. The job prospects for a medical pharmacologist are in academics, pharmaceutical industry/clinical research organization, government research institutions, in regulatory bodies and as scientific writer or science manager. Accordingly, a post graduate (MD) student in Pharmacology should be competent to meet the job requirements at all these places.

The applied nature of the discipline, the move towards integrated course structures, the widening of discipline boundaries and increasing number of students seeking post graduation degree raise issues concerning maintaining and improving competency as along with maintenance of academic standards. These issues also necessitate integration with other biomedical and clinical disciplines. A pragmatic approach to postgraduate pharmacology teaching in India is an important step towards addressing the aforesaid challenges and facilitating a fresh curriculum design.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC LEARNING OBJECTIVES***

At the end of the MD training programme in Pharmacology, the student should acquire competencies in the following areas:

### **1. Acquisition of knowledge**

The student should be able to explain clearly concepts and principles of Pharmacology and therapeutics. The student should also be able to explain the drug development processes. S/he should be able to explain Drugs and Cosmetics Act, in addition to clinical trial procedures.

## **2. Teaching and training**

The student should be able to effectively teach undergraduate students in medicine (MBBS) and allied health science courses (Dentistry and Nursing) so they become competent healthcare professionals and able to contribute to training of postgraduate trainees.

## **3. Research**

The student should be able to carry out a research project (both basic and clinical) from planning to publication and be able to pursue academic interests and continue life-long learning to become more experienced in all the above areas and to eventually be able to guide postgraduates in their thesis work.

# ***SUBJECT SPECIFIC COMPETENCIES***

**The student during the training program should acquire the following competencies:**

## **A. Cognitive domain**

1. Describe and apply pharmacological principles to explain the mechanism/s of the effects of drugs used in diagnosis, prevention and treatment of diseases of all systems of human body.
2. Explain pharmacodynamics and pharmacokinetics of drugs.
3. Describe mechanisms of drug-drug interactions and their clinical importance.
4. Apply and integrate knowledge of pathophysiology of diseases and its modulation by drugs.
5. Acquire knowledge on pharmacogenetics and pharmacogenomics
6. Acquire knowledge on principles of pharmacoeconomics
7. Acquire knowledge on pharmacoepidemiology, including drug utilization studies.
8. Acquire knowledge and understanding of principles of Good clinical practice (GCP) and Good laboratory practice (GLP) guidelines
9. Acquire knowledge on essential medicines
10. Acquire knowledge on pharmacovigilance
11. Acquire knowledge and apply the principle of biostatistics in the evaluation and interpretation of drug safety and efficacy studies
12. Describe how to evaluate, analyse and monitor preclinical and clinical data in drug discovery

13. Able to integrate principles of immunology in biochemistry.
14. Demonstrate knowledge of basics of research methodology, develop a research protocol, conduct the study, record experimental observations, analyse data using currently available statistical software, interpret results and disseminate these results and to have the potential ability to pursue further specializations and eventually be competent to guide students.
15. Describe the principles of teaching - learning technology towards application and take interactive classroom lectures, modules for problem based learning (PBL), case discussions, small group discussions, seminars, Journal club and research presentations
16. Demonstrate knowledge about computer assisted learning (CAL) softwares and ability to use them efficiently to promote learning of pharmacology.
17. Demonstrate knowledge of principles of Instrumentation.
18. Demonstrate knowledge about recent advances and trends in research in the field of pharmacology and clinical pharmacology.
19. Acquire knowledge on generic drugs and generic prescription.
20. Acquire knowledge on rational use of drugs and prescription auditing
21. Acquire knowledge about antimicrobial stewardship programs and strategies for containment of antibiotic resistance
22. Acquire knowledge on animal toxicity studies
23. Acquire knowledge on common poisoning
24. Acquire knowledge on the legal and ethical issues involved in drug development and research.
25. Acquire knowledge in Biostatistics including use of statistical softwares :
  - Estimation Sample size for a clinical trial
  - Scales of measurement, data display, measures of central tendency (mean, median, mode)
  - Dispersion of data (variance, standard deviation)
  - Selection of tests (of significance) and their applicability
  - Correlation and regression analysis
  - Basics of systematic reviews and meta-analysis

## **B. Affective domain**

1. Effectively explain to patients, the effects and side effects of drugs, including the need for medication adherence.
2. Communicate effectively with pharmacological reasoning with students, peers, staff and faculty, and other members of the health care team on rational use of drugs and improving spontaneous reporting of adverse events.
3. Demonstrate respect in interactions with peers, and other healthcare professionals.
4. Demonstrate ethical behavior and integrity in one's work.

5. Demonstrate ability to generate awareness about the use of generic drugs in patients.
6. Acquire skills for self-directed learning to keep up with developments in the field and to continuously build to improve on skills, expertise and perpetual professional development.

### **C. Psychomotor domain**

1. Able to predict efficacy and adverse effects associated with use of drugs, along with causality assessment.
2. Demonstrate skills for prescription writing.
3. Perform major *in vivo* and *in vitro* animal experiments.
4. Observe and understand basic principles of working of important advanced techniques, like High Performance Liquid Chromatography (HPLC).
5. Demonstrate standard operating procedures of various methods and techniques used in clinical trials and research.
6. Determine levels of common poisons in blood
7. Demonstrate presentation skills at academic meetings, publications and writing research projects for funding agencies.
8. Be able to analyze and evaluate a research paper

**By the end of the course, the trainee should have acquired practical skills in the following:**

1. *In vivo* and *ex vivo* experiments, like organ bath, analgesiometer, physiography/polygraph, convulsimeter, plethysmograph, learning and memory, models for affective disorders.
2. Administration of drugs by various routes (subcutaneous, intravenous, intraperitoneal) in experimental animals
3. Collection of blood samples and oral gavage in experimental animals
4. Preparation and administration of a drug solution in appropriate strength and volume
5. Experiments to show dose response curve of agonists (in the presence or absence of an antagonist) on various biological tissues, like
  - i) Isolated rabbit/rat/ guinea-pig intestine
  - ii) Isolated rat uterus
6. Determination of EC<sub>50</sub>, ED<sub>50</sub>, pD<sub>2</sub> and pA<sub>2</sub> values of drugs
7. Perform *in vivo* experiments to study effect of mydiatrics and miotics on rabbit eye
8. Perform *in vivo* experiments to study effect of antiepileptic drugs using animal models of epilepsy

9. Perform *in vivo* experiments to study effect of analgesics using animal models of analgesia
10. Perform *in vivo* experiments to study effects of drugs on learning, memory and motor coordination
11. Estimate toxic drug levels using chemical and biological tests (alkaloids, glycosides, steroids, barbiturates, salicylates) by commonly used methods)
12. Clinical pharmacology
  - i) Prepare protocol for a clinical trial
  - ii) Prepare Informed consent form and participant information sheet for research involving human participants
  - iii) Report Serious Adverse Effect (SAE)
  - iv) Evaluate promotional drug literature
  - v) Prepare “Drug Information Sheet” (WHO criteria)
  - vi) Interpret bioavailability parameters with the help of given pharmacokinetics data
  - vii) Perform causality assessment and report ADR as per Pharmacovigilance Programme of India (PvPI)

**Animal Experiments:** All animal experiments must be compliant with Govt. of India regulations, notified from time to time. Amphibian/Dog/Cat experiments should be conducted by computer assisted simulation models/ facilities. Other experiments should be performed as permissible by CPCSEA guidelines

## *Syllabus*

The **course contents** should cover the following broad topics:

1. Basic and molecular pharmacology
2. Drug receptors and Pharmacodynamics
3. Pharmacokinetics (Absorption, Distribution, Metabolism and Excretion)
4. Biotransformation
5. Pharmacogenomics and Pharmacogenetics
6. Autonomic Pharmacology
7. Drugs acting on Smooth muscles
8. Clinical pharmacology
9. Drug development and Regulations
10. Clinical Pharmacokinetics
11. Drugs acting on Synaptic and Neuroeffector Junctional sites
12. Drugs acting on Central Nervous System (Sedative, Hypnotics, Antiepileptics, General Anesthetics, Local Anesthetics, Skeletal Muscle Relaxants,

- Antipsychotic, Antidepressants, Drugs used in Parkinson's disease and other neurodegenerative disorders, opioid agonists and antagonists, Drugs of abuse)
13. Drugs modifying renal function
  14. Drugs acting on cardiovascular system and haemostatic mechanisms  
(Antihypertensives, Antianginal, Antiarrhythmics, Drugs used in heart failure, Drugs used in Dyslipidemias, Fibrinolytics, Anticoagulants, Antiplatelets
  15. Reproductive Pharmacology
  16. Agents effecting calcification and bone turnover
  17. Autacoids and related pharmacological agents (NSAIDs) and drugs used in Rheumatoid arthritis and Gout
  18. Gastrointestinal drugs
  19. Pharmacology of drugs affecting the respiratory system (drugs used in Bronchial Asthma and COPD)
  20. Antimicrobial, antiparasitics, disinfectants, antiseptics
  21. Chemotherapy of neoplastic disease
  22. Antiviral drugs
  23. Drugs used in Autoimmune disorder and Graft versus Host Disease)
  24. Dermatological pharmacology
  25. Ocular pharmacology
  26. Use of drugs in pregnancy
  27. Perinatal and Pediatric Pharmacology
  28. Geriatric Pharmacology
  29. Immunomodulators - immunosuppressants and immunostimulants
  30. Pharmacology of drugs used in endocrine disorders (drugs used in diabetes mellitus, hypothalamic and pituitary hormones, thyroid and antithyroid drugs, adrenocorticoid hormones and their antagonists, gonadal hormones and their inhibitors)
  31. Drug delivery systems
  32. Heavy metal poisoning
  33. Non-metallic toxicants - air pollutants, pesticides etc.
  34. Research methodology and biostatistics
  35. Literature search.
  36. Pharmacogenomics, Pharmacovigilance (ADR reporting), pharmacoeconomics (cost-effectiveness study) and pharmacoepidemiology
  37. Over the counter drugs
  38. Dietary supplements and herbal medicines
  39. Pharmacometrics - methods of drug evaluation.
  40. General screening and evaluation of:
    - Analgesics, antipyretics, anticonvulsants, anti-inflammatory drugs, antidepressants, antianxiety and antipsychotics, sedatives, muscle

relaxants, antihypertensives, hypocholesterolaemic agents, anti-arrhythmics, diuretics, adrenergic blocking drugs

- Drugs used in peptic ulcer diseases/Prokinetic agents/ antiemetics
- Antitussives, /anti-asthma agents
- Local Anaesthetics
- Oxytocics, antifertility agents
- Antidiabetics

Behavioral pharmacology models and evaluation of drugs affecting learning and memory

#### 41. Bioassays

- Bioassay methods
- Animal experiments: Ethical considerations, ethical approval, applicable regulatory Guidelines (CPCSEA), humane animal research (principles of 3Rs) and alternatives to animal experimentation. General and statistical considerations
- Anesthetics used in laboratory animals
- Principles of EC<sub>50</sub>, ED<sub>50</sub>, pD<sub>2</sub> and pA<sub>2</sub> values of drugs
- Describe methods of bioassay for estimation of :  
Acetylcholine, skeletal neuromuscular junction blockers, adrenaline, noradrenaline, histamine, 5 HT, hormones, insulin, vasopressin/oxytocin, estrogen, progestins, ACTH
- Competitive antagonism - pA<sub>2</sub> values
- Immunoassays: Concept, types of bioassays and their application/s
- Animal experiments: Ethical consideration, ethical approval
- Regulatory Guidelines (CPCSEA) and alternatives to animal experimentation

#### 42. **Biochemical Pharmacology**

- Basic principles and applications of simple analytical methods
- Principles of quantitative estimation of drugs, endogenous compounds and poisons using Colorimetry, Spectrophotometry, flame photometry, High Performance Liquid Chromatography (HPLC) and enzyme-linked immunosorbent assay (ELISA).

## ***TEACHING AND LEARNING METHODS***

### **Postgraduate teaching programme**

#### **Teaching methodology**

Learning in a PG program is primarily self-directed and in Pharmacology consists of laboratory and academic work. The formal sessions are merely meant to supplement this

core effort. Acquisition of practical competencies thus becomes the cornerstone of postgraduate medical education in Pharmacology.

### **Formal teaching sessions**

- In addition to laboratory work, at least 6-hr of formal teaching per week is necessary. The departments may select a mix of the following sessions:

Journal club	Once a week
Seminar	Once a week
Practical	Once a week
Group Discussions	Once a week
Case discussions	Once a month
Interdepartmental case or seminar	Once a month

**Note:** These sessions may be organized as an institutional activity for all postgraduates.

- Attend accredited scientific meetings (CME, symposia, and conferences).
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- Additional sessions on basic sciences, biostatistics, research methodology, teaching methodology, hospital waste management, health economics, medical ethics and legal issues related to experimentation are suggested.
- There should be a training program on Research methodology for existing faculty to build capacity to guide research and for keeping abreast with rapidly evolving methods and techniques in related disciplines.
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- **Log book:** During the training period, the post graduate student should maintain a Log Book giving details of experimentation done and skills acquired. The log book shall be used to aid the internal evaluation of the student. The Log books shall be checked and assessed periodically by the faculty members imparting the training.
- Department should encourage e-learning activities.

The postgraduate student in M.D (Pharmacology) shall undergo a 3 - year (6 terms of 6 months each) training that will comprise of the following:

I Theory: (lectures, seminars, group discussion, journal club) (at least 6 hours a week, daily 2 hours for 3 days)

II **Rotation:**

Practical training in the following suggested areas: (8 hours a week, daily 4 hours for 2 days)

- **Experimental Pharmacology:**  
*In vitro* (including bioassays), *in vivo* (including common methods of drug evaluation) experiments, computer simulations and toxicity tests
- **Chemical Pharmacology:**  
Identification of drug/toxin by using chemical, biological and analytical tests. Quantitative estimation - Use of colorimeter, spectrophotometer and/or other advanced analytical equipments
- **Clinical Pharmacology:**
  - I Evaluation of drugs in healthy volunteers as well as patients
  - II Critical evaluation of drug literature, pharmacoeconomics, pharmacovigilance and pharmacoepidemiology.
  - III Thesis on a suitable problem
  - IV Training in undergraduate teaching
  - V Computer training

**During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.**

## ***ASSESSMENT***

**FORMATIVE ASSESSMENT** ie., assessment during the training

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

**Quarterly assessment during the MD training should be based on:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I)**

**SUMMATIVE ASSESSMENT, ie., assessment at the end of training**

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The post graduate examination shall be in three parts:

**1. Thesis**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

**2. Theory examination:**

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers:

**Paper I:** General Pharmacology

**Paper II:** Clinical Pharmacology

**Paper III:** Systemic Pharmacology

**Paper IV:** Recent Advances in Pharmacology

**3. Practical/clinical and Oral/viva voce examination**

**Practical:**

**a) Long Experiment:**

Demonstrating effects of drugs/interpretation of results in anesthetized animal

Table exercise - Examples are given below:

- Calculating pharmacokinetic parameters
- Statistical exercise
- Critical appraisal of a published paper (abstract writing of a published paper)
- Evaluation of drug literature.
- Protocol designing
- ADR reporting and causality assessment
- Assessment of preclinical toxicity data
- Analysis of rational and irrational formulations

**b) Short experiment**

a. Isolated tissue experiment (Bioassay of drugs) (as per Govt regulations)

Or

interpretation of results of a previous tracing

b. *In vivo* experiment

c) Spotting exercises: Various drug delivery systems, inhalers, insulin syringe, drip chamber, various tablets, etc.

**Oral/Viva voce Examination**

Microteaching (teaching exercise)

Discussion on dissertation

Principles of general and systemic pharmacology

Recent advances in pharmacology & drug therapy

**Recommended Reading Material**

**Books (latest edition)**

1. Goodman & Gilman's The Pharmacological Basis of Therapeutics, ed. Laurence Brunton, Bruce A. Chabner, Bjorn Knollman.
2. Essentials of Medical Pharmacology, by KD Tripathi
3. Basic and Clinical Pharmacology, by Bertram G. Katzung and Anthony J. Trevor
4. Drug Discovery and Evaluation: Pharmacological Assays Editors: Vogel, Hans  
Clinical Pharmacology by Laurence, Bennett and Brown
6. Rang and Dale's Pharmacology by H.P. Rang
7. Koda Kimble and Youngs Applied Therapeutics by Brian K Alldredge and Robin L Corelli

**Journals**

03-05 international Journals and 02 national (all indexed) journals

**Postgraduate Students Appraisal Form**  
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks\* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**\*REMARKS:** Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PHYSIOLOGY**

## **Preamble**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The purpose of the training in Physiology is to produce experts with necessary knowledge, skills and attitude to impart education and to carry out research in Physiology, be able to serve the community as competent physiologists and render appropriate advice/service to the clinicians as and when it is required.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC LEARNING OBJECTIVES***

### **Programme Objectives**

#### **Goal:**

The goal is to have uniform standards in the teaching of Physiology at Postgraduate level throughout the country. The guidelines will help achieving such standards which will in ensure availability of competent physiologists equipped with required skills for teaching and applied research.

### **Learning Objectives**

A post graduate student having qualified the MD (Physiology) examination should be able to:

1. Understand and deal with all aspects of general, systemic and applied Physiology.
2. Teach effectively the basic physiological mechanisms of human body with reference to their implications in the pathogenesis of diseases (pathophysiology) affecting various organ systems and the physiological basis of their management to undergraduate medical, paramedical and all other basic science students.
3. Understand general principles of medical education (use of appropriate teaching techniques and resources).

4. Explain how the knowledge of physiology can be effectively used in a various clinical settings to solve diagnostic and therapeutic problems.
5. Interpret and evaluate research publications critically.
6. Use the library facilities (Literature database using computer, CD ROM, internet search and any other available newer techniques).
7. Conduct relevant clinical/experimental research which may have significant bearing on human health and patient care.
8. Interpret the research findings in the light of its basic and applied significance.
9. Acquire skills in conducting collaborative research in the field of physiology with allied sciences, clinical sciences and biomedical engineering.
10. Interact with the allied departments and render services in advanced laboratory investigations.
11. Serve as interface with society at large.
12. Acquire administrative skills to set up concerned department / laboratories and initiate purchase procedure and procure necessary items for running such laboratories.
13. Function as a member of a teaching or research team.

## ***SUBJECT SPECIFIC COMPETENCIES***

### **A. Cognitive Domain**

1. Able to teach the basic physiological mechanisms of human body with reference to their implications in the pathogenesis of diseases (pathophysiology) and their management to undergraduate medical and paramedical students.
2. Conduct such clinical and experimental research, as would have a significant bearing on human health and patient care.
3. Interact with other departments by rendering services in advanced laboratory investigations and relevant expert opinion.
4. Participate actively in various workshops/seminars/journal clubs/demonstration in the allied departments, to acquire various skills for collaborative research.
5. Contribute to society by imparting physiological understanding of health problems.
6. Plan a research study and conduct basic and clinical systemic investigations.

### **B Affective domain**

1. Demonstrate self-awareness and personal development in routine conduct.  
(*Self-awareness*)
2. Communicate effectively with peers, students and teachers in various teaching-learning activities. (*Communication*)
3. Demonstrate
  - a. Due respect in handling human body parts & cadavers during dissection (*Ethics & Professionalism*)

- b. Humane touch while demonstrating living surface marking in subject/patient (*Ethics & Professionalism*)
4. Acquire capacity of not letting his/her personal beliefs, prejudices and limitations come in the way of duty.
5. Appreciate the issues of equity and social accountability while exposing students to early clinical exposure (*Equity and social accountability*)

### **C. Psychomotor Domain**

The student should acquire competencies in the following tasks:

#### **I. Hematology Experiments**

1. Estimation of hemoglobin
2. Determination of Total Erythrocyte (RBC) Count and RBC Indices (Blood Standards)
3. Determination of Total Leucocytes (WBC) Count : TLC
4. Preparation of a peripheral Blood Smear and Determination of Differential Leucocyte Count: DLC
5. Determination of Arneht Count
6. Determination of Bleeding Time (BT) and Clotting Time (CT)
7. Determination of Blood groups (A,B,O and Rh system)
8. Determination of Erythrocyte Sedimentation Rate (ESR) and Packed cell volume (PCV)
9. Determination of Osmotic Fragility of Red Blood Cells
10. Determination of Platelet Count
11. Determination of Reticulocyte Count
12. Determination of Absolute Eosinophil Count
13. Study of Haemopoietic Cells Present in the Bone Marrow

#### **II. Animal Experiments (All animal experiments must be compliant with Govt. of India Regulations, notified from time to time). Experiments in Amphibian/Dog/Cat should be conducted by computer assisted simulation models/ facilities. Other experiments should be performed as permissible by CPCSEA guidelines.**

##### **A. Amphibian (Frog) Experiments**

1. Effect of temperature on simple muscle twitch.
2. Effect of two successive stimuli (of same strength) on skeletal muscle.
3. Effect of increasing strength of stimuli on skeletal muscle.
4. Effect of increasing frequency of stimuli on skeletal muscle (genesis of tetanus).
5. Effect of free load and after load on skeletal muscle.

6. Effect of repeated stimuli on skeletal muscle (study of phenomenon of Fatigue).
7. Study of isometric contraction in skeletal muscle.
8. Determination of conduction velocity of sciatic nerve and effect of variables on it.
9. Properties of cardiac muscle – Refractory period, All-or-None Law, extra-systole and compensatory pause, beneficial effect.
10. Regulation of Heart, Vagus dissection and effect of Vagal and WCL stimulation.
11. Effect of physiological and pharmacological variables on intact frog's heart.
12. Perfusion of isolated frog's heart-role of sodium, potassium, calcium ions and drugs.
13. Perfusion of blood vessels in the frog.
14. Capillary circulation (Frog Web).
15. Postural and protective reflex in the frog.

#### **B. *Mammalian Experiments (Dog/Rabbit/Guinea pig/Rat/Mice)***

1. General management of mammalian experiments.
2. Recording of heart rate, blood pressure and respiration and study the effects of various factors; drugs; asphyxia; occlusion of common carotid artery.
3. Effect of stimulation of central and peripheral end of vagus on arterial blood pressure and respiration after vagotomy.
4. Effect of stimulation and distension of carotid sinus on blood pressure and respiration.
5. Effect of stimulation of splanchnic nerve.
6. Effect of stimulation of peripheral somatic nerve (sciatic nerve).
7. Study of hypovolemic shock and its reversal.
8. Perfusion of isolated mammalian heart and study the effects of drugs and ions.
9. Recording of Isolated Intestinal movement and tone and studying the effect of drugs and ions.
10. Study of various stages of menstrual cycle, cervical smear and vaginal smear.

### **III. Human Physiology**

#### **Clinical Physiology**

1. Physiological principles of clinical examination.
2. General Physical examination, physiological basis of some clinical symptoms and signs.
3. General principles of Inspection/Palpation/Percussion/Auscultation.

#### **Nerve muscle physiology**

1. Ergography and hand grip spring dynamography and study of human fatigue.
2. Recording of electromyography (EMG) and its application.
3. Recording of nerve conduction.

### ***Cardiovascular system (CVS)***

1. Clinical examination of CVS.
2. Examination of arterial & venous pulses.
3. Measurements of arterial blood pressure and effect of head-up/head-down tilt.
4. Recording of 12 lead Electrocardiography (ECG) and its interpretation.
5. Measurement of blood flow.

### **Respiratory system**

1. Clinical examination of respiratory system.
2. Stethography – study of respiratory movements and effect of various factors.
3. Assessment of respiratory functions (spirometry, vitalography, and gas analysis).
5. Measurement of BMR.
6. Cardio pulmonary resuscitation (CPR) and Artificial respiration.

***Gastrointestinal system:*** Clinical examination of abdomen.

### ***Integrative Physiology / Excretory system***

1. Recording of body temperature/effect of exposure to cold and hot environment
2. Studies in stimulated environment - microgravity; high altitude; hot and cold environment.
3. Human studies involving sweat, salivation and urine.

### **Reproductive system**

1. Determination of ovulation time by basal body temperature chart and pregnancy diagnostic test - Immunological Tests.
2. Semen analysis: sperm count and motility.

### **Nervous System including Special senses**

1. Clinical examination of the nervous system and its physiological basis.
2. Examination of higher mental functions.
3. Examination of cranial nerves.
4. Examination of sensory system.
5. Examination of motor system including reflexes.

6. Clinical examination of special senses:
  - (i) Smell and Taste
  - (ii) Test for hearing to deafness
  - (iii) Physiology of eye:
    - (a) Clinical examination of the eye and pupillary reflex
    - (b) Visual acuity
    - (c) Perimetry – mapping out of visual field and blind spot
    - (d) Accommodation
    - (e) Fundoscopy
    - (f) Colour vision and colour blindness
7. Reaction (visual and auditory) and reflex time.
8. Electroencephalography (EEG) and Polysomnography
9. Autonomic Nervous System (ANS) Testing.
10. Neuro-electrodiagnostic techniques:
  - (i) Nerve conduction study.
  - (ii) Visual evoked potential (VEP).
  - (iii) Brainstem auditory evoked potential (B.A.E.P).
  - (iv) Somato-sensory evoked potential (SEP).
  - (v) Motor evoked potential (MEP).

#### **Others**

1. Construction of dietary chart for growing children, pregnant woman, elderly individuals, hypertensive patients, & diabetes mellitus patients.
2. Tests for physical fitness: Cardio – respiratory responses to steady state exercise using
  - (i) Harvard step test
  - (ii) Bicycle Ergometry
  - (iii) Treadmill test for determination of  $VO_2$  max

## ***Syllabus***

#### **Course contents:**

#### **Paper-I: *General and Cellular Physiology including Genetic Basis and Historical perspectives:***

1. Physiology of cell, various cellular mechanisms and genetic control mechanisms.
2. Various principles of Physics and Physical Chemistry involved in physiological phenomenon e.g. haemo-dynamics, bio-electrical potentials, body fluids, methods of measurements.
3. History of Physiology.
4. Biostatistics, Biophysics, Biochemistry, Micro-anatomy.
5. Growth and Development including aging.

6. Excretion, pH, water and Electrolyte balance.

**Paper-II: *Systemic Physiology (system providing transport, nutrition and energy) including comparative Physiology.***

1. Blood and Immunity.
2. Cardiovascular System.
3. Respiratory System.
4. Gastro- Intestinal Tract (GIT) and dietary requirements.

**Paper-III: *Systemic Physiology (system concerned with procreation, regulation and neural control)***

1. Nerve-Muscle Physiology including muscle mechanics
2. Endocrine Physiology
3. Nervous System (Central, peripheral and autonomic)
4. Special Senses
5. Reproduction & family planning/foetal & neonatal Physiology

**Paper-IV: *Applied Physiology including recent advances***

1. Patho-physiology pertaining to systemic Physiology
2. Physiological basis of various clinical investigation tests
3. Interaction of human body in ambient environment- high altitude, space and deep sea
4. Sports physiology
5. Yoga and Meditation
6. Recent advances relevant to Physiology
7. Social responsibilities of physiologists

**Departmental resources**

It is to be mandatory for the department to establish and develop the following laboratories. In addition to teaching, these laboratories should be involved in active research and in patient care services in one or more well defined fields.

**1. Clinical Neurophysiology Laboratory**

The department should generate liaison with clinical department and provide routine services for health monitoring and diagnostics (disease).

- (i) Electroencephalography

- (ii) Evoked potential recording
- (iii) Electromyography
- (iv) Nerve conduction studies
- (v) Autonomic nervous system (ANS) testing
- (vi) Any other newer technology

## **2. Cardio-Respiratory Laboratory**

The department should generate liaison with clinical department and provide routine services for health monitoring and diagnostics (disease).

- (i) Electrocardiography
- (ii) Blood-gas Analysis
- (iii) Computerized multifunctional spirometry
- (iv) Laboratory for measuring pulmonary diffusion capacity and functional residual capacity (FRC)
- (v) Whole-body plethysmography
- (vi) Laboratory for Blood flow measurements (Impedance plethysmograph/Laser flow meter/ Doppler flow meter)

## **3. Exercise Physiology Laboratory**

The department should generate liaison with sports authorities and clinical departments to provide services for testing and grading exercise and physical efficiency for health monitoring and diagnostics (disease). This should be done by using the following techniques:

- (i) Two step test exerciser
- (ii) Bicycle Ergometry
- (iii) Tread mill
- (iv) Respiratory gas analysis and measurement of basal metabolic rate (BMR)

## **4. Metabolic/Endocrinology/Reproductive Bio-medicine laboratory**

This laboratory should perform various tests pertaining to gastrointestinal, renal, metabolic, endocrinal and reproductive bio-medicine. The department should generate liaison with clinical departments and provide routine services for health monitoring and diagnostics (disease).

- (i) Spectrophotometer
- (ii) pH meter
- (iii) Elisa Reader/Washer
- (iv) Luminometer

- (v) Semi-autoanalyser

Post graduate students should be posted in the above laboratories and extend the required services on routine basis.

The Department should be equipped with general facilities like PG resource room with internet access and a departmental library with books especially those related to pertinent higher studies in Physiology and field of research. The college/department should make important journals available (at least four Indian journals and two international journals).

## ***TEACHING AND LEARNING METHODS***

### **Teaching methodology**

Based on the above laboratory facilities the department can prepare a list of post-graduate experiments pertaining to basic and applied physiology. Active learning should form the mainstay of postgraduate training.

- There should be seminars (at least 30 per year) along with symposia, group-discussions and weekly Journal clubs. Each Journal Club should run for 4 weeks (4 turns) and discuss articles published in indexed journals focusing on their new methodology, interesting results etc. PG student should attend at least six such journal clubs every year.
- The Post graduate student should attend at least, 2 symposia every year and weekly group discussions.
- The department should generate liaison with clinical departments and provide routine services for health monitoring and diagnostics (disease) and for periodical posting of Physiology PGs in clinical settings.
- The PG students should render special investigative services in their respective area of specialization. In consultation with the concerned clinical departments a 3 month roster should be made for the post-graduate students to attend the ward rounds of selected cases of pathophysiologic interest for PG teaching.
- A postgraduate student in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- The PG students should pay formal and scheduled visits to various hospital laboratories of interest for the purpose of learning.
- The student should be trained to generate teaching resource material for UG and develop problem solving modules.
- Department should encourage e-learning activities.

- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- Log books shall be checked and assessed periodically by the faculty members imparting the training.

**During the training programme, patient safety is of paramount importance, therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.**

#### **Rotation:**

Each post graduate student should undergo minimum of six terms training spread over a period of 03 years. The postings should be as under:-

1. **I semester:** Department of Physiology to cover (i) General aspects of UG teaching, (ii) Selection of thesis topics and collection of relevant references
2. **II Semester:** (i) submission of thesis synopsis (ii) Posting in departmental UG – PG laboratories
3. **III semester:** Posting in clinical departments: Medicine and allied disciplines.
4. **IV, V & VI semesters:** (i) UG-PG teaching (ii) thesis work.

**Note:** (1) UG, PG teaching and thesis work to continue throughout the course.  
 (2) 50% of time during III and IV Semester should be spent in the department of Physiology.

## ***ASSESSMENT***

**FORMATIVE ASSESSMENT** ie., during the training

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

#### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

**Quarterly Assessment during the MD training programme should be based on:**

1. **Journal based / recent advances learning**
2. **Patient based /Laboratory or Skill based learning**
3. **Self directed learning and teaching**

#### **4. Departmental and interdepartmental learning activity**

#### **5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).**

#### **SUMMATIVE ASSESSMENT ie, assessment at the end of training**

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

The post-graduate examinations should be conducted in 3 parts:

##### **1. Thesis**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

##### **2. Theory Examination**

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There should be 4 theory papers:

**Paper I:** General Physiology including history of Physiology

**Paper II:** Systemic Physiology (system providing transport, nutrition and energy)

**Paper III:** Systemic Physiology (system concerned with regulation, neural control and procreation)

**Paper IV:** Applied Physiology including recent advances

### 3. Practical and oral examination

Practical examination should be spread over two days and include the following components:

1. Objective Structured Practical Exam (OSPE)/ Spotting
2. Problem solving exercises pertaining to Clinical Physiology
3. Performing and reporting two special laboratory investigations
4. Two animal experiments (one long and one short) illustrating mechanisms, physiological concepts and their applications to humans. (Subject to current regulation of Government of India regarding animal usage). This is optional. It is advisable to use simulated experiments for this purpose.
5. Two human experiments (one long and one short), dealing with clinical physiology as would have significant bearing on human health and patient care.
6. Micro-teaching session for assessing communication skills.

Viva-voce examination should include the following components:

- (i) Theoretical discussion (General and systemic Physiology)
- (ii) Teaching techniques
- (iii) Thesis
- (iv) Eminent Physiologists (Foreign/Indian)
- (v) Journals (Indian/Foreign)
- (vi) Recent advances

### Recommended Reading

#### Books (latest edition)

1. A.C. Guyton – Text book of Medical Physiology
2. W.F. Ganong – Review of Medical Physiology
3. Vernon B. Mountcastle– Medical Physiology Vol. I & II
4. William’s Textbook of Endocrinology
5. J.E. Cotes- Respiratory Physiology
6. D.T. Harris – Experimental Physiology
7. Wintrobe’s – Clinical Hematology
8. Brown B.L. – Cell signaling, Biology and medicine of signal transduction
9. Berne and Levy- Medical Physiology
10. Textbook of Medicine by Harrison
11. API Textbook of Medicine

#### Journals

03-05 international Journals and 02 national (all indexed) journals

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**Pre / Para /Clinical Disciplines**

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6.	Thesis / Research work										
7.	Log Book Maintenance										

**Publications**

**Yes/ No**

Remarks\* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

\*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE of ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PSYCHIATRY**

## **Preamble**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A postgraduate specialist having undergone the required training should be able to recognize the health needs of the community, should be competent to handle medical problems effectively and should be aware of the recent advances pertaining to his specialty. The post graduate student should acquire the basic skills in teaching of medical/para-medical students. She/he is also expected to know the principles of research methodology and modes of consulting library.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC LEARNING OBJECTIVES***

The primary **goal** of the MD course in Psychiatry is to produce a post graduate clinician able to provide health care in the field of Psychiatry. A physician qualified in Psychiatry, at the end of the course, should be able to diagnose and treat psychiatric disorders, take preventive and curative steps for the disease in the community at all levels of health care and qualify as a consultant and teacher in the subject.

At the end of the MD course in Psychiatry, the student should have able to:

- Understand the relevance of mental health in relation to the health needs of the country
- Ethical considerations in the teaching and practice of Psychiatry
- Identify the social, economic, biological and emotional determinants of mental health
- Identify the environmental causes as determinants of mental health
- Institute appropriate diagnostic, therapeutic and rehabilitative procedures to the mentally ill patient

- Take detailed history, conduct appropriate ethically valid physical examination and institute appropriate evaluation procedures to make a correct clinical diagnosis
  - Perform relevant investigative and therapeutic procedures for the psychiatric patient
  - Recommend appropriate laboratory and imaging examinations and interpret the results correctly
  - Plan and deliver comprehensive treatment of a psychiatric patient using principles of rational drug therapy
  - Plan rehabilitation of psychiatric patient suffering from chronic illness
  - Clinically manage psychiatric emergencies efficiently
  - Demonstrate empathy and humane approach towards patients and their families and respect their sensibilities
  - Demonstrate communication skills of a high order in explaining management and prognosis, providing counseling and giving health education messages to patients, families and communities
  - Develop appropriate skills to practice evidence-based psychiatry
  - Demonstrate competence in basic concepts of research methodology and epidemiology
  - Be aware of and take appropriate steps in the implementation of national mental health programs, effectively and responsibly
  - Be aware of the concept of essential drugs and rational use of drugs
  - Be aware of the legal issues in the practise of Psychiatry
  - Be aware of the special requirements in the practice of Child and adolescent Psychiatry and Geriatric Psychiatry
- **Research:** The student should know the basic concepts of research methodology and plan a research project in accordance with ethical principles. S/he should also be able to interpret research findings and apply these in clinical practice. S/he should know how to access and utilize information resources and should have basic knowledge of statistics.
  - **Teaching:** S/He should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students, health professionals, members of allied disciplines (e.g. behavioural sciences), law enforcement agencies, families and consumers and members of the public.

### ***SUBJECT SPECIFIC COMPETENCIES***

**By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:**

## **A. Cognitive domain**

**By the end of the course, the student should demonstrate knowledge in the following:**

### **1. General topics:**

1. The student should be able to demonstrate knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to Psychiatry.
2. The student should be able to explain aetiology, assessment, classification and management and prognosis of various psychiatric disorders (including psychiatric sub-specialities), and Neuroanatomy, Neurophysiology, Neurochemistry, Neuroimaging, Electrophysiology, Psychoneuroendocrinology, Psychoneuroimmunology, Chronobiology and Neurogenetics.
3. Acquire knowledge of delirium, dementia, amnestic & other cognitive disorders and mental disorders due to a general medical condition.
4. The student should be able to explain follow-up care of person suffering from chronic relapsing psychiatric ailments.
5. The student should acquire knowledge of emergency measures in acute crisis arising out of various psychiatric illnesses including drug detoxification and withdrawal.
6. The student should acquire knowledge of pharmacokinetics & pharmacodynamics of drugs involved in psychiatric management of patients.
7. The student should acquire knowledge of (a) normal child development and adolescence, mental retardation in children (b) learning & associated disorders and their management
8. The student should acquire knowledge and be able to explain mechanisms for rehabilitation of psychiatric patients.
9. The student should acquire knowledge of substance related disorders and their management.
10. The student should acquire knowledge of psychotic disorders, mood disorders, and anxiety disorders and their management
11. The student should acquire knowledge of sexual and gender identity disorders and their management.
12. The student should acquire knowledge of eating disorders and sleep disorders and their management.
13. The student should be conversant with recent advances in Psychiatry.
14. The student should be conversant with routine bedside diagnostic and therapeutic procedures and acquire knowledge of latest diagnostics and therapeutics procedures available.
15. The student should be conversant with various policy related aspects of Psychiatric practice in India (e.g. Mental Health Act, National Health Mental

Health Programmes etc.).

16. The student should be conversant with research methodologies.

### **B. Affective Domain:**

1. The student should be able to function as a part of a team, develop an attitude of cooperation with colleagues, interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. The student should always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel
3. The student should demonstrate respect for the rights of the patient including the right to information and second opinion.
4. The student should develop communication skills to prepare reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

### **C. Psychomotor domain**

**At the end of the course, the student should acquire the following clinical skills and be able to:**

- become an expert in good history taking, physical examination, mental state examination, and able to establish rapport and counsel family members and patients on scientific basis. choose the required investigations for both short and long term management.

At the end of the course, the student should be able to:

1. Obtain a proper relevant history, and perform a humane and thorough clinical examination including detailed mental state examinations using proper communication skills.
2. Arrive at a logical working diagnosis and differential diagnosis after clinical examination.
3. Order appropriate investigations keeping in mind their relevance and cost effectiveness and obtain additional relevant information from family members to help in diagnosis and management.
4. Identify psychiatric situations calling for urgent or early intervention and refer at the optimum time to appropriate centres.
5. Write a complete case record with all necessary details.
6. Write a proper discharge summary with all relevant information.
7. Obtain informed consent for any examination/procedure.

8. Perform clinical audit.
9. Must be able to perform modified Electroconvulsive therapy (ECT).

**The student, at the end of the course should be able to perform independently, the following:**

1. Conduct detailed Mental Status Examination (MSE)
2. Cognitive behaviour therapy
3. Supportive psychotherapy
4. Modified ECT
5. Clinical IQ assessment
6. Management of alcohol withdrawal
7. Alcohol intoxication management
8. Opioid withdrawal management
9. Delirious patients
10. Crisis intervention

**The student must be able to demonstrate approach to patient with variety of clinical presentations including following symptoms:**

1. Auditory hallucinations
2. Visual hallucinations
3. Pseudo hallucination
4. Seizures true and pseudo seizure
5. Panic attack
6. Manic symptoms
7. Behavioural symptoms of schizophrenia
8. Catatonia
9. Delirium
10. Malingering

**The student, at the end of the course should be able to perform under supervision, the following:**

1. Behaviour therapy
2. Opioid intoxication management
3. Genetic counselling
4. Family therapy

**The student, at the end of the course should be able to assist the expert in the following:**

1. Interpersonal therapy
2. Management of suicide attempt

## *Syllabus*

### **Course Contents:**

No limit can be fixed and no fixed number of topics can be prescribed as course contents. He is expected to know the subject in depth; however emphasis should be on the diseases/health problems most prevalent in that area. Knowledge of recent advances and basic sciences as applicable to his/her specialty should get high priority. Competence in managing behavioural problems commensurate with the specialty must be ensured.

### **The student must acquire knowledge in the following:**

#### **Theoretical concepts:**

1. Functional and behavioural neuroanatomy
2. Neurophysiology and Neuro-chemistry
3. Neuro-imaging
4. Electrophysiology (including chronobiology, electroencephalogram, etc)
5. Psychoneuroendocrinology
6. Neurogenetic disorder
7. Classification In Psychiatry
8. Theory of personality and personality disorders
9. Abuse (Physical / Sexual) or Neglect Of Child /Adult
10. Adjustment Disorder
11. Anxiety Disorders (including Panic Disorder, Agoraphobia, Phobias, Obsessive-Compulsive Disorder, Posttraumatic Stress Disorder, Acute Stress Disorder, Generalized Anxiety Disorder, etc).
12. Case-Presentations (including History Taking, Neurological Examination, Mental Status Examination etc.).
13. **Child Psychiatry** (including Learning Disorders, Motor Skills Disorder, Communication Disorders, Pervasive Developmental Disorders (Autistic Disorder, Rett's Disorder, Childhood Disintegrative Disorder, Asperger's Disorder), Attention-Deficit/Hyperactivity Disorder, Conduct Disorder, Oppositional Defiant Disorder, Pica, Tic Disorders, Elimination Disorders, Separation Anxiety Disorder, Selective Mutism, Reactive Attachment Disorder of Infancy or Early Childhood, Stereotypic Movement Disorder, etc.)
14. Community psychiatry
15. Consultation-Liaison Psychiatry
16. Culture Bound Syndromes
17. Dissociative Disorders (including Dissociative Amnesia, Dissociative Fugue, Dissociative Identity Disorder, Depersonalization Disorder, etc.
18. Eating Disorders (including Anorexia Nervosa, Bulimia Nervosa, etc.)
19. Electro-Convulsive Therapy

20. Emergencies In Psychiatry
21. Emotional Intelligence
22. Ethics In Psychiatry
23. Factitious Disorders
24. Forensic and Legal Psychiatry (including Indian Lunacy Act, Mental Health Act, Persons with Disability Act, Narcotic Drugs and Psychotropic Substance Act)
25. Impulse-Control Disorders (including Intermittent Explosive Disorder, Kleptomania, Pyromania, Pathological Gambling, Trichotillomania, etc)
26. Learning – Theories
27. Memory
28. Mental Retardation
29. Miscellaneous: Non-compliance, Malingering, Antisocial Behaviour, Borderline Intellectual Functioning, Age-Related Cognitive Decline, Bereavement [including Death], Academic Problems, Occupational Problems, Identity Problems, Religious or Spiritual Problems, Acculturation Problems, Phase of Life Problems, Chronic Fatigue Syndrome, etc.)
30. Mood Disorders (including Depressive Disorders, Bipolar Disorders, Cyclothymic Disorder, etc.)
31. Movement Disorders (including Medication-Induced Movement Disorders, etc)
32. Organic Psychiatry (including Amnestic Disorders, Catatonic Disorder, Cerebrovascular Disorders, Delirium, Dementia, Endocrine Epilepsy, Head Injury, Headache, HIV – AIDS, Infections, etc.
33. Neuropsychology (including Psychological Features of Cerebral Disorders, Clinical Assessment etc.)
34. Pre-Menstrual Dysphoric Disorder
35. Post-Partum Psychiatric Disorders
36. Psychodynamics
37. Psychology (Clinical)
38. Psychometry/ Psychodiagnostics
39. Psychopharmacology
40. Psychosis (including Schizophrenia, Schizophreniform Disorder, Schizoaffective Disorder, Delusional Disorder, Brief Psychotic Disorder, Shared Psychotic Disorder, etc).
41. Psychosomatic Disorders
42. Psychotherapy
43. Sexual And Gender Identity Disorders (including Sexual Desire Disorders, Sexual arousal Disorders, Orgasmic Disorders, Sexual Pain Disorders, Vaginismus, Paraphilias, etc)
44. Sleep Disorders (including Insomnia, Narcolepsy, Breathing-Related Sleep

- Disorders, Circadian Rhythm Sleep Disorders, Parasomnias, Nightmare Disorder, Sleep Terror Disorder, Sleepwalking Disorder, etc.)
45. Somatoform Disorders (including Somatization Disorder, Undifferentiated Somatoform Disorder, Conversion Disorder, Pain Disorder, Hypochondriasis, Body Dysmorphic Disorder, etc.)
  46. Statistics/Research Methodology
  47. Stress and related disorders
  48. Stupor
  49. Substance Related Disorders (including Alcohol-Related Disorders, Amphetamine-Related Disorders, Caffeine-Related Disorders, Cannabis-Related Disorders, Cocaine-Related Disorders, Hallucinogen-Related Disorders, Inhalant-Related Disorders, Nicotine-Related Disorders, Opioid-Related Disorders, Phencyclidine-Related Disorders, Sedative-, Hypnotic-, or Anxiolytic-Related Disorders, etc.)
  50. Suicidemanagement and medico-legal aspect
  51. Transcultural Psychiatry
  52. Rehabilitation of psychiatric patients
  53. Geriatric Psychiatry

**The student may know the following:**

1. Psychiatry rating scales
2. Epidemiology
3. History of Psychiatry
4. Mental Health Issues in Women
5. Mind – the evolving concepts
6. Placebo Effect
7. Psychosurgery

## ***TEACHING AND LEARNING METHODS***

**Teaching methodology**

1. **Lectures:** Lectures are to be kept to a minimum. They may, however, be employed for teaching certain topics. Lectures may be didactic or integrated. Didactic lectures are of least importance; small group discussion such as seminars, journal clubs, symposia, reviews and guest lecturers should get priority for theoretical knowledge. Bedside teaching, grand rounds, structured interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning. The student should have hands-on training in performing various procedures and ability to interpret various tests/investigations. Exposure to newer specialized

diagnostic/therapeutic procedures concerning the subject should be given. Self learning tools like assignments and case base learning may be promoted.

The post graduate student should have knowledge of:

- Psycho-pharmacology and broadening the treatment options using medicines.
- Neuro-imaging techniques to understand behaviour and psychiatric illness.
- Community-Psychiatry.
- Functioning of psychiatric hospital.

Community Psychiatry should go beyond familiarization with the National Mental Health Programme. The post graduate student should have hands on experience with:

- G.P. Training Programme
- Organizing Mental Health Camps
- Carrying out Health Education Activities
- Forensic /Legal Psychiatry
- Integration of Mental Health Care with General Health Care

2. **Thesis writing:** Thesis writing is compulsory.
3. **Research Methodology:** The student should know the basic concepts of research methodology and biostatistics, plan a research project, be able to retrieve information from the library.
4. **Teaching skills:** The post graduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
5. **Continuing Medical Education Programmes (CME):** Each student should attend at least two CME programmes, in 3 years.
6. **Conferences:** The student should attend courses, conferences and seminars relevant to the specialty.
7. A post graduate student of a postgraduate degree course in broad specialties/super specialties would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
8. **Seminars:** There should be a weekly seminar in which the PG students present material on assigned topics in rotation. It should be followed by discussion in which

all trainees are supposed to participate. Generally the topics covered should be those that supplement the formal teaching programme.

9. **Case Conference:** A case conference should be held every week where a PG student prepares and presents a case of academic interest by rotation and it is attended by all the members of the Department.
10. **Psychosomatic Rounds:** This is a presentation of a case of psychosomatic illness, or a medical illness with pronounced psychiatric problems. It should be held weekly in collaboration with various departments and attended by the faculty and the PG students of psychiatry and the concerned Department.
11. **Research Forum:** There should be a monthly meeting of one hour each in which the PG students present their plan of research as well as the report of the completed work of their projects. The other research scholars/staff in the department also may participate in it. The faculty, PG students and the non-medical professionals should make critical comments and suggestions.
12. **Journal Club:** A monthly meeting of Journal club should be held in which a senior PG student presents a critical evaluation of a research paper from a journal. All PG students are expected to attend.
13. **Case presentations:** All new in-patients and outpatients cases should be routinely reviewed with one of the Consultants. In addition, the PG student is required to present case material at routine rounds and other case conferences. Senior PG students will conduct evening classes on clinical topics.
14. **Extra-mural activities:** The post graduate students are encouraged to attend certain academic activities in allied subjects held outside parent department e.g. seminars/lectures held at Departments of Sociology, Psychology, Neurology etc.
15. **Psychotherapy tutorials:** These should be held in small groups supervised by a consultant, in which a case is presented by a PG student and psychotherapeutic management discussed.

**16. Rotation:**

**Clinical Postings**

- A major tenure of posting should be in General Psychiatry. It should include care of in-patients, out-patients, special clinics and maintenance of case records for both in and out patients.
- Exposure to the following areas should be given :-

**Schedule of clinical postings for M.D Psychiatry \*(36 months)**

**Area/ Specialty**

Ward and OPD (Concurrent)	18 months
Neurology	2 months
Emergency Medicine/ Internal Medicine	1 month
Consultation Liaison Psychiatry	3 months
Psychiatric hospital and Forensic Psychiatry	1 month
Clinical Psychology	1 month

Addiction Psychiatry	3 months
Child and Adolescent Psychiatry	3 months
Community psychiatry	2 months#
Elective posting	2 months (as per choice in the same Institute)

\* The stated duration can be subjected to minor modifications depending on available resources

# *Exposure to community based services should be integral to various postings.*

**Applicable only for trainees in General Hospital Psychiatric units:** Facilities for these need to be arranged.

The post graduate student in Psychiatric hospitals would have extended period of exposure to consultation - liaison psychiatry and other medical specialties. Exposure to community based services should be integral part of various postings. The post graduate student shall be given full responsibility for patient care and record keeping under the supervision of the senior PG students and consultants. The post graduate student shall also take patients for psychological interventions in an individual as well as group setting. S/he must complete a minimum of 100 hours of supervised psychological interventions.

- **Inter-Unit Rotation of posting**

Inter-unit rotation in the department should be done for a period of up to one year (divided during the first year and third year while the post graduate student stays in the parent unit throughout the duration of his thesis work).

**17. Clinical meetings:**

There should be intra - and inter - departmental meetings for discussing the uncommon / interesting medical problems.

**18. Log book:**

Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book and signed by the authorized teacher and Head of Department.

19. The Department should encourage e-learning activities.

**During the training programme, patient safety is of paramount importance, therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of clinical skills laboratories in medical colleges is mandatory.**

## **ASSESSMENT**

## **FORMATIVE ASSESSMENT, ie., assessment during the training**

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

### **Quarterly assessment during the MD training should be based on:**

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).**

## **SUMMATIVE ASSESSMENT, ie., at the end of training**

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The examination shall be in three parts:

### **1. Thesis**

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

### **2. Theory Examination:**

There shall be four papers each of three hours duration.

**Paper I:** Basic Sciences as related to Psychiatry

**Paper II:** Clinical Psychiatry

**Paper III:** Psychiatric theory and Psychiatric specialties

**Paper IV:** Neurology and General Medicine as related to Psychiatry

### **3. Clinical/Practical and Oral/viva voce examination should consist of:**

- Presentation of long case of Psychiatry
- Neurology short case
- A short case Psychiatry
- Viva –voce

Due importance should be given to Log Book Records and day-to-day observation during the training.

### **Recommended Reading**

#### **Books (latest edition)**

1. Kaplan and Saddock's Comprehensive Text Book of Psychiatry
2. Kaplan and Saddock 's Synopsis of Psychiatry
3. Fish Clinical Psychopathology
4. Lishman's Organic Psychiatry, The Psychological consequences of cerebral disorder
5. Clinical practice guidelines of Psychiatric disorders in India
6. Stahl Psychopharmacology
7. Oxford text book of Psychiatry
8. Mental Health Act, Person with Disability Act (India)
9. Lowinson et al -Substance Abuse-A Comprehensive Textbook
10. Galanter and Klebert-Textbook of Substance Use Treatment

#### **Journals**

03-05 international Journals and 02 national (all indexed) Journals

**Postgraduate Students Appraisal Form  
Clinical Disciplines**

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks\* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**\*REMARKS:** Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN PULMONARY MEDICINE**

## **Preamble**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

Evolution of critical care medicine makes it imperative that the post graduates are trained in the basic principles of Pulmonary Medicine as applied to critical care. The person shall be abreast with the recent advances and developments in the specialty of Pulmonary Medicine. It is expected that the person will develop a spirit of enquiry and get oriented to apply recent advances and medical evidence to the practice of pulmonary medicine. He would also grasp the fundamentals of research methodology. Medical Science is dynamic with a continuous enhancement of knowledge. The process of acquiring knowledge and skills continues even after formal education. The syllabus to be covered during post graduate training in Pulmonary Medicine given below is designed to develop a sound and scientific foundation. It is intended to serve as a guide to impart basic knowledge and develop skills and does not impose any limits to expansion beyond the areas listed.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC OBJECTIVES***

The primary **goal** of the MD course in Pulmonary Medicine is to produce post graduate clinicians able to provide health care in the field of pulmonary medicine. It is expected that a physician qualified in Pulmonary Medicine at the end of the course should be able to diagnose and treat pulmonary diseases, take preventive and curative steps for these diseases in the community at all levels of health care and qualify as a consultant and teacher in the subject.

Each student should obtain proficiency in the following domains during the period of training:

1. Theoretical knowledge of different aspects of Pulmonary Medicine including the status in health and disease.
2. Acquire clinical skills.
3. Acquire practical skills.
4. Management of emergencies including intensive care.
5. Preparation of thesis as per MCI guidelines.

These involve patient management in the outpatient, inpatient and emergency situations, case presentations, didactic lectures, seminars, journal reviews, clinico-pathological conferences and mortality review meetings and working in the laboratories.

## ***SUBJECT SPECIFIC COMPETENCIES***

**By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:**

### **A. Cognitive domain**

**At the end of the MD course in Pulmonary Medicine, the students should be able to:**

1. demonstrate sound knowledge of common pulmonary diseases, their clinical manifestations, including emergent situations and of investigative procedures to confirm their diagnosis. A comprehensive knowledge of epidemiological aspects of pulmonary diseases should be acquired.
2. demonstrate comprehensive knowledge of various modes of therapy used in treatment of pulmonary diseases.
3. describe the mode of action of commonly used drugs, their doses, side-effects / toxicity, indications and contra-indications and interactions.
4. describe commonly used modes of management including medical and surgical procedures available for treatment of various diseases and to offer a comprehensive plan of management inclusive of National tuberculosis Control Programme.
5. manage common pulmonary emergencies and understand the basic of intensive care in patients with pulmonary diseases.
6. practice the field of pulmonary medicine ethically and assiduously, show empathy and adopt a humane approach towards patients and their families.
7. recognize the national priorities in pulmonary medicine and play an important role in the implementation of National Health Programmes including tuberculosis.
8. demonstrate competence in medical management.
9. should inculcate good reading habits and develop ability to search medical literature and develop basic concept of medical research.

## **B. Affective Domain**

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

## **C. Psychomotor domain**

**At the end of the course, the student should acquire following clinical skills and be able to:**

1. interview the patient, elicit relevant and correct information and describe the history in chronological order.
2. conduct clinical examination, elicit and interpret clinical findings and diagnose common pulmonary disorders and emergencies.
3. perform simple, routine investigative and office procedures required for making the bedside diagnosis, especially sputum collection and examination for etiologic organisms especially Acid Fast Bacilli (AFB), interpretation of the chest x-rays and lung function tests.
4. interpret and manage various blood gases abnormalities in various pulmonary diseases.
5. develop management plans for various pulmonary diseases.
6. assist in the performance of common procedures, like bronchoscopic examination, pleural aspiration and biopsy, pulmonary physiotherapy, endotracheal intubation and pneumo-thoracic drainage / aspiration etc.
7. recognize emergency situations in intensive care, respond to these appropriately and perform basic critical care monitoring and therapeutic procedures.
8. collect, compile, analyse, interpret, discuss and present research data.
9. teach pulmonary medicine to undergraduate and postgraduate students.

To acquire the above skills, the student should be exposed and trained in the following tests and procedures:

### **1. Diagnostic tests: Performance and interpretation**

- Sputum and other body fluids examination with ZN stain for AFB, culture methods for pathogenic bacteria, fungi and viruses
- Newer diagnostic techniques for tuberculosis including molecular techniques
- FNAC of lung masses (blind and image-guided)
- Arterial blood gas analysis and pulse oximetry
- Imaging: Interpretation of plain radiography, ultrasound examination, Computed tomogram, PET scan, MRI
- Sputum cytology
- Simple haematological tests
- Immunological and Serological tests
- Polysomnography (full-night and split-night studies) including CPAP titration; evaluation of daytime sleepiness
- Cardiopulmonary exercise testing
- Pulmonary function tests and interpretation (Spirometry, lung volume, diffusions, body plethysmography, other lung function tests)
- Bronchoprovocation tests
- BCG vaccination
- Mantoux testing; interferon gamma release assays
- Bronchoscopy: fiberoptic/rigid, diagnostic and therapeutic
- ECG, 2D and Doppler echocardiography
- Venous Doppler ultrasound
- Skin tests for hypersensitivity
- Sputum induction and non-invasive monitoring of airway inflammation
- Medical thoracoscopy

## **2. Therapeutic procedures**

- Fine needle aspiration and other guided procedures
- Tube thoracostomy
- Cardiopulmonary rehabilitation exercises
- Postural drainage
- Pleural biopsy, lymph node biopsy
- Administration of inhalation therapy
- Administration of oxygen therapy
- Administration of continuous positive airway pressure (CPAP)/ Bilevel Positive Airway Pressure (BiPAP)
- Monitoring and emergency procedures in intensive care

## ***Syllabus***

**Course contents:**

The student should acquire knowledge in the following:

**I. Basic Sciences****A. Anatomy and Histology of Respiratory System**

1. Development and Anatomy of Respiratory System
2. Applied embryology of lungs, mediastinum and diaphragm
3. Developmental anomalies

**B. Physiology and Biochemistry**

1. Assessment of pulmonary functions
2. Control of ventilation; pulmonary mechanics
3. Ventilation, pulmonary blood flow, gas exchange and transport
4. Non-respiratory metabolic functions of lung
5. Principles of electrocardiography
6. Inhalation kinetics and its implication in aerosol therapy, and sputum induction etc.
7. Acid-base and electrolyte balance
8. Physiology of sleep and its disorders
9. Pulmonary innervation and reflexes
10. Pulmonary defence mechanisms
11. Principles of exercise physiology and testing
12. Physiological changes in pregnancy, high altitude, aging
13. Physiological basis of pulmonary symptoms

**C. Microbiology**

1. Mycobacterium tuberculosis and other mycobacteria
2. Bacteria causing pulmonary diseases
3. Atypical organisms and respiratory tract infections
4. Anaerobes in pleuropulmonary infections
5. Laboratory diagnosis of non-tubercular infections of respiratory tract
6. Laboratory diagnosis of TB including staining, culture and drug sensitivity testing
7. Virulence and pathogenicity of mycobacteria
8. Respiratory viruses: Viral diseases of the respiratory system and diagnostic methods
9. Respiratory fungi: (i) Classification of fungal diseases of lung: candidiasis, Actinomyces, Nocardiosis, Aspergillosis, Blastomycosis etc. (ii) Laboratory diagnostic procedures in pulmonary mycosis
10. Opportunistic infections in the immuno-ompromised individuals
11. HIV and AIDS. Virological aspects, immuno-pathogenesis, diagnosis

## 12. Parasitic lung diseases

### **D. Pathology**

1. Acute and chronic inflammation: Pathogenetic mechanisms in pulmonary diseases
2. Pathology aspects of Tuberculosis
3. Pathology aspects of Pneumonias and bronchopulmonary suppuration
4. Chronic bronchitis and emphysema, asthma, other airway diseases
5. Occupational lung diseases including Pneumoconiosis
6. Interstitial lung diseases including sarcoidosis, connective tissue diseases, pulmonary vasculitis syndromes, pulmonary eosinophilias
7. Tumours of the lung, mediastinum and pleura

### **E. Epidemiology**

1. Epidemiological terms and their definitions
2. Epidemiological methods
3. Epidemiology of tuberculosis, pneumoconiosis, asthma, lung cancer, COPD and other pulmonary diseases
4. National Tuberculosis Control Programme and RNTCP; Epidemiological aspects of BCG
5. Epidemiological aspects of pollution-related pulmonary diseases
6. Research methodology, statistics and study designs

### **F. Allergy and Immunology**

1. Various mechanisms of hypersensitivity reactions seen in pulmonary diseases
2. Diagnostic tests in allergic diseases of lung - *in vitro* and *in vivo* tests, bronchial provocation test
3. Immunology of tuberculosis, Sarcoidosis and other diseases with an immunological basis of pathogenesis

### **G. Pharmacology**

1. Pharmacology of antimicrobial drugs
2. Pharmacology of antitubercular drugs
3. Pharmacology of antineoplastic and immunosuppressant drugs
4. Bronchodilator and anti-inflammatory drugs used in pulmonary diseases
5. Drugs used in viral, fungal and parasitic infections
6. Other drugs pharmacokinetics and drugs interaction of commonly used drugs in pulmonary diseases
7. Pharmacovigilance

## **II. Clinical Pulmonary Medicine**

Clinical pulmonary medicine covers the entire range of pulmonary diseases. All aspects of pulmonary diseases including epidemiology, aetiopathogenesis, pathology, clinical features, investigations, differential diagnosis and management are to be covered.

### **A. Infections**

#### **1. Tuberculosis**

1. Aetiopathogenesis
2. Diagnostic methods
3. Differential diagnosis
4. Management of pulmonary tuberculosis; RNTCP, DOTS, and DOTS-Plus; International Standards of TB Care
5. Complications in tuberculosis
6. Tuberculosis in children
7. Geriatric tuberculosis
8. Pleural and pericardial effusion and empyema
9. Mycobacteria other than tuberculosis
10. Extrapulmonary tuberculosis
11. HIV and TB; interactions of antitubercular drugs with antiretrovirals
12. Diabetes mellitus and tuberculosis
13. Management of MDR and XDR tuberculosis

#### **2. Non-tuberculous infections of the lungs**

- Approach to a patient with pulmonary infection
- Community-acquired pneumonia
- Hospital-associated pneumonia, ventilator-associated pneumonia
- Unusual and atypical pneumonias including bacterial, viral, fungal and parasitic and rickettsial, anaerobic
- Bronchiectasis, lung abscess and other pulmonary suppurations
- Acquired immunodeficiency syndrome and opportunistic infections in immuno-compromised host
- Principles governing use of antibiotics in pulmonary infections
- Other pneumonias and parasitic infections, Zoonosis

### **B. Non-infectious Lung Diseases**

#### **3. Immunological disorders**

- Immune defence mechanisms of the lung
- Sarcoidosis
- Hypersensitivity pneumonitis and lung involvement
- Eosinophilic pneumonias and tropical eosinophilia
- Pulmonary vasculitides
- Connective tissue diseases involving the respiratory system
- Interstitial lung disease of other etiologies
- Reactions of the interstitial space to injury, drugs
- Occupational and environmental pulmonary diseases

#### **4. Other non-infectious disorders of the lungs and airways**

- Aspiration and inhalational (non-occupational) diseases of the lung
- Drug induced pulmonary diseases
- Bullous lung disease
- Uncommon pulmonary diseases (metabolic, immunological, unknown etiology), pulmonary haemorrhagic syndromes
- Other pulmonary diseases of unknown etiology including PLCH, LAM, PAP, alveolar microlithiasis
- Cystic fibrosis and disorders of ciliary motility
- Obesity-related pulmonary disorders
- Upper airways obstruction syndromes
- Occupational lung diseases and pneumoconiosis
- Air-pollution induced diseases, toxic lung and other inhalational injuries
- Health hazards of smoking
- Drug-induced lung diseases

#### **5. Pulmonary Circulatory disorders**

- Pulmonary hypertension and cor pulmonale
- Pulmonary edema
- Pulmonary thromboembolic diseases and infarction
- Cardiac problems in a pulmonary patient and pulmonary complications produced by cardiac diseases

#### **6. Obstructive diseases of the lungs**

- Asthma including allergic bronchopulmonary aspergillosis, specific allergen immunotherapy and immunomodulation
- Chronic obstructive lung disease and diseases of small airways

- Special aspects of management including Long term oxygen therapy, Inhalation therapy and Pulmonary rehabilitation

### **7. Tumors of the lungs**

- Comprehensive knowledge of neoplastic and non-neoplastic diseases of lung including epidemiology, natural history, staging, and principles of treatment (medical, surgical, and radiation)
- Solitary pulmonary nodule

### **8. Diseases of the mediastinum**

- Non-neoplastic disorders
- Benign and malignant (primary and secondary) neoplasms and cysts

### **9. Disorders of the pleura**

- Pleural dynamics and effusions
- Non-neoplastic and neoplastic pleural diseases
- Pneumothorax
- Pyothorax and broncho-pleural fistula
- Fibrothorax

### **10. Critical Care Pulmonary Medicine**

- Management of emergency problems of different pulmonary diseases
- Adult respiratory distress syndrome
- Respiratory failure in the patient with obstructive airway disease
- Respiratory failure in other pulmonary diseases
- Management of sepsis
- Respiratory and haemodynamic monitoring in acute respiratory failure
- Non-invasive and Mechanical ventilation
- Principles of critical care, diagnosis and management of complications; severity of illness scoring systems
- Ethical and end-of-life issues in critical care

### **11. Extrapulmonary manifestations of pulmonary diseases**

### **12. Sleep-related pulmonary diseases**

- Polysomnography
- Sleep apneas

- Other sleep-disordered breathing syndromes

### **13. Miscellaneous aspects**

- Diseases of the diaphragm
- Disorders of chest wall
- Obesity-related pulmonary disorders
- Oxygen therapy
- End-of-life care
- Aerospace Medicine
- Pulmonary problems related to special environments (high altitude, diving, miners)
- Assessment of quality of life using questionnaires
- Health impacts of global warming

### **14. Preventive Pulmonology**

- Principles of smoking cessation and smoking cessation strategies
- Cardiopulmonary rehabilitation
- Preventive aspects of pulmonary diseases
- Vaccination in pulmonary diseases

## **III. Surgical aspects of Pulmonary Medicine**

- Pre- and post-operative evaluation and management of thoracic surgical patients
- Chest trauma/trauma related lung dysfunction
- Lung transplantation

## ***TEACHING AND LEARNING METHODS***

### **Postgraduate teaching programme**

#### **General principles**

Acquisition of practical competencies being the keystone of PG medical education, PG training should be skills oriented. Learning in PG program should be essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

#### **Teaching methodology**

This should include regular bedside case presentations and demonstrations, didactic lectures, seminars, journal clubs, clinical meetings, and combined conferences with allied

departments. The post graduate student should be given the responsibility of managing and caring for patients in a gradual manner under supervision.

### **Formal teaching sessions**

In addition to bedside teaching rounds, at least 5-hr of formal teaching per week are necessary. The departments may select a mix of the sessions, as given under formative assessment. Further, the student should:

- Attend accredited scientific meetings (CME, symposia, and conferences).
- Attend additional sessions on resuscitation, basic sciences, biostatistics, research methodology, teaching methodology, hospital waste management, health economics, medical ethics and legal issues related to medical practice are suggested.
- There should be a training program on Research methodology for existing faculty to build capacity to guide research.
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- **Log book:** During the training period, the post graduate student should maintain a Log Book indicating the duration of the postings/work done in Wards, OPDs and Casualty. This should indicate the procedures assisted and performed, and the teaching sessions attended. The Log book shall be checked and assessed periodically by the faculty members imparting the training.
- Department should encourage e-learning activities.

### **Thesis**

All MD (Pulmonary Medicine) post graduate students should carry out work on an assigned topic under the direct guidance of a recognised post graduate teacher. A written protocol of the proposed work should be submitted before the end of the first 6 months. Subsequently, the post graduate student should carry out the proposed work for at least 1 year (not inclusive of the period for submitting the protocol and writing-up the final thesis).

**During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of skills laboratories in medical colleges is mandatory.**

## ***ASSESSMENT***

### **FORMATIVE ASSESSMENT, ie., assessment during training**

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

#### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

#### **Quarterly assessment during the MD training should be based on:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).**

### **SUMMATIVE ASSESSMENT, ie., assessment at the end of training**

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

The Post Graduate Examination shall be in three parts:

1. Thesis:

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

## **2. Theory Examination:**

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3<sup>rd</sup> academic year. An academic term shall mean six month's training period.

There shall be four theory papers:

**Paper I:** General pulmonary medicine and basic sciences;

**Paper II:** Clinical pulmonary medicine including medical emergencies;

**Paper III:** Clinical pulmonary medicine including critical care medicine;

**Paper IV:** Recent advances in pulmonary medicine, and research methodology.

The final qualifying examination should include an assessment of clinical skills in the form of case presentations and discussions. Other rules laid down by the MCI regarding M.D. examinations shall apply here as well.

## **3. Practical/Clinical and Oral/viva voce Examination:**

The post graduate students shall examine a minimum of one long and two short cases.

### **Oral/viva voce Examination**

The oral examination shall be thorough and shall aim at assessing the knowledge and competence of the post graduate student on the subject, investigative procedures, therapeutic technique and other aspects of the specialty which form a part of the examination.

### **Recommended reading:**

#### **Books (latest edition)**

1. Harrison's Principles of Internal Medicine ed. Petersdorf (McGraw Hill)
2. Cecil Text book of Medicine ed. Wyngaarden
3. Crofton & Douglas Respiratory diseases ed. Seaton et al (Oxford)
4. Pulmonary diseases & disorders by Fishman (McGraw Hill)
5. Textbook on Pulmonary disease by Fraser & Pare

6. Asthma by Clarke et al
7. Bronchoscopy by Straddling
8. Tuberculosis by SK Sharma
9. Lung diseases in the Tropics ed. OP Sharma (Marcel Dekker)
10. The Normal Lung by Murray (Saunders)
11. Pulmonary Function Testing by Clausen (Academic Press)
12. Respiratory Physiology by J.B. West (Williams & Wilkins)
13. Physiology of Respiration by J.H. Comroe (Yearbook Med Pub.)
14. Respiratory Function in disease by Bates et al (Saunders)

### **Journals**

03-05 international Journals and 02 national (all indexed) journals

**Postgraduate Students Appraisal Form**  
**Pre / Para /Clinical Disciplines**

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

**Publications**

**Yes/ No**

Remarks\* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**\*REMARKS:** Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MD IN RADIOLOGICAL DIAGNOSIS**

## **Preamble:**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

**The Goal** of this program is to impart training in conventional and modern radiology and imaging techniques so that the post graduate student becomes well versed and competent to practice, teach and conduct research in the discipline of radiology. The student should also acquire basic knowledge in the various sub-specialities of radiology. These Guidelines also would also help to standardize Radiodiagnosis teaching at post graduate diploma (DMRD) level throughout the country so that it will benefit in achieving competent radiologist with appropriate expertise.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SPECIFIC LEARNING OBJECTIVES***

The objective of the program is to train a student to become a skilled and competent radiologist to conduct and interpret various diagnostic/interventional imaging studies (both conventional and advanced imaging), to organize and conduct research and teaching activities and be well versed with medical ethics and legal aspects of imaging/intervention.

## ***SUBJECT SPECIFIC COMPETENCIES***

### **A. Cognitive Domain**

A post graduate student on completing MD (Radiodiagnosis) should acquire knowledge in the following areas, and be able to:

1. Acquire good basic knowledge in the various sub-specialities of radiology such as chest radiology, neuro-radiology, GI-radiology, uro-radiology, cardio-vascular-radiology, musculoskeletal, interventional radiology, emergency radiology, pediatric radiology and women’s imaging.

2. Independently conduct and interpret all routine and special radiologic and imaging investigations.
3. provide radiological services in acute emergency and trauma including its medico-legal aspects.
4. Elicit indications, diagnostic features and limitation of applications of ultrasonography, CT and MRI and should be able to describe proper cost-effective algorithm of various imaging techniques in a given problem setting.
5. Decide on the various image-guided interventional procedures to be done for diagnosis and therapeutic management.
6. Able to decide on further specialization to be undertaken in any of the branches in Radiodiagnosis such as gastrointestinal radiology, uro-radiology, neuro-radiology, vascular radiology, musculoskeletal radiology, interventional radiology etc.
7. Able to formulate basic research protocols and carry out research in the field of radiology- related clinical problems.
8. Acquire knowledge and teaching capabilities to work as a post graduate student /consultant in Radiodiagnosis and conduct teaching programmes for undergraduates, post graduates as well as paramedical and technical personnel.
9. interact with other specialists and super-specialists so that maximum benefit accrues to the patient.
10. Should be able to organize CME activities in the specialty utilizing modern methods of teaching and evaluation.
11. Acquire knowledge to impart training in both conventional radiology and modern imaging techniques so that the post graduate student is fully competent to practice, teach and do research in the broad discipline of radiology including ultrasound, Computed Tomography and Magnetic Resonance Imaging.
12. Acquire knowledge of interventional radiology.

## **B. Affective Domain:**

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

## **C. Psychomotor domain**

Practical Training will include two major aspects:

- A) Interpretation of images, and
- B) Skill in performing a procedure.

#### **A) Interpretation of images:**

**The student should be able to interpret images on all imaging modalities of diseases of following organs :**

1. **Musculo-skeletal System** - Interpretation of diseases of muscles, soft tissue, bones and joints including congenital, inflammatory, traumatic, endocrine and metabolic, neoplastic and miscellaneous conditions.
2. **Respiratory System** - Interpretation of diseases of the chest wall, diaphragm, pleura and airway; pulmonary infections, pulmonary vasculature; pulmonary neoplasm; diffuse lung disease; mediastinal disease, chest trauma; post-operative lung and X-ray in intensive care.
3. **Cardiovascular System** - Interpretation of diseases and disorders of cardiovascular system (congenital and acquired conditions) and the role of imaging by conventional radiology, ultrasound, colour Doppler, CT, MRI, Angiography and Isotopes Studies.
4. **Gastro-intestinal tract and hepato-biliary pancreatic system** - Interpretation of diseases and disorders of mouth, pharynx, salivary glands, esophagus, stomach, small intestine, large intestine, diseases of omentum, peritoneum and mesentery: acute abdomen, abdominal trauma. Diseases and disorders of liver, biliary system and pancreas.
5. **Urogenital System** - Interpretation of various diseases and disorders of genitor-urinary system. These include: congenital, inflammatory, traumatic, neoplastic, calculus disease and miscellaneous conditions.
6. **Central Nervous System (C.N.S.)** - Interpretation of diseases and disorders of the head, neck and spine covering, congenital, infective, vascular, traumatic neoplastic degeneration metabolic and miscellaneous condition.
7. Imaging in Emergency Medicine.
8. Imaging in Obstetrics and Gynecology.
9. Imaging of Breast and interventional procedures.
11. ENT, EYE and Dental Imaging.
11. Imaging of endocrine glands and those involved with metabolic diseases.
12. Clinical applied radionuclide imaging.
13. Interventional Radiology

#### **B) Skills in performing a procedure**

**The student should be able to perform the following procedures:**

- 1) **GIT contrast studies:** Barium studies (swallow, upper GI, Follow through, enema);

- fistulogram; sialogram; cologram/ileostogram,
- 2) **GU:** Excretory urography, MCU, RGU, nephrostogram, genitogram,
  - 3) **Ultrasound:** Studies of whole body including neonatal transfontanell studies, Doppler studies,
  - 4) **CT scan:** should be able to position a patient, plan study as per the clinical indication, do reconstruction of images, perform triple phase study, perform & interpret advanced applications like CT enterography, CT angiography etc.
  - 5) **MRI:** plan and perform MRI studies of whole body
  - 6) **DSA:** should be able to describe the techniques, do (if available to student) transfemoral puncture and insert catheter, help in angiographic procedures both diagnostic and interventional.
  - 7) **Radiography:** should be able to independently do radiography of common and some important uncommon views of different body parts. This includes positioning, centering of X ray beam, setting of exposure parameters, exposing and developing the films. The student should be familiar with not only conventional radiography but with CR and DR systems.
  - 8) **Interventional radiology:** The student should be able to perform simple, common non-vascular procedures under ultrasound and fluoroscopy guidance e.g. abscess drainage, drainage catheter placement, nephrostomy, biliary drainage etc. The student should have knowledge of common vascular interventions e.g stricture dilatation using balloon catheters, embolization with gel foam and other agents, names of common catheters, handling of intravenous contrast reactions; techniques, indications and contraindications for various procedures;

## *Syllabus*

### **Course contents:**

#### **Anatomy**

Gross and cross sectional anatomy of all the body systems.

#### **Pathology**

Gross morphology of pathological conditions of systemic diseases affecting all organ systems.

#### **Radiology Course**

This would cover imaging and interventions of diseases affecting all the body systems:

- Chest
- Cardiovascular system
- Musculoskeletal including soft tissue
- Gastrointestinal system
- Hepato-biliary-pancreatic system
- Urogenital (genito-urinary) system

- CNS including head and neck
- Obstetrics and gynaecology
- ENT, eye, dental, breast
- Endocrine and metabolic system
- Clinically applied radionuclide imaging

## **Radiological Physics**

1. Introduction of general properties of radiation and matter: Fundamentals of nuclear physics and radioactivity
2. Interaction of x-rays and gamma rays with matter and their effects on irradiated materials
3. X-ray Generating Apparatus
4. Screen-film radiography
5. Film processing: Dark room, dry processing, laser /dry chemistry cameras, artifacts.
6. Fluoroscopy: Digital including flat panel units, fluoroscopy cum radiography units
7. Digital radiography: Computed Radiography, Flat panel radiography
8. Other equipments: Ultrasound including Doppler, CT, MRI and DSA
9. Contrast Media (Iodinated, MR & Ultrasound) - types, chemical composition, mechanism of action, dose schedule, route of administration, adverse reaction and their management
10. Nuclear Medicine: Equipments and isotopes in various organ systems and recent advances
11. Picture Archiving and Communication System (PACS) and Radiology Information System (RIS) to make a film-less department and for Teleradiology
12. Radiation protection, dosimetry and radiation biology
13. Image quality and Quality Assurance (QA)
14. Recent advances in radiology and imaging

The student should have knowledge of the following physics experiments:

- Check accuracy of kVp and timer of an X ray unit
- Check accuracy of congruence of optical radiation field
- Check perpendicularity of x ray beam
- Determine focal spot size
- Check linearity of timer of x ray unit
- Check linearity of mA
- Verification of inverse square law for radiation
- Check film screen contact
- Check film screen resolution
- Determine total filtration of an x ray unit
- Processor quality assurance test

- Radiological protection survey of an x ray unit
- Check compatibility of safe light
- Check performance of view box
- Effect of kVp on x ray output

### **Radiography and processing techniques**

1. Processing techniques: includes dark room and dry processing.
2. Radiography of the musculo-skeletal system including extremities.
3. Radiography of the chest, spine, abdomen and pelvic girdle.
4. Radiography of the skull, orbit, sinuses.
5. Contrast techniques and interpretation of GI tract, hepato-biliary tract, pancreas etc.
6. Contrast techniques and interpretation of the Central Nervous system.
7. Contrast techniques and interpretation of the cardiovascular system including chest.
8. Contrast techniques and interpretation of the genito - urinary system including Obstetrics and Gynaecology.
9. Paediatric radiology including MCU, genitogram, bone age.
10. Dental, portable and emergency (casualty) radiography.

## ***TEACHING AND LEARNING METHODS***

### **The training is spread over 3 years and includes following components:**

1. Physics related to imaging
2. Rotational posting in various sub-specialties.
3. Seminars, case discussion, journal club.
4. Research methodology and statistics.
5. A log book should be maintained by the student and will be checked and signed regularly by the faculty-in-charge during the training program.
6. The postgraduate students shall be required to participate in the teaching and training program of undergraduate students and interns.
7. The postgraduate student would be required to present one poster presentation, to read one paper at a national/state conference and to submit one research paper which should be published or accepted for publication or sent for publication to a peer reviewed journal, during the period of his/her postgraduate studies so as to make him/her eligible to appear at the postgraduate degree examination.
7. Department should encourage e-learning activities.

### **Rotations:**

**During the three-year course, suggested rotations are as follows:-**

1. Conventional chest, abdomen, musculoskeletal including skull, spine, PNS and mammography etc 8 months
2. Contrast studies: G.U., GIT, Hepato-biliary, angiography etc including fluoroscopic guided interventions 8 months
3. US, Doppler and US guided interventions 8 Months
4. CT and CT guided interventions 6 Months
5. Emergency radiology 2 Months
6. M.R.I. 2 Month
7. Elective posting 2 Months

During each posting, post graduate student should be able to perform the procedures and interpret the findings.

### PROPOSED SCHEDULE FOR ROTATION

1 <sup>ST</sup> Year (1/6)	Conventional Chest & abdomen	Conventional skull, spine, musculo-skeletal etc.	US	Contrast studies - GIT & other fluoroscopic investigations	Contrast studies - G.U. tract	US
	US & interventions	Conventional skull, spine, musculo-skeletal etc.	CT	Contrast studies -- GIT & other fluoroscopic investigations	Contrast studies - G.U. tract	US & interventions
2 <sup>nd</sup> Year (3/6)	Conventional Chest & abdomen	Contrast studies - GIT & other fluoroscopic investigations including angiography	Contrast studies - G.U. tract	US & interventions	Emergency	CT
	Conventional skull, spine, musculo-skeletal etc.	Contrast studies - G.U. tract including pediatric MCU/genitogram	US & interventions	US & Doppler	Emergency	MRI
3 <sup>rd</sup> year (5/6)	Conventional Chest & mammography	Contrast studies - GIT & other fluoroscopic investigations including angiography	US & Doppler	Emergency	CT & interventions	Elective
(6/6)	Conventional musculo-skeletal & mammography	Contrast studies - G.U. tract including pediatric MCU/genitogram	CT& interventions	CT & interventions	MRI	Elective

**During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently. For this purpose, provision of skills laboratories in medical colleges is mandatory.**

## ***ASSESSMENT***

### **FORMATIVE ASSESSMENT, during the training programme**

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

#### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and practical/clinical examination.

#### **Quarterly assessment during the MD training should be based on:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).**

### **SUMMATIVE ASSESSMENT, i.e., assessment at the end of training**

**The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

#### **Postgraduate Examination**

The Post Graduate Examination was conducted in three parts.

- 1. Thesis:**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognized Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis (Dissertation). Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical /

Practical examination. The thesis shall be examined by a minimum of two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

## **2. Theory Examination**

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D. shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers:

- Paper I:** Basic sciences related to Radiology (consists of Anatomy, Pathology, Basic and Radiation Physics, Imaging Techniques, and Film processing).
- Paper II:** Chest, CVS, CNS including Head & Neck, Eye, ENT, musculo-skeletal, pediatric radiology and Mammography.
- Paper III:** Abdominal Imaging including GI, GU, Hepatobiliary, endocrine and metabolic, Obstetrics and Gynaecology and Interventional radiology
- Paper IV:** Recent advances, nuclear medicine; Radiology related to clinical specialties

All papers would consist of short answer questions (minimum 10) covering all aspects of the course.

## **3. Practical/clinical and oral Examination (will include cases, spots, ultrasound procedure, physics, implements etc)**

Practical Examination will have:

1. 3-4 Cases
2. Film Quiz (50 – 60 Spots)
3. To perform Ultrasound on a patient

Oral/Viva voce will include:

- Radiation Physics and quality assurance
- Implements, Catheters and contrast
- Cassettes, films, dark room, equipment
- Radiographic techniques, Radiological procedures,
- Gross pathology

**Suggested Reading:**

**Books (latest edition)**

1. Grainger & Allison's Text book of Diagnostic Radiology (Churchill Livingstone)
2. Textbook of Gastrointestinal Radiology- Gore and Levine (Saunders)
3. MRI of Brain and Spine - Scott Atlas (LWW)
4. Diagnosis of Diseases of the Chest -Fraser
5. Diagnostic Imaging Series: (Amirsys, Elsevier)  
Abdominal Imaging, Orthopedics, Head and Neck, Neuroradiology, Pediatric Radiology Chest, Obstetrics, Breast
6. MRI in Orthopedics and Sport Injuries - Stoller
7. Skeletal Radiology - Greenspan
8. Abdominal-Pelvic MRI - Semelka (IWW)
9. Caffey's Pediatric Radiology
10. CTI and MRI of the whole body- John R. Haaga
11. Text Book of Radiology and imaging - Davod sulton
12. Diagnostic ultrasound - Carol C. Rumack
13. AIIMS-MAMC-PGI's Comprehensive Textbook of Diagnostic Radiology, Volumes 1, 2, 3

## **Journals**

03-05 international Journals and 02 national (all indexed) journals

- ~~1.—American Journal of Roentgenology~~
- ~~2.—Radiology~~
- ~~3.—Seminars in Ultrasound, CT, MRI~~
- ~~4.—Radiographies~~
- ~~5.—Clinical Radiology~~
- ~~6.—British Journal of Radiology~~
- ~~7.—Radiological Clinics of North America~~
- ~~8.—Pediatric Radiology~~
- ~~9.—Australasian Radiology~~
- ~~10.—Journal of Computerized Axial Tomography~~
- ~~11.—Clinical Imaging~~
- ~~12.—MR Clinics of North America~~
- ~~13.—Seminars in Roentgenology~~



**Postgraduate Students Appraisal Form**  
**Pre / Para /Clinical Disciplines**

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks\* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**\*REMARKS:** Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN OTORHINOLARYGOLOGY**

## **Preamble:**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The purpose of MS ENT is to standardize Otorhinolaryngology teaching at Post Graduate level throughout the country so that it will benefit in achieving uniformity in undergraduate teaching as well and resultantly creating competent ENT Surgeons with appropriate expertise.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC LEARNING OBJECTIVES***

### **At the end of postgraduate training the student should be able to:**

1. Practice his specialty ethically keeping in mind the requirement of the patient, community and people at large.
2. Demonstrate sufficient understanding of basic sciences related to his specialty and be able to integrate such knowledge in his Clinical practice.
3. Diagnose and manage majority of conditions in his specialty (clinically and with the help of relevant investigations)
4. Plan and advise measures for the promotive, preventive, curative and rehabilitative aspects of health and diseases in the specialty of ENT.
5. Should be able to demonstrate his cognitive skills in the field of ENT and its ancillary branches during the formative and summative evaluation processes.
6. Play the assigned role in the implementation of National Health Programs
7. Demonstrate competence in basic concepts of research methodology and writing thesis and research papers.
8. Develop good learning, communication and teaching skills.

9. Demonstrate sufficient understanding of basic sciences and the clinical applications related to the specialty to be able to integrate this knowledge into Clinical practice. Acquire in-depth knowledge in the subject including recent advances.
10. Demonstrate that he is fully conversant with the latest diagnostics & therapeutics available.

### ***SUBJECT SPECIFIC LEARNING OBJECTIVES***

#### **1. Theoretical Knowledge:**

A student should have fair knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to ENT and be able to integrate such knowledge in his clinical practice. She/He should acquire in-depth knowledge of his subject including recent advances. She/He should be fully conversant with the bedside procedures (diagnostic and therapeutic) and having knowledge of latest diagnostics and therapeutics available.

#### **2. Clinical / Practical skills:**

A student should be adept at good history taking, physical examination, providing basic life support and advanced cardiac life support, common procedures like FNAC, Biopsy, aspiration from serous cavities, lumbar puncture etc. She/he should be able to choose the required investigations to enhance the attitude, communication skills, including dealing with patient's relatives with the required empathy, adapt to changing trends in education, learning methods and evolving new diagnostic and therapeutic techniques in the subject of ENT.

#### **3. Research:**

She/He should know the basic concepts of research methodology, plan a research project, plan and write a thesis and should know how to use library facilities. Basic knowledge of statistics is also required. Knowledge about use of internet resources is required.

#### **4. Teaching:**

The student should learn the basic methodology of teaching and assessment and develop competence in teaching medical/paramedical students and their assessment.

### ***SUBJECT SPECIFIC COMPETENCIES***

#### **A. Cognitive Domain**

**At the end of training, the student should be able to demonstrate ability to practically apply knowledge gained during training period. This would include the following:**

**Basic Sciences related to Otolaryngology**

- Physiology- Mechanism of perception of smell and taste, mechanism of breathing and voice production, lacrimation, deglutition and salivation. Functional tests of the nose and paranasal sinuses, mechanism of cough and sneezing.
- Physics of sound, theories of hearing, mechanism of perception of sound and speech production, physiology of equilibrium and cerebral function. Physiology of brain in connection with hearing, speech, smell and phonation. Audiologic tests like audiometry, impedance, evoked potentials, OAE, Speech audiometry.
- Physiology of larynx, tracheobronchial tree and oesophagus - Histology of mucous membranes, internal ear and other associated organs and structures, nose, PNS NPx, Larynx, Tracheo-Bronchial tree, Lymphoepithelial system. Mechanism of immune system/immunology and genetics.
- Anatomy-Embryogenesis of ear, nose and throat including palate and the larynx, Oesophagus, trachea and lungs, tongue, salivary gland Head and Neck and skull base etc.
- Parapharyngeal spaces in the neck including connective tissue barriers of larynx.
- Applied anatomy of the skull bones, accessory sinuses, external, middle and inner ears, nose, PNS, nasopharynx, meninges, brain, pharynx, larynx, trachea and bronchi, lungs, pleurae, oesophagus and the mediastinum.
- Anatomy of all cranial nerves with their functions.

### **Principles and Practices of Otolaryngology, Audiology and Speech Pathology**

- Clinical Methodology as applied to ORL HN diseases in adult and children and the accessory sinuses, diagnosis and surgical treatment of diseases of nose, throat and ear in adult and children. Prevention and treatment, infectious diseases of Otolaryngology and Head Neck region. Circulatory and nervous disturbances of the nose, throat and ear and their effects on other organs of the body. Deformities, injuries sinus infections, polyps and the tumors of the nose, and paranasal sinuses.
- Examination of the ear, deafness and allied diseases, complications of diseases of the ear. Injuries, tumors, nervous and circulatory neurological disturbances of the ear. Diagnosis and treatment of tinnitus and vertigo. Diagnosis and rehabilitation of the Hearing handicapped including, dispensing of hearing aid other vibrotatile aids.
  - Surgical pathology of Otolaryngology and Head Neck region.
  - Basic knowledge of anaesthesia as related to ENT.
  - Examination of diseases of children (Paediatric ORL) in connection with throat and larynx. Neurological and vascular disturbances. Congenital and neonatal stridor.
  - Pathology of various diseases of the larynx and throat, tracheo-bronchial tree and their causative organisms.

- Indications and various techniques of direct laryngoscopy, nasal endoscopy. Bronchoscopy and oesophagoscopy, including microlaryngoscopic procedures.
- Reading of radiograms, scans, audiograms, nystagmograms and tympanograms in connection with ENT diseases/disorders.
- Special apparatus for the diagnosis and treatment of the diseases of ear, nose and throat including audiometer, BERA, Speech analyser etc.

### **Recent advances in Otolaryngology and Head Neck surgery**

- Recent developments in the diagnosis, pathogenesis and treatment of the ENT diseases
- The knowledge of the frontiers of the oto-laryngology and lateral skull base surgery
- Rhinoplasty, endoscopic sinus surgery, and anterior cranial fossa surgery
- Knowledge of LASERS and fibre optics
- Other methods of managing Hearing loss
- Implantable hearing aids cochlear implants
- Phonosurgery
- Etiology and Managements of sleep apnoea/snoring
- Hypophysectomy and optic nerve decompressions
- Immunotherapy and modalities of the gene therapy
- Newer techniques for Radiotherapy including, use of gamma knife for treatment of Intracranial tumors and other malignancy
- Chemotherapy of cancer

### **General Surgical Principles and Head-Neck Surgery**

- General Surgery, Head and Neck oncology, and Medicine as applicable to the ENT disorders/diseases. Surgery of congenital deformities of nose, ear (Pinna) and trachea/oesophagus etc.
- Radiology, Imaging – computed tomography and magnetic resonance imaging, (MRI) and intervention radiology and angiography as related to ENT
- General Pathologic aspects such as wound healing and also pathology and Pathogenesis of ENT diseases, Pharmacology, molecular biology, genetics, cytology, haematology, and immunology as applicable to otolaryngology
- General Principles of faciomaxillary traumatology and neck injury
- Plastic Surgery as applicable to Otolaryngology

## **B. Affective Domain**

1. The student will show integrity, accountability, respect, compassion and dedicated patient care. The student will demonstrate a commitment to excellence and continuous professional development.
2. The student should demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.
3. The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.
4. The student should be able to choose the required investigations to enhance the attitude, communicative skills, including dealing with patient's relatives with the required empathy, adapt to changing trends in education, learning methods and evolving new diagnostic and therapeutic techniques in the subject of ENT.

### **C. Psychomotor Domain**

**By the end of the training, a student should be able to demonstrate his skills in:**

- Taking a good history and demonstrating good examination techniques.
- arrive at a logical working diagnosis, differential diagnosis after clinical examination and order appropriate investigations keeping in mind their relevance (need based) and thereby provide appropriate care that is ethical, compassionate, responsive and cost effective and in conformation with statutory rules.
- Should be able to perform and demonstrate the practical skills in the field of ENT including the following:
  - Examination of the ear, nose and throat oral cavity examination
  - Clinico-physiological examination and evaluation of the audio-vestibulo neurological system
  - Examination of the larynx and the throat including flexible endoscopy, stroboscopy, voice analysis and the clinico-physiological examination of the speech
  - Examination of the otological and audiological system including Tuning fork testing, audiological evaluation, micro and otoendoscopy
  - Clinical and physiological evaluation of the nose and paranasal sinuses including nasal endoscopy and olfactory evaluation
  - Examination of the neck and its structures
- Should demonstrate and perform various therapeutic skills related to the speciality such as :
  - Tracheostomy
  - Anterior/ posterior nasal packing
  - Ear Packing and Syringing
  - Foreign body removal from air nose and throat

- Airway management including basic life support skills, Cardiopulmonary resuscitation, intubation, homeostasis maintenance, IV alimentation and fluid, electrolyte maintenance and principles of blood transfusion alimentation including Nasogastric feeding, gastrostomy
- Wound suturing, dressings and care of the wounds
- Basic principles of rehabilitation
- common procedures like FNAC, biopsy, aspiration from serous cavities, lumbar puncture etc.
- Should understand principles of and interpret X-rays/CT/MRI, audiograms, ENG, BERA, OAE, ultrasonographic abnormalities and other diagnostic procedures in relation to the speciality
- Should have observed/performed under supervision the various surgical procedures in relation to the speciality

## *Syllabus*

### **Course contents:**

1. Anatomy and Physiology of Ear, Nose and Throat, Trachea and esophagus.
2. The generation and reception of speech
3. Radiographic anatomy of the ear, nose, throat and imaging.
4. Bacteriology in relation to Otorhinolaryngology
5. Allergy and rhinitis
6. Haematology in relation to Otolaryngology
7. Anaesthesia for Otolaryngology
8. Pharmacology of drugs used in ENT
9. Electrolyte, fluid balance/shock conditions
10. Use of teaching aids
11. Routine blood, urine testing
12. Preparation of slides
13. Facial nerve stimulation test
14. Audiometric tests like pure tone Audiometry, Impedance Audiometry, Free field Audiometry, Specialized tests of hearing including SISI, Tone decay, ABLB, Speech discrimination score etc.
15. Vestibular tests like caloric testing (Water and Air) stopping test, Fukuda's test,
16. Evoked response audiometry.

### **Ear:**

1. The physical and functional examination of the ear
2. The functional and physical examination of the vestibular system.
3. Tinnitus
4. Affections of external ear
5. Repair of deformities of the external ear.

6. Congenital conditions of the middle ear cleft
7. Traumatic conductive deafness
8. Acute inflammation of the middle ear cleft
9. Non-suppurative otitis media
10. Chronic suppurative otitis media
11. Management of chronic suppurative otitis media
12. Complications of infections of middle ear.
13. Tumors of the middle ear cleft and temporal bone
14. Diseases of the otic capsule-otosclerosis
15. Diseases of the otic capsule-other diseases
16. The deaf child
17. Acoustic neuroma
18. Ototoxicity
19. Presbycusis
20. Diagnosis and management of sudden and fluctuant sensorineural hearing loss
21. Meniere's disease
22. Neurologic aspects of vertigo
23. Facial paralysis
24. Rehabilitation of adults with acquired Hearing loss-Hearing aids
25. The cochlear Implants
26. Nystagmus
27. Otoacoustic emissions

**Nose:**

1. Examination of the nose
2. Conditions of the external nose
3. Injuries of the facial skeleton
4. Congenital diseases of the nose
5. The nasal septum
6. Foreign bodies in the nose, rhinolith
7. Epistaxis
8. Acute chronic inflammations of the nasal cavities
9. Vasomotor rhinitis-allergic and non-allergic
10. Nasal polyposis
11. Abnormalities of smell
12. Acute sinusitis
13. Chronic sinusitis
14. Nasal Allergy/Fungal allergic sinusitis
15. Complications of acute and chronic sinusitis
16. Tumors of nose and sinuses
17. Facial pains
18. Trans-ethmoidal hypophysectomy

## 19. Functional endoscopic sinus surgery (FESS)

### **Throat:**

1. Methods of examination of the mouth and pharynx
2. Diseases of the mouth
3. Diseases of the salivary glands
4. Pharyngeal lesions associated with general diseases
5. Diseases of the tonsils and adenoids (excluding neoplasms)
6. Tumors of the pharynx
7. Hypopharyngeal diverticulum (Pharyngeal Pouch)
8. Methods of examining and larynx and tracheobronchial tree
9. Congenital diseases of the larynx
10. Laryngeal disorders in singers and other voice users
11. Neurological affections of larynx and pharynx
12. Intubation of the larynx, laryngotomy and tracheostomy
13. Cervical node dissection
14. Skin grafts in Otolaryngology and reconstructive methods including regional and distant flaps for repair of defects after excision of tumors or trauma.
15. Micro laryngeal surgery/thyroplasty

### **Miscellaneous and head and neck:**

1. Cranial nerves
2. Raised intracranial tension-causes, diagnosis, management with particular reference to otitis hydrocephalus
3. Head injuries and I.C. Haemorrhage
4. Pituitary gland, anatomy, physiology hypo - and hyper - pituitarism, new growths.
5. Intracranial venous sinuses and their affections
5. Osteology: skull, mandible cervical and thoracic vertebral sternum
6. Cervical fascia, facial spaces in neck, retro-pharyngeal and parapharyngeal Abscesses
7. Anatomy and physiology of thyroid gland, goitre, diseases of the thyroid and carcinoma of thyroid
8. Large blood vessels in neck, thoracic duct development of major cervical and thoracic blood vessels.
9. Head and neck reconstructive surgery

### **Drugs used in ENT:**

1. Antibiotics Antihistaminic
2. Nasal vasoconstrictors
3. Local anaesthetics
4. Corticosteroids

5. Cyto-toxic agents
6. Antibiotics
7. Radioactive isotopes
8. Antifungal agents
9. Vasopressive and other agents used in shock like states.

**General:**

1. Physiology of circulation, regulation of blood pressure, reactions of body to haemorrhage, patho-physiology of shock, fluid balance, blood transfusion and its hazards, fluid replacement therapy, burns
2. Agents used in shock like states

**Desirable**

1. The ears and nasal sinuses in the aerospace environment
2. Physiological consideration of pressure effects on the ear and sinuses in deep water diving
3. The principles of cancer immunology with particular reference to head and neck cancer
4. Principles of chemotherapy in head and neck cancer
5. Recording of nystagmus by ENG and its interpretation

**Ear:**

1. Traumatic lesions of the inner ear
2. Inflammatory lesions of the vestibular and auditory nerve
3. Vascular lesions of the inner ear
4. Electronystagmography
5. Skull base/Neurologic surgery

**Nose:**

1. Cosmetic surgery of the nose
2. Non-healing granuloma of the nose
3. Surgery of the pterygopalatine fossa
4. LASER Surgery

**Throat:**

1. Oesophageal conditions in the practice of ear, nose and throat surgery
2. Disorders of speech
3. Lower respiratory conditions in Otolaryngology

**Miscellaneous and head and neck**

1. Functional Anatomy of cerebellum and brainstem

2. Anatomy of mediastinum
3. Pleura, plural cavity, broncho-pulmonary segments and their clinical importance
4. Facial plastic surgery

## ***TEACHING AND LEARNING METHODS***

### **Teaching methodology**

Didactic lectures are of least importance; small group discussion such as seminars, journal clubs, symposia, reviews and guest lectures should get priority for theoretical knowledge. Bedside teaching, grand rounds, structured interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning with appropriate emphasis on e-learning. Student should have hand-on training in performing various procedures and ability to interpret various tests/investigations. Exposure to newer specialized diagnostic/therapeutic procedures concerning her/his subject should be given. Self-learning tools like assignments and case-based learning may be promoted. Exposure to newer specialized diagnostic/therapeutic procedures concerning ENT should be given.

#### **1. Rotations:**

- A major portion of posting should be in ENT Department. It should include in-patients, out-patients, ICU, trauma, emergency room, specialty clinics including Vertigo Clinic, Rhinology Clinic, Otology Clinic, Cancer Clinic, Cadaveric dissection Lab, Audiology and speech therapy.
- Inter-unit rotation in the department should be done for a period of up to one year.
- Rotation in appropriate related subspecialties for a total period not exceeding 06 months.

#### **2. Clinical meetings:**

There should be intra- and inter- departmental meetings for discussing the uncommon /interesting cases involving multiple departments.

**3. Log book:** Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

#### **4. Thesis writing and research:**

Thesis writing is compulsory.

5. The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
6. A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at

a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

7. The student should know the basic concepts of research methodology, plan a research project, be able to retrieve information from the library. The student should have a basic knowledge of statistics.
8. Department should encourage e-learning activities.

**During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in the medical colleges is mandatory.**

## ***ASSESSMENT***

Assessment should be comprehensive & objective. It should address the stated competencies of the course. The assessment needs to be spread over the duration of the course.

**FORMATIVE ASSESSMENT, i.e., assessment during the training would include: Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

**Quarterly assessment during the MS training should be based on following educational activities:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).**

### **SUMMATIVE ASSESSMENT ie.,at the end of the training**

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

#### **The examination will be in three parts:**

##### **1. Thesis**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the candidate to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A candidate shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

##### **2. Theory**

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify candidate's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

Theory shall consist of four papers of 3 hours each.

**Paper I:** Basic Sciences related Otolaryngology

**Paper II:** Principles and Practices of Otolaryngology

**Paper III:** Recent advances in Otolaryngology and Head Neck surgery.

**Paper IV:** General Surgical Principles and Head-Neck Surgery.

##### **3. Clinical / Practical and viva voce Examination**

Clinical examination shall be conducted to test the knowledge, skills, attitude and competence of the post graduate students for undertaking independent work as a

specialist/teacher, for which post graduate students shall examine a minimum one long case and two short cases.

The Oral examination shall be thorough and shall aim at assessing the post graduate student's knowledge and competence about the subject, investigative procedures, therapeutic technique and other aspects of the specialty, which form a part of the examination.

Assessment may include Objective Structured Clinical Examination(OSCE).

Oral/Viva-voce examination needs to assess knowledge on X-rays, instrumentation, operative procedures. Due weightage should be given to Log Book Records and day-to-day observation during the training.

### **Recommended Reading:**

#### **Books (latest edition)**

- Scott-Brown's *Otorhinolaryngology and Head and Neck Surgery*
- Cummings *Otolaryngology - Head and Neck Surgery*
- *Otolaryngology, Otology & Neurotology* by Paparella & Micheal
- Glasscock-Shambaugh's *Surgery of the Ear*
- *Essentials of Functional Sinus Surgery* by Heinz Stammberger MD
- *Color Atlas of Head & Neck Surgery* by Jatin P Shah
- *Handbook of Clinical Audiology* by Jack Katz
- Stell & Maran's *Textbook of Head and Neck Surgery and Oncology*

#### **Journals**

03-05 international Journals and 02 national (all indexed) journals

**Postgraduate Students Appraisal Form**  
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

**Publications**

**Yes/ No**

Remarks\* \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

\*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN OBSTETRICS AND GYNAECOLOGY**

## **Preamble:**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The purpose of MS Obstetrics and Gynaecology is to standardize Obstetrics & Gynaecology teaching at Post Graduate level throughout the country so that it will benefit in achieving uniformity in undergraduate teaching as well and resultantly creating competent Obstetrician and Gynaecologist with appropriate expertise.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC LEARNING OBJECTIVES***

### **Programme Objectives**

The **goal** of the MS course in Obstetrics and Gynaecology is to produce a competent Obstetrician and Gynaecologist who can:

- a. Provide quality care to the community in the diagnosis and management of Antenatal, Intra-natal and Post-natal period of normal and abnormal pregnancy and labor.
- b. provide effective and adequate care to a pregnant woman with complicated pregnancy.
- c. provide effective and adequate care to a normal and high risk neonate.
- d. perform obstetrical ultrasound in normal and abnormal pregnancy including Doppler.
- e. manage effectively all obstetrical and gynecological emergencies and if necessary make appropriate referrals.
- f. provide quality care to the community in the diagnosis and management of gynaecological problems including screening, and management of all gynecological cancers including during pregnancy.

- g. conduct a comprehensive evaluation of infertile couple and have a broad based knowledge of assisted reproductive techniques including – ovulation induction, *in vitro* fertilization and intra-cytoplasmic sperm injection, gamete donation, surrogacy and the legal and ethical implications of these procedures.
- h. provide counseling and delivery of fertility regulation methods including reversible and irreversible contraception, emergency contraception etc.
- i. provide quality care to women having spontaneous abortion or requesting Medical Termination of Pregnancy (MTP) and manage their related complications.

## ***SUBJECT SPECIFIC COMPETENCIES***

### **A. Cognitive Domain**

**At the end of the MS Course in Obstetrics and Gynaecology, the student should have acquired knowledge in the following:**

- recognizes the health needs of women and adolescents and carries out professional obligations in keeping with principles of National Health Policy and professional ethics
- has acquired the competencies pertaining to Obstetrics and Gynaecology that are required to be practiced in the community and at all levels of health system
- on genetics as applicable to Obstetrics.
- on benign and malignant gynecological disorders.
- on Gynecological Endocrinology and infertility.
- on interpretation of various laboratory investigations and other diagnostic modalities in Obstetrics & Gynecology.
- on essentials of Pediatric and adolescent Gynecology.
- on care of postmenopausal women and geriatric Gynecology.
- on elementary knowledge of female breast & its diseases.
- on vital statistics in Obstetrics & Gynecology.
- Anesthesiology related to Obstetrics & Gynecology.
- Reproductive and Child Health, family welfare & reproductive tract infections.
- STD and AIDS & Government of India perspective on women's health related issues.
- Medico-legal aspects in Obstetrics & Gynecology.
- Asepsis, sterilization and disposal of medical waste.
- be able to effectively communicate with the family and the community
- is aware of the contemporary advances and developments in medical sciences as related to Obstetrics and Gynaecology.

- maintain medical records properly and know the medico-legal aspects in respect of Obstetrics & Gynecology
- Understands the difference between audit and research and how to plan a research project and demonstrate the skills to critically appraise scientific data and literature
- has acquired skills in educating medical and paramedical professionals

**Ethical and Legal Issues:**

The post graduate student should understand the principles and legal issues surrounding informed consent with particular awareness of the implication for the unborn child, postmortem examinations consent to surgical procedures including tubal ligation/vasectomy, parental consent and medical certification, research and teaching and properly maintain medical records.

**Risk Management:**

The post graduate student should demonstrate a working knowledge of the principles of risk management and their relationship to clinical governance and complaints procedures.

**Confidentiality:**

The post graduate student should:

- be aware of the relevant strategies to ensure confidentiality and when it might be broken.
- understand the principles of adult teaching and should be able to teach common practical procedures in Obstetrics and Gynaecology and involved in educational programme in Obstetrics and Gynaecology for medical and paramedical staff.
- be abreast with all recent advances in Obstetrics and Gynaecology and practice evidence based medicine.

**Use of information technology, audits and standards:**

The post graduate student should:

- acquire a full understating of all common usage of computing systems including the principles of data collection, storage, retrieval, analysis and presentation.
- understand quality improvement and management and how to perform, interpret and use of clinical audit cycles and the production and application of clinical standards, guidelines and protocols.

- understand National Health Programmes related to Obstetrics and Gynaecology and should be aware of all the Acts and Laws related to specialty.

### **Health of Adolescent Girls and Post-Menopausal Women**

The student should:

- Recognize the importance of good health of adolescent and postmenopausal women.
- Identification and management of health problems of post-menopausal women.
- Understanding and planning and intervention program of social, educational and health needs of adolescent girls and menopausal women.
- Education regarding rights and confidentiality of women's health, specifically related to reproductive function, sexuality, contraception and safe abortion.
- Geriatric problems.

### **Reproductive Tract and 'HIV' Infection**

- Epidemiology of RTI and HIV infection in Indian women of reproductive age group.
- Cause, effect and management of these infections.
- HIV infections in pregnancy, its effects and management.
- Relationship of RTI and HIV with gynaecological disorders.
- Planning and implementation of preventive strategies.

### **Medico-legal Aspects**

- Knowledge and correct application of various Acts and Laws while practicing Obstetrics and Gynaecology, particularly MTP Act and sterilization, Preconception and P.N.D.T. Act.
- Knowledge of importance of proper recording of facts about history, examination findings, investigation reports and treatment administered in all patients.
- Knowledge of steps recommended for examination and management of rape cases.
- Knowledge of steps taken in the event of death of a patient.

### **B. Affective domain**

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

### **C. Psychomotor domain**

**At the end of the course, the student should acquire following clinical & operative skills and be able to:**

#### **Operative Skills in Obstetrics and Gynaecology**

- Adequate proficiency in common minor and major operations, post-operative management and management of their complications.
- Operative procedures which must be done by P G students during training period: *(in graded manner - assisting, operating with senior person assisting, operating under supervision)*

**(Operations MUST BE DONE/OBSERVED during PG training programme and log book maintained)**

#### **1. Obstetrics:** Venesection, culdocentesis

Conduct normal deliveries

Episiotomy and its repair

- Application of forceps and ventouse (10).
- Carry out caesarian section delivery (10 must be done)
- Manual removal of placenta
- Management of genital tract obstetrical injuries.
- Post partum sterilization/Minilap tubal ligation (20 must be done)
- Medical termination of pregnancy - various methods (20 must be done)

#### **2. Gynaecology:** Endometrial / cervical biopsy.

Dilatation and curettage

Coldocentesis, Colpotomy

- Opening and closing of abdomen (10 must be done)
- Operations for pelvic organ prolapse
- Ovarian cyst operation
- Operation for ectopic pregnancy
- Vaginal and abdominal hysterectomy

**Operations must be OBSERVED and/or ASSISTED when possible:**

- Internal podalic version
- Caesarea Hysterectomy
- Internal iliac artery ligation
- Destructive obstetrical operations
- Tubal microsurgery
- Radical operations for gynaec malignancies
- Repair of genital fistulae
- Operations for incontinence
- Myomectomy, Laparoscopic and hysteroscopic surgery

**Diagnostic Procedures**

- Interpretation of x-rays - Twins, common fetal malformations / mal-presentations, abnormal pelvis (pelvimetry), Hysterosalpingography
- Sonographic pictures at various stages of pregnancy - normal and abnormal pregnancies, Fetal biophysical profile, common gynaecological pathologies.
- Amniocentesis
- Fetal surveillance methods - Electronic fetal monitoring and its interpretation
- Post-coital test
- Vaginal Pap Smear
- Colposcopy
- Endoscopy - Laparo and Hystero-scopy.

**Health of Adolescent Girls and Post-Menopausal Women**

- Provide advice on importance of good health of adolescent and postmenopausal women.
- Identification and management of health problems of post-menopausal women.
- Planning and intervention program of social, educational and health needs of adolescent girls and menopausal women.
- Provide education regarding rights and confidentiality of women's health, specifically related to reproductive function, sexuality, contraception and safe abortion.
- Provide advice on geriatric problems.

**Reproductive Tract and 'HIV' Infection**

- Provide advice on management of RTI and HIV infections in Indian women of reproductive age group.

- Provide advice on management of HIV infections in pregnancy, relationship of RTI and HIV with gynaecological disorders.
- Planning and implementation of preventive strategies.

### **Medico-legal Aspects**

- Correct application of various Acts and Laws while practicing obstetrics and gynaecology, particularly MTP Act and sterilization, Preconception and P.N.D.T. Act.
- Implement proper recording of facts about history, examination findings, investigation reports and treatment administered in all patients.
- Implement the steps recommended for examination and management of rape cases.
- Follow proper procedures in the event of death of a patient.

### **Environment and Health**

- Follow proper procedures in safe disposal of human body fluids and other materials.
- Follow proper procedures and universal precautions in examination and surgical procedures for the prevention of HIV and other diseases.

## ***Syllabus***

### **Course Contents:**

#### **Paper I**

##### **1. Basic Sciences**

- Normal and abnormal development, structure and function (female and male) urogenital system and female breast.
- Applied Anatomy of genito-urinary system, abdomen, pelvis, pelvic floor, anterior abdominal wall, upper thigh (inguinal ligament, inguinal canal, vulva, rectum and anal canal).
- Physiology of spermatogenesis.
- Endocrinology related to male and female reproduction (Neurotransmitters).
- Anatomy and physiology of urinary and lower GI (Rectum / anal canal) tract.
- Development, structure and function of placenta, umbilical cord and amniotic fluid.
- Anatomical and physiological changes in female genital tract during pregnancy.
- Anatomy of fetus, fetal growth and development, fetal physiology and fetal circulation.
- Physiological and neuro-endocrinal changes during puberty, adolescence, menstruation, ovulation, fertilization, climacteric and menopause.

- Biochemical and endocrine changes during pregnancy, including systemic changes in cardiovascular, hematological, renal hepatic, renal, hepatic and other systems.
- Biophysical and biochemical changes in uterus and cervix during pregnancy and labor.
- Pharmacology of identified drugs used during pregnancy, labour, post-partum period in reference to their absorption, distribution, excretion, (hepatic) metabolism, transfer of the drugs across the placenta, effect of the drugs (used) on labor, on fetus, their excretion through breast milk.
- Mechanism of action, excretion, metabolism of identified drugs used in the management of Gynaecological disorder.
- Role of hormones in Obstetrics and Gynaecology.
- *Markers in Obstetrics & Gynaecology* - Non-neoplastic and neoplastic diseases
- Pathophysiology of ovaries, fallopian tubes, uterus, cervix, vagina and external genitalia in healthy and diseased conditions.
- Normal and abnormal pathology of placenta, umbilical cord, amniotic fluid and fetus.
- Normal and abnormal microbiology of genital tract. Bacterial, viral and parasitical infections responsible for maternal, fetal and gynaecological disorders.
- Humoral and cellular immunology in Obstetrics & Gynaecology.
- Gametogenesis, fertilization, implantation and early development of embryo.
- Normal Pregnancy, physiological changes during pregnancy, labor and pauperism.
- Immunology of pregnancy.
- Lactation.

## **2. Medical Genetics**

- Basic medical genetics including cytogenetics.
- Pattern of inheritance
- Chromosomal abnormalities - types, incidence, diagnosis, management and recurrence risk.
- General principles of Teratology.
- Screening, counseling and prevention of developmental abnormalities.
- Birth defects - genetics, teratology and counseling.

## **Paper II**

### **Clinical obstetrics**

#### **1. Antenatal Care:**

- Prenatal care of normal pregnancy including examination, nutrition, immunization and follow up.
- Identification and management of complications and complicated of pregnancy – abortion, ectopic pregnancy, vesicular mole, Gestational trophoblastic Diseases, hyperemesis gravidarum, multiple pregnancy, antipartum hemorrhage, pregnancy induced hypertension, preeclampsia, eclampsia, Other associated hypertensive disorders, Anemia, Rh incompatibility, diabetes, heart disease, renal and hepatic diseases, preterm - post term pregnancies, intrauterine fetal growth retardation,
- Neurological, hematological, dermatological diseases, immunological disorders and other medical and surgical disorders/problems associated with pregnancy, Multiple pregnancies, Hydramnios, Oligoamnios.
- Diagnosis of contracted pelvis (CPD) and its management.
- High-risk pregnancy
  - Pregnancy associated with complications, medical and surgical problems.
  - Prolonged gestation.
  - Preterm labor, premature rupture of membranes.
  - Blood group incompatibilities.
  - Recurrent pregnancy wastage.
- Evaluation of fetal and maternal health in complicated pregnancy by making use of diagnostic modalities including modern ones (USG, Doppler, Electronic monitors) and plan for safe delivery for mother and fetus. Identifying fetus at risk and its management. Prenatal diagnostic modalities including modern ones.
- Infections in pregnancy (bacterial, viral, fungal, protozoan)
  - Malaria, Toxoplasmosis.
  - Viral – Rubella, CMV, Herpes, HIV, Hepatic viral infections (B, C etc)
  - Sexually Transmitted Infections (STDs)
  - Mother to fetal transmission of infections.
- Identification and management of fetal malpositions and malpresentations.
- Management of pregnancies complicated by medical, surgical (with other specialties as required) and gynecological diseases.
  - Anemia, hematological disorders
  - Respiratory, Heart, Renal, Liver, skin diseases.
  - Gastrointestinal, Hypertensive, Autoimmune, Endocrine disorders.
  - Associated Surgical Problems.  
Acute Abdomen (surgical emergencies - appendicitis and GI emergencies).  
Other associated surgical problems.
  - Gynaecological disorders associate with pregnancy - congenital genital tract developmental anomalies, Gynaec pathologies - fibroid uterus, Ca Cx, genital prolapse etc.
  - Prenatal diagnosis (of fetal problems and abnormalities), treatment – Fetal therapy
  - M.T.P, PC & P.N.D.T Act etc

- National health MCH programs, social obstetrics and vital statistics
- Recent advances in Obstetrics.

## **2. Intra-partum care:**

- Normal labor - mechanism and management.
- Partographic monitoring of labor progress, recognition of abnormal labor and its appropriate management.
- Identification and conduct of abnormal labor and complicated delivery - breech, forceps delivery, caesarian section, destructive operations.
- Induction and augmentation of labor.
- Management of abnormal labor - Abnormal pelvis, soft tissue abnormalities of birth canal, mal-presentation, mal-positions of fetus, abnormal uterine action, obstructed labor and other distocias.
- Analgesia and anaesthesia in labor.
- Maternal and fetal monitoring in normal and abnormal labor (including electronic fetal monitoring).
- Identification and management of intrapartum complications, Cord presentation, complication of 3<sup>rd</sup> stage of labor - retained placenta, inversion of uterus, rupture of uterus, post partum hemorrhage.

## **3. Post Partum**

- Complication of 3<sup>rd</sup> stage of labor retained placenta, inversion of uterus, post partum hemorrhage, rupture of uterus, Management of primary and secondary post-partum hemorrhage, retained placenta, uterine inversion. Post-partum collapse, amniotic fluid embolism
- Identification and management of genital tract trauma - perineal tear, cervical/vaginal tear, episiotomy complications, rupture uterus.
- Management of critically ill woman.
- Post partum shock, sepsis and psychosis.
- Postpartum contraception.  
Breast feeding practice; counseling and importance of breast-feeding. Problems in breast-feeding and their management, Baby friendly practices.
- Problems of newborn - at birth (resuscitation), management of early neonatal problems.
- Normal and abnormal purpura - sepsis, thrombophlebitis, mastitis, psychosis.  
Hematological problems in Obstetrics including coagulation disorders. Use of blood and blood components/products.

## **4. Operative Obstetrics:**

- Decision-making, technique and management of complications.
- Vaginal instrumental delivery, Caesarian section, Obst. Hysterectomy, destructive operations, manipulations (External/internal podalic version, manual removal of placenta etc)
- Medical Termination of Pregnancy - safe abortion - selection of cases, technique and management of complication. MTP law.

## **5. New Born**

1. Care of new born: Normal and high risk new born (including NICU care).
2. Asphyxia and neonatal resuscitation.
3. Neonatal sepsis - prevention, detection and management.
4. Neonatal hyper - bilirubinemia - investigation and management.
5. Birth trauma - Detection and management.
6. Detection and management of fetal/neonatal malformation.
7. Management of common neonatal problems.

## **Paper III**

### **Clinical Gynaecology and Fertility Regulation**

- Epidemiology and etiopathogenesis of gynaecological disorders.
- Diagnostic modalities and management of common benign and malignant gynaecological diseases (diseases of genital tract):
  - Fibroid uterus
  - Endometriosis and adenomyosis
  - Endometrial hyperplasia
  - Genital prolapse (uterine and vaginal)
  - Cervical erosion, cervicitis, cervical polyps, cervical neoplasia.
  - Vaginal cysts, vaginal infections, vaginal neoplasia (VIN)
  - Benign Ovarian pathologies
  - Malignant genital neoplasia - of ovary, Fallopian tubes, uterus, cervix, vagina, vulva and Gestational Trophoblastic diseases, Cancer Breast.
- Diagnosis and surgical management of clinical conditions related to congenital malformations of genital tract. Reconstructive surgery in gynaecology.
- Intersex, ambiguous sex and chromosomal abnormalities.
- Reproductive endocrinology: Evaluation of Primary/secondary Amenorrhea, management of Hyperprolactinemia, Hirsutism, Chronic an-ovulation, PCOD, thyroid and other endocrine dysfunctions.
- Infertility - Evaluation and management
  - Methods of Ovulation Induction

- Tubal (Micro) surgery
  - Management of immunological factors of Infertility
  - Male infertility
  - Obesity and other Infertility problems.
  - **(Introductory knowledge of)** Advanced Assisted Reproductive Techniques (ART)
- Reproductive tract Infections: prevention, diagnosis and treatment.
    - STD
    - HIV
    - Other Infections
    - Genital Tuberculosis.
  - Principles of radiotherapy and chemotherapy in gynaecological malignancies. Choice, schedule of administration and complications of such therapies.
  - Rational approach in diagnosis and management of endocrinal abnormalities such as: menstrual abnormalities, amenorrhea (primary/secondary), dysfunctional uterine bleeding, polycystic ovarian disease, hyperprolactinemia (galactorrhea), hyperandrogenism, thyroid - pituitary - adrenal disorders, menopause and its treatment (HRT).
  - Urological problems in Gynaecology - Diagnosis and management.
    - Urinary tract infection
    - Urogenital Fistulae
    - Incontinence
    - Other urological problems
  - Orthopedic problems in Gynaecology.
  - Menopause: management (HRT) and prevention of its complications.
  - Endoscopy (Laparoscopy - Hysteroscopy)
    - Diagnostic and simple therapeutic procedures (PG students must be trained to do these procedures)
    - Recent advances in gynaecology - Diagnostic and therapeutic
    - Pediatric, Adolescent and Geriatric Gynaecology
    - **Introduction to Advance Operative procedures.**

### **Operative Gynaecology**

- Abdominal and Vaginal Hysterectomy
- Surgical Procedures for genital prolapse, fibromyoma, endometriosis, ovarian, adenexal, uterine, cervical, vaginal and vulval pathologies.
- Surgical treatment for urinary and other fistulae, Urinary incontinence
- Operative Endoscopy

### **Family Welfare and Demography**

- Definition of demography and its importance in Obstetrics and Gynaecology.

- Statistics regarding maternal mortality, perinatal mortality/morbidity, birth rate, fertility rate.
- Organizational and operational aspects of National health policies and programs, in relation to population and family welfare including RCH.
- Various temporary and permanent methods of male and female contraceptive methods.
- Knowledge of in contraceptive techniques (including recent developments).
  1. Temporary methods
  2. Permanent Methods.
  3. Recent advances in contraceptive technology
- Provide adequate services to service seekers of contraception including follow up.
- Medical Termination of Pregnancy: Act, its implementation, providing safe and adequate services.
- Demography and population dynamics.
- Contraception (fertility control)

### **Male and Female Infertility**

- History taking, examination and investigation.
- Causes and management of male infertility.
- Indications, procedures of Assisted Reproductive Techniques in relation to male infertility problems.

## ***TEACHING AND LEARNING METHODS***

### **Postgraduate Training**

**Teaching methodology** should be imparted to the students through:

- Lectures, seminars, symposia, Inter- and intra- departmental meetings (clinic-pathological, Radio-diagnosis, Radiotherapy, Anaesthesia, Pediatrics/ Neonatology), maternal morbidity/mortality meetings and journal club. ***Records of these are to be maintained by the department.***
- By encouraging and allowing the students to attend and actively participate in CMEs, Conferences by presenting papers.
- Maintenance of log book: Log books shall be checked and assessed periodically by the faculty members imparting the training.
- Writing thesis following appropriate research methodology, ethical clearance and good clinical practice guidelines.
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.

- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- Department should encourage e-learning activities.

### **Practical and Clinical Training**

- Emphasis should be self learning, group discussions and case presentations.
- Student should be trained about proper History taking, Clinical examination, advising / ordering relevant investigations, their interpretation and instituting medical / surgical management by posting students in OPD, specialty clinics, wards, operation theaters, Labor room, family planning clinics and other departments like anesthesiology, neonatology, radiology/ radiotherapy. **Students should be able to perform and interpret ultra - sonography in Obstetrics and Gynaecology, NST, Partogram**

### **Rotations:**

- Details of 3 years posting in the PG programme (6 terms of 6 months each)

#### ***a. Allied posts should be done during the course – for 8 weeks***

- |      |                        |           |
|------|------------------------|-----------|
| i.   | Neonatology            | - 2 weeks |
| ii.  | Anaesthesia            | - 2 weeks |
| iii. | Radiology/Radiotherapy | - 2 weeks |
| iv.  | Surgery                | - 2 weeks |
| v.   | Oncology               | - 2 weeks |

#### **b. Details of training in the subject during resident posting**

The student should attend to the duties (Routine and emergency):

Out patient Department and special clinics

Inpatients

Operation Theater

Labor Room

***Writing clinical notes regularly and maintains records.***

***1<sup>st</sup> term - working under supervision of senior residents and teaching faculty.***

*2<sup>nd</sup> & 3<sup>rd</sup> term- Besides patient care in O.P.D., wards, Casualty and labor room, carrying out minor operations under supervision and assisting in major operation.*

*4<sup>th</sup> 5<sup>th</sup> & 6<sup>th</sup> term - independent duties in management of patient including major operations under supervision of teaching faculty*

c. Surgeries to be done during PG training. (Details in the Syllabus)

**During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in medical colleges is mandatory.**

## **ASSESSMENT**

**FORMATIVE ASSESSMENT, during the training includes**

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

**Quarterly assessment during the MS training should be based on following educational activities:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).**

### **SUMMATIVE ASSESSMENT, ie., assessment at the end of training**

The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.

**Postgraduate Examination shall be in three parts:**

**1. Thesis**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

**2. Theory Examination:**

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There should be four theory papers, as given below:

**Paper I:** Applied Basic sciences.

**Paper II:** Obstetrics including social obstetrics and Diseases of New Born

**Paper III:** Gynaecology including fertility regulation

**Paper IV:** Recent Advances in Obstetrics & Gynaecology

**3. Clinical/Practical & oral/viva voce Examination: shall be as given below:**

**a) Obstetrics:**

**Clinical**

Long Case: 1 case

2 cases with different problems

Short Case/ Spot Case: 1 case

**Viva voce including:**

- Instruments
- Pathology specimens
- Drugs and X-rays, Sonography etc.
- Dummy Pelvis

**b) Gynaecology:**

**Clinical**

Long Case: 1 case

2 cases with different problems

Short Case/ Spot Case: 1 case

**Viva including:**

- Instruments
- Pathology specimens
- Drugs and X-rays, Sonography etc.
- Family planning

**Recommended Reading:**

**Books (latest edition)**

**Obstetrics**

1. William Textbook of Obstetrics
2. High risk Obstetrics - James
3. High risk pregnancy - Ian Donal
4. Text book of Operative Obstetrics - Munro Kerr.
5. Medical disorder in pregnancy - De Sweit
6. High risk pregnancy - Arias
7. A text book of Obstetrics - Thrbull
8. Text book of Obstetrics - Holland & Brews.
9. Manual of Obstetrics - Daftary & Chakravarty

**Gynaecology**

1. Text book of Gynaecology - Novak
2. Text book of Operative Gynaecology - Te-lindes
3. Text book of operative gynaecology - Shaws
4. Text book of Gynaecology and Reproductive Endocrinology - Speroft
5. Text book of Obstetrics & Gynaecology - Dewhurst
6. Manual of Gynaecological Oncology - Disai
7. Text book of Gynaecology – Jaeffcot

**Journals**

03-05 international Journals and 02 national (all indexed) journals

**Postgraduate Students Appraisal Form**  
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks\* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN OPHTHALMOLOGY**

## **Preamble:**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

The purpose of this programme is to standardize Ophthalmology teaching at post graduate level throughout the country so that it will benefit in achieving uniformity in post graduate and undergraduate teaching as well as result in creating competent ophthalmic surgeons with appropriate expertise.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC LEARNING OBJECTIVES***

### **Programme Objectives**

The clinical post graduate training programmes are intended at developing in a student a blend of qualities that of a clinical specialist, a teacher and a researcher. These programmes are organized such that a post graduate student should possess the following qualities, knowledge and skills:

- a. The student should possess basic knowledge of the structure, function and development of the human body as related to ophthalmology, of the factors which may disturb these mechanisms and the disorders of structure and function which may result thereafter.
- b. The student should be able to practice and handle most day-to-day problems independently in ophthalmology. The student should recognize the limitations of his/her own clinical knowledge and know when to seek further help.
- c. The student should understand the effects of environment on health and be familiar with the epidemiology of at least the more common diseases in the field of ophthalmology.

- d. The student should be able to integrate the preventive methods with the curative and rehabilitative measures in the comprehensive management of the disease.
- e. The student should be familiar with common eye problems occurring in rural areas and be able to deal with them effectively.
- f. The student should also be made aware of Mobile Ophthalmic Unit and its working and components.
- g. The student should be familiar with the current developments in Ophthalmic Sciences.
- h. The student should be able to plan educational programmes in Ophthalmology in association with senior colleagues and be familiar with the modern methods of teaching and evaluation.
- i. The student should be able to identify a problem for research, plan a rational approach to its solution, execute it and critically evaluate his/her data in the light of existing knowledge.
- j. The student should reach the conclusions by logical deduction and should be able to assess evidence both as to its reliability and its relevance.
- k. The student should have basic knowledge of medico-legal aspects of medicine.
- l. The student should be familiar with patient counseling and proper consent taking.

### ***SUBJECT SPECIFIC COMPETENCIES***

A post graduate student upon successfully qualifying in the M.S. (Ophthalmology) examination should be able to:

- a) Offer to the community, the current quality of 'standard of care' in ophthalmic diagnosis as well as therapeutics, medical or surgical, in most of the common situations encountered at the level of health services.
- b) Periodically self assess his or her performance and keep abreast with ongoing advances in the field and apply the same in his/her practice.
- c) Be aware of her/his own limitations to the application of the specialty in situations, which warrant referral to more qualified centers or individuals.
- d) Apply research and epidemiological methods during his/her practice. The post graduate student should be able to present or publish work done by him/her.
- e) Contribute as an individual/group towards the fulfillment of national objectives with regard to prevention of blindness.
- f) Effectively communicate with patients or relatives so as to educate them sufficiently and give them the full benefit of informed consent to treatment and ensure compliance.

**At the end of the course, the student should have acquired knowledge in the following:**

## **A. Cognitive domain**

### **Basic Medical Sciences:**

- Attain understanding of the structure and function of the eye and its parts in health and disease.
- Attain understanding and application of knowledge of the structure and function of the parts of Central Nervous System and other parts of the body with influence or control on the structure and function of the eye.
- Attain understanding of and develop competence in executing common general laboratory procedures employed in diagnosis and research in Ophthalmology.

### **1. Clinical Ophthalmology:**

Given adequate opportunity to work on the basis of graded responsibilities in outpatients, inpatient and operation theatres on a rational basis in the clinical sections from the day of entry to the completion of the training programme, the students should be able to:

- Acquire scientific and rational approach to the diagnosis of ophthalmic cases presented.
- Acquire understanding of and develop inquisitiveness to investigate to establish cause and effect of the disease.
- To manage and treat all types of ophthalmic cases.
- To competently handle and execute safely all routine surgical procedures on lens, glaucoma, lid, sac, adnexa, retina and muscle anomalies.
- To competently handle all ophthalmic medical and surgical emergencies.
- To be familiar with micro-surgery and special surgical techniques.
- To demonstrate the knowledge of the pharmacological (including toxic) aspects of drugs used in ophthalmic practice and drugs commonly used in general diseases affecting the eyes.

### **2. Refraction:**

- Acquire competence in assessment of refractive errors and prescription of glasses for all types of refraction problems.
- Acquire basic knowledge of manufacture and fitting of glasses and competence of judging the accuracy and defects of the dispensed glasses.

### **3. Ophthalmic super-specialties:**

Given an opportunity to work on a rotational basis in various special clinics of sub-specialties of ophthalmology, if possible, the student should be able to:

- Examine, diagnose and demonstrate understanding of management of the problems of neuro-ophthalmology and refer appropriate cases to neurology and neuro-surgery.
- Examine, diagnose and demonstrate understanding of management of (medical and surgical) complicated problems in the field of (a) lens, (b) glaucoma, c) cornea, (d) retina, (e) pediatric ophthalmology, (f) oculoplasty, (g) uvea, and (I) genetic problems in ophthalmology.
- To demonstrate understanding of the manufacture, and competence in prescription and dispensing of contact lenses and ocular prosthesis.

**5. Ophthalmic pathological/microbiological/biochemical sciences**

- Be able to interpret the diagnosis in correlation with the clinical data and routine materials received in such cases.

**6. Community Ophthalmology**

Eye camps may be conducted where the PG students are posted for imparting training to according to a set methodology. The community and school surveys may also be conducted by the post graduate students.

The post graduate students are given an opportunity to participate in surveys, eye camps. They should be able to guide rehabilitation workers in the organisation and training of the blinds in art of daily living and in the vocational training of the blind leading to gainful employment.

**7. Research :**

- Recognise a research problem.
- State the objectives in terms of what is expected to be achieved in the end.
- Plan a rational approach with appropriate controls with full awareness of the statistical validity of the size of the material.
- Spell out the methodology and carry out most of the technical procedures required for the study.
- Accurately and objectively record on systematic lines results and observation made.
- Analyze the data with the aid of an appropriate statistical analysis.

- Interpret the observations in the light of existing knowledge and highlight in what ways the study has advanced existing knowledge on the subject and what further remains to be done.
- Write a thesis in accordance with the prescribed instructions.
- Write at least one scientific paper as expected of International Standards from the material of this thesis.

## **B. Affective Domain:**

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

## **C. Psychomotor domain**

**At the end of the course, the student should acquire following clinical skills:**

**Essential diagnostic skills:**

### **I. Examination techniques along with interpretation**

#### **1. Slit lamp Examination**

- i. Diffuse examination
- ii. Focal examination
- iii. Retroillumination – direct and indirect
- iv. Sclerotic scatter
- v. Specular reflection
- vi. Staining modalities and interpretation

#### **2. Fundus evaluation**

- Direct/Indirect ophthalmoscopy
- Fundus drawing
- 3-mirror examination of the fundus
- 78-D/90-D/60-D examination
- Amsler's charting

## **II. Basic investigations along with their interpretation**

### **1. Tonometry**

Tonometry - Applanation/Indentation/Non-contact

### **2. Gonioscopy**

Gonioscopy grading of the anterior chamber angle

### **3. Tear/ Lacrimal function tests**

- i. Staining- fluorescein and Rose Bengal
- ii. Schirmer test/tear film break up time
- iii. Syringing
- iv. Dacrocystography

### **4. Corneal**

- Corneal scraping and cauterization
- Smear preparation and interpretation (Gram's stain /KOH )
- Media inoculation
- Keratometry - performance and interpretation
- Pachymetry
- Corneal topography - if available

### **5. Colour Vision evaluation**

- Ishihara pseudoisochromatic plates
- Farnsworth Munsell, if available

### **6. Refraction**

- i. Retinoscopy- Streak/ Priestley Smith
- ii. Use of Jackson's cross-cylinder
- iii. Subjective and objective refraction
- iv. Prescription of glasses

### **7. Diagnosis and assessment of Squint**

- i. Ocular position and motility examination
- ii. Synoptophore usage
- iii. Lees screen usage
- iv. Diplopia charting
- v. Assessment of strabismus - cover tests/prisms bars
- vi. Amblyopia diagnosis and treatment
- vii. Assessment of convergence, accommodation, stereopsis, suppression

## **8. Exophthalmometry**

Usage of Hertel's exophthalmometer - proptosis measurement

## **9. Contact lenses**

- Fitting and assessment of RGP and soft lenses
- Subjective verification of over refraction
- Complications arising of contact lens use
- Educating the patient regarding CL usage and imparting relevant knowledge of the complications arising thereon

## **10. Low Vision Aids**

- Knowledge of basic optical devices available and relative advantages and disadvantages of each.
- The basics of fitting with knowledge of availability & cost

### **III. The post graduate must be well versed with the following investigative modalities although the student may or may not perform it individually. But, she/he should be able to interpret results of the following tests:**

1. Fundus photography
2. Fluorescein angiography
3. Ophthalmic ultrasound A-scan/B scan
4. Automated perimetry for glaucoma and neurological lesions
5. Radiological tests - X rays - Antero posterior/ Lateral view  
PNS (Water's view) / Optic canal views  
  
Localisation of intra-ocular and intra-orbital FBs  
  
Interpretations of -USG/ CT/ MRI Scans
6. OCT and UBM
7. ERG, EOG, and VEP

### **IV. Minor surgical procedures – Must know and perform independently**

- Conjunctival and corneal foreign body removal on the slit lamp
- Chalazion incision and curettage
- Pterygium excision
- Biopsy of small lid tumours
- Suture removal- skin/conjunctival/corneal/ corneoscleral
- Tarsorrhaphy
- Subconjunctival injection
- Retrobulbar, parabolbar anaesthesia
- Posterior Sub-Tenon's injections

- Artificial eye fitting

## V. Surgical procedures

### 1. Must know and can perform independently

#### a. Ocular anaesthesia:

- Retrobulbar anaesthesia
- Peribulbar anaesthesia
- Facial blocks- O'Brein / Atkinson/Van lint and modifications
- Frontal blocks
- Infra orbital blocks
- Blocks for sac surgery

### 2. Must be able to independently perform and deal with complications arising from the following surgeries :

- Lid Surgery -       Tarsorrhaphy  
                              Ectropion and entropion  
                              Lid repair following trauma  
                              Epilation
- Destructive procedures  
                              Evisceration with or without implant  
                              Enucleation with or without implant
- Sac surgery
  - i. Dacryocystectomy
  - ii. Dacryocystorhinostomy
  - iii. Probing for congenital obstruction of nasolacrimal duct
- Strabismus surgery  
                              Recession and resection procedures on the horizontal recti.
- Orbit surgery  
                              Incision and drainage via anterior orbitotomy for abscess
- Cyclocryotherapy/Cyclophotocoagulation

### 3. PG Students should be well conversant with use of operating microscope and must be able to perform the surgeries listed below competently under the same:

- Cataract surgery
  - i. Standard ECCE (extracapsular cataract extraction; first year) with or without IOL implantation

- ii. Small incision ECCE with or without IOL implantation and/or Phacoemulsification with PC IOL implantation
  - iii. Intracapsular cataract extraction (second year)
  - iv. Cataract with Phacoemulsification (third year)
  - v. Secondary AC or PC IOL implantation
  - Vitrectomy/Scleral buckling
    - Intra-vitreous and intra-cameral (anterior chamber) injection techniques and doses of drugs for the same
    - Needs to know the basis of open sky vitrectomy (anterior segment) as well as management of cataract surgery complications.
    - Assisting vitrectomy and scleral buckling procedures
  - Ocular surface procedures
    - Pterygium excision with modifications
    - Conjunctival cyst excision/foreign body removal
    - Corneal foreign body removal
    - Conjunctival flap/ peritomy
  - Glaucoma
    - Trabeculectomy
  - Corneal
    - Repair of corneo - scleral perforations
    - Corneal suture removal
    - Application of glue and bandage contact lens
4. Should have performed/assisted the following microscopic surgeries
- i. Keratoplasty
    - Therapeutic and optical
  - ii Glaucoma surgery
    - Pharmacological modulation of trabeculectomy
    - Trabeculotomy
    - Goniotomy
    - Glaucoma valve implant surgery
5. Desirable to be able to perform following laser procedures
- Yag Capsulotomy
  - Laser iridotomy
  - Focal and panretinal photocoagulation
6. Should have assisted/knowledge of Keratorefractive procedures

### **Operations:**

The PG is provided with an opportunity to perform operations both extra-ocular and intra-ocular with the assistance of the senior post graduate students and/or under the direct supervision of a faculty member. The student is provided with an opportunity

to learn special and complex operations by assisting the senior post graduate student or the faculty in operations of cases of the specialty and be responsible for the post-operative care of these cases.

In **first phase**, the post graduate student is given training in preparations of cases for operation, pre-medication and regional anaesthetic blocks. In the **next phase**, the post graduate student assists the operating surgeon during the operations. In the **third phase**, the post graduate student operates independently assisted by senior post graduate student or a faculty member. She/he is required to be proficient in some operations and show familiarity with others.

## *Syllabus*

### **Course contents:**

These are only broad guidelines and are illustrative, there may be overlap between sections.

#### ***I. Basic Sciences:***

1. Orbital and ocular anatomy

- i. Gross anatomy
- ii. Histology
- iii. Embryology

2. Ocular Physiology

3. Ocular Pathology

4. Ocular Biochemistry

General biochemistry, biochemistry applicable to ocular function

5. Ocular Microbiology

General Microbiology, specific microbiology applicable to the eye

6. Immunology with particular reference to ocular immunology

7. Genetics in ophthalmology

8. Community Eye Health

#### ***II. Optics***

- a. Basic physics of optics
- b. Applied ophthalmic optics
- c. Applied optics including optical devices
- d. Disorders of Refraction

#### ***III. Clinical Ophthalmology***

- i. Disorders of the lids
- ii. Disorders of the lacrimal system
- iii. Disorders of the Conjunctiva
- iv. Disorders of the Sclera

- v. Disorders of the Cornea
- vi. Disorders of the Uveal Tract
- vii. Disorders of the Lens
- viii. Disorders of the Retina
- ix. Disorders of the Optic Nerve and Visual Pathway
- x. Disorders of the Orbit
- xi. Glaucoma
- xii. Neuro-ophthalmology
- xiii. Paediatric ophthalmology
- xiv. Ocular involvement in systemic disease
- xv. Immune ocular disorders
- xvi. Strabismus and Amblyopia
- xvii. Ocular oncology

## ***TEACHING AND LEARNING METHODS***

### **Teaching Methodology:**

The theoretical knowledge is imparted to the post graduate student through distinct courses of lecture demonstrations, seminars, symposia and inter- and intra-departmental meetings. The students are exposed to recent advances through discussions in journal clubs and participation in CMEs, and symposia.

### **The post graduate students are imparted clinical training in several ways:**

1. ***Group Discussion***

The junior post graduate students may present the symposium to their senior postgraduates where it is fully discussed before finally being discussed in front of the faculty or senior eye specialists. A free and fair discussion is encouraged. These discussions enable the post graduate students to prepare for a general discussion in the class.

2. ***Clinical Case discussion***

- a. Bedside discussion on the rounds and outpatient teaching take their toll with patient management. Therefore in addition to these, clinical case discussions should form part of a department's schedule at a fixed time every week. This could range from 1-2 hours and could be held at least once a week. The choice and manner of presentation and discussion varies widely and is left to the discretion of the department. Every effort should be made to include as wide a variety of cases as possible over three years with multiple repetitions. Problem oriented approach is better as it aids in decision making skills.

- b. In addition to bedside teaching rounds, at least 5-hr of formal teaching per week are necessary.
- c. Consultant case presentation is another approach which should be encouraged as it aids in solving complex problems and also is forum for discussion of interesting cases.
- d. Case discussions on the patient's records written by the student is to be encouraged as it helps exercise the student's diagnostic and decision making skills. It also helps the consultant in critical evaluation of the student's progress academically.
- e. Case presentation at other in-hospital multidisciplinary forums.
- f. The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- g. Department should encourage e-learning activities.

### 3. **Seminars**

Seminars should be conducted at least once weekly. The duration should be at least one hour. The topics selected should be repeated once in 3 years so as to cover as wide a range of topics as possible. Seminars could be individual presentations or a continuum (large topic) with many post graduate students participating.

### 4. **Journal clubs**

Journals are reviewed in particular covering all articles in that subject over a 6 months period and are discussed by the post graduate student under the following headings.

- 1) Aim
- 2) Methods
- 3) Observations
- 4) Discussions and
- 5) Conclusions

The post graduate student to whom the journal is allotted presents the journal summaries to the senior postgraduates. They are expected to show their understanding of the aspects covered in the article and clarify any of the points raised in the article, offer criticisms and evaluate the article in the light of known literature.

- 5. A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.

- 6. **Out-Patients:** For the first six months of the training programme, post graduate students may be attached to a faculty member to be able to pick up methods of history taking and ocular examination in ophthalmic practice. During this period

the post graduate student may also be oriented to the common ophthalmic problems. After 6 months, the clinical post graduate student may work independently, where he receives new and old cases including refractions and prescribes for them. The post graduate students are attached to a senior post graduate student and faculty member whom they can consult in case of difficulty.

7. **Wards:** Each post graduate student may be allotted beds in the in-patient section depending upon the total bed capacity and the number of the post graduates. The whole concept is to provide the post graduate student increasing opportunity to work with increasing responsibility according to seniority. A detailed history and case record is to be maintained by the post graduate student.

**Relevance of beds and admissions in Ophthalmology has really gone down at present, as most of the surgical and special investigative procedures are being performed on out-patient basis. Most of the teaching has to be imparted in out-patients department and special Clinics.**

#### 8. **Rotations: Specialty clinics**

The student may rotate in the following subspecialty clinics:

- Anterior segment and cataract
- Glaucoma
- Oculoplastics
- Paediatric ophthalmology and strabismus
- Retina and Uvea
- Cornea, Contact lens and low vision
- Neuroophthalmology
- Refractive Clinic

#### 9. **Practicals in Ocular Histopathology**

The post graduate students may be provided with fully stained slides of the ocular tissues along with relevant clinical data and discuss the diagnosis and differential diagnosis on the basis of the information provided

10. Attend accredited scientific meetings (CME, Symposia, and Conferences).
11. Additional sessions on basic sciences, biostatistics, research methodology, teaching methodology, hospital waste management, health economics, medical ethics and legal issues related to ophthalmology practice are suggested.
13. Maintenance of **log book:** Log books shall be checked and assessed periodically by the faculty members imparting the training.

**During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in medical colleges is mandatory.**

## ***ASSESSMENT***

### **FORMATIVE ASSESSMENT, ie, during the training**

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

### **FORMATIVE ASSESSMENT, ie., during the training**

#### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

**Quarterly assessment during the MS training should be based on following educational activities:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I)**

### **SUMMATIVE ASSESSMENT, ie., assessment at the end of training**

**The summative examination would be carried out as per the Rules given in POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

**The Post Graduate examination shall be in three parts:**

#### **1. Thesis:**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall

be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners. From regulations)

## **2. Theory Examination:**

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

**There shall be four theory papers.**

- Paper I:** Basic Sciences related to Ophthalmology, Refraction & Optics
- Paper II:** Clinical Ophthalmology
- Paper III:** Systemic Diseases in Relation to Ophthalmology
- Paper IV:** Recent Advances in Ophthalmology and Community Ophthalmology

## **3. Clinical/Practical and oral/viva voce examination**

### **Clinical**

- 1 long case
- 2 short cases with different problems
- 2 fundus Cases
- 1 refraction case

**Oral/Viva voce Examination shall be comprehensive enough to test the post graduate student's overall knowledge of the subject and shall include:**

- i. Instruments
- ii. Pathology specimens
- iii. Drugs, X-rays, USG/OCT/CT/MRI Scans, etc.
- iv. Visual fields and other ophthalmic diagnostic charts

## **Recommended Reading:**

### **Books (latest edition)**

1. Ophthalmic Surgery: Principles and Techniques. Blackwell Science. Albert DM.
2. Principles and Practice of Ophthalmology. Albert DM, Jakobiec. W B Saunders
3. Principles & Practice of Ophthalmology. Gholam A Paymen
4. The Current American Academy of Ophthalmology Basic and Clinical Science Course (13 volumes)
5. Duke Elder's Practice of Refraction. Abrams D. Churchill Livingstone.
6. Text book of Ophthalmology. Yanoff and Duker
7. Retina. Stephen J Ryan:
8. Ophthalmic Ultrasound: Sandra Byrne and Ronald Green.
9. Cornea: Fundamentals, Diagnosis, and Management. Krachmer JH, Mannis MJ, Holland EJ. Mosby Elsevier.
10. Ophthalmology. Yanoff N, Duker JS. Mosby Elsevier.
11. Review of Ophthalmology. Friedman NJ, Kaiser PK, Trattler WB. Elsevier Saunders, Philadelphia.
12. Corneal Transplantation. Vajpayee RB. Jaypee Brothers Medical Publishers (P) Ltd, New Delhi.
13. Fundamentals of Clinical Ophthalmology Series. Coster D. Cornea. Blackwell Publishing Limited.
14. The Contact Lens Manual. A practical guide to fitting. Gasson A, Morris A J. Butterworth Heinemann Elsevier.
15. Steinert's cataract surgery.
16. Shields Text book of glaucoma
17. Smith and Nozik : Uvea
18. Rootman's diseases of the orbit
19. Eyelid, conjunctival and orbital tumors. An atlas and textbook. Shields JA, Shields CL. Philadelphia: Lippincott Williams & Wilkins.
20. Intraocular tumors. An atlas and textbook. Shields JA, Shields CL.
21. Pediatric Ophthalmology. Taylor and Hoyt: Saunders Ltd.
22. Management of Strabismus and Amblyopia. Pratt-Johnson and Tilson: Thieme Verlag.
23. Handbook of Pediatric Eye and Systemic disease. Wright, Spiegel and Thompson.
24. Binocular Vision and Ocular Motility. Theory and Management of Strabismus. Von Noorden GK. Mosby.
25. Surgical Management of Strabismus. Helveston:
26. Strabismus: A Decision Making Approach. Von Noorden and Helveston:
27. Thyroid Eye Diseases. Char DR. Williams and Wilkins, Baltimore.

28. A Manual of Systematic Eyelid Surgery. Collin JRO (ed). Churchill Livingstone, Edinburgh.
29. Refractive Surgery. Agarwal A, Agarwal A, Jacob Soosan. Jaypee.
30. LASIK Complications, Prevention and management. Gimbel HV, Penno EEA. Slack Inc.
31. Management of Complications of Refractive Surgery. Alio JL, Azar DT. Springer.
32. Quality of Vision: Essential Optics for the Cataract and Refractive Surgeon. Holladay JT. Slack Inc.
33. Ocular Pharmacology: Havener
34. Anatomy: Wolff 's Anatomy of the Eye and Orbit
35. Physiology: Adler's Physiology of the Eye
36. Textbook of Ophthalmology (2 volumes). Easty DL, Sparrow JM. Oxford Oxford Medical Publications.
37. The Eye. Basic Sciences in Practice. Forrester JV, Dick AD, McMenamin PG, Lee WR. W B Saunders.
38. A Stereoscopic Atlas of Macular Diseases: Diagnosis and Treatment. Gass JDM.
39. Neuroophthalmology. Glaser JS. Lipincott Williams & Wilkins. .
40. Clinical Ophthalmic Pathology. Harry J, Misson G. Butterworth/Heinemann.
41. Inherited Retinal Diseases. A Diagnostic Guide. Jimenez Sierra JM, Ogden TE, Van Boemel GB. Mosby.
42. Clinical Ophthalmology. Kanski JJ. Butterworth/Heinemann.
43. ABC of Resuscitation. Colquhoun, M. C., Evans, T. R., Handley, A. J. BMJ Publishing Group.
44. Walsh and Hoyt's Clinical Neuroophthalmology (5 volumes). Miller NR, Newman NJ, Williams and Wilkins.
45. The human eye. Oyster CW Sinauer Associates. Sunderland. Massachusetts
46. Paediatric Ophthalmology. Taylor D. Blackwell Science.
47. Decision Making in Ophthalmology. Van Heuven WAJ, Zwann J. Mosby.
48. Parsons' Diseases of the eye. Sihota and Tandon.
49. Wills Eye Manual
50. International Council of Ophthalmology Residency Curriculum available at <http://www.icoph.org/>

### **Journals**

03-05 international Journals and 02 national (all indexed) journals

**Postgraduate Students Appraisal Form**  
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks\* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN ORTHOPAEDICS**

## **Preamble**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A postgraduate undergoing training MS in Orthopaedics should be trained to identify and recognize various congenital, developmental, inflammatory, infective, traumatic, metabolic, neuromuscular, degenerative and oncologic disorders of the musculoskeletal systems. She/he should be able to provide competent professional services to trauma and orthopaedic patients at a primary/ secondary/tertiary healthcare centres.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC LEARNING OBJECTIVES***

This will be dealt with under the following headings:

- Theoretical knowledge (Cognitive domain)
- Practical and clinical skills (psychomotor domain)
- Attitudes including communication skills (Affective domain)
- Writing thesis / Reviewing Research activities (Scholarly activity)
- Training in Research Methodology (Practice based learning, Evidence based practice)
- Professionalism
- Teaching skills

## ***SUBJECT SPECIFIC COMPETENCIES***

### **A. Cognitive domain**

**At the end of the M.S. Orthopaedics programme, the post graduate student should be able to:**

1. Demonstrate sufficient understanding of the basic sciences relevant to orthopaedic speciality through a problem based approach.
2. Describe the Principles of injury, its mechanism and mode, its clinical presentation, plan and interpret the appropriate investigations, and institute the management of musculoskeletally injured patient.

3. Identify and describe the surface anatomy and relationships within of the various bones, joints, ligaments, major arteries, veins and nerves of the musculoskeletal system of the spine, upper limb, lower limb and the pelvis, chest, abdomen and head & neck.
4. Define and describe the pathophysiology of shock (circulatory failure).
5. Define and describe the pathophysiology of Respiratory failure
6. Describe the principles and stages of bone and soft tissue healing
7. Understand and describe the metabolic, nutritional, endocrine, social impacts of trauma and critical illness.
8. Enumerate, classify and describe the various bony/soft tissue injuries affecting the axial and appendicular skeletal system in adults and children.
9. Describe the principles of internal and external fixation for stabilization of bone and joint injuries.
10. Describe the mechanism of homeostasis, fibrinolysis and methods to control haemorrhage
11. Describe the physiological coagulation cascade and its abnormalities
12. Describe the pharmacokinetics and dynamics of drug metabolism and excretion of analgesics, anti inflammatory, antibiotics, disease modifying agents and chemotherapeutic agents.
13. Understanding of biostatistics and research methodology
14. Describe the clinical presentation, plan and interpret investigations, institute management and prevention of the following disease conditions
  - a. Nutritional deficiency diseases affecting the bones and joints
  - b. Deposition arthropathies
  - c. Endocrine abnormalities of the musculoskeletal system
  - d. Metabolic abnormalities of the musculoskeletal system
  - e. Congenital anomalies of the musculoskeletal system
  - f. Developmental skeletal disorder of the musculoskeletal system
15. Describe the pathogenesis, clinical features plan and interpret investigations and institute the management in adults and children in
  - a. Tubercular infections of bone and joints (musculoskeletal system)
  - b. Pyogenic infections of musculoskeletal system
  - c. Mycotic infections of musculoskeletal system
  - d. Autoimmune disorders of the musculoskeletal system
  - e. Rheumatoid arthropathy, Ankylosing spondylitis, seronegative arthropathy
  - f. Osteoarthritis and spondylosis
16. Describe the pathogenesis, clinical presentation, plan and interpret investigations and institute appropriate treatment in the following conditions:
  - a. Post polio residual paralysis
  - b. Cerebral palsy
  - c. Muscular dystrophies and myopathies
  - d. Nerve Injuries
  - e. Entrapment neuropathies
17. Identify the diagnosis and describe management of musculoskeletal manifestation of AIDS and HIV infection

18. Describe the aetiopathogenesis, identify, plan and interpret investigation and institute the management of osteonecrosis of bones.
19. Identify situations requiring rehabilitation services and prescribe suitable orthotic and prosthetic appliances and act as a member of the team providing rehabilitation care
20. Identify a problem, prepare a research protocol, conduct a study, record observations, analyse data, interpret the results, discuss and disseminate the findings.
21. Identify and manage emergency situation in disorders of musculoskeletal system
22. Understanding of the basics of diagnostic imaging in orthopaedics like:
  - a. Plain x-ray
  - b. Ultrasonography
  - c. Computerised axial tomography
  - d. Magnetic resonance imaging
  - e. PET scan
  - f. Radio Isotope bone scan
  - g. Digital Subtraction Angiography (DSA)
  - h. Dual energy x-ray Absorptiometry
  - i. Arthrography
23. Describe the aetiopathogenesis, clinical presentation, Identification, Plan investigation and institute treatment for oncologic problems of musculoskeletal system both benign and malignancies, primary and secondary.
24. Understand the basics, principles of biomaterials and orthopaedic metallurgy
25. Describe the principles of normal and abnormal gait and understand the biomedical principles of posture and replacement surgeries.
26. Describe social, economic, environmental, biological and emotional determinants of health in a given patient with a musculoskeletal problem.

## **B. Affective Domain:**

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

### **Attitudes including Communication skills and Professionalism**

#### **a. Communication skills:**

- Exhibits participation in honest, accurate health related information sharing in a sensitive and suitable manner
- Recognizes that being a good communicator is essential to practice effectively

- Exhibits effective and sensitive listening skills
  - Recognises the importance and timing of breaking bad news and knows how to communicate
  - Exhibits participation in discussion of emotional issues
  - Exhibits leadership in handling complex and advanced communication
  - Recognizes the importance of patient confidentiality and the conflict between confidentiality and disclosure
  - Able to establish rapport in therapeutic bonding with patients, relatives and other stakeholders through appropriate communication
  - Able to obtain comprehensive and relevant history from patients/relatives
  - Able to counsel patients on their condition and needs
- b. **Teamwork:** Seek cooperation. Coordination and communication among treating specialties and paramedical staff
- c. **Counseling of relatives:** regarding patients condition, seriousness, bereavement and counseling for organ donation in case of brain stem death
- d. **Leadership:** Trauma prevention, education of the public, paramedical and medical persons. **Advocacy:** with the government and other agencies towards cause of trauma care
- e. **Ethics:** The Code of Medical Ethics as proposed by Medical Council of India will be learnt and observed.

## C. Psychomotor domain

### 1. At the end of the first year of M.S. Orthopaedics programme, the student should be able to:

1. Elicit a clinical history from a patient, do a physical examination, document in a case record, order appropriate investigations and make a clinical diagnosis
2. Impart wound care where applicable
3. Apply all types of POP casts/slabs, splints and tractions as per need
4. Identify shock and provide resuscitation
5. Perform aspiration of joints and local infiltration of appropriate drugs
6. Perform appropriate wound debridement
7. Perform arthrotomy of knee joint
8. Perform incision and drainage of abscess
9. Perform split thickness skin grafting
10. Perform fasciotomes
11. Apply external fixators
12. Apply skeletal tractions including skull tongs
13. Triage a disaster situation and multiple trauma patients in an emergency room
14. Perform on bone models, interfragmentary compression screws, external fixation, Tension band wiring and Broad plating
15. Perform closed reduction of common dislocations like shoulder and common fractures like collar fracture, supracondylar fracture.

16. Perform on a cadaver standard surgical approaches to the musculo skeletal system

**2. At the end of the second year of M.S. Orthopaedics course, the student should be able to:**

1. Take an informed consent for standard orthopaedic procedures
2. Perform closed/open biopsies for lesions of bone, joints and soft tissues
3. Perform split thickness skin grafting and local flaps
4. Perform on bone models, internal fixation with k-wires, screws, plates. Dynamic hip/condylar screws/nailing.
5. Perform sequestrectomy and saucerisation
6. Perform arthrotomy of joints like hip/shoulder, ankle, elbow
7. Perform repair of open hand injuries including tendon repair
8. Perform arthodesis of small joints
9. Perform diagnostic arthroscopy on models and their patients
10. Perform carpal tunnel/tarsal tunnel release
11. Apply ilizarov external fixator
12. Perform soft tissue releases in contractures, tendon lengthening and correction of deformities
13. Perform amputations at different levels
14. Perform corrective surgeries for CTEV, DDH, perthes/ skeletal dysplasia

**3. At the end of the third year of M.S. Orthopaedics programme, the student should be able to:**

1. Assist in the surgical management of polytrauma patient
2. Assist in Arthroplasty surgeries of hip, knee, shoulder and the ankle
3. Assist in spinal decompressions and spinal stabilizations
4. Assist in operative arthroscopy of various joints
5. Assist /perform arthrodesis of major joints like hip, knee, shoulder, elbow
6. Assist in corrective osteotomes around the hip, pelvis, knee, elbow, finger and toes
7. Assist in surgical operations on benign and malignant musculoskeletal tumour including radical excision and custom prosthesis replacement.
8. Assist in open reduction and internal fixations of complex fractures of acetabular, pelvis, IPSI lateral floating knee/elbow injuries, shoulder girdle and hand
9. Assist in spinal deformity corrections
10. Independently perform closed/open reduction and internal fixation with DCP, LCP, intrameduallary nailing, LRS
11. Assist in limb lengthening procedures
12. Assist in Revision surgeries
13. Provide pre and post OP care
14. Perform all clinical skills as related to the speciality.

# *Syllabus*

## **Course contents:**

### **1. Basic Sciences**

- Anatomy and function of joints
- Bone structure and function
- Growth factors and fracture healing
- Cartilage structure and function
- Structure and function of muscles and tendons
- Tendon structure and function
- Metallurgy in Orthopaedics
- Stem Cells in Orthopaedic Surgery
- Gene Therapy in Orthopaedics

### **2. Diagnostic Imaging in Orthopaedics**

**(Should know the interpretation and Clinical Correlation of the following): -**

- Digital Subtraction Angiography (DSA)
- MRI and CT in Orthopaedics
- Musculoskeletal USG
- PET Scan
- Radio-isotope bone scan

### **3. Metabolic Bone Diseases**

- Rickets and Osteomalacia
- Osteoporosis
- Scurvy
- Mucopolysaccharoidoses
- Fluorosis
- Osteopetrosis

### **4. Endocrine Disorders**

- Hyperparathyroidism
- Gigantism, Acromegaly

### **5. Bone and Joint Infections**

- Pyogenic Haematogenous Osteomyelitis - Acute and Chronic
- Septic arthritis
- Fungal infections
- Miscellaneous infections
- Gonococcal arthritis

- Bone and joint brucellosis
- AIDS and the Orthopaedic Surgeon (universal precautions)
- Musculoskeletal Manifestations of AIDS
- Pott's spine
- Tubercular synovitis and arthritis of all major joints

## **6. Poliomyelitis**

- General considerations
- Polio Lower limb and spine
- Management of Post Polio Residual Palsy (PPRP)

## **7. Orthopaedic Neurology**

- Cerebral Palsy
- Myopathies

## **8. Peripheral Nerve Injuries**

- Traumatic
- Entrapment Neuropathies

## **9. Diseases of Joints**

- Osteoarthritis
- Calcium Pyrophosphate Dihydrate (CPPD), Gout
- Collagen diseases

## **10. Systemic Complications in Orthopaedics**

- Shock
- Crush syndrome
- Disseminated Intravascular Coagulation (DIC)
- Acute Respiratory Distress Syndrome (ARDS)

## **11. Bone Tumors**

- Benign bone tumors
- Malignant bone tumors
- Tumor like conditions
- Metastatic bone Tumors

## **12. Miscellaneous Diseases**

- Diseases of muscles
- Fibrous Dysplasia
- Unclassified diseases of bone
- Paget's disease

- Peripheral vascular disease
- Orthopaedic manifestations of bleeding disorders

### **13. Regional Orthopaedic Conditions of Adults and Children**

- The spine
- The shoulder
- The elbow
- The hand
- The wrist
- The hip
- The knee
- The foot and ankle
- The pelvis

### **14. Biomaterials**

- Orthopaedic metallurgy
- Bio-degradable implants in Orthopaedics
- Bone substitutes
- Bone Banking

### **15. Fracture and Fracture-Dislocations**

General considerations

- Definitions, types, grades, patterns and complications
- Pathology of fractures and fracture healing
- Clinical and Radiological features of fractures and dislocations
- General principles of fracture treatment
- Recent advances in internal fixation of fractures
- Locking plate osteosyntheses
- Less Invasive Stabilisation System (LISS)
- Ilizarov technique
- Bone grafting and bone graft substitutes
- Open fractures and soft tissue coverage in the lower extremity
- Compartment syndrome
- Fractures of the upper extremity and shoulder girdle
- Fractures of the lower extremity
- Fractures of the hip and pelvis
- Malunited fractures
- Delayed union and non union of fractures
- Fractures/dislocations and fracture - dislocations of spine

### **16. Dislocations and Subluxations**

- Acute dislocations
- Old unreduced dislocations

- Recurrent dislocations

### **17. Traumatic Disorders of Joints (Sports Injuries)**

- Ankle injuries
- Knee injuries
- Shoulder and elbow injuries
- Wrist and hand injuries

### **18. Arthrodesis**

- Arthrodesis of lower extremity and hip
- Arthrodesis of upper extremity
- Arthrodesis of spine

### **19. Arthroplasty**

- Biomechanics of joints and replacement of the following joints.
- Knee
- Ankle
- Shoulder
- Elbow

### **20. Minimally Invasive Surgery (MIS)**

#### **Arthroscopy**

- General principles of Arthroscopy
- Arthroscopy of knee and ankle
- Arthroscopy of shoulder and elbow

### **21. Amputations and Disarticulations**

- Amputations and disarticulations in the lower limb
- Amputations and disarticulations in the upper limb

### **22. Rehabilitation - Prosthetics and Orthotics**

#### **23. Pediatric orthopaedics:**

- Fractures and dislocations in children
- Perthes' disease
- Slipped capital femoral epiphysis
- Congenital Dislocation of Hip (CDH)
- Neuromuscular disorders

### **24. Spine**

- a) **Spinal trauma:** diagnosis and management including various types of fixations
  - i. Rehabilitation of paraplegics/quadriplegics
  - ii. Management of a paralyzed bladder
  - iii. Prevention of bed sores and management of established bed sores

- iv. Exercise programme and Activities of Daily Living (ADL)
- v. Psychosexual counseling

**b) Degenerative disorders of the spine**

- i. Prolapsed Inter Vertebral Disc (PIVD)
- ii. Lumbar Canal Stenosis (LCS)
- iii. Spondylolysis/Spondylolisthesis
- iv. Lumbar Spondylosis
- v. Ankylosing Spondylitis
- vi. Spinal fusion: various types and their indications.

**25. Triage, Disaster Management, BTLS and ATLS**

**26. Recent advances in orthopaedics**

- Autologous chondrocyte implantation
- Mosaicplasty
- Video assisted Thoracoscopy (VATS)
- Endoscopic spine surgery
- Metal on metal arthroplasty of hip
- Surface replacements of joints
- Microsurgical techniques in Orthopaedics
- Designing a modern orthopaedic operation theatre
  - Sterilization
  - Theatre Discipline
  - Laminar air flow
  - Modular OTs

## ***TEACHING AND LEARNING METHODS***

- Emphasis should be given to various small group teachings rather than didactic lectures.
- CASE PRESENTATION once a week in the ward, in the outpatient department and special clinics.
- Seminars / Symposia – Twice a month; Theme based student centered
- Journal club/ Review : Twice a month
- Academic grand ward rounds: Twice a month presentation of cases by residents and clinically applicable discussions.
- **ORTHO RADIOLOGY MEETS:** Twice a month discussions amongst Ortho & Radiology Residents under facilitation of faculty on various imaging modalities used and its interpretation
- **ORTHO SURGICAL PATHOLOGICAL MEET:** Special emphasis on the surgical pathology radiological aspect of the case in the pathology department. Clinician (Ortho resident) presenting the clinical details of the case, radiology PG student describes the Radiological findings and its interpretation and Pathology student describes the morbid anatomy and histopathology of the same case.
- **SKILLS LAB SESSIONS:** Once a fortnight for all two years.
- **Clinical teaching** in the OPD, Emergency room, ICU, OR as per the situation.
- **Mortality & Morbidity meetings with SURGICAL AUDIT:** Once a month

- Maintenance of log book: to be signed by the faculty in charge
- The post graduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- A post graduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the post graduate degree examination.
- Should have attended two conferences/CMEs/Workshops during his tenure as a postgraduate
- Department should encourage e-learning activities.

### **Rotations:**

#### **1. Clinical postings**

A major portion of posting should be in Orthopaedics department. It should include in-patients, out-patients, ICU, trauma, emergency room and speciality clinics.

#### **Rotation of posting**

- Inter-unit rotation in the department should be done for a period of up to one year.
- Rotation in appropriate related subspecialties for a total period not exceeding 06 months.

#### **Clinical meetings:**

There should be intra- and inter- departmental meetings for discussing the uncommon /interesting cases involving multiple departments.

**Log book:** Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

**During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in medical colleges is mandatory.**

### **ASSESSMENT**

Assessment should be comprehensive and objective assessing the competencies stated in the course. The assessment is both formative and summative. Formative is spread over the entire duration of the programme and the summative is as per university examination pattern.

## **FORMATIVE ASSESSMENT, during the training,**

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

**Quarterly assessment during the MS training should be based on following educational activities:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

## **SUMMATIVE ASSESSMENT, at the end of the course,**

### **Post Graduate Examination**

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

The Post Graduate examination shall be in three parts: -

#### **1. Thesis**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

#### **2. Theory:**

The examinations shall be organized on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

There shall be four theory papers as follows:

**Paper I:** Basic Sciences as applied to Orthopaedics

**Paper II:** Traumatology and Rehabilitation

**Paper III:** Orthopaedic diseases

**Paper IV:** Recent advances in Orthopaedic surgery + General Surgery as applied to Orthopaedics

3. **Practical/Clinical:** The practical examination should consist of the following and should be spread over two days, if the number of post graduate students appearing is more than five.

1. One long case: History taking, physical examination, interpretation of clinical findings, differential diagnosis, investigations, prognosis and management.
2. Short cases from various sections of the speciality (three)

#### 4. Oral/Viva-voce Examination

- Surgical Anatomy including Osteology
- Instruments
- Radiology
- Surgical Pathology
- Orthotics and prosthetics

#### Recommended Reading:

##### Books (latest edition)

1. Campbell's Operative Orthopaedics, Vols 1,2,3 & 4
2. Mercer's Orthopaedic Surgery
3. Rockwood And Greens – Fractures In Adults, Vol 1& 2
4. Fractures In Children – Rockwood & Wilkins
5. Physiological Basis Of Medical Practice – Best And Taylor's
6. Arthroscopic Surgery Of The Knee – Johannes
7. Paediatric Orthopaedics – Tachidjian, Vol 4
8. Concise System Of Orthopaedics And Fractures – Graham Apley
9. Orthopaedics And Traumatology – Natarajan
10. Outline Of Fractures Adams, Hamblen
11. Textbook Of Orthopaedics And Trauma – Kulkarni, Vol 1
12. B.D. Chaurasia's Human Anatomy, Vol 1, Vol 2, Vol 3
13. Pharmacology And Pharmacotherapeutics – Satoskar
14. Orthopaedics Anatomy And Surgical Approaches Frederick Wreckling

15. The Art Of Aesthetic Plastic Surgery – John R Levis, Vol 1
16. Current Concepts In Orthopaedics Dr. D. K. Tareja
17. Custom Mega Prosthesis & Limb Salvage Surgery Dr. Mayilvahanan
18. Advances In Operative Orthopaedics
19. Green's Operative Hand Surgery-Vol. 1&. 2, Green, David P; Hotchkiss, Robert N
20. Tachdjian's Pediatric Orthopaedics-Vol. 1, Vol 2, Vol 3, Herring, John Anthony
21. Surgical Exposures In Orthopedics:The Anatomic Approach, Hoppenfeld, Stanley; De Boer,Piet
22. Adams's Outline Of Orthopaedics, Hamblen, David L; Simpson, Hamish R
23. Text Book Of Ilizarov Surgical Techniques Bone Correction And Lengthening, Golyakhovsky, Vladimir; Frankel, Victor H
24. Current Techniques In Total Knee Arthroplasty, Sawhney G S
25. Applied Orthopaedic Biomechanics, Dutta, Santosh; Datta,Debasis
26. Essential Orthopaedics And Trauma, Dandy, David J; Edwards, Dennis J
27. Adams's Outlines Of Fractures;Including Joint Injuries, Hamblen, David L; Simpson, A Hamish R W
28. Orthopedic Physical Assessment, Magee, David J
29. Turek's Textbook Of Orthopaedics Vol 1 & 2, Turek's
30. Orthopaedics Surgical Approach, Miller

### **Journals**

03-05 international Journals and 02 national (all indexed) journals

Postgraduate Students Appraisal Form

Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks\* \_\_\_\_\_

\*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD

# **GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN GENERAL SURGERY**

## **Preamble:**

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A post graduate specialist having undergone the required training should be able to recognize the health needs of the community, should be competent to handle effectively medical / surgical problems and should be aware of the recent advances pertaining to his specialty. The PG student should be competent to provide professional services with empathy and humane approach. The PG student should acquire the basic skills in teaching of medical / para-medical students and is also expected to know the principles of research methodology and self-directed learning for continuous professional development.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## ***SUBJECT SPECIFIC LEARNING OBJECTIVES***

### **Clinical Objectives**

At the end of postgraduate training, the PG student should be able to: -

1. diagnose and appropriately manage common surgical ailments in a given situation.
2. provide adequate preoperative, post-operative and follow-up care of surgical patients.
3. identify situations calling for urgent or early surgical intervention and refer at the optimum time to the appropriate centers.
4. counsel and guide patients and relatives regarding need, implications and problems of surgery in the individual patient.
5. provide and coordinate emergency resuscitative measures in acute surgical situations including trauma.
6. organize and conduct relief measures in situations of mass disaster including triage.

7. effectively participate in the National Health Programs especially in the Family Welfare Programs.
8. discharge effectively medico-legal and ethical responsibilities and practice his specialty ethically.
9. must learn to minimize medical errors.
10. must update knowledge in recent advances and newer techniques in the management of the patients.
11. must learn to obtain informed consent prior to performance of operative procedure.
12. perform surgical audit on a regular basis and maintain records (manual and/or electronic) for life.
13. participate regularly in departmental academic activities by presenting Seminar, Case discussion, Journal Club and Topic discussion on weekly basis and maintain logbook.
14. demonstrate sufficient understanding of basic sciences related to his specialty.
14. plan and advise measures for the prevention and rehabilitation of patients belonging to his specialty.

**Research:**

The student should:

1. know the basic concepts of research methodology, plan a research project and know how to consult library.
2. should have basic knowledge of statistics.

**Teaching:**

The student should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students.

**Professionalism:**

1. The student will show integrity, accountability, respect, compassion and dedicated patient care. The student will demonstrate a commitment to excellence and continuous professional development.
2. The student should demonstrate a commitment to ethical principles relating to providing patient care, confidentiality of patient information and informed consent.
3. The student should show sensitivity and responsiveness to patients' culture, age, gender and disabilities.

***SUBJECT SPECIFIC COMPETENCIES***

**By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:**

**A. Cognitive domain**

- Demonstrate knowledge of applied aspects of basic sciences like applied anatomy, physiology, biochemistry, pathology, microbiology and pharmacology.
- Demonstrate knowledge of the bedside procedures and latest diagnostics and therapeutics available.
- Describe aetiology, pathophysiology, principles of diagnosis and management of common surgical problems including emergencies, in adults and children.
- Demonstrate the theoretical knowledge of general principles of surgery.
- Demonstrate the theoretical knowledge of systemic surgery including disaster management and recent advances.
- Demonstrate the theoretical knowledge to choose, and interpret appropriate diagnostic and therapeutic imaging including ultrasound, Mammogram, CT scan, MRI.
- Demonstrate the knowledge of ethics, medico-legal aspects, communication skills and leadership skills. The PG student should be able to provide professional services with empathy and humane approach.

**B. Affective domain**

- Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
- Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
- Develop communication skills to word reports, obtain a proper relevant history and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.
- Obtain informed consent for any examination/procedure and explain to the patient and attendants the disease and its prognosis with a humane approach.
- Provide appropriate care that is ethical, compassionate, responsive and cost effective and in conformation with statutory rules.

**C. Psychomotor domain**

- Perform a humane and thorough clinical examination including internal examinations and examinations of all organs/systems in adults and children
- Write a complete case record with all necessary details.
- Arrive at a logical working diagnosis / differential diagnosis after clinical examination.
- Order appropriate investigations keeping in mind their relevance (need based).
- Choose, perform and interpret appropriate imaging in trauma - ultrasound FAST (Focused Abdominal Sonography in Trauma).

- Perform minor operative procedures and common general surgical operations independently and the major procedures under guidance.
- Provide basic and advanced life saving support services in emergency situations
- Provide required immediate treatment and comprehensive treatment taking the help of specialist as required.
- Perform minimally invasive surgery in appropriate clinical settings. Must have undergone basic training in operative laparoscopy related to general and GI Surgery.
- Undertake complete patient monitoring including the preoperative and post operative care of the patient.
- Write a proper discharge summary with all relevant information.

## ***Syllabus***

### **Course Contents:**

No limit can be fixed and no fixed number of topics can be prescribed as course contents. She/he is expected to know the subject in depth, however, emphasis should be on the diseases/health problems most prevalent in that area. Knowledge of recent advances and basic sciences as applicable to his/her specialty should get high priority. Competence in surgical skills commensurate with the specialty (actual hands - on training) must be ensured.

### **1. General topics:**

A student should have fair knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology and Pharmacology) as applied to his specialty. Further, the student should acquire in-depth knowledge of his subject including recent advances and should be fully conversant with the bedside procedures (diagnostic and therapeutic) and having knowledge of latest diagnostics and therapeutics available.

1. History of medicine with special reference to ancient Indian texts
2. Health economics - basic terms, health insurance
3. Medical sociology, doctor-patient relationship, family adjustments in disease, organizational behavior, conflict resolution
4. Computers - record keeping, computer aided learning, virtual reality, robotics
5. Hazards in hospital and protection:  
AIDS, hepatitis B, tuberculosis, radiation, psychological
6. Environment protection - bio-medical waste management
7. Surgical audit, evidence based surgical practice, quality assurance
8. Concept of essential drugs and rational use of drugs
9. Procurement of stores and material & personal management

10. Research methodology - library consultation, formulating research, selection of topic, writing thesis protocol, preparation of consent form from patients
11. Bio-medical statistics, clinical trials
12. Medical ethics
13. Consumer protection
14. Newer antibiotics
15. Problem of resistance.
16. Sepsis - SIRS
17. Nosocomial infection
18. Advances in imaging technologies
19. Disaster management, mass casualties, Triage
20. O.T. design, technologies, equipment
21. Critical care in surgical practice
22. Response to trauma
23. Wound healing
24. Fluid and electrolyte balance
25. Nutrition
26. Blood transfusion
27. Brain death
28. Cadaveric organ retrieval

### **1. Systemic Surgery**

The student must acquire knowledge in the following important topics are but teaching should not be limited to these topics. A standard text-book may be followed, which will also identify the level of learning expected of the trainees.

- Wound healing including recent advances
- Asepsis, antiseptics, sterilization and universal precaution
- Surgical knots, sutures, drains, bandages and splints
- Surgical infections, causes of infections, prevention
- Common aerobic and anaerobic organisms and newer organisms causing infection including *Helicobacter Pylori*
- Tetanus, gas gangrene treatment & prevention
- Chronic specific infections TB, Filariasis
- Boils, cellulites, abscess, necrotizing fasciitis and synergistic infection
- Antibiotic therapy rationale including antibiotic prophylaxis, misuse, abuse
- Hospital acquired nosocomial infection causes and prevention including MRSA etc.
- HIV, AIDS and Hepatitis B & C, Universal precautions when dealing with patients suffering from these diseases
- Fluid and electrolyte balance including acid – base disturbance, consequences,

interpretation of blood gas analysis data and management

- Rhabdomyolysis and prevention of renal failure
- Shock (septicaemic, hypovolaemic, Neurogenic, anaphylactic), etiology, pathophysiology and management
- Blood and blood components, transfusion indication, contraindication, mismatch and prevention and management of complications of massive blood transfusion
- Common preoperative preparation (detailed preoperative workup, risk assessment according to the disease and general condition of the patient as per ASA grade) and detailed postoperative complications following major and minor surgical procedures
- Surgical aspects of diabetes mellitus particularly management of diabetic foot and gangrene, preoperative control of diabetes, consequences of hypo- and hyperglycaemia in a postoperative setting
- Consequences and management of bites and stings including snake, dog, human bites
- Mechanisms and management of missile, blast and gunshot injuries
- Organ transplantation: Basic principles including cadaver donation, related Human Organ Transplant Acts, ethical and medicolegal aspects.
- Nutritional support to surgical patients
- Common skin and subcutaneous condition
- Sinus and fistulae, pressure sores
- Acute arterial occlusion, diagnosis and initiate management
- Types of gangrene, Burger's disease and atherosclerosis
- Investigations in case of arterial obstruction, amputation, vascular injuries: basic principles and management
- Venous disorders: Varicose veins
- Diagnosis, principles of therapy, prevention of DVT: basic principles and management
- Lymphatic: Diagnosis and principles of management of lymphangitis and lymphedema
- Surgical management of Filariasis
- Burns: causes, prevention and management
- Wounds of scalp and its management
- Recognition, diagnosis and monitoring of patients with head injury, Glasgow coma scale
- Undergo advanced trauma and cardiac support course (certified) before appearing in final examination
- Recognition of acute cerebral compression, indication for referrals.
- Cleft lip and palate
- Leukoplakia, retention cysts, ulcers of tongue

- Oral malignancies
- Salivary gland neoplasms
- Branchial cyst, cystic hygroma
- Cervical lymphadenitis nonspecific and tuberculous, metastatic lymph nodes and lymphomas.
- Diagnosis and principles of management of goitre
- Thyroglossal cyst and fistula
- Thyrotoxicosis
- Thyroid neoplasms
- Management of solitary thyroid nodule
- Thoracic outlet syndrome
- Management of nipple discharge
- Breast abscess
- Clinical breast examination, breast self examination
- Screening and investigation of breast lump
- Concept of Single Stop Breast Clinic
- Cancer breast diagnosis, staging and multimodality management (common neoadjuvant and adjuvant and palliative chemotherapy protocols and indications of radiation and hormonal therapy, pathology and interpretation of Tumour Markers, breast cancer support groups and counseling)
- Recognition and treatment of pneumothorax, haemothorax
- Pulmonary embolism: Index of suspicion, prevention/recognition and treatment
- Flail chest, stove in chest
- Postoperative pulmonary complication
- Empyema thoracis
- Recognition of oesophageal atresia and principles of management
- Neoplasms of the lung including its prevention by tobacco control
- Cancer oesophagus: principles of management including importance of early detection and timely referral to specialist
- Achalasia cardia
- Gastro-oesophageal reflux disease (GERD)
- Congenital hypertrophic pyloric stenosis
- Aetiopathogenesis, diagnosis and management of peptic ulcer including role of H. Pylori and its diagnosis and eradication
- Cancer stomach
- Signs and tests of liver dysfunction
- Amoebic liver abscess and its non-operative management
- Hydatid cyst and its medical and surgical management including laparoscopic management
- Portal hypertension, index of suspicion, symptoms and signs of liver failure and

timely referral to a specialist center

- Obstructive jaundice with emphasis on differentiating medical vs surgical Jaundice, algorithm of investigation, diagnosis and surgical treatment options
- Neoplasms of liver
- Rupture spleen
- Indications for splenectomy
- Clinical features, diagnosis, complications and principles of management of cholelithiasis and cholecystitis including laparoscopic cholecystectomy
- Management of bile duct stones including endoscopic, open and laparoscopic management
- Carcinoma gall bladder, incidental cancer gallbladder, index of suspicion and its staging and principles of management
- Choledochal cyst
- Acute pancreatitis both due to gallstones and alcohol
- Chronic pancreatitis
- Carcinoma pancreas
- Peritonitis: causes, recognition, diagnosis, complications and principles of management with knowledge of typhoid perforation, tuberculous peritonitis, postoperative peritonitis
- Abdominal pain types and causes with emphasis on diagnosing early intra-abdominal acute pathology requiring surgical intervention
- Intestinal amoebiasis and other worms manifestation (Ascariasis) and their surgical complications (Intestinal Obstruction, perforation, gastrointestinal bleeding, involvement of biliary tract)
- Abdominal tuberculosis both peritoneal and intestinal
- Intestinal obstruction
- **Appendix:** Diagnosis and management of acute appendicitis
- Appendicular lump and abscess

### **Colon**

- Congenital disorders, Congenital megacolon
- Colitis infective / non infective
- Inflammatory bowel diseases
- Premalignant conditions of large bowel
- Ulcerative colitis
- Carcinoma colon
- Principles of management of types of colostomy

### **Rectum and Anal Canal:**

- Congenital disorders, Anorectal anomalies
- Prolapse of rectum

- Carcinoma rectum
- Anal Canal: surgical anatomy, features and management of fissures, fistula - in – ano.
- Perianal and ischiorectal abscess
- Haemorrhoids – Non-operative outpatient procedures for the control of bleeding (Banding, cryotherapy, injection) operative options - open and closed haemorrhoidectomy and stapled haemorrhoidectomy
- Anal carcinoma
- Clinical features, diagnosis, complication and principles of management of inguinal hernia including laparoscopic repair
- Umbilical, femoral hernia and epigastric hernia
- Open and Laparoscopic repair of incisional/primary ventral hernia
- Urinary symptoms and investigations of urinary tract
- Diagnosis and principles of management of urolithiasis
- Lower Urinary tract symptoms or prostatism
- Benign prostatic hyperplasia; diagnosis and management
- Genital tuberculosis in male
- Phimosi and paraphimosi
- Carcinoma penis
- Diagnosis and principles of treatment of undescended testis
- Torsion testis
- Hydrocele, haematocele and pyocele Varicocele: Diagnosis (Medical Board for fitness)
- Varicocele: Diagnosis (Medical Board for fitness)
- Acute and chronic epididymo-orchitis
- Testicular tumours
- Principles of management of urethral injuries
- Management of soft tissue sarcoma
- Prosthetic materials used in surgical practice
- Telemedicine, teleproctoring and e-learning
- Communication skills

A student should be expert in good history taking, physical examination, providing basic life support and advanced cardiac life support, common procedures like FNAC, Biopsy, aspiration from serous cavities, lumbar puncture etc. The student should be able to choose the required investigations.

**Clinical cases and Symptoms-based approach to the patient with:**

1. Ulcers in oral cavity

2. Solitary nodule of the thyroid
3. Lymph node in the neck
4. Suspected breast lump
5. Benign breast disease
6. Acute abdominal pain
7. Blunt Trauma Abdomen
8. Gall stone disease
9. Dysphagia
10. Chronic abdominal pain
11. Epigastric mass
12. Right hypochondrium mass
13. Right iliac fossa mass
14. Renal mass
15. Inguino-scrotal swelling
16. Scrotal swelling
17. Gastric outlet obstruction
18. Upper gastrointestinal bleeding
19. Lower gastrointestinal bleeding
20. Anorectal symptoms
21. Acute intestinal obstruction
22. Obstructive jaundice
23. Acute retention of Urine
24. Bladder outlet obstruction
25. Haematuria
26. Peripheral vascular disease
27. Varicose veins
28. New born with developmental anomalies
29. Hydronephrosis , Pyonephrosis, perinephric abscess
30. Renal tuberculosis
31. Renal tumors
32. Carcinoma prostate
33. Genital tuberculosis in male

**At the end of the course, post graduate students should be able to perform independently (including perioperative management) the following:**

- Start IV lines and monitor infusions
- Start and monitor blood transfusion
- Venous cut-down
- Start and manage a C.V.P. line
- Conduct CPR (Cardiopulmonary resuscitation)

- Basic/ advance life support
- Endotracheal intubation
- Insert nasogastric tube
- Proctoscopy
- Urethral catheterisation
- Surgical management of wounds
- Biopsies including image guided
- Manage pneumothorax / pleural space collections
- Infiltration, surface and digital Nerve blocks
- Incise and drain superficial abscesses
- Control external hemorrhage
- Vasectomy (Preferably non-scalpel)
- Circumcision
- Surgery for hydrocele
- Surgery for hernia
- Surgery and Injection/banding of piles
- Management of all types of shock
- Assessment and management of burns
- Hemithyroidectomy
- Excision of thyroglossal cyst
- Excision Biopsy of Cervical Lymphnode
- Excision of benign breast lump
- Modified Radical mastectomy
- Axillary Lymphnode Biopsy
- Excision of gynaecomastia
- Excision of skin and subcutaneous swellings
- Split thickness skin graft
- Management of hernias
- Laparoscopic and open cholecystectomy
- Management of Liver abscess
- appendectomy
- Management of intestinal obstruction, small bowel resection, perforation and anastomosis
- Colostomy

**The student must have observed or assisted (the list is illustrative) in the following:**

- Hartmann's procedure for cancer rectum
- Splenectomy (emergency)
- Stomach perforation
- Varicose Vein surgery

- Craniotomy (Head Injury)
- Superficial parotidectomy
- Submandibular gland excision
- Soft tissue tumours including sarcoma
- Pancreaticoduodenal resection
- Hydatid cyst liver
- Pancreatic surgery
- Retroperitoneal operations

## ***TEACHING AND LEARNING METHODS***

### **Teaching methodology**

Didactic lectures are of least importance; small group discussion such as seminars, journal clubs, symposia, reviews and guest lectures should get priority for theoretical knowledge. Bedside teaching, grand rounds, structured interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning with appropriate emphasis on e-learning. Student should have hand-on training in performing various procedures and ability to interpret various tests/investigations. Exposure to newer specialized diagnostic/therapeutic procedures concerning her/his subject should be given. Self-learning tools like assignments and case-based learning may be promoted.

### **1. Clinical postings**

A major portion of posting should be in General Surgery. It should include in-patients, out-patients, ICU, trauma, emergency room and speciality clinics.

#### **Rotation of posting**

- Inter-unit rotation in the department should be done for a period of up to one year.
- Rotation in appropriate related subspecialties for a total period not exceeding 06 months.

### **2. Clinical meetings:**

There should be intra- and inter- departmental meetings for discussing the uncommon /interesting cases involving multiple departments.

- 3. Log book:** Each student must be asked to present a specified number of cases for clinical discussion, perform procedures/tests/operations/present seminars/review articles from various journals in inter-unit/interdepartmental teaching sessions. They should be entered in a Log Book. The Log books shall be checked and assessed periodically by the faculty members imparting the training.

### **4. Thesis writing and research:**

Thesis writing is compulsory.

5. The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
6. A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
7. The student should know the basic concepts of research methodology, plan a research project, be able to retrieve information from the library. The student should have a basic knowledge of statistics.
8. Department should encourage e-learning activities.

**During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in the medical colleges is mandatory.**

## ***ASSESSMENT***

Assessment should be comprehensive & objective. It should address the stated competencies of the course. The assessment needs to be spread over the duration of the course.

**FORMATIVE ASSESSMENT, i.e., assessment during the training would include:**

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

**Quarterly assessment during the MS training should be based on following educational activities:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**

#### **4. Departmental and interdepartmental learning activity**

#### **5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).**

### **SUMMATIVE ASSESSMENT, ie., assessment at the end of training**

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

The examination will be in three parts:

#### **1. Thesis**

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the candidate to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A candidate shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

#### **2. Theory**

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify candidate's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

Theory shall consist of four papers of 3 hours each.

**Paper I:** Basic Sciences

**Paper II:** Principles and Practice of Surgery

**Paper III:** Principles and practice of Operative Surgery

**Paper IV:** Recent Advances in Surgery

**3. Clinical / Practical and viva voce Examination**

Clinical examination shall be conducted to test the knowledge, skills, attitude and competence of the post graduate students for undertaking independent work as a specialist/Teacher, for which post graduate students shall examine a minimum one long case and two short cases.

The Oral examination shall be thorough and shall aim at assessing the post graduate student's knowledge and competence about the subject, investigative procedures, therapeutic technique and other aspects of the specialty, which form a part of the examination.

Assessment may include Objective structured clinical examination.(OSCE)

Oral/Viva-voce examination needs to assess knowledge on X-rays, instrumentation, operative procedures. Due weightage should be given to Log Book Records and day-to-day observation during the training.

**Recommended Reading:**

**Books (latest edition)**

1. *Text Book of Surgery*, by Christopher Davis
2. ASI Text Book of Surgery
3. *Surgery of Colon, Rectum and Anal canal*, by Goligher J C
4. *Schwartz Text Book of Surgery*
5. *Textbook on Laparoscopic Surgery*
6. *Trauma (Mattox)*
7. *Recent Advances in Surgery*
8. *Year Book of Surgery*
9. *Surgical Clinics of North America*
10. *Short practice of Surgery* by Bailey and Love
11. *A manual of clinical Surgery*, by S Das
12. Hamilton Bailey's demonstration of clinical signs
13. *Pye's Surgical Handicraft*

**Journals**

03-05 international Journals and 02 national (all indexed) journals

**Postgraduate Students Appraisal Form**  
Pre / Para /Clinical Disciplines

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / recent advances learning										
2.	Patient based /Laboratory or Skill based learning										
3.	Self directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										

Publications

Yes/ No

Remarks\* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\*REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF CONSULTANT

SIGNATURE OF HOD



# **SANTOSH**

## **Deemed to be University**

(Established u/s 3 of the UGC Act, 1956)

### **REVISED REGULATIONS AND SYLLABUS FOR THE MDS DEGREE COURSES - 2018**

In accordance of the Rules and Bye Laws of the Santosh Deemed to be University, Ghaziabad the Academic Council of the Santosh Deemed to be University, hereby makes the following regulations and Syllabus for the MDS Degree Courses.

#### **CHAPTER – I**

##### **1. SHORT TITLE:**

These regulations shall be called **“THE REGULATIONS AND SYLLABUS FOR THE MASTER OF DENTAL SURGERY DEGREE COURSES – 2018 OF THE SANTOSH DEEMED TO BE UNIVERSITY, GHAZIABAD”**.

##### **2. COMMENCEMENT:**

These Regulations, curriculum and the Syllabi are in accordance with the Dental Council of India’s Revised MDS Course Regulations, 01.09.2017, 14.03.2018 & 02.09.2019 and are subjected to modifications by the Academic Council of the Santosh Deemed to be University from time to time. These are made applicable to the students admitted to the MDS course under Santosh Deemed to be University from the academic year 2018-19.

##### **3. ELIGIBILITY:**

- (1) A candidate for admission to the MDS (Master of Dental Surgery) Degree Course must have a recognized degree of BDS (Bachelor of Dental Surgery) awarded by an Indian University in of respect of recognized Dental College under Section 10(2) of the Dentists Act, 1948 or an equivalent qualification recognized by the Dental Council of India and should have obtained permanent registration with the State Dental Council.

Candidates not possessing a recognized Dental qualification for the above purpose should secure the prior approval of his/her qualifications by the Dental Council of India before he can be admitted to the MDS Course of any University in India.

- (2) Candidates who possess PG Diploma recognized by the DCI with the duration of 2 years in particular specialty is eligible for admission in MDS in the same specialty and the duration will be 2 years.

Provided that in the case of a foreign national shall obtain temporary registration from the Dental Council of India, for the duration of the postgraduate training to which he is admitted.

Provided further that the temporary registration of such foreign national shall be subject to the condition that such person is duly registered as dental practitioner in his own country from which he has obtained his basic dental qualification and that his degree is recognized by the corresponding dental council or the Santosh Deemed to be University and No Objection Certificate from the Ministry of External Affairs of the Central Government for granting such admission in India.

#### **4. AGE LIMIT:**

There is no upper age limit.

#### **5. PHYSICAL FITNESS CERTIFICATE:**

Every candidate before admission to the course shall submit to the Principal of Santosh Dental College & Hospital, a Certificate of Medical Fitness from an authorized Medical Officer that the Candidate is physically fit to undergo the M.D.S course and does not suffer from any contagious disease. Students with disability should produce the Disability Certificate issued by the duly constituted District Medical Board.

#### **6. CRITERIA OF SELECTION FOR ADMISSION:**

Students for MDS course shall be admitted in accordance with the National Eligibility Entrance Test [NEET] provided further that when the number of qualifying candidates in the respective categories on the basis of the above mentioned percentile are less than three times the number of vacancies, the cut-

off percentile will be automatically lowered in such a manner that the number of eligible candidates shall be minimum three times the number of seats in each respective category.

**7. ELIGIBILITY CERTIFICATE:**

No candidate shall be admitted to any postgraduate MDS degree course of study unless the candidate has obtained and produced eligibility certificate issued by the Santosh University. The candidate who has passed the qualifying examination as specified in Regulation No.3 above, has to make an application to the University by remitting the prescribed fees along with the filled in application form, which is available in the University, with required documents there for.

**8. CUT OFF DATE FOR ADMISSION TO THE COURSE:**

As per NEET all kinds of admission shall be completed on or before 31<sup>st</sup> May of the academic year. There shall not be any admission after 31<sup>st</sup> May, even if seats are vacant or any other directions from the Competent Authorities.

**9. SUBMISSION OF ANTI – RAGGING UNDERTAKING:**

The candidates admitted to the course of study shall furnish, duly countersigned by his/her parent/guardian, an undertaking to the Principal of the college, as per the directions of the Hon'ble Supreme Court of India, that the student shall not indulge in any Ragging activities during his/her period of study and accepting the consequences of such involvement as in **Annexure – I** of this Regulation.

**10. REGISTRATION OF CANDIDATES:**

A candidate admitted to the 1<sup>st</sup> year MDS degree course of this University shall Register his / her name by submitting the prescribed application form for Registration duly filled along with the original documents, prescribed fee and an Undertaking and Declaration as in the formats in **Annexure - I, II & III** to the University through the Principal, Santosh Dental College within 60 days from the cut-off date prescribed for admission to the MDS degree course.

**11. DURATION OF THE COURSE:**

- (a) The period of certified study and training of the Master of Dental Surgery Post-Graduate Degree Course shall be Three Academic Years.

- (b) No exemption shall be given from this period of study and training for any other experience gained prior to admission to the course except as mentioned in eligibility criteria No.2.

**12. COMMENCEMENT OF THE COURSE:**

Academic Year for the Master of Dental Surgery course shall commence from 1<sup>st</sup> May of the year of admission.

**13. CURRICULUM:**

The Curriculum and the Syllabi for the courses shall be as prescribed in the regulations and are subject to modifications by the Academic Council from time to time.

**14. MEDIUM OF INSTRUCTION:**

English shall be the medium of instruction for all the subjects of the M.D.S. course.

**15. METHOD OF TRAINING:**

- (a) The training of Postgraduate Dental degree shall be full time with graded responsibilities in the management and treatment of patients entrusted to his / her care. The participation of the students in all facets of educational process is essential. Every candidate should take part in seminars, group discussions, grand rounds, case demonstration, clinics, journal review meeting, CPS and clinical meeting. Every candidate should participate in the teaching and training programme of undergraduate students. Training should include involvement in laboratory and experimental work and research studies.

- (b) The students undergoing postgraduate courses shall be exposed to the following :-

- i. Basics of Statistics to understand and critically evaluate published research papers.
- ii. Few Lectures on other type of exposure to human behaviour studies.
- iii. Basic understanding of Pharmaco-economics.
- iv. Introduction to the non-linear mathematics.

## **16. GUIDELINES:**

The guidelines issued in this regulation and syllabus for the MDS degree course training program are intended to maintain a good academic standards and to impart quality training in Dental Education. Most of the guidelines are consistent with the norms laid down by the University, Dental Council of India and the practice followed throughout India in different Universities. Moreover, for upgrading the standard of MDS degree course training, the University can issue such other guidelines from time to time.

## **17. ATTENDANCE, PROGRESS, CONDUCT, PUNCTUALITY, OBEDIENCE & LEAVE:**

### **17.1 Attendance**

- (i) A candidate pursuing MDS degree should work in the concerned department of the college for the full period as a full time student.
- (ii) A candidate is required to put in minimum of 80% of attendance both in theory and practical / clinical separately in each subject before admission to the examination. However, candidate should not be absent continuously as the course is a full time one.
- (iii) A candidate lacking in the prescribed attendance and progress in any one subject in theory and practical / clinical, wherever necessary, in the first appearance shall not be permitted for admission to the entire examination.

### **17.2 Progress**

Every candidate shall attend symposia, seminars, conferences, journal review meeting, grand rounds, CPC, case presentation, clinics and lectures during each year as prescribed by the department and not absent himself from work without valid reasons.

### **17.3 Conduct**

- (i) No candidate is permitted to run a Clinic / work in Clinic / Laboratory / Nursing Home while studying postgraduate course.
- (ii) No candidate shall join any other course of study or appear for any other examination conducted by this University or any other University in India or during the period of registration.

#### **17.4 Punctuality**

A Post-graduate MDS student is expected to follow the discipline of institution and follow punctuality, not only regarding the college time table but also in the hospital clinics and laboratory.

#### **17.5 Obedience**

- (i) It is universally true that the student should be obedient and receptive for his / her total involvement in the teaching / learning process. The instructions issued by the P.G. Teacher, HOD and the competent authority from time to time must be followed.
- (ii) The assignments allotted by the concerned P.G. Teachers and HOD must be completed within stipulated time with full involvement and dedication. Individual Department discipline must be followed. The acts of insubordination and indiscipline shall not be tolerated.

#### **17.6 Monitoring progress of study**

##### **17.6.1 Work Diary / Log Book**

- (i) Every MDS candidate shall maintain a work diary / Log Book and record of his/her participation in the three years training program conducted by the department such as day to day patient record. Relevant record pertaining to his/her specialty must be maintained for presentation during University examination. The record includes – Case records, models, Clinical photographs, X-rays, relevantly particular case and specialty journal reviews.
- (ii) Special mention may be made of the presentations by the candidate as well as details of clinical or laboratory procedures, if any conducted by the candidate. The work diary shall be scrutinized and certified by the Guide once in three months, Head of the Department and the Principal of Santosh Dental College and presented in the University practical/ clinical examination.
- (iii) The candidate is also required to participate in the teaching and training program for the Under Graduate students under the direct supervision of the concerned teacher.

- (iv) In addition, the Head of the Department shall involve their Post-Graduate students in seminars, Journal Group Discussions and Participation in conferences.
- (v) At the end of the course, the candidate should summarize the contents and get the Log Book certified by the Head of the Department.
- (vi) Every Post-Graduate candidate should be encouraged to present short papers in conferences and improve on it and submit them for publication in reputed Dental journals. Motivation by the Heads of Departments shall be essential in this area to sharpen the research skills of the Post-Graduate candidates.

#### **17.6.2 Periodic tests**

- a. The Internal Assessment tests may be held once in six months during the course of three years study. These tests shall consist of - (i) theory (ii) Clinical/ Practical / Viva Voce.
- b. The average of all the above tests marks may be taken for the Internal Assessment Marks of the candidate.

#### **17.6.3 Leave**

- i. A postgraduate can avail 12 days causal leave during a calendar year.
- ii. Special leaves can be granted on the recommendation of the P.G. Guides & HOD for attending conference, symposium, Seminars which will not be exceeded 8 days in a year.
- iii. Official deputation for research work, clinical posting, library work etc. can be given on the recommendation of the P.G. guide and P.G. teacher and head of the department provided that the student produces attendance certificate of the institution he was deputed to.
- iv. No other leave apart from this shall be applicable.

**Note:** The sub-clause (ii) and (iii) are permissible subject to production of attendance certificate from the authorities where the conference/seminars or research work etc. was attended by him/her.

## **18. CONDONATION OF ATTENDANCE:**

There shall be no condonation of attendance for the course.

## **19. DISSERTATION**

- (1) Every candidate pursuing MDS degree course is required to carry out work on a selected research project under the guidance of a recognized P.G. teacher. The result of such a work shall be submitted in the form of a dissertation.
- (2) The dissertation is aimed to train a postgraduate student in research methods and techniques. It includes identification of a problem, formulation of a hypothesis, search and review of literature, getting acquainted with recent advances, designing of a research study, collection of data, critical analysis, comparison of results, drawing and conclusions.
- (3) The dissertation should be written under the following headings:
  - i. Introduction
  - ii. Aims and objectives of study
  - iii. Review of literature
  - iv. Materials and methods
  - v. Observation and result
  - vi. Discussion
  - vii. Conclusion
  - viii. Summary
  - ix. Reference
  - x. Tables
  - xi. Annexure
- (4) The written text of dissertation shall be not less than 50 pages and shall not exceed 150 pages excluding references, tables, questionnaires and other annexure. It should be neatly typed in double line spacing on one side of paper (A4 size, 8.27" x 11.69") and bound properly. Spiral binding should be avoided; The dissertation should be certified by the Guide, Head of the department and the Principal of the Santosh Dental College and Hospital.

- (a) The **topic** of the dissertation should be submitted within six months from the date of commencement of the course. The Candidate should also inform the name of the Guide for the dissertation to the University while submitting the dissertation topic.
- (b) If there is change in the dissertation topic, the same has to be informed before the end of the first year course.
- (c) The **dissertation / thesis** should be submitted six months before appearing for the University Examination duly signed by the Guide and the same has to be forwarded to the Controller of Examination through the Head of the Department and Principal / Dean of the College six months prior to the Examination.
- (d) No marks will be allowed for dissertation, the External Examiners should mark the dissertation as either “approved” or “not approved”.
- (e) If the dissertation is not approved or rejected by the majority of the examiners, the results shall be withheld till the resubmitted dissertation is approved.

**(i) Guide**

The academic qualification and teaching experience required for recognition by the University as a Guide for dissertation work is as laid down by the Dental Council of India as a P.G. Teacher.

**(ii) Co-guide**

A co-guide may be included provided the work requires substantial contribution from the same department, and / or from a sister department or from another institution recognized for teaching / training by the Dental Council of India.

**(iii) Change of guide**

In the event of a recognized guide leaving the college for any reason or in the event of death of guide, guide may be changed with prior permission from the University.

## **20. SUBJECTS OF STUDY**

### **20.1 The subject of study in Applied Basic Medical Sciences shall be as under:**

- i. Applied Anatomy
- ii. Applied Physiology
- iii. Applied Pathology
- iv. Biostatistics
- v. Nutrition and Dietetics
- vi. Teaching and Testing Methodology
- vii. Research Methodology
- viii. Psychology and Practice Management
- ix. Comparative Anatomy
- x. Genetics Growth and Development
- xi. Applied Chemistry including Metallurgy, Dental Materials
- xii. Pharmacology

### **20.2 Syllabus distribution among 4 papers in various specialties are as under:-**

#### **(i) PROSTHODONTICS AND CROWN & BRIDGE**

##### **PART-I**

**PAPER-I :** Applied Basic Sciences: Applied Anatomy, Embryology, Growth and Development Genetics, Immunology, Anthropology, Physiology, Nutrition and Biochemistry, Pathology and Microbiology, Virology, Applied Pharmacology, Research Methodology and Bio Statistics, Applied Dental Anatomy and Histology, Oral Pathology & Oral Microbiology, Adult and Geriatric Psychology. Applied Dental Materials.

##### **PART-II**

**PAPER-I :** Removable Prosthodontics and Implant supported Prosthesis (Implantology), Geriatric Dentistry and Cranio Facial Prosthodontics

**PAPER-II :** Fixed Prosthodontics, Occlusion, TMJ and Esthetics.

**PAPER-III:** Descriptive and analysing type question

**(ii) PERIODONTOLOGY**

**PART-I**

**PAPER-I** : Applied Basic Sciences: Applied Anatomy, Physiology and Biochemistry, Pathology, Microbiology, Pharmacology, Research Methodology And Biostatistics.

**PART-II**

**PAPER-I** : Normal Periodontal Structure, Etiology and Pathogenesis of Periodontal Diseases, Epidemiology as related to Periodontics

**PAPER-II** : Periodontal Diagnosis, Therapy and Oral Implantology

**PAPER-III**: Descriptive and analysing type question

**(iii) ORAL & MAXILLOFACIAL SURGERY**

**PART-I**

**PAPER-I** : Applied Basic Sciences: Applied Anatomy, Physiology and Biochemistry, Pathology, Microbiology, Pharmacology, Research Methodology And Biostatistics.

**PART-II**

**PAPER-I** : Minor Oral Surgery and Trauma

**PAPER-II** : Maxillo-Facial Surgery

**PAPER-III**: Descriptive and analysing type question

**(iv) CONSERVATIVE DENTISTRY AND ENDODONTICS**

**PART-I**

**PAPER-I** : Applied Basic Sciences: Applied Anatomy, Physiology, Pathology Including Oral microbiology, Pharmacology, Biostatistics and Research Methodology and Applied dental Materials.

**PART-II**

**PAPER-I** : Conservative Dentistry

**PAPER-II** : Endodontics

**PAPER-III**: Descriptive and analysing type question

**(v) ORTHODONTICS AND DENTOFACIAL ORTHOPEDICS**

**PART-I**

**PAPER-I** : Applied Basic Sciences: Applied Anatomy, Physiology, Dental Materials, Genetics, Pathology, Physical Anthropology, Applied Research Methodology, Bio-Statistics and applied Pharmacology.

**PART-II**

**PAPER-I** : Orthodontic History, Concepts Of Occlusion and Esthetics, Child and Adult Psychology, Etiology and Classification of Malocclusion, Dentofacial Anomalies, Diagnostic procedures and Treatment Planning in Orthodontics, Practice Management in Orthodontic

**PAPER-II** : Clinical Orthodontics

**PAPER-III**: Descriptive and analysing type question

**(vi) ORAL AND MAXILLOFACIAL PATHOLOGY AND ORAL MICROBIOLOGY:**

**PART-I**

**PAPER-I** : Applied Basic Sciences: Applied Anatomy, Physiology (General and Oral), Cell Biology, General Histology, Biochemistry, General Pathology, General and Systemic Microbiology, Virology, Mycology, Basic Immunology, Oral Biology (Oral And Dental Histology), Biostatistics and Research Methodology

**PART-II**

**PAPER-I** : Oral Pathology, Oral Microbiology and Immunology and Forensic Odontology

**PAPER-II** : Laboratory Techniques and Diagnosis and Oral Oncology

**PAPER-III**: Descriptive and analysing type question

**(vii) PUBLIC HEALTH DENTISTRY**

**PART-I**

**PAPER-I** : Applied Basic Sciences: Applied Anatomy and Histology, Applied Physiology and biochemistry, Applied Pathology, Microbiology, Oral Pathology, Physical and Social Anthropology, Applied Pharmacology and Research Methodology and Biostatistics.

**PART-II**

**PAPER-I** : Public Health

**PAPER-II** : Dental Public Health

**PAPER-III**: Descriptive and analysing type question

**(viii) PEDIATRIC & PREVENTIVE DENTISTRY**

**PART-I**

**PAPER-I** : Applied Basic Sciences : Applied Anatomy, Physiology, and Biochemistry, Pathology, Microbiology, Pharmacology, Research Methodology and Biostatistics Growth and Development and Dental plaque, Genetics

**PART-II**

**PAPER-I** : Clinical Pedodontics

**PAPER-II** : Preventive and Community Dentistry as applied to pediatric dentistry

**PAPER-III**: Descriptive and analysing type question

**(ix) ORAL MEDICINE AND RADIOLOGY**

**PART-I**

**PAPER-I** : Applied Basic Sciences: Applied Anatomy, Physiology, and Biochemistry, Pathology, Microbiology, Pharmacology, Research Methodology And Biostatistics

**PART-II**

**PAPER-I** : Oral and Maxillofacial Radiology

**PAPER-II** : Oral Medicine, Therapeutics and Laboratory investigations

**PAPER-III**: Descriptive and analysing type question

**21. REVALUATION / RE-TOTALING OF ANSWER PAPERS**

There is no provision for revaluation of answer papers. However, re-totaling is allowed in the failed subjects on application and on remittance of prescribed fees.

**22. NUMBER OF APPEARANCE**

A candidate registered for three years M.D.S. Course must qualify in the Examinations within six years from the date of his / her admission.

The candidate will not be permitted to appear for more than five attempts in the final examinations and shall be discharged from the course if he / she fails to pass examination in the said number of attempts.

### **23. DURATION OF COMPLETION OF THE COURSE OF STUDY**

The duration for the completion of the course shall be fixed as double the time of the course and the students have to pass within the said period otherwise they have to get fresh admission.

### **24. AWARD OF DISTINCTION AND UNIVERSITY RANKS**

Distinction will be awarded to successful candidates who secure 75% marks or more as a course aggregate in all the subjects without any failure.

The names of first Ten University rank holders at the end of the course without any failure will be published in the University website.

### **25. RE-ADMISSION AFTER BREAK OF STUDY**

As per the University common Regulations for Re-admission after break of study for all courses.

### **26. MIGRATION / TRANSFER OF CANDIDATES**

Request for Migration/Transfer of candidates during the course of study from one recognized college to another recognized college of this University or from another University shall not be granted under any circumstances.

### **27. ELIGIBILITY NORMS FOR ADMISSION OF CANDIDATES TO M.D.S. EXAMINATIONS**

No candidate shall be permitted to appear in any one of the parts of M.D.S. Examinations, unless he / she has attended the course in all the subjects for the prescribed period of three years in the Dental College of this University and has produced the necessary certificate of study, attendance, satisfactory conduct and progress from the Head of the Institution. The following requirements shall be fulfilled by every candidate to become eligible to appear for the final examination:

(i) Attendance

Every candidate shall have fulfilled the 80% attendance, prescribed by the Dental Council of India and the University, during each academic year of the MDS course. In case of failure in the final examination of MDS, the unsuccessful candidate will have to secure full attendance to become eligible to appear in the next scheduled examination.

- (ii) Progress and Conduct  
Every candidate shall have participated in seminars, journal review meetings, symposia, conferences, case presentations, clinics and didactic lectures during each year as designed by the concerned department.
- (iii) Work Diary and Log Book  
Every candidate shall maintain a work diary and logbook for recording his/her participation in the training program conducted by the department. The work diary and logbook shall be verified and certified by the Co-guide, if available, Guide and the Head of the Department.
- (iv) The certificate of satisfactory progress by the Guide, Head of the Department and head of the institution shall be based on (i), (ii), and (iii) as mentioned above,
- (v) Dissertation: Approval of dissertation shall be a precondition for the candidate to appear for the MDS examination.
- (vi) Internal Assessment: The Internal Assessment tests may be held once in six months during the course of three years study. These tests shall consist of (i) theory (ii) practical / Clinical and Viva Voce.

## **28. SCHEDULE OF EXAMINATIONS**

**28.1** The University examinations for the MDS degree course shall be held at the end of 1<sup>st</sup> year i.e. **Part – I** and at the end of three academic years i.e. **Part – II**. The University shall conduct examinations in two sessions in a year during **MAY** and during **AUGUST**.

**28.2** Theory Examination will not be held on Sundays and University Holidays. If the date of commencement of the Examination falls on Sundays and on the University holidays, the next working day will be the date of commencement of examinations.

## **29. PATTERN OF UNIVERSITY EXAMINATIONS**

The University MDS examinations in any branch of study shall consist of dissertation, written paper (theory), practical/clinical and viva voce.

- (i) Dissertation: Approval of dissertation shall be a precondition for the candidate to appear for the MDS examination.
- (ii) Written (theory) examination: Written examination of three hours duration for each paper.
- (iii) Practical/Clinical examination: The practical examination should be aimed at assessing competence and skills of techniques and procedures. It should also to test the student's ability to make relevant and valid observations, interpretation and inference of laboratory or experimental or clinical work relating too his/her subject for undertaking independent work as a specialist.
- (iv) Viva-voce examination shall aim at assessing depth of knowledge, logical reasoning, confidence and oral communication skills.

#### MARKS DISTRIBUTION

<b>PROSTHODONTICS AND CROWN &amp; BRIDGE</b>							
Paper		Year of Study	Theory	Practical / Clinical	Viva Voce	Pedagogy	Grand Total
Part- I	Paper – I	1 year	100	-	100	-	200
Part - II	Paper – I	3 years *	300 [100 marks each paper]	200	80	20	600
	Paper – II						
	Paper – III						

\* Including one year of Part-I

<b>PERIODONTOLOGY</b>							
Paper		Year of Study	Theory	Practical / Clinical	Viva Voce	Pedagogy	Grand Total
Part- I	Paper – I	1 year	100	-	100	-	200
Part - II	Paper – I	3 years *	300 [100 marks each paper]	200	80	20	600
	Paper – II						
	Paper – III						

\* Including one year of Part-I

<b>ORAL &amp; MAXILLOFACIAL SURGERY</b>							
Paper		Year of Study	Theory	Practical / Clinical	Viva Voce	Pedagogy	Grand Total
Part- I	Paper – I	1 year	100	-	100	-	200
Part - II	Paper – I	3 years *	300 [100 marks each paper]	200	80	20	600
	Paper – II						
	Paper – III						

\* Including one year of Part-I

<b>CONSERVATIVE DENTISTRY AND ENDODONTICS</b>							
Paper		Year of Study	Theory	Practical / Clinical	Viva Voce	Pedagogy	Grand Total
Part- I	Paper – I	1 year	100	-	100	-	200
Part - II	Paper – I	3 years*	300 [100 marks each paper]	200	80	20	600
	Paper – II						
	Paper – III						

\* Including one year of Part-I

<b>ORTHODONTICS AND DENTOFACIAL ORTHOPEDICS</b>							
Paper		Year of Study	Theory	Practical / Clinical	Viva Voce	Pedagogy	Grand Total
Part- I	Paper – I	1 year	100	-	100	-	200
Part - II	Paper – I	3 years*	300 [100 marks each paper]	200	80	20	600
	Paper – II						
	Paper – III						

\* Including one year of Part-I

<b>ORAL AND MAXILLOFACIAL PATHOLOGY AND ORAL MICROBIOLOGY:</b>							
Paper		Year of Study	Theory	Practical / Clinical	Viva Voce	Pedagogy	Grand Total
Part- I	Paper – I	1 year	100	-	100	-	200
Part - II	Paper – I	3 years*	300 [100 marks each paper]	200	80	20	600
	Paper – II						
	Paper – III						

\* Including one year of Part-I

<b>PUBLIC HEALTH DENTISTRY</b>							
Paper		Year of Study	Theory	Practical / Clinical	Viva Voce	Pedagogy	Grand Total
Part- I	Paper – I	1 year	100	-	100	-	200
Part - II	Paper – I	3 years*	300 [100 marks each paper]	200	80	20	600
	Paper – II						
	Paper – III						

\* Including one year of Part-I

<b>PEDIATRIC &amp; PREVENTIVE DENTISTRY</b>							
Paper		Year of Study	Theory	Practical / Clinical	Viva Voce	Pedagogy	Grand Total
Part- I	Paper – I	1 year	100	-	100	-	200
Part - II	Paper – I	3 years*	300 [100 marks each paper]	200	80	20	600
	Paper – II						
	Paper – III						

\* Including one year of Part-I

<b>ORAL MEDICINE AND RADIOLOGY</b>							
Paper		Year of Study	Theory	Practical / Clinical	Viva Voce	Pedagogy	Grand Total
Part- I	Paper – I	1 year	100	-	100	-	200
Part - II	Paper – I	3 years*	300 [100 marks each paper]	200	80	20	600
	Paper – II						
	Paper – III						

\* Including one year of Part-I

### **30. DISTRIBUTION OF MARKS&QUESTION PATTERN**

#### **Theory**

**(Total 400 Marks)**

#### **(1) Part I University Examination (100 Marks)**

There shall be 10 questions of 10 marks each (Total of 100 Marks)

**(2) Part II (3 papers of 100 Marks each) [300 Marks]**

**(i) Paper-I:**

2 long essay questions of 25 marks each and 5 short essays of 10 marks each.  
(Total of 100 Marks)

**(ii) Paper-II:**

2 long essay questions of 25 marks each and 5 short essays of 10 marks each.  
(Total of 100 Marks)

**(iii) Paper III:**

2 out of 3 essay questions (50 x 2 = 100 Marks)

**Practical and Clinical Examination :**

**Part – I**

Viva-Voce 100 Marks

**Part – II**

Practical and Clinical Examinations 200 Marks

Viva-voce and Pedagogy 100 Marks

**31. Marks Qualifying For A Pass:**

**Part – I**

50% of marks in University Theory Examinations 50/100

50% of marks in University Viva-voce Examinations 50/100

50% of marks aggregate in Theory and Viva-voce Examinations 100/200

**Part – II**

50% of marks in University Theory Examinations 150/300

50% of marks in University Practical/Clinical including Viva Examinations 150/300

50% of marks aggregate in Theory, Practical/Clinical Including Viva examination 300/600

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## **M.Sc Course**

- i. M.Sc. Medical Anatomy
- ii. M.Sc. Medical Physiology
- iii. M.Sc. Medical Biochemistry
- iv. M.Sc. Medical Microbiology

## **2.9. PROGRAM STRUCTURE**

### **2.9.1. Curriculum**

- a) The curriculum and the syllabus for the course pertaining to the M.Sc. Medical PG Programme are given separately as per their specialization.
- b) The curriculum and the syllabus for the course shall be prescribed by the Academic Council based on the recommendations of concerned Board of Faculty and Board of Studies and duly approved by the Board of Management of the Institution Deemed to be University.

### **2.9.2. Components of Curriculum**

There shall be six components for Medical M.Sc. curriculum extended throughout the entire period of study as follows:



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SN	Components	No. of Courses	Theory Credits	Practical Credits	Total Credits
1	Discipline Specific Core Courses (Anatomy, Physiology, Biochemistry)	3T + 3P	12	12	24
2	Discipline Specific Specialty Courses viz. Anatomy, Physiology, Biochemistry & Microbiology	3T	18	-	18
3	Ability Enhancement Course (Optional)	1	2	-	2
4	Generic Elective Course (Optional)	1	4	-	4
5	Teaching Learning Requirements [Continuous Internal Assessment]	1	-	12	12
6	Practical / Clinical Postings	1	-	12	12
7	Dissertation & Viva-voce	1	-	14	14
<b>Total</b>		<b>12 + 2</b>	<b>30 + 6</b>	<b>50</b>	<b>80 + 6 (optional)</b>

**a) Discipline Specific Core Courses (DSCC - as per (1) above):**

The compulsory courses irrespective of the various specializations as per the Medical post-graduate programme form the Discipline Specific Core Courses of the said PG programme and it is mandatory for the students to compulsorily take up the said courses and its credits in order to complete the programme.

**b) Discipline Specific Specialty Courses (DSSC - as per (2) above)**

The Discipline Specific Specialty Courses are offered as per the various specializations opted as per the candidature and application for which the candidate is being admitted. The DSSC is offered as a combo of 3 papers which shall be examined at the end of the third year from the date



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of admission to the programme, however the candidate shall opt the programme of specialization at the beginning of the second year itself.

**c) Ability Enhancement Courses (AEC) - Optional:**

The Ability Enhancement Course has been designed with focus on competency / employability / skill development offered either on collaboration with partner Institutions / Industries, the said recognized MOOCs programme offered by any other Universities from time to time. The Ability Enhancement Course opted by the candidate shall not be considered for the calculation of CGPA and final classification of results as the nature of the course is being offered as non-CGPA course.

**AEC offered by the Partner Institution / SWAYAM - MOOCs**

- (i) Soft skill development
- (ii) Language and Communication Skill development
- (iii) Yoga and Wellness
- (iv) Analytical Skill development
- (v) Human value development
- (vi) Personality / Professional Development
- (vii) Employability Skills development

If a student wishes to opt for a MOOCs course, an appropriate **Three Member Committee** shall be formed by the Institution Deemed to be University headed by the Vice-Chancellor. The committee shall, on careful examination of the reliability and validity, including the examination patterns of the said MOOCs course, recommend the student for the entitlement of Credit transfer on production of the course completion / pass certificate / grade sheet indicating pass and duly approve the same in lieu of the Ability Enhancement Course offered by the University, provided that the corresponding entries in the transcript of the student shall be made as per the consideration of MOOCs course opted by the students.

**d) Generic Elective Course (GEC) - Optional:**

Fast track learners / advanced learners shall be entitled to opt for any one of the Generic Elective Courses from the pool of Courses offered as per his / her wish and interest for obtaining in depth knowledge and additional skills. The transcript of the student shall have entries showing his / her contribution towards the Generic Elective Course and shall have earned extra credit, which shall not be considered for calculation of CGPA.



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**List of GEC papers offered:**

- i. Hospital Management
- ii. Medical transcription
- iii. Basics of NABL / NABH Accrediation
- iv. Good Lab Practices / Good Clinical Lab Practices
- v. Introduction to SPSS package
- vi. Hospital Infection Control System
- vii. Biomedical Waste Management

**e) Teaching Learning requirements:**

- i. Log Book: Every Medical M.Sc., student shall maintain a work diary / Log Book and record his / her acquired skills, during the training period duly certified by the various Heads of Departments where he / she has undergone training including outside the Institution, participation in the training programme conducted by the department such as day to day relevant record pertaining to his / her specialty must be maintained for presentation during final examinations. The record includes - case records and specialty, journal reviews etc.
- ii. Presentation by Candidate: Special mention may be made of the presentation by the candidate as well as details of clinical or laboratory procedures, if any conducted by the candidate. The work diary shall be scrutinized and certified the Guide once in three months, Head of the department and the Dean of Santosh Medical College and presented in the University Practical / clinical examinations.
- iii. Candidates are required to participate in the teaching and training program for the Under Graduate students.
- iv. Seminar, Journal club, Group Discussion and Participation in Clinical / Clinico-pathological Conferences
- v. Presentation of short HMRC papers in Conferences and improve on it and submit them for publication in reputed Journals.

The various teaching learning activities suggested above shall be minimum requirements and mandate for the completion of the said Medical M.Sc. programme.



**f) Practical / Clinical Postings:**

Practical / Clinical postings have been designed in view of the students to have hands on practice in various clinical skills and handling procedures for the requisite qualifications as prescribed by the statutory council norms from time to time. A rigorous practice on the skills such as communication, clinical examination, medical procedures or prescription, exercise prescription, latest techniques, evaluation and interpretation of results so as to undertake independent work as a specialist has been made available for the students.

**g) Dissertation:**

The Medical M.Sc. students shall prepare a dissertation based on the clinical or experimental work or any other study conducted by them under the supervision of a recognized Guide.

**2.10 YEAR WISE DISTRIBUTION OF CREDITS AND HOURS:**

**1<sup>st</sup> Year (For Credit Hours)**

SN	Components	No. of Courses	Theory Credits	Practical Credits	Hours per week
1	Discipline Specific Core Course - I (Anatomy)	1	4	4	8
2	Discipline Specific Core Course - II (Physiology)	1	4	4	8
3	Discipline Specific Core Course - III (Biochemistry)	1	4	4	8
4	Practical / Clinical Postings	-	-	-	18
	<b>Total</b>	<b>3</b>	<b>12</b>	<b>12</b>	<b>42</b>



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## 2<sup>nd</sup> Year (For Credit Hours)

SN	Components	No. of Courses	Theory Credits	Practical Credits	Hours per week
1	Discipline Specific Specialty Course - I	-	-	-	8
2	Discipline Specific Specialty Course - II	-	-	-	8
3	Discipline Specific Specialty Course - III	-	-	-	8
4	Teaching Learning Requirements [Continuous Internal]	-	-	-	8
5	Dissertation	-	-	-	10
6	Ability Enhancement Course (AEC) - Optional	1	2	-	2
7	Generic Elective Course (GEC) Optional	1	4	-	4
	<b>Total</b>	<b>2</b>	<b>6</b>	<b>-</b>	<b>42 + 6 optional</b>

## 3<sup>rd</sup> Year (For Credit Hours)

SN	Components	No. of Courses	Theory Credits	Practical Credits	Hours per week
1	Discipline Specific Specialty Course - I	1	6	-	6
2	Discipline Specific Specialty Course - II	1	6	-	6
3	Discipline Specific Specialty Course - III	1	6	-	6
4	Teaching Learning Requirements [Continuous Internal Assessment]	1	-	12	6
5	Practical / Clinical Postings	1	-	12	12



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6	Dissertation	1	-	14	6
	<b>Total</b>		<b>18</b>	<b>38</b>	<b>42</b>

## 2.11. EXAMINATIONS

### 2.11.1. Eligibility

a) Attendance: Every candidate shall secure 80 % attendance during each academic year.

b) Progress and Conduct: Every candidate shall participate in seminars, journal review meetings, symposia, conferences, case presentations, clinics and didactic lectures during each year organized by the concerned department.

c) Work diary and log book: Every candidate shall maintain a work diary and log book for recording his or her participation in the training programmes conducted by the department. The work diary and log book shall be verified and certified by the Head of the Department of the Institution. The certification of satisfactory progress is based on the work diary and log book.

### 2.11.2 University Examinations

The University Examinations shall consist of theory, practical and clinical examinations and viva-voce and Pedagogy.

#### a) Theory Examinations:

There shall be a theory examination in the Discipline Specific Core Course, Discipline Specific Elective Course at the end of **1<sup>st</sup> year** of course and **3<sup>rd</sup> year** of the course as given below. The question paper shall be set and evaluated by the concerned Department / Specialty.

#### First Year Theory Examinations:

SN	Components	Credits	Marks
1	Discipline Specific Core Course - I (Anatomy)	4	120
2	Discipline Specific Core Course - II (Physiology)	4	120
3	Discipline Specific Core Course - III (Biochemistry)	4	120
	<b>Total</b>	<b>12</b>	<b>360</b>



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First year theory examinations shall have three components as (i) Written Examinations (ii) Continuous Internal Assessment and (iii) Oral Examinations and shall be evaluated for a sum of **120 marks in each of the courses**. A sum total of all the three components shall have to be 50

% and above for students to have declared as pass in the theory examinations for each of the courses of the First year of study. The details of the components of theory examinations are as under:

**(i) Pattern of question paper for First Year Written Examinations:**

The students shall be evaluated for **80 marks** for each course **[3 courses]** of three hours duration of the following pattern

Section	Pattern	Marks per question	Total Marks
<b>A</b>	2 Essay Questions [10M each]	10	20
<b>B</b>	10 Short Notes [6M each]	6	60
	<b>Total</b>		<b>80</b>

**(ii) Continuous Internal Assessment for First Year:**

Continuous Internal Assessment for the first year shall be for **20 marks** for each of the theory courses. The Continuous Internal Assessment shall be given prior to the University Theory Examinations. A minimum of 50% of marks is required for a student to be declared pass. Students with less than 50% of Continuous Internal Assessment shall have to take up the unsuccessful course again in the subsequent year of study.

**(iii) Oral Examinations for First Year:**

Oral Examinations are mandatory for each course and shall be evaluated for **20 marks**.

**Third year Theory Examinations:**

SN	Components	Credits	Marks
1	Discipline Specific Specialty Course - I	6	100
2	Discipline Specific Specialty Course - II	6	100
3	Discipline Specific Specialty Course - III	6	100
	<b>Total</b>	<b>18</b>	<b>300</b>

Third year theory examinations shall have four components as (i) Written Examinations (ii) Continuous Internal Assessment (iii)



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Dissertation (iv) Oral / Viva Examinations and shall be evaluated for **550 marks**. A sum total of all the four components shall have to be 50 % and above for students to have declared as pass in the theory examinations for each of the courses of the Third year of study. The details of the components of theory examinations are as under:

**(i) Pattern of question paper for Third Year Written Examinations:**

The students shall be evaluated for **100 marks** for each course [3 courses] of three hours duration of the following pattern

Section	Pattern	Marks per question	Total Marks
<b>A</b>	2 Essay type Questions [20M each]	20	40
<b>B</b>	10 Short Notes [6M each]	6	60
		<b>Total</b>	<b>100</b>

**(ii) Continuous Internal Assessment for Third Year:**

Continuous Internal Assessment for the third year shall be for **150 marks**. The Continuous Internal Assessment shall be given prior to the University Theory Examinations. A minimum of 50% of marks is required for a student to be declared pass. Students with less than 50 % of Continuous Internal Assessment shall have to redo the entire third year courses again.

**(iii) Dissertation:**

Dissertation shall be a mandatory component for the M.Sc. Medical Degree programme and shall be evaluated for **40 marks**. Each student shall be allotted a topic of research as per the interest of the respective student guided by a mentor for undergoing the research. Every candidate appearing for the post-graduate degree examination shall, at least six months prior to the Final Year Examinations, submit four typewritten copies of dissertation undertaken by the candidate, prepared under the direction and guidance of his / her guide. The dissertation so submitted shall be referred to the external examiners for their examination, and acceptance of it shall be a condition precedent to allow the candidate to appear for the written part of the examination.

Provided further that if the dissertation is rejected by the examiner, the examiner shall assign reasons therefore with suggestions for its improvement to the candidate and such candidate shall submit his / her dissertation to the same examiner who shall accept it before appearing in the examinations.



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**(iv) Viva-Voce:** The post-graduate students whose dissertations have been approved by the external examiners shall appear for the Viva-Voce Examinations for **60 marks**.

**b) Clinical / Practical Examinations:**

Clinical / Practical Examinations is designed to test the clinical skill, performance and competence of candidate in skills such as communication, clinical examination, medical / dental procedures or prescription, exercise prescription, latest techniques, evaluation and interpretation of results so as to undertake independent work as a specialist. The University provides ample opportunity for the candidate to perform in various clinical procedures.

The practical / clinical examination in all the specialties shall be conducted for the candidates. Provided that the practical / clinical examination may be extended for one more day if not required. The practical / clinical examinations shall be conducted on selection of external examiners (approved by the Vice-Chancellor from a panel of examiners) of respective discipline made from the panel of examiners suggested by the HoD.

**i) First Year Practical Examinations:**

The practical / clinical examination for the **First Year** shall be evaluated for **80 marks** in each of the courses with a provision for internal marking scheme as follows:

SN	Courses	Credits	Internal	External	Total Marks
1	Discipline Specific Core Practical - I [Anatomy]	4	20	60	80
2	Discipline Specific Core Practical - II [Physiology]	4	20	60	80
3	Discipline Specific Core Practical - III [Biochemistry]	4	20	60	80
	<b>Total</b>	<b>12</b>			<b>240</b>

A student shall be declared to have passed the First Year Practical Examinations only when he / she has obtained 50 % and above marks in Internal component and 50 % and above in the sum total of the Internal and External component of each of the practical courses.



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**ii) Final Year Practical Examinations:** The practical / clinical examination for the **Final Year** shall be evaluated for **250 marks** in each of the courses with a provision for internal marking scheme as follows:

SN	Courses	Credits	Internal	External	Total Marks
1	Practical / Clinical Postings	12	50	200	250

A student shall be declared to have passed the Final Year Practical examinations only when he / she has obtained 50 % and above marks in Internal component and 50 % and above in the sum total of the Internal and External component of the practical course.

## **2.12. EXAMINERS**

### **2.12.1. Theory Examinations for Ability Enhancement Courses / Generic Elective Courses:**

- i. The Ability Enhancement Course / Generic Elective Course offered by the Industrial Collaboration / MOOCs Courses, the assessment shall be done as per the evaluation standards set forth by the Partner Institution / Industry / MOOCs evaluator, and the same shall be considered valid and reliable. The Industry shall evaluate the students as per their respective norms and certify through a certificate that the students have successfully completed the respective course. The students on producing the respective course completion certificate shall be entitled for credit transfer as per the UGC.

### **2.12.2. Practical / Clinical Examinations & Dissertation & Viva-voce Examinations:**

There shall be two examiners in each subject. Out of them, one shall be external examiner and one internal examiner. The external examiner shall be from other Universities / Institutions.

## **2.13. QUALIFICATION AND EXPERIENCE FOR EXAMINERS**

The qualification and experience for appointment of an examination shall be as under:

- i. Shall possess qualification and experience as Professor in a Post- Graduate Degree Programme of the same subject / allied subject;
- ii. The internal examiner in a subject shall not accept external examinership in a college for the same academic year;
- iii. No person shall be appointed as an external examiner for the same institution for more than two consecutive years. However, if there



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is a break of one year, the person may be re-appointed.

## 2.14. MALPRACTICES

Malpractices, of any kind or degree, shall be viewed very seriously by the Institution Deemed to be University. If a candidate indulges in malpractice in any internal test / model examination / end semester examination, he / she shall be liable for punitive action as prescribed by the rules and regulations of the Deemed to be University.

## 2.15. EQUIVALENT GRADE POINTS

The marks obtained by the candidates shall be equated to the respective grade points as under:

Range of Marks	Explanation	Letter Grade	Grade Point (GP)
90 & above	Outstanding	O	10
80 - 89	Excellent	A++	9
70 - 79	Very Good	A+	8
60 - 69	Good	A	7
50 - 59	Average	B	6
Less than 50	Fail	F	-
Absent	Absent	AB	-

## 2.16. PASSING REQUIREMENTS

### 2.16.1. First Year Passing requirements:

A candidate shall be declared to have passed in each of the Discipline Specific Core Courses [Anatomy, Physiology and Biochemistry] if he / she has secured a Grade Point of **6 and above** on an aggregate of the respective theory and practical courses.

### 2.16.2. Third [Final] Year Passing requirements:

A candidate shall be declared to have passed in each of the Discipline



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Specific Specialty Courses if he / she has secured a Grade Point of **6 and above** in the theory courses.

## **2.17. SUPPLEMENTARY EXAMINATION**

Students, who have failed in any of the theory / practical courses in any of the years, shall apply for the supplementary examinations conducted in the subsequent Examinations after 6 months.

## **2.18. METHODS FOR REDRESSAL OF GRIEVANCES IN EVALUATION OF ANSWER SCRIPTS**

Students who are not satisfied with the grades awarded shall seek redressal as follows:

- (i) Re-totaling of answer scripts shall be made available for the students within 30 days after declaration of result along with the payment of prescribed fee.

## **2.19. CLASSIFICATION OF PERFORMANCE**

Classification of performance of students in the examinations pertaining to the courses in a programme shall be arrived at on the basis of numerical value of Cumulative Grade Point Average (CGPA).

### **2.19.1. Yearly Grade Point Average (YGPA)**

On completion of a year, each student is assigned a Yearly Grade Point Average which is computed as below for all courses registered by the student during that semester.

$$\text{Yearly Grade Point Average (YGPA)} = \frac{\sum(C_i \times G_i)}{\sum C_i}$$

Where  $C_i$  is the credit for a course in that semester and  $G_i$  is the Grade Point earned by the student for that course. The YGPA is rounded off to two decimals.

#### **For Example:**

The credits earned by the candidate in the DSCC-I, II, III including theory and practical will be 8, 8 & 8 respectively ---- [1]

The grade point obtained by the candidate on equating the aggregate marks of theory and practical component of DSCC-I, II & III may be

$$6.8, 7.5 \text{ \& } 8.2 \text{ respectively} \quad \text{---- [2]}$$



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The total credits including Theory & Practical Components for DSCC-I, II & III are 8, 8, 8 credits respectively [4 theory & 4 practical] ---- [3]

Then the YGPA will be:

$$\begin{aligned} &= \frac{\text{DSCC-I [1] x [2]}}{[3]} + \frac{\text{DSCC-II [1] x [2]}}{[3]} + \frac{\text{DSCC-III [1] x [2]}}{[3]} \\ &= \frac{8 \times 6.8}{8} + \frac{8 \times 7.5}{8} + \frac{8 \times 8.2}{8} \\ &= \frac{54.4 + 60 + 70.4}{24} \\ &= \frac{184.8}{24} \\ &= 7.7 \quad \text{----- [YGPA for First Year]} \end{aligned}$$

### 2.19.2 Cumulative Grade Point Average (CGPA)

The overall performance of a student at any stage of the Degree programme is evaluated by the Cumulative Grade Point Average earned (CGPA) up to that point of time.

$$\text{Cumulative Grade Point Average (CGPA)} = \sum_j \left\{ \frac{\sum_i (C_{ij} \times G_{ij})}{\sum_i C_{ij}} \right\}$$

Where 'j' indicates the year number, 'i' indicates the course number in the year 'j', C the credit for a course in any year and G is the grade point earned by the student for that course. The CGPA is rounded off to two decimals.

### 2.20. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Classification of successful candidates shall be made based on the CGPA of theory and practical separately in the final year as under:

#### 2.20.1 Theory Classification

- A successful candidate who secures CGPA not less than 8.50 in aggregate and passing all courses in his/ her first appearance will be declared to have passed in First class with Distinction.



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- b) A successful candidate who secures CGPA not less than 7.0 in aggregate and passing all courses within the three years of programme duration will be declared to have passed in First Class.
- c) Candidates who do not fall under clause 2.19.1 (a) & (b) but have passed all the courses as per regulations with a CGPA above 6.0 shall be declared to have passed in Second Class.

### **2.20.2 Practical Classification**

- a) A successful candidate who secures CGPA in Practicals not less than 8.50 in his/ her first appearance will be declared to have passed in First class with Distinction.
- b) A successful candidate who secures CGPA in Practicals not less than 7.0 will be declared to have passed in First Class.
- c) Candidates who do not fall under clause 2.19.2 (a) & (b) but have passed with a CGPA above 6.0 shall be declared to have passed in Second Class.

### **Final Classification:**

<b>Category</b>	<b>CGPA [Theory]</b>	<b>CGPA [Practical]</b>
First Class with Distinction	8.50 & Above	8.50 & Above
First Class	7.00 - 8.49	7.00 - 8.49
Second Class	6.00 - 6.99	6.00 - 6.99

**THE REVISED REGULATIONS FOR THE AWARD OF PH.D DEGREE IN MEDICAL  
AND DENTAL DISCIPLINES AT SANTOSH DEEMED TO BE UNIVERSITY,  
GHAZIABAD, NCR DELHI AS APPROVED BY THE BOS, ACADEMIC COUNCIL  
AND BOM IN THEIR MEETINGS HELD ON 22.02.2021, 24.02.2021 &  
27.02.2021**

\* \* \* \* \*

**1. SHORT TITLE AND COMMENCEMENT**

These Regulations shall be called "THE REGULATIONS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (Ph.D.) OF SANTOSH DEEMED TO BE UNIVERSITY, GHAZIABAD, NCR DELHI.

These revised Regulations shall come into force with effect from the academic year 2021 - 22 subject to changes/amendments from time to time by the University Grants Commission (UGC), or as approved by the Board of Management.

**2. ELIGIBILITY**

Candidates applying for admission to Ph.D. program should have qualified with at least 55% marks in aggregate **OR** its equivalent grade "B" in the UGC 7 point scale (or an equivalent grade in a point scale wherever grading system is followed) in M.Sc. Medical Anatomy, Medical Physiology, Medical Biochemistry and Medical Microbiology (three years course) as per UGC Norms **OR** PG in Medical/ Dental Courses (50 % Marks) as per MCI & DCI Norms.

Further relaxation of 5% marks or an equivalent relaxation of grade, may be allowed for those belonging to SC/ST/OBC (non-creamy layer)/Differently abled.

**3. REQUIREMENTS FOR ADMISSION OF FOREIGN NATIONALS/NRI:**

- 3.1 Foreign Nationals/NRI are required to fill in the prescribed application form indicating the choice of subject (only one subject) for admission to postgraduate course leading to award of Ph.D. degree.
- 3.2 The Foreign nationals/NRI are required to send their application through Diplomatic Channel. They are also required to **appear for Entrance test and interview along with other candidates.**
- 3.3 Seats are not reserved in any discipline for foreign nationals/NRI
- 3.4 No Fellowship / Grant will be provided to Sponsored / Foreign National/NRI candidates

**4. DURATION OF PH.D COURSE :**

- 4.1 The **minimum duration** of the course **shall be for a period of three years** from the date of registration/admission of the Ph.D Programme and **maximum duration** of **six years**. The Ph.D Course is full time Course. All Ph.D students will require to attend/follow the distribution of hours/

the Department Concerned) along with the consent of the Co-Supervisor by the University.

14.2 The Supervisor should be from the Santosh Deemed to be University as per UGC Norms.

14.3 The Supervisor and Co-Supervisor(s) shall not be related to the Candidate.

## **15. PH.D. COURSE WORK**

### **15.1 Ph.D. Course-Work [1st Year]**

As per UGC Regulations (Minimum Standards and Procedures for the Award of M.Phil/Ph.D Degrees), May 2016, the Course Work: Credit requirements, number, duration, syllabus, minimum standards for completion etc., are mandatory for the Ph.D Degree.

The candidates registered for Ph.D. Degree in the University are required to complete Ph.D. course-Work consisting of following four papers at the end of First Year of registration. Paper I, Paper II and Paper III are compulsory papers and candidate can select any one, from the pool of elective papers offered under Paper IV.

**Paper I : Research Methodology, Biostatistics and Computer Basics (4 Credits & 60 hours)**

**Paper II : Advanced Specialization in the subject area (4 Credits & 60 hours)**

**Paper III : Research and Publication Ethics (2 Credits & 30 hours)**

**Paper IV : Elective Paper (4 credits & 60 hours) Pool of Elective papers are as under:**

1	Hospital Waste Disposal Management
2	Stem Cells And Regenerative medicine
3	Emergency Management and Evaluation of Patients
4	Molecular Diagnostics & Genetic Techniques
5	Pharmaceutical Sciences and Pharmacovigilance
6	Inflammation and inflammatory diseases
7	Neurodegenerative disorders
8	Biomaterials /Growth factors & Regenerative dentistry

### **15.2 DISTRIBUTION OF HOURS / CREDITS**

PAPER	TOPIC	HOURS	MARKS	CREDITS
Paper-I	Research Methodology, Biostatistics and Computer Basics	60	100	4

<b>Paper-II</b>	Advanced Specialization in the subject area	60	100	4
<b>Paper-III</b> [Provision for Credit Transfer available through SWAYAM / MOOCS] / University Offline Teaching]	Research & Publication Ethics	30	100	2
<b>As per UGC letter No. D.O.No.F.1-1/2018(Journal/Care) dated 26.12.2019</b>				
<b>Paper-IV</b>	Choose any one of the Elective	60	100	4
<b>Other mandatory credits to be earned [II &amp; III Year]</b>				
Dissertation/Thesis			200	6
Two Publications in indexed journal(preferably scopus/web of science/pubmed/UGC Care list with impact factor (preferably JCR)	Mandatory for submission of thesis Hard copies to be submitted			1
Two Research paper presentation(poster and One oral presentation in National / International conference /seminar and workshops attended/field work	Prior to the submission of the dissertation/thesis Certificates to be attached			1
Participation in Departmental research activities/teaching As per log book record	As per dept schedule (mandatory to participate)			2
<b>Optional Credits:</b>				
<b>Research Funding</b> For Advanced Learners: Awarded by National/International bodies ( Govt/Non - Govt Sources)	Certificates to be attached: a) Award sanction letter b) Evidence of fund received & utilization certificate c) Statement of expenditure d) Report			3
<b>TOTAL</b>			<b>500</b>	<b>27</b>

**Paper II : The details of Advanced Specialization in the subject area are as under:-**

Research scholar is required to do a course in Recent Advances in his/her research area under the concerned supervisor, the syllabus for the same will be provided by concerned Department.

1. Advances In Anatomy
2. Advances In Physiology
3. Advances in Biochemistry
4. Advances In Microbiology
5. Advances in Pharmacology
6. Topics in Community Medicine
7. Reproductive Endocrinology and Infertility
8. Advances in Clinical Psychology
9. Pulmonary Medicine
10. Advances in Rehabilitation Medicine
11. Advances in Hematology
12. Advances in Maxillofacial Surgery
13. Advances in Orthodontics
14. Advances in Pedodontics
15. Advances in Prosthodontics
16. Integrated Implantology

### 15.3 Scheme of Examination and Passing:

- a. Assessment of the course work will be through **written examination** for 3 hours duration for each of the course paper. All theory examinations will be held at the end of 1<sup>st</sup> year and will be conducted by the University as per the norms from time to time.
- b. **Each** theory paper will be evaluated for **100 marks**.
- c. **Each** theory paper will consist of six questions of **25 marks** each and students are expected to answer any four questions out of six questions.

#### Note:-

- i. Marks for **Paper-I** will be awarded by the respective Assessor/s as indicated under the heading of **Research Methodology, Biostatistics and Computer Basics** and recorded in the log book duly signed by Guide/HOD.
- ii. Marks for **Paper-II** will be awarded by the concerned Department Assessor/s as indicated under the heading of **Advanced Specialization in the subject area** and recorded in the log book duly signed by Guide/HOD.
- iii. Marks for **Paper-III** will be awarded by the respective Assessor/s appointed by the Dean Research and recorded in the log book duly signed by Guide/HOD.
- iv. Marks for **Paper-IV** will be awarded by the concerned Speciality Assessor/s as indicated under the heading of **Elective Paper** and recorded in the log book duly signed by Guide/HOD.
- v. All Results are to be sent through **RAC Coordinator** to the University.



#### 15.4 Standard point scale for grading:

Achievements shall be equated to equivalent grade points. A Ph.D. scholar has to obtain a minimum of 55% of marks or its equivalent grade in the 7-point scale in each of the course work in order to be eligible to continue in the program and submit the Dissertation / Thesis.

Grade	Marks	Grade Points
O	95 - 100	10
A	90 - 94.99	9
B	80 - 89.99	8
C	70 - 79.99	7
D	60 - 69.99	6
E	55 - 59.99	5
F	Less than 55	Fail

If a student fails to clear the course work examination or remains absent, he /she should appear for the same next year along with the next batch. No separate exam will be conducted for the same.

#### 15.5 Course work completion:

1. Successful completion of Course work examination within first 2 semesters shall be treated as prerequisite for Ph.D. programme. Scholars who have completed their course work alone shall be required to take up the Research part.
2. The Course Work Examinations shall be conducted during the month of October every year.

#### 16. COURSE COMPLETION

- 16.1 A Ph.D. scholar has to obtain **minimum of 20 credits and maximum of 27 credits** to have the Ph.D. degree awarded by Santosh deemed to be University.
- 16.2 **That Course Completion Certificate and Mark Sheet** is to be provided to the Ph.D. students after declaration of result and also issue of the Provisional Certificate as per **ANNEXURE - 1**

#### 17. RESEARCH ADVISORY COMMITTEE & ITS FUNCTIONS:

The Vice Chancellor will constitute this Research Advisory Committee that includes at least one member from the concerned department from which the Ph.D. Research has been registered. The Research Advisory Committee will meet frequently under the Chairmanship of Vice Chancellor for monitoring the progress of the Course work and Thesis. Relaxations, if any, are required in these

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## **21. SUBMISSION OF THESIS**

- 21.1 Each candidate for the award of degree of Doctor of Philosophy shall submit five copies of his/her thesis in the prescribed format as per **Annexure - 5** along with the C.D. not earlier than prescribed minimum period of three years and not later than the maximum period of Six Years. The thesis shall be certified by both the Guide and by the Co-Guide(s) and submitted through proper channel to the Academic Section of the University.
- 21.2 The Supervisor shall submit a panel of examiners at least six months before the expected date of submission of the thesis. The panel shall include four examiners who, on the basis of their published work are acknowledged leaders in the field of study undertaken by the candidate and this should be indicated in the protocol.
- 21.3 A Board of four examiners i.e. two external examiners and two internal examiners shall be appointed by the University for assessment of the thesis. Two internal examiners shall be the Chief Supervisor and Co-supervisor of the candidate, who shall act as co-ordinators and internal examiner. The other two will be external examiners from the panel of examiners as per 21.2 above.
- 21.4 After the thesis has been approved by the external and internal examiner, a public defence of the thesis will be held, as well as the viva voce examination to adjudge the general proficiency, subject knowledge on the Research work carried out and the subject(s) allied to the candidate's field of work.
- 21.5 If the thesis is rejected by more than one examiner, it will stand rejected and shall not be referred to any other examiner.
- 21.6 In the event that the thesis is rejected by only one examiner, it will be referred to another examiner from among the approved panel. In case the thesis is approved by this examiner, it will be considered as unanimously approved.
- 21.7 If one or more examiner recommends re-submission of the thesis after modifications it shall be done within a maximum period of six months from the date on which the candidate is so informed by the University.
- 21.8 The candidate shall be entitled to appear at the defence of thesis / viva voce examination only if the thesis is unanimously approved by the Board of Examiners for the thesis.



- 21.9 If the reports from all the external examiners are not received within two months, a copy of the thesis shall be sent to another examiner from amongst the approved panel.
- 21.10 The external examiners, from India who assessed the thesis of the candidate will act as the external examiners at the viva voce examination.
- 21.11 In the event of non-availability of one of the external examiners who examined the thesis, another examiner from amongst the panel be called for the viva voce examination at the discretion of the University.
- 21.12 There shall be a public defence of the thesis by the candidate. The topic, date and time of the defence of thesis shall be announced by the University well in advance so that the Faculty members and others interested in the topic of the thesis can be present. Those attending the public defence, who are not members of the Board of Examiners, can also participate by asking relevant questions. The Board of Examiners shall take into consideration the views and criticism if any, of the Faculty members and others participating in the public defence of thesis. However, the result of the examinations shall be decided solely by the members of the Board of Examiners.
- 21.13 The Institutions shall develop appropriate methods so as to complete the entire process of evaluation of Ph.D. thesis within a period of six months from the date of submission of the dissertation/thesis.

## **22. EXTENSION OF TIME TO SUBMIT PH.D. THESIS**

- 22.1 The thesis shall ordinarily be submitted not later than 6 years from the date of registration. Such cases where the Ph.D Scholar is unable to submit the thesis within a period of 6 years and requires extension of time, these cases first be considered by RAC on the recommendations of the Departmental Committee/ Supervisor. The Recommendations of the RAC may be placed before the Board of Management for their consideration.
- 22.2 If the scholar fails to submit thesis, even after extension of time so granted, the registration gets automatically lapsed and his / her name shall be taken off from the rolls of Registered Candidates.

## **23. RESULT**

- 23.1 The candidate shall be declared eligible for the award of the Degree of Doctor of Philosophy only on the unanimous recommendations of the members of the Board of Examiners at the viva voce examination.
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23.2 In case the examiners are not satisfied with the performance of the candidate in the above examination, the candidate shall be required to reappear for another viva voce examination after a period of two months provided such specific recommendations are carried out and resubmitted by the Board of Examiners.

#### **24. AWARD OF THE PH.D. DEGREE:**

The Ph.D Degree awarded by the Santosh Deemed to be University shall have a mention of **“Under the Faculty of Medicine”** in the provisional Pass Certificate / Degree.

#### **25. DEPOSITORY WITH INFLIBNET**

25.1 Following the successful completion of the evaluation process and before the announcement of the award of the Ph.D. degree, the Institution concerned shall submit an electronic copy of the Ph.D. thesis to the INFLIBNET, for hosting the same so as to make it accessible to all Institutions/Colleges

25.2 Prior to the actual award of the degree, the degree-awarding Institution shall issue a provisional Certificate to the effect that the Degree has been awarded in accordance with the provisions of these UGC Regulations, 2016.

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**SANTOSH**  
**Deemed to be University**  
(Established u/s 3 of the UGC Act, 1956)

**Bachelor of Optometry**  
**(B.Optom)**

The Yearly Theory Examination Papers in 4 Sections containing 20 Marks of each section which should cover complete Syllabus viz:

- I. Short Notes - 4 x 5 Marks = 20 Marks
- II. Long Notes - 2 x 10 Marks = 20 Marks  
(Problem Based)
- III. Long Question - 1 x 20 Marks = 20 Marks
- IV. MCQs - 20 x 1 Mark = 20 Marks

<b>Total Theory</b>	<b>80 Marks</b>
<b>Internal Assessment</b>	<b>20 Marks</b>
<b>Viva</b>	<b>20 Marks</b>
<b>Practical Internal</b>	<b>20 Marks</b>
<b>University Practical</b>	<b>60 Marks</b>
<hr/>	
<b>Total</b>	<b>200 Marks</b>

Total Marks for each paper is proposed to be 200 Marks Maximum and a student shall be declared to have passed if he/she has secured more than 50 % in Theory Components including viva and 50 % in Practical components.

**SANTOSH DEEMED TO BE UNIVERSITY, GHAZIABAD, DELHI NCR**  
**PROPOSAL FOR FOLLOWING UNIQUE PATTERN FOR THE NEW COURSE INTRODUCED**

S.No	Course	Year	No. of Papers	Internal Assessment weightage / Marks (Per Paper)	University Theory Marks (Per paper)	Viva	Practical Internal	Practical University	Other Remarks
1.	B.Optom	1 <sup>st</sup>	5	20	80	20	20	60	It is proposed that each paper will be assessed for 200 Marks including internal assessment and Internal Practical
		2 <sup>nd</sup>	5	20	80	20	20	60	
		3 <sup>rd</sup>	5	20	80	20	20	60	
2.	B.Sc. Clinical Nutrition & Dietetics	1 <sup>st</sup>	5	20	80	20	20	60	
		2 <sup>nd</sup>	5	20	80	20	20	60	
		3 <sup>rd</sup>	5	20	80	20	20	60	
3.	M.Sc. Clinical Psychology	1 <sup>st</sup>	4	20	80	20	20	60	
		2 <sup>nd</sup>	4	20	80	20	20	60	
4.	M.Sc. Trauma and Critical Care	1 <sup>st</sup>	4	20	80	20	20	60	
		2 <sup>nd</sup>	4	20	80	20	20	60	

S.No	Course	Year	No. of Papers	Internal Assessment weightage / Marks (Per Paper)	University Theory Marks (Per paper)	Viva	Practical Internal	Practical University	Other Remarks	
5.	M.Sc. Medical Imaging Technology	1 <sup>st</sup>	4	20	80	20	20	60		
		2 <sup>nd</sup>	4	20	80	20	20	60		
6.	M.H.A	1 <sup>st</sup>	4	20	80	20	20	60		
		2 <sup>nd</sup>	4	20	80	20	20	60		
7.	M.Sc. Medical Lab Technology	1 <sup>st</sup>	4	20	80	20	20	60		
		2 <sup>nd</sup>	4	20	80	20	20	60		
8.	M.S.W. Community Medicine	1 <sup>st</sup>	4	20	80	20	20	60		
		2 <sup>nd</sup>	4	20	80	20	20	60		
9.	M.Sc. Sports Medicine and Exercise Sciences	1 <sup>st</sup>	4	20	80	20	20	60		It is proposed that each paper will be assessed for 200 Marks including internal assessment and Internal Practical
		2 <sup>nd</sup>	4	20	80	20	20	60		

### Introduction:

#### **About Optometry:-**

Optometry means a health care profession that is autonomous and concerned specially with examining the eye for the defect and faults of refraction. With prescribing correctional lenses, Eye exercises / or visual rehabilitation care for visually impaired with diagnosing disease of the eye, and with treating such disease or referring then for treatment.

#### **Definition of optometry -**

“Optometrist are primary health care practitioners of the eye and visual system to provide comprehensive eye and vision care, which includes refraction and dispensing, detection/ diagnoses and co-management of disease in the eye and the rehabilitation of conditions of the visual system”

**Learning Objectives:** At the completion of this course, the student should -

- 1.1 Be able to develop skills to provide comprehensive eye examination
  - 1.a To acquire knowledge on ocular structures, its functions and pathological changes
  - 1.b To carryout ophthalmic investigations
  - 1.c To impart knowledge with regard to common eye diseases
  - 1.d To impart knowledge on treatment modalities from the perspective of counselling
  - 1.e To acquire knowledge about the referral guidelines for ocular and systemic conditions
- 1.2 Be able to correct refractive error and provide spectacle prescription
- 1.3 Be able to fit, evaluate, prescribe and dispense contact lenses for refractive correction and other ocular conditions
- 1.4 Be able to assess the low vision and provide comprehensive low vision care
- 1.5 Be able to have adequate knowledge to develop skill in manufacturing of spectacle lenses, contact lenses and low vision devices.
- 1.6 Be able to do complete binocular vision assessment, manage non-strabismic binocular vision anomalies and refer condition which warrants surgery
- 1.7 Be able to assess the visual demands for various occupations and match it to the visual capabilities. Also be able to advice on eye safety wear for various occupations.
- 1.8 Have knowledge and skill for early detection of various ocular conditions and pathologies – Refractive error, Strabismus, Cataract, Diabetic retinopathy, Glaucoma etc.
- 1.9 Have knowledge regarding organizations of eye banks and preservation of ocular tissues.
- 1.10 Have knowledge on sensory substitution and other rehabilitation measures for totally visually challenged.
- 1.11 Have knowledge of counselling on visual/ocular hygiene, nutritional and environmental modifications

#### **Expectation from the future graduates in the providing patient care.**

- 1 Optometrist will work independently or in conjunction with other eye/health care professionals.
- 2 The optometrist will be knowledgeable, skillful and analytical in diagnosis, treatment

planning, management of visual defects & impairments and in co-managements of ocular conditions.

- 3 The optometrist can work in hospitals (both private and public sectors), optical outlets and/or work as independent practitioner
- 4 The course will lead to a basic degree in optometry, which is considered as the minimum essential for statutory registration of optometrists in countries where optometry has been brought under legislation.
- 5 Undertake public health optometry projects and vision screening eye camps in schools, colleges, urban slums, rural areas and also practice occupational optometry in industries.
- 6 Public education on ocular hygiene and related nutritional and environmental counselling.
- 7 Offer a helping hand and or efficiently manage and successfully run any ophthalmic clinic, optometry department in hospitals, optical shops, and offer product expertise in ophthalmic industry & trade.

### **Eligibility for admission:**

The Candidates who possess 10+2 /HSC with English, Physics, Chemistry and Biology or (Botany & Zoology) [OR] English, Physics, Chemistry, Mathematics or its equivalent qualifications from a Recognized Board.

[OR]

The Candidates who possess Diploma in Optometry are eligible for admission to B.Optom Course (Lateral Entry).

## **GENERAL RULES**

### **Duration of the course**

The B Optom undergraduate degree program is of four years duration (3+1) including one year of compulsory internship.

Duration of the course: 4 (3+1) years or 8 (6+2) semesters.

**Total hours –3075 (didactics+ practical +internship) (300 additional hours to be spent on research project)**

### **Annual scheme**

#### **First year academic calender**

Commencement of class - august

First sessional exam - 20 oct to 30 oct

Second sessional exam - 20 jan to 30 jan

Model exam ( with practical ) - 15 may to 15 june

University exam ( practical) - 15 june to 15 july

Annual vocation - After the exam

## **SECOND YEAR**

Commencement of class - august

first sessional exam - 20oct to 30 oct Second

sessional exam - 20 jan to 30 jan Modal

exam ( practical) - 15 may to 15 june

University exam (practical) - 15 june to 15 july Annual

vocation - after the exam

## **THIRD YEAR**

Commencement of class - august

First sessional exam - 20 oct to 30 oct

Second sessional exam - 20 jan to 30 jan

Model exam ( with practical ) - 15 may to 15 june

University exam ( practical) - 15 june to 15 july

Annual vocation - After the exam

## **INTERNSHIP**

Commencement of internship - 1 august

Completion of internship - 31july

### **Medium of instruction:**

English shall be the medium of instruction for all the subjects of study and for examination of the course.

## **III. EXAMINATION REGULATION**

### **Attendance:**

A candidate has to secure minimum-

- 1 75% attendance in theoretical
- 2 80% in Skills training (practical) for qualifying to appear for the final examination.

### **Internal Assessment:**

1. Regular periodic assessment shall be conducted throughout the course at least two sessional examinations in theory and preferably to practical examination should be conducted in each subject. The model examination should be same pattern of university examination .

2. A candidate secure a minimum of 50% marks in the internal assessment of each subject to be eligible to appear for the university examination

3. The internal assesment will be done by the department twice during the course period in a gap not more then 5 months and final modern exam which will be the same pattern of university examination at 3<sup>rd</sup> sessional examination . The period of sessional examination of academic year as are follows;

\* First sessional exam - oct

\* Secound sessional exam - jan

\* Model sessional exam - may and june

### **Competency Standard**

Classification Units of Competency Skills at Entry level for optometrist

#### **Communication Skills**

- 1 Professional Conduct
- 2 Patient Examination and management.
- 3 Optical Dispensing
- 4 Documentation

## **UNIVERSITY EXAMINATIONS**

1. University examination shall be conducted at the end of every academic year.

2. A candidate who satisfies the requirement of attendance, internal assessment marks, as stipulated by the university shall be eligible to appear for the university examination .

3. One Academic year will be 12 months including the days of the university examination year will be counted from the date of commencement of classes which will include the inauguration day.

4. The minimum pass for the internal assessment is 50% and for the university examination is 50%.

5. If the candidate fails in either theory and practical paper , he/she has to re-appear

for both the papers (theory and practical )/.

6. maximum number of attempts permitted for each paper is 5 included the first attempt

7. The maximum period to complete the course shall not exceed 6 years.

8. all practical examination will be conducted in the respective clinical areas.

9. Numbers of candidate for practical examinations should be maximum 10-12 per day

10. One internal and external examiner should jointly conduct the theory evaluation and practical examination for each student during the final examination every years

## **ELIGIBILITY FOR UNIVERSITY EXAMINATION**

A student who has secured 50% marks for internal assessment is qualified to appear for university examination provided he/she satisfies percentage of attendance requirement as already mentioned at the clause III

## **VALUATION OF THEORY - REVALUATION OF PAPERS**

1. Valuation work will be under taken by the examiners .

2. there will be re-valuation for the university for all the university examinations fees time to time

3. Application for re-valuation should be submitted with in 10 days from date of result of examination declared and it should be submitted to the office with payment of fees principal .

## **SUPPLEMENTARY EXAMINATIONS**

Every main university examination will be followed by the supplementary examination which will normally be held with in 4-6 months from the date of completion of the main examinations .

As stipulated under clause no.2 under internal assessment , H.O.D will hold an internal examination 3-4 weeks prior to the date of the university of examinations, marks secured in the said examinations will be taken fir the purpose of internal assessment .HODs will send such details to the principal ten days prior to the date of commencement of university examinations.

Students who have not passed/cleared all or any subjects in the first university

examinations will be permitted to attend the second year classes and also eligible to appear for second year university examinations along with first year supplementary examination. However he/she can appear for the third (final) year university examination, only if he/she clears all the subjects in the first as well as in the second year examinations.

Same attendance and internal marks of the main examinations will be considered for the supplementary examinations, unless the HOD furnish fresh internal marks and attendance after conducting fresh examinations.

Students of supplementary batches are expected to prepare themselves for the university examinations. No extra coaching is expected to be provided by the institution. In case at any time the institution has to provide extra coaching, students will be required to pay fees as fixed for the said coaching.

## **RULES REGARDING CARRYOVER SUBJECTS**

A candidate will be permitted to continue the second and third year respectively of the course even if he/she has failed in the first or second year university examinations.

A candidate must have passed in all subjects to become eligible to undergo compulsory internship of one year, for the candidates who have not passed all the subjects duration of the third year shall be extended until they become eligible to undergo compulsory internship.

## **CRITERIA FOR PASSED IN UNIVERSITY EXAMINATIONS – REGULATIONS ;**

### **ELIGIBILITY CRITERIA FOR PASS IN UNIVERSITY EXAMINATIONS**

In each of the subjects, a candidate must obtain 50% in aggregate for a pass and the details are as follows;

- \* A separate minimum of 50% for internal assessment
- \* 50% in theory and 40% in oral/viva
- \* A separate minimum of 50% in aggregate for practicals / clinics (university examination).
- \* overall 50% in the minimum pass in subject aggregate (university theory + viva/oral + practicals + internal assessments (T&P))

## **EVALUATIONS AND GRADE;**

1. Minimum marks for pass shall be 50% in each of the theory and practical paper separately (including internal assessment in all subjects)
2. A candidate who passes the examination in all subjects with an aggregate of 50% marks and above and less than 65% shall be declared to have passed the examinations in the second class .
3. A candidate who passes the examinations in all subjects in the first attempts obtaining not less 65% of the aggregates marks for all the three years shall be declared to have passed the examination with first class
4. A candidate who secured an aggregates of 75% or above marks is awarded distinction a candidates who secure not less than 75% marks in any subjects will be deemed to have passed the examination with distinction in that subjects provided he/she passes the whole examination in the first attempt
5. A candidate who takes more than one attempt in any subjects and pass subsequently shall be ranked only in pass class
6. A candidate passing the entire course is placed in second class/first class/distinction based on the cumulative percentage of the aggregates marks of all the subjects in the I,II&III(final ) university examinations.
7. rank in the examination :- Aggregate marks of all three years regular examination will be considered for awarding rank for the graduate examinations for the courses where the numbers of students are more than 15 rank will be calculated as under .

- \* Topmost score will be declared as first rank
- \* second to the top most will be declared as second rank
- \* third to the topmost will be declared as third rank

### **Curriculum Outline**

#### **First Year:-**

<b>Sl. No.</b>	<b>Course Titles</b>
<b>BOP101</b>	General Anatomy & ocular anatomy
<b>BOP102</b>	General Physiology & ocular physiology
<b>BOP103</b>	General Biochemistry & ocular biochemistry
<b>BOP104</b>	Physical optics & Geometrical Optics
<b>BOP105</b>	Clinical Optometry & Visual Optics

#### **SECOND YEAR :-**

<b>Sl. No.</b>	<b>Course Titles</b>
<b>BOP201</b>	Basic and ocular pathology , microbiology & pharmacology
<b>BOP202</b>	Optometric optics & Dispensing Optics
<b>BOP203</b>	Clinical examination of visual system & ophthalmic instrument
<b>BOP204</b>	Ocular disease
<b>BOP205</b>	Low vision aids

**Third year:-**

<b>Sl. No.</b>	<b>Course Titles</b>
<b>BOP301</b>	Contact lenses
<b>BOP302</b>	Binocular vision
<b>BOP303</b>	Systemic eye disease
<b>BOP304</b>	Public health / community and occupational optometry
<b>BOP305</b>	Pediatric and geriatric optometry

**Internship is for 12 months (1<sup>st</sup> august – 31<sup>st</sup> july ) or 1 year. Total number of days (after deducting for national holidays & Sundays + Examination): 250 days (6 days / week; 6 hours / day)  
= 1500 hours or minimum of 18 weeks /semester (216 days).**

**Students are encouraged to involve in community outreach activities as part of their clinical postings without absenting himself /herself for the other regular classes.  
Project report (thesis) needs to be submitted at the end of internship**

## **GENERAL ANATOMY**

**COURSE DESCRIPTION:** General anatomy deals with the entire human anatomy with emphasis on different tissues, blood vessels, glands, nerves and the entire central nervous system in particular.

**OBJECTIVES:** At the end of the semester, the student should be able to:

- 4.1 Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the human body.
- 4.2 Identify the microscopic structures of various tissues, and organs in the human body and correlate the structure with the functions.
- 4.3 Comprehend the basic structure and connections between the various parts of the central nervous system so as to analyze the integrative and regulative functions on the organs and systems.

### **TEXT BOOKS:-**

- 1 MARIANO S.H. DIFIORE: Atlas of Human Histology, 5th Ed. 1981, Lea and Feliger.
- 2 G.J. TORTORA & N.P ANAGNOSTAKOS: Principles of Anatomy and Physiology. (recent edition)
- 3 B.D. CHAURASIA: Handbook of General Anatomy, 2nd Ed., CBS Publishers and Distributors, New Delhi - 110 032.

### **REFERENCE BOOKS:-**

- 1 PETER L. WILLIAMS AND ROGER WARWICK: - Gray's Anatomy - Descriptive and Applied, 36th Ed., 1980, Churchill Livingstone.
- 2 T.S. RANGANATHAN: Text book of Human Anatomy, 1982, S. Chand & Co., New Delhi 110 055.
- 3 INDERBIR SINGH: Human Embryology, 3rd Ed., Macmillan India, 1981.
- 4 R. KANAGASUNTHARAM, P. SIVANANDA-SINGHAM & A. KRISHNAMURTI: Anatomy- Regional, Functional, & Clinical, P.G. Publisher, Singapore 1987.

**PREREQUISITES:** Higher secondary level biology or remedial biology

### **COURSE PLAN:**

Sl. No.	Topics	No. of hrs.
1	Introduction to Human Anatomy: Anatomy: Definition and its relevance in medicine and optometry Planes of the body, relationship of structures, organ system	1
2	Skeleton System	3
3	Tissues of the Body: Epithelium, connective tissue, bone and cartilage, Embryology, histology, different types of each of them, types of cells, cellular differentiation and arrangements in	3

Sl. No.	Topics	No. of hrs.
	different tissues	
4	Muscles: Different types of muscles, their functional differentiation, their relationship with different structures, their neural supply	3
5	Blood vessels: Differentiation between arteries and veins, embryology, histology of both arteries and veins, Functional differences between the two, anatomical differences at different locations	3
6	Skin and appendages: Embryology, anatomical differences in different areas, functional and protective variations, innervations, relationship with muscles and nerves	3
7	Lymphatic system: Embryology, functions, relationship with blood vessels and organs	1
8	Glands: Embryology, different types of glands (exocrine and endocrine), functional differences, neural control of glands	2
9	Nervous system: Parts of Nervous system, cell types of nervous system, Blood-brain barrier, Reflex arc, Peripheral Nerves, Spinal nerves, Nerve fibers, Autonomic Nervous system	5
10	Brain and Cranial nerves: Major parts of Brain, Protective coverings of the Brain, Cerebrospinal Fluid, Brain stem, Cerebellum, Diencephalon, Cerebrum, Cranial nerves	6
<b>Total Number of Hours</b>		<b>30</b>

**PRACTICAL (15 Hours):** Practical demonstration of each organ using specimen. If specimen for certain organs are not available, then videos can be shown to make the student understand the anatomic structures.

## **OCULAR ANATOMY**

**COURSE DESCRIPTION:** This course deals with detailed anatomy of the orbit, eyeball and cranial nerves associated with ocular functions.

**OBJECTIVES:** At the end of the course, the student should be able to:

- 1 Comprehend the normal disposition, inter-relationships, gross, functional and applied anatomy of various structures in the eye and adnexa.
- 2 Identify the microscopic structures of various tissues in the eye and correlate the structure with the functions.
- 3 Comprehend the basic structure and connections between the various parts of the central nervous system and the eye so as to understand the neural connections and distribution.
- 4 To understand the basic principles of ocular embryology.

**TEXT BOOK:** L A Remington: Clinical Anatomy of the Visual System, Second edition, Elsevier Butterworth Heinemann, Missouri, USA, 2005.

**REFERENCE BOOKS:** AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006

**PREREQUISITES:** General anatomy.

**COURSE PLAN (Total: 45 hours)**

- 1 Central nervous system:
  - 1.1 Spinal cord and brain stem
  - 1.2 Cerebellum
  - 1.3 Cerebrum.
- 2 Orbit
  - 2.1 Eye
  - 2.2 Sclera
  - 2.3 Cornea
  - 2.4 Choroid
  - 2.5 Ciliary body
  - 2.6 Iris
  - 2.7 Retina
- 3 Refractory media-
  - 3.1 Aqueous humor
  - 3.2 Anterior chamber
  - 3.3 Posterior chamber
  - 3.4 Lens
  - 3.5 Vitreous body
- 4 Eyelids
- 5 Conjunctiva
- 6 Embryology

**PRACTICAL (Total: 15 hours)**

- 1 Eye: Practical dissection of bull's eye
- 2 Orbit: Practical demonstration of orbital structures.

## **GENERAL PHYSIOLOGY**

**COURSE DESCRIPTION:** General physiology deals with the entire human anatomy with emphasis on different organ systems, their physiological functions with special emphasis on blood and neuro physiology.

**OBJECTIVES:** At the end of the course the student will be able to: • Explain the normal functioning of various organ systems of the body and their interactions. • Elucidate the physiological aspects of normal growth and development. • Describe the physiological response and adaptations to environmental stresses. • Know the physiological principles underlying pathogenesis of disease.

### **TEXT BOOKS:-**

- 1 L Prakasam reddy, Fundamentals of Medical Physiology, 4th Edition, Paras medical Publisher, Hyderabad, 2008
- 2 Sujit K. Chaudhuri, Concise Medical Physiology, 6th edition, New Central Book Agency, Kolkata, 200

**REFERENCE BOOKS:-**

- 1 AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006
- 2 A C Guyton: Text book of Medical Physiology, 8th edition, saunders company, Japan,
- 3 G J Tortora, B Derrickson: Principles of anatomy & physiology, 11th edition, Harper & Row Publishers, New York
- 4 John Wiley & Sons Inc, New Jersey, 2007

**PREREQUISITES:** Higher secondary level biology or remedial biology

**COURSE PLAN:**

Sl. No.	Topics	No. of hrs.
1	<b>CELL STRUCTURE &amp; ORGANIZATION</b> Tissue organization Epithelium Connective tissue –Collagen fibers –Elastic fibers –Areolar fibers Cartilage –Bone Contractile tissue –striated –skeletal –cardiac –non striated –plain –myoepithelial General principles of cell physiology Physiology of skeletal muscle	4
2	<b>BLOOD:</b> Composition Volume measurement & variations Plasma proteins –classification & functions Red blood cells –development, morphology & measurements –functions & dysfunctions. White blood cells –development –classification, morphology –functions & dysfunctions Platelets –morphology –development, functions & dysfunctions Clotting –factors –mechanism –anti- coagulants dysfunctions Blood grouping –classification –importance in transfusion, Rh factor & incompatibility Suspension stability Osmotic stability Reticulo endothelial system <ul style="list-style-type: none"> <li>○ Spleen</li> <li>○ lymphatic tissue</li> <li>○ Thymus</li> <li>○ bone marrow</li> <li>○ immune system</li> <li>○ cellular</li> <li>○ Humoral</li> <li>○ Autoimmune</li> </ul>	4
Sl. No.	Topics	No. of hrs.

3	<b>DIGESTION:</b> General arrangement Salivary digestion –functions & regulations Gastric digestion –functions & regulations Pancreatic digestion –functions & regulations Intestinal digestion –functions & regulations Liver & bile Absorption Motility Deglutition Vomiting Defecation Functions of large intestine Neurohumoral regulations of alimentary functions, summary	2
4	<b>EXCRETION:</b> Body fluids –distribution, measurement & exchange, Kidney –structure of nephron –mechanism of urine formation –composition of the urine and abnormal constituents –urinary bladder & micturition	2
5	<b>ENDOCRINES:</b> Hormone mechanism –negative feed backs –tropic action –permissive action –cellular action, hypothalamic regulation Thyroid - hormones, actions, regulations Adrenal cortex - hormones, actions, regulations Adrenal medulla –hormones, actions, regulations Parathyroid - hormones, actions, regulations Islets of pancreas –hormones, actions, regulations Miscellaneous _ hormones, actions, regulations Common clinical disorders	3
6	<b>REPRODUCTION:</b> Male reproductive system –control & regulation Female reproductive system –uterus –ovaries –menstrual cycle –regulation –pregnancy & delivery –breast –family planning	1
7	<b>RESPIRATION:</b> Mechanics of respiration –pulmonary function tests –transport of respiratory gases- neural and chemical regulation of respiration –hypoxia, cyanosis, dyspnoea– asphyxia.	1
8	<b>CIRCULATION:</b> General principles Heart: myocardium –innervation –transmission of cardiac impulse- Events during cardiac cycle –cardiac output. Peripheral circulation: peripheral resistances –arterial blood pressure –measurements –factors regulation variations –capillary circulation –venous circulation. Special circulation: coronary cerebral –miscellaneous	4
9	<b>ENVIRONMENTAL PHYSIOLOGY</b> Body temperature regulation (including skin Physiology). Exposure to low and high atmospheric pressure	2
<b>Sl. No.</b>	<b>Topics</b>	<b>No. of hrs.</b>

10	<b>NERVOUS SYSTEM:</b> Neuron –Conduction of impulse –synapse –receptor. Sensory organization –pathways and perception Reflexes –cerebral cortex –functions. Thalamus –Basal ganglia Cerebellum. Hypothalamus. Autonomic nervous system –motor control of movements, posture and equilibrium – conditioned reflex, eye hand co-ordination	5
11	<b>SPECIAL SENSES –(Elementary) Olfaction –Taste –Hearing</b>	2
	<b>Total Number of Hours</b>	<b>30</b>

### **PRACTICAL (Total: 15 hours)**

- 1 Blood test: Microscope, Haemocytometer, Blood, RBC count, Hb, WBC count, Differential Count, Haematocrit demonstration, ESR, Blood group & Rh. type, Bleeding time and clotting time
- 2 Digestion: Test salivary digestions
- 3 Excretion: Examination of Urine, Specific gravity, Albumin, Sugar, Microscopic examination for cells and cysts
- 4 Endocrinology and Reproduction: Dry experiments in the form of cases showing different endocrine disorders.
- 5 Respiratory System: Clinical examination of respiratory system, Spirometry, Breath holding test
- 6 Cardio Vascular System: Clinical examination of circulatory system, Measurement of blood pressure and pulse rate, Effect of exercise on blood pressure and pulse rate
- 7 Central Nervous System: Sensory system, Motor system, Cranial system, Superficial and deep reflexes

## **OCULAR PHYSIOLOGY**

**COURSE DESCRIPTION:** Ocular physiology deals with the physiological functions of each part of the eye.

**OBJECTIVES:** At the end of the course, the student should be able to:

- 1 Explain the normal functioning of all structures of the eye and their interactions
- 2 Elucidate the physiological aspects of normal growth and development of the eye
- 3 Understand the phenomenon of vision
- 4 List the physiological principles underlying pathogenesis and treatment of diseases of the eye

**TEXT BOOK:** AK Khurana, Indu Khurana: Anatomy and Physiology of Eye, Second edition, CBS Publishers, New Delhi, 2006

## **REFERENCE BOOKS:**

- 1 RD Ravindran: Physiology of the eye, Arvind eye hospitals, Pondicherry, 2001
- 2 PL Kaufman, A Alm: Adler's Physiology of the eye clinical application, 10th edition, Mosby, 2002

**PREREQUISITES:** General Physiology

## **COURSE PLAN: (Total: 45 hours)**

- 1 Protective mechanisms in the eye: Eye lids and lacrimation, description of the globe
- 2 Extrinsic eye muscles, their actions and control of their movements
- 3 Coats of the eye ball
- 4 Cornea
- 5 Aqueous humor and vitreous: Intra ocular pressure
- 6 Iris and pupil
- 7 Crystalline lens and accommodation – presbyopia
- 8 Retina – structure and functions
- 9 Vision – general aspects of sensation
- 10 Pigments of the eye and photochemistry
- 11 The visual stimulus, refractive errors
- 12 Visual acuity, Vernier acuity and principle of measurement
- 13 Visual perception – Binocular vision, stereoscopic vision, optical illusions
- 14 Visual pathway, central and cerebral connections
- 15 Colour vision and colour defects. Theories and diagnostic tests
- 16 Introduction to electro physiology
- 17 Scotopic and Photopic vision
- 18 Color vision, Color mixing
- 19 Mechanism of accommodation
- 20 Retinal sensitivity and Visibility
- 21 Receptive stimulation and flicker

- 22 Ocular, movements and saccades
- 23 Visual perception and adaptation
- 24 Introduction to visual psychology (Psychophysics)

**PRACTICAL: Total: 15 hours.**

- 1 Lid movements
- 2 Tests for lacrimation tests
- 3 Extra ocular movements
- 4 Break up time
- 5 Pupillary reflexes
- 6 Applanation tonometry
- 7 Schiotz tonometry.
- 8 Measurement of accommodation and convergence
- 9 Visual acuity measurement.
- 10 Direct ophthalmoscopy
- 11 Indirect ophthalmoscopy
- 12 Retinoscopy
- 13 Light and dark adaptation.
- 14 Binocular vision( Stereopsis)

## **GENERAL BIOCHEMISTRY**

**COURSE DESCRIPTION:** This course will be taught in two consecutive semesters. General Biochemistry deals with the biochemical nature of carbohydrates, proteins, minerals, vitamins, lipids etc. A detailed study of these, emphasizing on their chemical composition and their role in metabolism is the required aim of this course.

**OBJECTIVES:** At the end of the course, the student should be able to: demonstrate his knowledge and understanding on:

- 1 Structure, function and interrelationship of biomolecules and consequences of deviation from normal.
- 2 Integration of the various aspects of metabolism, and their regulatory pathways.
- 3 Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data.

**TEXT BOOK:** S. Ramakrishnan: Essentials of biochemistry and ocular biochemistry, Annamalai University Publications, Chidambaram, India, 1992

**REFERENCE BOOKS:**

- 1 S. Ramakrishnan, K G Prasanna and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990
- 2 D.R. Whitehart: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003

**PREREQUISITES:** Higher secondary level chemistry with good knowledge of organic chemistry.

**COURSE PLAN**

Sl.No.	Topics	No of hrs
1	Carbohydrates: Glucose; fructose; galactose; lactose; sucrose; starch and glycogen (properties and tests, Structure and function)	6
2	Proteins: Amino acids, peptides, and proteins (general properties & tests with a few examples like glycine, tryptophan, glutathione, albumin, hemoglobin, collagen)	6
3	Lipids: Fatty acids, saturated and unsaturated, cholesterol and triacylglycerol, phospholipids and plasma membrane	6
4	Vitamins: General with emphasis on A, B2, C, E and inositol (requirements, assimilation and properties)	6
5	Minerals: Na, K, Ca, P, Fe, Cu and Se. (requirements, availability and properties)	6
	<b>Total Number of Hours</b>	<b>30</b>

**PRACTICAL (Total: 15 hours)**

2.1 Reactions of monosaccharides, disaccharides and starch:

Glucose	Fructose
Galactose	Maltose, lactose
Sucrose	Starch

2.2 Analysis of Unknown Sugars

Estimation:	
Photometry	Biofluid of choice – blood, plasma, serum
Standard graphs	Glucose
Proteins	Urea
Creatinine	Bilirubin

## **OCULAR BIOCHEMISTRY**

**COURSE DESCRIPTION:** This course is being taught in two consecutive semesters. Ocular Biochemistry deals with the metabolism that takes place in the human body. It also deals with ocular biochemistry in detail. Clinical estimation as well as the clinical significance of biochemical values is also taught.

**OBJECTIVES:** At the end of the course, the student should be able to demonstrate his knowledge and understanding on

- 1 Structure ,function and interrelationship of biomolecules and consequences of deviation from the normal
- 2 Integration of various aspects of metabolism and their regulatory pathways
- 3 Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data
- 4 Understand metabolic processes taking place in different ocular structures.

**TEXT BOOK:** S. Ramakrishnan: Essentials of biochemistry and ocular biochemistry, Annamalai University Publications, Chidambaram, India, 1992

### **REFERENCE BOOKS:**

- 1 S. Ramakrishnan, K G Prasanna and R Rajan: Text book of Medical Biochemistry, Orient Longman, Madras, 1990
- 2 D R Whitehart: Biochemistry of the Eye, 2nd edition, Butterworth Heinemann, Pennsylvania, 2003

**PREREQUISITES:** Higher secondary level chemistry with good knowledge of organic chemistry and knowledge of Biochemistry I

**COURSE PLAN: (Total: 15 hours)**

- 1 Hormones basic concepts in metabolic regulation with examples say insulin.
- 2 Metabolism: General whole body metabolism (carbohydrates, proteins, lipids)
- 3 Ocular Biochemistry: Various aspects of the eye, viz., cornea, lens aqueous, vitreous, retina and pigment rhodopsin. (The important chemicals in each and their roles.)  
Immunology of anterior segment
- 4 Technique: Colloidal state, sol. Gel. Emulsion, dialysis, electrophoresis. pH buffers mode of action, molar and percentage solutions, photometer, colorimeter and spectrometry. Radio isotopes: application in medicine and basic research.
- 5 Clinical Biochemistry: Blood sugar, urea, creatinine and bilirubin significance of their estimation.

**PRACTICAL (Total: 15 hours)**

- 1 Quantitative analysis
- 2 Abnormal constituents in urine, sugar proteins, ketones, blood and bile salts.
- 3 Techniques of detection of abnormal constituents of urine:
- 4 Electrophoresis
  - 4.1 Chromatography
  - 4.2 Preparation of normal, molar and percentage solutions.
  - 4.3 Preparation of buffers, pH determination
- 5 Demonstration
  - 5.1 Estimation of blood cholesterol
  - 5.2 Estimation of alkaline phosphatase.
  - 5.3 Salivary amylase (effect of ph, etc)
  - 5.4 Milk analysis.

## **PHYSICAL OPTICS**

**COURSE DESCRIPTION:** This course will be taught in one semester. Physical Optics is the study of light, its properties and its interaction with matter. Specifically, the phenomena of interference, diffraction, polarization and scattering will be dealt with in detail.

**OBJECTIVES:** The objective of this course is to equip the students with a thorough knowledge of properties of light. At the end of this course, students will be able to predict the distribution of light under various conditions.

**TEXT BOOK:** Subrahmanyam N, BrijLal, A text book of Optics, S. Chand Co Ltd, New Delhi, India, 2003.

## REFERENCE BOOKS:

- 1 Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.
- 2 Keating NM. P, Geometric, Physical and Visual Optics, Butterworth- Heinemann, Massachusetts, USA, 2002.

**PREREQUISITES:** Higher secondary level mathematics and physics.

## COURSE PLAN

No.	Topics	No of hrs.
1.	Nature of light –light as electromagnetic oscillation –wave equation; ideas of sinusoidal oscillations –simple harmonic oscillation; transverse nature of oscillation; concepts of frequency, wavelength, amplitude and phase.	7
2.	Sources of light; Electromagnetic Spectrum.	3
3.	Polarized light; linearly polarized light; and circularly polarized light.	3
4.	Intensity of polarized light; Malus' Law; polarizers and analyzers; Methods of producing polarized light; Brewster's angle.	2
5.	Birefringence; ordinary and extraordinary rays.	2
6.	Relationship between amplitude and intensity.	1
7.	Coherence; interference; constructive interference, destructive interference; fringes; fringe width.	2
8.	Double slits, multiple slits, gratings.	2
9.	Diffraction; diffraction by a circular aperture; Airy's disc	2
10.	Resolution of an instrument (telescope, for example); Raleigh's criterion	2
11.	Scattering; Raleigh's scattering; Tyndall effect.	2
12.	Fluorescence and Phosphorescence	2
13.	Basics of Lasers –coherence; population inversion; spontaneous emission; Einstein's theory of lasers.	5
14.	Radiometry; solid angle; radiometric units; photopic and scotopic luminous efficiency and efficacy curves; photometric units	4
15.	Inverse square law of photometry; Lambert's law.	3
16.	Other units of light measurement; retinal illumination; Trolands	3
	<b>Total number of Lectures</b>	<b>45</b>

## PRACTICAL: Total : 15 hours

Each practical session could be evaluated for 10 marks and the total could be added to the final evaluations. These practical could be customized as per the university requirements and spaced apart conveniently. The practical to be done include the following:

- 1 Gratings – determination of grating constant using Sodium vapour lamp; determination of wavelengths of light from Mercury vapour lamp
- 2 Circular Apertures – measurements of Airy's disc for apertures of various sizes
- 3 Verification of Malus' Law using a polarizer – analyzer combination
- 4 Demonstration of birefringence using Calcite crystals
- 5 Measurement of the resolving power of telescopes.
- 6 Newton's rings
- 7 Demonstration of fluorescence and phosphorescence using crystals and paints

## **GEOMETRICAL OPTICS**

**COURSE DESCRIPTION:** This course will be taught in two consecutive semesters. Geometric Optics is the study of light and its behaviour as it propagates in a variety of media. Specifically, the phenomena of reflection and refraction of light at boundaries between media and subsequent image formation will be dealt with in detail. Reflections at plane and spherical surfaces and refractions at plane, spherical, cylindrical and toric surfaces will be studied in this course. Attention will be given to the system of surfaces and/or lenses and their imaging properties. The effect of aperture stops on the quality of images, such as blur and aberrations, depth of field and depth of focus, will also be studied

**OBJECTIVES:** The objective of this course is to equip the students with a thorough knowledge of mirrors and lenses. At the end of this course, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.

### **TEXT BOOK:**

- 1 Tunnaclyffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990.
- 2 Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.

### **REFERENCE BOOKS:**

- 1 Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.
- 2 Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw-Hill, New York, USA, 2002.

**PREREQUISITES:** Higher secondary level mathematics and physics.

### **COURSE PLAN**

<b>No.</b>	<b>Topics</b>	<b>No of hrs.</b>
1.	Nature of light –light as electromagnetic oscillation; ideas of sinusoidal oscillations; amplitude and phase; speed of light in vacuum and other media; refractive index.	2
2.	Wavefronts–spherical, elliptical and plane; Curvature and vergence; rays; convergence and divergence in terms of rays and vergence; vergence at a distance	2
3.	Refractive index; its dependence on wavelength	1
4.	Fermat’s and Huygen’s Principle –Derivation of laws of reflection and refraction (Snell’s law) from these principles	3
5.	Plane mirrors –height of the mirror; rotation of the mirror	1
6.	Reflection by a spherical mirror –paraxial approximation; sign convention; derivation of vergence equation	1
7.	Imaging by concave mirror, convex mirror	2
8.	Reflectivity; transmissivity; Snell’s Law, Refraction at a plane surface	2
<b>No.</b>	<b>Topics</b>	<b>No of hrs.</b>

9.	Glass slab; displacement without deviation; displacement without dispersion	2
10.	Thick prisms; angle of prism; deviation produced by a prism; refractive index of the prism	2
11.	Prisms; angular dispersion; dispersive power; Abbe's number.	1
12.	Definition of crown and flint glasses; materials of high refractive index	1
13.	Thin prism –definition; definition of Prism diopter; deviation produced by a thin prism; its dependence on refractive index	2
14.	Refraction by a spherical surface; sign convention; introduction to spherical aberration using image formed by a spherical surface of a distance object; sag formula	3
15.	Paraxial approximation; derivation of vergence equation	1
16.	Imaging by a positive powered surface and negative powered surface	1
17.	Vergence at a distance formula; effectivity of a refracting surface	1
18.	Definition of a lens as a combination of two surfaces; different types of lens shapes.	1
19.	Image formation by a lens by application of vergence at a distance formula; definitions of front and back vertex powers; equivalent power; first and second principal planes/points; primary and secondary focal planes/points; primary and secondary focal lengths	3
20.	Newton's formula; linear magnification; angular magnification	2
21.	Nodal Planes	1
22.	Thin lens as a special case of thick lens; review of sign convention	1
23.	Imaging by a thin convex lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions	2
24.	Imaging by a thin concave lens; image properties (real/virtual; erect/inverted; magnified/minified) for various object positions	2
25.	Prentice's Rule	1
26.	System of two thin lenses; review of front and back vertex powers and equivalent power, review of six cardinal points.	2
27.	System of more than two thin lenses; calculation of equivalent power using magnification formula	2
	<b>Total number of Lectures</b>	<b>45</b>

### **PRACTICAL (Total: 15 hours)**

- 2.1 Thick Prism – determination of prism angle and dispersive power; calculation of the refractive index
- 2.2 Thin Prism – measurement of deviation; calculation of the prism diopter
- 2.3 Image formation by spherical mirrors
- 2.4 Convex lens - power determination using lens gauge, power determination using distant object method; power determination using the vergence formula
- 2.5 Concave lens – in combination with a convex lens – power determination.

### **GEOMETRICAL OPTICS II:**

**COURSE DESCRIPTION:** This course will be taught in two consecutive semesters. Geometric Optics is the study of light and its behaviour as it propagates in a variety of media. Specifically, the phenomena of reflection and refraction of light at boundaries between media and subsequent image formation will be dealt with in detail. Reflections at plane and spherical surfaces and refractions at

plane, spherical, cylindrical and toric surfaces will be studied in this course. Attention will be given to the system of surfaces and/or lenses and their imaging properties. The effect of aperture stops on the quality of images, such as blur and aberrations, depth of field and depth of focus, will also be studied

**OBJECTIVES:** The objective of this course is to equip the students with a thorough knowledge of mirrors and lenses. At the end of this course, students will be able to predict the basic properties of the images formed on the retina by the optics of the eye.

**TEXT BOOK:**

- 1 Tunnacliffe A. H, Hirst J. G, Optics, The association of British Dispensing Opticians, London, U.K., 1990.
- 2 Pedrotti L. S, Pedrotti Sr. F. L, Optics and Vision, Prentice Hall, New Jersey, USA, 1998.

**REFERENCE BOOKS:**

- 1 Loshin D. S. The Geometric Optics Workbook, Butterworth-Heinemann, Boston, USA, 1991.
- 2 Schwartz S. H. Geometrical and Visual Optics: A Clinical Introduction, McGraw-Hill, New York, USA, 2002.

**PREREQUISITES:** Higher secondary level mathematics and physics.

**COURSE PLAN: Total: 45 hours**

- 1 Vergence and vergence techniques revised.
- 2 Gullstrand's schematic eyes, visual acuity, Stile Crawford
- 3 Emmetropia and ametropia
- 4 Blur retinal Imaginary
- 5 Correction of spherical ammetropia, vertex distance and effective power, dioptric power of the spectacle, to calculate the dioptric power, angular magnification of spectacles in aphakic
- 6 Thin lens model of the eye –angular magnification –spectacle and relative spectacle magnification.
- 7 Aperture stops- entrance and exit pupils.
- 8 Astigmatism. - To calculate the position of the line image in a sphero-cylindrical lens.
- 9 Accommodation –Accommodation formulae and calculations.

- 10 Presbyopia- Spectacle magnification, angular magnification of spectacle lens, near point, calculation of add, depth of field.
- 11 Spatial distribution of optical information- modulation transfer functions- Spatial filtering- applications.
- 12 Visual optics of aphakia and pseudophakia.

**PRACTICAL: Total: 15 hours**

- 1 Construction of a tabletop telescope – all three types of telescopes.
- 2 Construction of a tabletop microscope
- 3 Imaging by a cylindrical lens – relationship between cylinder axis and image orientation
- 4 Imaging by two cylinders in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinders' powers and orientations
- 5 Imaging by a spherocylindrical lens – sphere and cylinder in contact – determination of the position of CLC; verification of CLC using a spherical lens with power equal to the spherical equivalent; orientations and position of the line images and their relation to the cylinder's power and orientation

**CLINICAL OPTOMETRY I (STUDENTSHIP): Total: 15 hours**

Students will observe the basic operations of the optometry clinic while interacting with the multidisciplinary team members involved in providing optimal care to patients. The student will be introduced to optical terminology, equipment, and techniques used for treatment.

**CLINICAL OPTOMETRY II (STUDENTSHIP) Total: 45 hours**

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students apply knowledge from previous clinical learning experience under the supervision of a registered optometrist. Students are tested on intermediate clinical optometry skills. The practical aspects of the dispensing optics( hand-on in optical), optometric instruments, clinical examination of visual system( Hands-on under supervision) and ocular diseases ( Slides and case discussion) will be given to the students during their clinical training.

**VISUAL OPTICS I**

**COURSE DESCRIPTION:** This course deals with the concept of eye as an optical instrument and thereby covers various optical components of eye, types of refractive errors, clinical approach in diagnosis and management of various types of refractive errors.

**OBJECTIVES:** Upon completion of the course, the student should be able:

- 1 To understand the fundamentals of optical components of the eye
- 2 To gain theoretical knowledge and practical skill on visual acuity measurement, objective and subjective clinical refraction.

**TEXT BOOK:**

- 1 A H Tunnacliffe: Visual optics, The Association of British Optician, 1987
- 2 AG Bennett & RB Rabbets: Clinical Visual optics, 3rd edition, Butterworth Heinemann, 1998

**REFERENCE BOOKS:**

- 1 M P Keating: Geometric, Physical and Visual optics, 2nd edition, Butterworth-Heinemann, USA, 2002
- 2 HL Rubin: Optics for clinicians, 2nd edition, Triad publishing company. Florida, 1974.
- 3 H Obstfeld: Optic in Vision- Foundations of visual optics & associated computations, 2nd edition, Butterworth, UK, 1982.
- 4 WJ Benjamin: Borish's clinical refraction, 2nd edition, Butterworth Heinemann, Missouri, USA, 2006
- 5 T Grosvenor: Primary Care Optometry, 4th edition, Butterworth –heinemann, USA, 2002

**PREREQUISITES:** Geometrical optics, Physical optics, Ocular Physiology

**COURSE PLAN (Total: 15 hours)**

- 1 Review of Geometrical Optics: Vergence and power
  - 1.1 Conjugacy, object space and image space
  - 1.2 Sign convention
  - 1.3 Spherical refracting surface
  - 1.4 Spherical mirror; catoptric power
  - 1.5 Cardinal points

- 1.6 Magnification
- 1.7 Light and visual function
- 1.8 Clinical Relevance of: Fluorescence, Interference, Diffraction, Polarization, Bi-refringence, Dichroism
- 1.9 Aberration and application Spherical and Chromatic
- 2 Optics of Ocular Structure
  - 2.1 Cornea and aqueous
  - 2.2 Crystalline lens
  - 2.3 Vitreous
  - 2.4 Schematic and reduced eye
- 3 Measurements of Optical Constants of the Eye
  - 3.1 Corneal curvature and thickness
  - 3.2 Keratometry
  - 3.3 Curvature of the lens and ophthalmophakometry
  - 3.4 Axial and axis of the eye
  - 3.5 Basic Aspects of Vision.
    - 3.5.1 Visual Acuity
    - 3.5.2 Light and Dark Adaptation
    - 3.5.3 Color Vision
    - 3.5.4 Spatial and Temporal Resolution
    - 3.5.5 Science of Measuring visual performance and application to Clinical Optometry
- 4 Refractive anomalies and their causes
  - 4.1 Etiology of refractive anomalies
  - 4.2 Contributing variability and their ranges
  - 4.3 Populating distributions of anomalies.
  - 4.4 Optical component measurements
  - 4.5 Growth of the eye in relation to refractive errors

## **VISUAL OPTICS II:**

**COURSE DESCRIPTION:** This course deals with the concept of eye as an optical instrument and thereby covers different optical components of eye, types of refractive errors, clinical approach in diagnosis and management of various types of refractive errors.

**OBJECTIVES:** Upon completion of the course, the student should be able:

- 1 To understand the fundamentals of optical components of the eye
- 2 To gain theoretical knowledge and practical skill on visual acuity measurement, objective and subjective clinical refraction.

### **TEXT BOOK/REFERENCE BOOKS:**

- 1 Theodore Grosvenor: Primary Care Optometry, 5th edition, Butterworth –Heinemann, 2007

- 2 Duke –Elder’s practice of Refraction
- 3 AI Lens: Optics, Retinoscopy, and Refractometry: 2nd edition, SLACK Incorporated (p) Ltd, 2006
- 4 George K. Hans, Kenneth Cuiffreda: Models of the visual system, Kluwer Academic, NY, 2002
- 5 Leonard Werner, Leonard J. Press: Clinical Pearls in Refractive Care, Butterworth – Heinemann, 2002
- 6 David B. Elliot: Clinical Procedures in Primary Eye care, 3rd edition, Butterworth – Heinemann, 2007
- 7 WJ Benjamin: Borish’s clinical refraction, 2nd edition, Butterworth Heinemann, Missouri, USA, 2006

**PREREQUISITES:** Geometrical Optics, Physical Optics & Ocular Physiology, Visual optics -I

### COURSE PLAN

Sl. No	Topics	No. of Hrs
1.	Accommodation & Presbyopia <ul style="list-style-type: none"> <li>• Far and near point of accommodation</li> <li>• Range and amplitude of accommodation</li> <li>• Mechanism of accommodation</li> <li>• Variation of accommodation with age</li> </ul>	6
Sl. No	Topics	No. of Hrs
	<ul style="list-style-type: none"> <li>• Anomalies of accommodation</li> <li>• Presbyopia</li> <li>• Hypermetropia and accommodation</li> </ul>	
2.	Convergence: <ul style="list-style-type: none"> <li>• Type, Measurement and Anomalies</li> <li>• Relationship between accommodation and convergence-AC/A ratio</li> </ul>	3
3.	Objective Refraction (Static & Dynamic) <ul style="list-style-type: none"> <li>• Streak retinoscopy</li> <li>• Principle, Procedure, Difficulties and interpretation of findings</li> <li>• Transposition and spherical equivalent</li> <li>• Dynamic retinoscopy various methods</li> <li>• Radical retinoscopy and near retinoscopy</li> <li>• Cycloplegic refraction</li> </ul>	8
4.	Subjective Refraction: <ul style="list-style-type: none"> <li>• Principle and fogging</li> <li>• Fixed astigmatic dial(Clock dial),Combination of fixed and rotator dial(Fan and block test),J.C.C</li> <li>• Duochrome test <ul style="list-style-type: none"> <li>○ Binocular balancing- alternate occlusion, prism dissociation, dissociate Duochrome balance, Borish dissociated fogging</li> <li>○ Binocular refraction-Variou techniques</li> </ul> </li> </ul>	8

5.	Effective Power & Magnification : <ul style="list-style-type: none"> <li>• Ocular refraction vs. Spectacle refraction</li> <li>• Spectacle magnification vs. Relative spectacle magnification</li> <li>• Axial vs. Refractive ametropia, Knapp's law</li> <li>• Ocular accommodation vs. Spectacle accommodation</li> <li>• Retinal image blur-Depth of focus and depth of field</li> </ul>	5
<b>Total number of hours</b>		30

## **PATHOLOGY**

**COURSE DESCRIPTION:** This course describes basic aspects of disease processes with reference to specific entities relevant in optometry/ophthalmology.

**OBJECTIVES** At the end of the course students will acquire knowledge in the following aspects:

- 1 Inflammation and repair aspects.
- 2 Pathology of various eye parts and adnexa.

**TEXT BOOK** K S Ratnagar: Pathology of the eye & orbit, Jaypee brothers Medical Publishers, 1997

### **REFERENCE BOOKS:**

- 1 CORTON KUMAR AND ROBINS: Pathological Basis of the Disease, 7th Edition, Elsevier, New Delhi, 2004.
- 2 S R Lakhani Susan AD & Caroline JF: Basic Pathology: An introduction to the mechanism of disease, 1993.

**PREREQUISITES:** Higher Secondary Biology, General and Ocular Anatomy, General and Ocular Physiology

## **COURSE PLAN (Total: 15 hours)**

- 1 Inflammation and repair
- 2 Infection in general
- 3 Specific infections
  - 3.1 Tuberculosis
  - 3.2 Leprosy
  - 3.3 Syphilis
  - 3.4 Fungal infection
  - 3.5 Viral chlamydial infection
- 4 Neoplasia
- 5 Haematology
  - 5.1 Anemia
  - 5.2 Leukemia
  - 5.3 Bleeding disorders
- 6 Circulatory disturbances
  - 6.1 Thrombosis
  - 6.2 Infarction
  - 6.3 Embolism
- 7 Clinical pathology
  - 7.1 Interpretation of urine report
  - 7.2 Interpretation of blood smears.
- 8 Immune system
- 9 Shock, Anaphylaxis.
- 10 Allergy

## **OCULAR MICROBIOLOGY**

**COURSE DESCRIPTION** This course covers the basic biological, biochemical and pathogenic characteristics of pathogenic organisms.

**OBJECTIVES** The objectives of the course are:

- 1 To prepare the students to gain essential knowledge about the characteristics of bacteria, viruses, fungi and parasites;
- 2 To acquire knowledge of the principles of sterilisation and disinfection in hospital and ophthalmic practice;
- 3 To understand the pathogenesis of the diseases caused by the organisms in the human body with particular reference to the eye infections and
- 4 To understand basic principles of diagnostic ocular Microbiology.

### **TEXT BOOK:**

- 1 BURTON G.R.W: Microbiology for the Health Sciences, third edition, J.P. Lippincott Co., St. Louis, 1988.
- 2 M J Pelczar (Jr), ECS Chan, NR Krieg : Microbiology ,fifth edition, TATA McGRAW-HILL

Publisher, New Delhi,1993

**REFERENCE BOOKS:**

- 1 KJ Ryan, CG Ray: Sherris Medical Microbiology- An Introduction to infectious Diseases, fourth edition, McGRAW HILL Publisher, New Delhi, 1994 MACKIE & McCartney Practical Medical Microbiology
- 2 SYDNEY M. FINEGOLD & ELLEN JO BARON: Diagnostic Microbiology (DM) 5)

**PREREQUISITES:** Higher secondary Biology

**COURSE PLAN: (Total: 15 hours)**

- 1 Morphology and principles of cultivating bacteria
- 2 Sterilization and disinfections used in laboratory and hospital practice
- 3 Common bacterial infections of the eye.
- 4 Common fungal infections of the eye
- 5 Common viral infections of the eye.
- 6 Common parasitic infections of the eye.

**BASIC AND OCULAR PHARMACOLOGY**

**COURSE DESCRIPTION:** This course covers the actions, uses, adverse effects and mode of administration of drugs, especially related to eyes.

**OBJECTIVES:** At the end of the course the students will acquire knowledge in the following aspects-

- 1 Basic principle of pharmacokinetics & Pharmacodynamics
- 2 Commonly used ocular drugs, mechanism, indications, contraindications, drug dosage and adverse effects.

**TEXT BOOK/REFERENCE BOOKS:**

- 1 K D Tripathi: Essentials of Medical Pharmacology. 5th edition, Jaypee, New Delhi, 2004
- 2 Ashok Garg: Manual of Ocular Therapeutics, Jaypee, New Delhi, 1996
- 3 T J Zimmerman, K S Kooner : Text Book of Ocular Pharmacology, Lippincott-Raven, 1997

**PREREQUISITES:** General Physiology & Biochemistry

## COURSE PLAN

Sl. No	Topics	No. of Hrs
1.	General Pharmacology: Introduction & sources of drugs, Routes of drug administration, Pharmacokinetics (emphasis on ocular pharmacokinetics), Pharmacodynamics & factors modifying drug actions	10
2.	Systemic Pharmacology: Autonomic nervous system: Drugs affecting papillary size and light reflex, Intraocular tension, Accommodation; Cardiovascular system: Anti-hypertensive sand drugs useful in Angina; Diuretics: Drugs used in ocular disorders; Central Nervous System: Alcohol, sedative hypnotics, General & local anaesthetics, Opioids & non-opioids; Chemotherapy : Introduction on general chemotherapy, Specific chemotherapy –Antiviral, antifungal, antibiotics; Hormones : Corticosteroids, Antidiabetics; Blood Coagulants	10
3.	Ocular Pharmacology: Ocular preparations, formulations and requirements of an ideal agent; Ocular Pharmacokinetics, methods of drug administration & Special drug delivery system; Ocular Toxicology	10
4.	Diagnostic & Therapeutic applications of drugs used in Ophthalmology: Diagnostic Drugs & biological agents used in ocular surgery, Anaesthetics used in ophthalmic procedures, Anti-glaucoma drugs; Pharmacotherapy of ocular infections –Bacterial, viral, fungal & chlamydial; Drugs used in allergic, inflammatory& degenerative conditions of the eye; Immune modulators in Ophthalmic practice, Wetting agents & tear substitutes ,Antioxidants	15
	<b>Total number of hours</b>	<b>45</b>

## OPTOMETRIC OPTICS I

**COURSE DESCRIPTION:** This course deals with understanding the theory behind spectacle lenses and frames, their materials, types, advantages and disadvantages, calculations involved, when and how to prescribe. It will impart construction, design application and development of lenses, particularly of the methods of calculating their power and effect.

**OBJECTIVES:** Skills/knowledge to be acquired at the end of this course: -

- 1 Measurement of lens power , lens centration using conventional techniques
- 2 Transposition of various types of lenses •Knowledge to identify different forms of lenses (equi- convex, planoconvex, periscopic, etc.)
- 3 Knowledge to select the tool power for grinding process.
- 4 Measurement of surface powers using lens measure.
- 5 Method of laying off the lens for glazing process.
- 6 Ophthalmic prism knowledge –effects, units, base-apex notation, compounding and

- 7 Knowledge of prism and decentration in ophthalmic lenses
- 8 Knowledge of different types of materials used to make lenses and its characteristics
- 9 Knowledge lens designs –single vision, bifocals, progressive lens
- 10 Knowledge on tinted and protective lenses
- 11 Knowledge on special lenses like iseikonic, spectacle magnifiers.
- 12 Knowledge on spectacle frames –manufacture, materials

**TEXT BOOK:** Jalie M: The principles of Ophthalmic Lenses, The Association of Dispensing Opticians, London, 1994.

**REFERENCE BOOKS:**

- 1 David Wilson: Practical Optical Dispensing, OTEN- DE, NSW TAFE Commission,1999
- 2 C V Brooks, IM Borish: System for Ophthalmic Dispensing, Second edition, Butterworth- Heinemann, USA, 1996

**PREREQUISITES:** Physical Optics, Geometrical Optics

**COURSE PLAN (Total: 45 hours)**

- 1 Introduction –Light, Mirror, Reflection, Refraction and Absorption
  - 2 Prisms –Definition, properties, Refraction through prisms, Thickness difference, Base-apex notation, uses, nomenclature and units, Sign Conventions, Fresnel’s prisms, rotary prisms
  - 3 Lenses –Definition, units, terminology used to describe, form of lenses
  - 4 Vertex distance and vertex power, Effectivity calculations
  - 5 Lens shape, size and types i.e. Spherical, cylindrical and Sphero-cylindrical
  - 6 Transpositions –Simple, Toric and Spherical equivalent
  - 7 Prismatic effect, centration, decentration and Prentice rule, Prismatic effect of Plano-cylinder and Spherocylinderlenses
  - 8 Spherometer & Sag formula, Edge thickness calculations
  - 9 Magnification in high plus lenses, Minification in high minus lenses
  - 10 Tilt induced power in spectacles
  - 11 Aberration in Ophthalmic Lenses
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Second year

**OPTOMETRIC OPTICS II & Dispensing Optics**

**OPTOMETRIC OPTICS II**

**COURSE DESCRIPTION:** This course deals with understanding the theory behind spectacle lenses and frames, their materials, types, advantages and disadvantages, calculations involved, when

and how to prescribe. It will impart construction, design application and development of lenses, particularly of the methods of calculating their power and effect. In addition deals with role of optometrists in optical set-up.

**OBJECTIVES:** Skills/knowledge to be acquired at the end of this course:

- 1 To select the tool power for grinding process
- 2 Different types of materials used to make lenses and its characteristics
- 3 Lens designs–Bifocals, progressive lens
- 4 Tinted, Protective & Special lenses
- 5 Spectacle frames –manufacture process & materials
- 6 Art and science of dispensing spectacle lens and frames based on the glass prescription.
- 7 Reading of spectacle prescription. Counselling the patient
- 8 Lens edge thickness calculation
- 9 Frame & lens measurements and selection
- 10 Writing spectacle lens order
- 11 Facial measurements - Interpupillary distance measurement and measuring heights (single vision, multifocal, progressives)
- 12 Lens verification and axis marking and fitting of all lens types
- 13 Final checking of finished spectacle with frame adjustments
- 14 Delivery and follow-up
- 15 Troubleshooting complaints and handling patient's questions

**TEXT BOOK/REFERENCE BOOKS:**

- 1 Jalie MO: Ophthalmic lens and Dispensing, 3rd edition, Butterworth –Heinemann, 2008
- 2 Troy E. Fannin, Theodore Grosvenor: Clinical Optics, 2nd edition, Butterworth – Heinemann, 1996
- 3 C W Brooks, IM Borish: System for Ophthalmic Dispensing, 3rd edition, Butterworth - Heinemann, 2007
- 4 Michael P Keating: Geometric, Physical & Visual Optics, 2nd edition, Butterworth – Heinemann, 2002

**PREREQUISITES:** Geometrical Optics, Physical Optics & Ocular Physiology, Optometric Optics - I

**COURSE PLAN**

Sl. No	Topics	No. of Hrs
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1.	Spectacle Lenses - II: <ul style="list-style-type: none"> <li>• Manufacture of glass</li> <li>• Lens materials</li> <li>• Lens surfacing</li> <li>• Principle of surface generation and glass cements</li> <li>• Terminology used in Lens workshop</li> <li>• Lens properties</li> <li>• Lens quality</li> <li>• Faults in lens material</li> <li>• Faults on lens surface</li> </ul>	5
<b>Sl. No</b>	<b>Topics</b>	<b>No. of Hrs</b>
	<ul style="list-style-type: none"> <li>• Methods of Inspecting the quality of lenses</li> <li>• Safety standards for ophthalmic lenses (FDA, ANSI, ISI, Others)</li> </ul>	
2.	Spectacle Frames: <ul style="list-style-type: none"> <li>• Types and parts</li> <li>• Classification of spectacle frames-material, weight, temple position, Coloration</li> <li>• Frame construction</li> <li>• Frame selection</li> <li>• Size, shape, mounting and field of view of ophthalmic lenses</li> </ul>	5
3.	Tinted & Protective Lenses <ul style="list-style-type: none"> <li>• Characteristics of tinted lenses Absorptive Glasses</li> <li>• Polarizing Filters, Photochromic &amp; Reflecting filters</li> <li>• Safety lenses-Toughened lenses, Laminated Lenses, CR 39, Polycarbonate lenses</li> </ul>	5
4.	Multifocal Lenses: <ul style="list-style-type: none"> <li>• Introduction, history and development, types</li> <li>• Bifocal lenses, Trifocal &amp; Progressive addition lenses</li> </ul>	3
5.	Reflection from spectacle lens surface & lens coatings: <ul style="list-style-type: none"> <li>• Reflection from spectacle lenses - ghost images -Reflections in bifocals at the dividing line</li> <li>• Antireflection coating, Mirror coating, Hard Multi Coating [HMC], Hydrophobic coating</li> </ul>	2
6.	Miscellaneous Spectacle: <ul style="list-style-type: none"> <li>• Iseikonic lenses</li> <li>• Spectacle magnifiers</li> <li>• Recumbent prisms</li> <li>• Fresnel prism and lenses</li> <li>• Lenticular &amp; Aspherical lenses</li> <li>• High Refractive index glasses</li> </ul>	5
	<b>Total number of hours</b>	<b>25</b>

### **DISPENSING OPTICS:**

<b>Sl. No.</b>	<b>Topic</b>	<b>No. of Lectures</b>
1	Components of spectacle prescription & interpretation, transposition, Add and near power relation	1
2	Frame selection –based on spectacle prescription, professional requirements, age group, face shape	4
3	Measuring Inter-pupillary distance (IPD) for distance & near, bifocal height	1



- 4 J.B Eskridge, J F. Amos, J D. Bartlett: Clinical Procedures in Optometry, Lippincott Williams and Wilkins,1991
- 5 N B. Carlson , DI Kurtz: Clinical Procedures for Ocular Examination ,3rd edition, McGraw-Hill Medical, 2003

**PREREQUISITES:** Optometric Instruments, Pharmacology

**COURSE PLAN (Total: 30 hours)**

- 1 History taking
- 2 Visual acuity estimation
- 3 Extraocular motility, Cover test, Alternating cover test
- 4 Hirschberg test, Modified Krimsky
- 5 Pupils Examination
- 6 Maddox Rod
- 7 Van Herrick
- 8 External examination of the eye, Lid Eversion
- 9 Schirmer's, TBUT, tear meniscus level, NITBUT (keratometer),
- 10 Color Vision
- 11 Stereopsis
- 12 Confrontation test
- 13 Photostress test
- 14 Slit lamp biomicroscopy
- 15 Ophthalmoscopy
- 16 Tonometry
- 17 ROPLAS
- 18 Amsler test
- 19 Contrast sensitivity function test
- 20 Saccades and pursuit test

## **OPTOMETRIC INSTRUMENTS**

**COURSE DESCRIPTION:** This course covers commonly used optometric instruments, its basic principle, description and usage in clinical practice.

**OBJECTIVES:** Upon completion of the course, the student should be able to gain theoretical knowledge and basic practical skill in handling the following instruments

- 1 Visual Acuity chart/drum
- 2 Retinoscope
- 3 Trail Box
- 4 Jackson Cross cylinder
- 5 Direct ophthalmoscope

- 6 Slit lamp Biomicroscope
- 7 Slit lamp Ophthalmoscopy ( +90, 78 D)
- 8 Gonioscope
- 9 Tonometer: Applanation Tonometer
- 10 Keratometer
- 11 Perimeter
- 12 Electrodiagnostic instrument (ERG, VEP, EOG)
- 13 A –Scan Ultrasound
- 14 Lensometer

**TEXT BOOK:** David Henson: Optometric Instrumentations, Butterworth- Heinemann, UK, 1991

**REFERENCE BOOKS:**

- 1 P R Yoder: Mounting Optics in Optical Instruments, SPIE Society of Photo- Optical Instrumentation, 2002
- 2 G Smith, D A. Atchison: The Eye and Visual Optical Instruments, Cambridge University Press, 1997

**PREREQUISITES:** Geometrical optics

**COURSE PLAN (Total: 30 hours)**

- 1 Refractive instruments
  - 1.1 Optotypes and MTF, Spatial Frequency
  - 1.2 Test charts standards.
  - 1.3 Choice of test charts
  - 1.4 Trial case lenses
  - 1.5 Refractor (phoropter) head units
  - 1.6 Optical considerations of refractor units
  - 1.7 Trial frame design
  - 1.8 Near vision difficulties with units and trial frames
  - 1.9 Retinoscope – types available
  - 1.10 Adjustment of Retinoscopes- special features
  - 1.11 Objective optometers.
  - 1.12 Infrared optometer devices.
  - 1.13 Projection charts
  - 1.14 Illumination of the consulting room.
  - 1.15 Brightness acuity test
  - 1.16 Vision analyzer
  - 1.17 Pupilometer
  - 1.18 Potential Acuity Meter
  - 1.19 Abberometer
- 2 Ophthalmoscopes and related devices
  - 2.1 Design of ophthalmoscopes – illumination
  - 2.2 Design of ophthalmoscopes- viewing
  - 2.3 Ophthalmoscope disc

- 2.4 Filters for ophthalmoscopy
- 2.5 Indirect ophthalmoscope
  
- 3 Lensometer, Lens gauges or clock
- 4 Slit lamp
- 5 Tonometers
- 6 Keratometer and corneal topography
- 7 Refractometer
- 8 Orthoptic Instruments (Synaptophore Only)
- 9 Color Vision Testing Devices
- 10 Fields of Vision And Screening Devices
- 11 Scans
- 12 ERG
- 13 New Instruments

## **OCULAR DISEASES I**

**COURSE DESCRIPTION:** This course deals with various ocular diseases affecting various parts of the eyes. It covers clinical signs and symptoms, cause, pathophysiological mechanism, diagnostic approach, differential diagnosis and management aspects of the ocular diseases.

**OBJECTIVES:** At the end of the course the students will be knowledgeable in the following aspects of ocular diseases:

- 1 Etiology
- 2 Epidemiology
- 3 Symptoms
- 4 Signs
- 5 Course sequelae of ocular disease
- 6 Diagnostic approach and
- 7 Management of the ocular diseases.

**TEXT BOOK:** A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international p Ltd. Publishers, New Delhi, 2007

### **REFERENCE BOOKS:**

- p.1 Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990
- p.2 Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth - Heinemann, 2007

**PREREQUISITES:** Ocular anatomy and Ocular Physiology, Ocular Biochemistry and Microbiology, Pharmacology

### **COURSE PLAN (Total: 45 hours)**

- 1 Orbit

- 1.1 Applied Anatomy
- 1.2 Proptosis (Classification, Causes, Investigations)
- 1.3 Enophthalmos
- 1.4 Developmental Anomalies (craniosynostosis, Craniofacial Dysostosis, Hypertelorism, Median facial cleft syndrome)
- 1.5 Orbital Inflammations (Preseptal cellulites, Orbital cellulitis Orbital Periostitis, cavernous sinus Thrombosis)
- 1.6 Grave's Ophthalmopathy
- 1.7 Orbital tumors( Dermoids, capillary haemangioma, Optic nerve glioma)
- 1.8 Orbital blowout fractures
- 1.9 Orbital surgery (Orbitotomy)
- 1.10 Orbital tumors
- 1.11 Orbital trauma
- 1.12 Approach to a patient with proptosis
- 2 Lids
  - 2.1 Applied Anatomy
  - 2.2 Congenital anomalies (Ptosis, Coloboma, Epicanthus, Distichiasis, Cryptophthalmos)
  - 2.3 Oedema of the eyelids(Inflammatory, Solid, Passive edema)
  - 2.4 Inflammatory disorders (Blepharitis, External Hordeolum, Chalazion ,Internalhordeolum, Molluscum Contagiosum)
  - 2.5 Anomalies in the position of the lashes and Lid Margin (Trichiasis, Ectropion, Entropion, Symblepharon, Blepharophimosis, Lagophthalmos, Blepharospasm, Ptosis).
  - 2.6 Tumors (Papillomas, Xanthelasma, Haemangioma, Basal carcinoma, Squamous cell carcinoma, sebaceous gland melanoma)
- 3 Lacrimal System
  - 3.1 Applied Anatomy
  - 3.2 Tear Film
  - 3.3 The Dry Eye ( Sjogren's Syndrome)
  - 3.4 The watering eye ( Etiology, clinical evaluation)
  - 3.5 Dacryocystitis
  - 3.6 Swelling of the Lacrimal gland( Dacryoadenitis)
- 4 Conjunctiva
  - 4.1 Applied Anatomy
  - 4.2 Inflammations of conjunctiva ( Infective conjunctivitis – bacterial, chlamydial, viral , Allergic conjunctivitis, Granulomatous conjunctivitis)
  - 4.3 Degenerative conditions( Pinguecula, Pterygium, Concretions)
  - 4.4 Symptomatic conditions( Hyperaemia, Chemosis, Ecchymosis, Xerosis, Discoloration)
  - 4.5 Cysts and Tumors
- 5 Cornea
  - 5.1 Applied Anatomy and Physiology
  - 5.2 Congenital Anomalies (Megalocornea, Microcornea, Cornea plana, Congenital cloudy cornea)
  - 5.3 Inflammations of the cornea (Topographical classifications: Ulcerative keratitis and Non ulcerative
  - 5.4 Etiological classifications: Infective, Allergic, Trophic, Traumatic, Idiopathic))

- 5.5 Degenerations ( classifications, Arcussenilis, Vogt's white limbal girdle, Hassal-henle bodies, Lipoid Keratopathy, Band shaped keratopathy, Salzmann's nodular degeneration, Droplet keratopathy, Pellucid Marginal degeneration)
- 5.6 Dystrophies ( Reis Buckler dystrophy, Recurrent corneal erosion syndrome, Granular dystrophy, Lattice dystrophy, Macular dystrophy, cornea guttata, Fuch's epithelial endothelial dystrophy, Congenital hereditary endothelial dystrophy)
- 5.7 Keratoconus, Keratoglobus
- 5.8 Corneal oedema, Corneal opacity, Corneal vascularisation
- 5.9 Penetrating Keratoplasty
- 6 Uveal Tract and Sclera
  - 6.1 Applied Anatomy,
  - 6.2 Classification of uveitis
  - 6.3 Etiology
  - 6.4 Pathology
  - 6.5 Anterior Uveitis
  - 6.6 Posterior Uveitis
  - 6.7 Purulent Uveitis
  - 6.8 Endophthalmitis
  - 6.9 Panophthalmitis
  - 6.10 Pars Planitis
  - 6.11 Tumors of uveal tract( Melanoma)
  - 6.12 Episcleritis and scleritis
  - 6.13 Clinical examination of Uveitis and Scleritis

## **OCULAR DISEASE II :**

**COURSE DESCRIPTION:** This course deals with various ocular diseases affecting various parts of the eyes. It covers clinical signs and symptoms, cause, pathophysiological mechanism, diagnostic approach, differential diagnosis and management aspects of the ocular diseases.

**OBJECTIVES:** At the end of the course the students will be knowledgeable in the following aspects of ocular diseases: knowledge on

- 1 Etiology
- 2 Epidemiology
- 3 Symptoms
- 4 Signs
- 5 Course sequelae of ocular disease
- 6 Diagnostic approach, and
- 7 Management of the ocular diseases.

**TEXT BOOK:** A K Khurana: Comprehensive Ophthalmology, 4th edition, New age international p Ltd. Publishers, New Delhi, 2007

**REFERENCE BOOKS:**

- p.1 Stephen J. Miller : Parsons Diseases of the Eye, 18th edition, Churchill Livingstone, 1990  
 p.2 Jack J. Kanski Clinical Ophthalmology: A Systematic Approach, 6th edition, Butterworth-Heinemann, 2007

**PREREQUISITES:** Ocular anatomy and Ocular Physiology, Ocular Biochemistry and Microbiology, Ocular Disease - I

**COURSE PLAN**

Sl. No	Topics	No. of Hrs
1.	Retina and Vitreous: <ul style="list-style-type: none"> <li>• Applied Anatomy</li> <li>• Congenital and Developmental Disorders ( Optic Disc: Coloboma, Drusen, Hypoplasia, Medullated nerve fibers; Persistent Hyaloid Artery)</li> <li>• Inflammatory disorders ( Retinitis : Acute purulent , Bacterial, Virus, mycotic)</li> <li>• Retinal Vasculitis ( Eales’s)</li> <li>• Retinal Artery Occlusion ( Central retinal Artery occlusion)</li> <li>• Retinal Vein occlusion ( Ischaemic, Non Ischaemic , Branch retinal vein occlusion)</li> <li>• Retinal degenerations : Retinitis Pigmentosa, Lattice degenerations</li> <li>• Macular disorders: Solar retinopathy, central serous retinopathy, cystoid macular edema, Age related macular degeneration.</li> <li>• Retinal Detachment: Rhegmatogenous, Tractional, Exudative)</li> <li>• Retinoblastoma</li> <li>• Diabetic retinopathy</li> </ul>	12
2.	Ocular Injuries: Terminology : Closed globe injury ( contusion, lamellar laceration) Open globe injury ( rupture, laceration, penetrating injury, perforating injury) <ul style="list-style-type: none"> <li>• Mechanical injuries ( Extraocular foreign body, blunt trauma, perforating injury, sympathetic ophthalmitis)</li> <li>• Non Mechanical Injuries ( Chemical injuries, Thermal, Electrical, Radiational)</li> <li>• Clinical approach towards ocular injury patients</li> </ul>	3
3.	Lens <ul style="list-style-type: none"> <li>• Applied Anatomy and Physiology</li> <li>• Clinical examination</li> <li>• Classification of cataract</li> <li>• Congenital and Developmental cataract</li> <li>• Acquired ( Senile, Traumatic, Complicated, Metabolic, Electric, Radiational, Toxic)</li> <li>• Morphological: Capsular, Subcapsular, Cortical, Supranuclear, Nuclear, Polar.</li> <li>• Management of cataract ( Non-surgical and surgical measures; preoperative evaluation, Types of surgeries,)</li> <li>• Complications of cataract surgery</li> <li>• Displacement of lens: Subluxation, Displacement</li> <li>• Lens coloboma, Lenticonus, Microspherophakia.</li> </ul>	10

4.	Clinical Neuro-ophthalmology	12
<b>Sl. No</b>	<b>Topics</b>	<b>No. of Hrs</b>
	<ul style="list-style-type: none"> <li>• Anatomy of visual pathway</li> <li>• Lesions of the visual pathway</li> <li>• Pupillary reflexes and abnormalities (Amaurotic light reflex, Efferent pathway defect, Wernicke's hemianopic pupil, Marcus gunn pupil. Argyll Robetson pupil, Adie's tonic pupil)</li> <li>• Optic neuritis, Anterior Ischemic optic neuropathy, Pappilloedema, optic atrophy</li> <li>• Cortical blindness</li> <li>• Malingering</li> <li>• Nystagmus</li> <li>• Clinical examination</li> </ul>	
5.	<b>Glaucoma</b> <ul style="list-style-type: none"> <li>• Applied anatomy and physiology of anterior segment</li> <li>• Clinical Examination</li> <li>• Definitions and classification of glaucoma</li> <li>• Pathogenesis of glaucomatous ocular damage</li> <li>• Congenital glaucoma's</li> <li>• Primary open angle glaucoma</li> <li>• Ocular hypertension</li> <li>• Normal Tension Glaucoma</li> <li>• Primary angle closure glaucoma ( Primary angle closure suspect, Intermittent glaucoma, acute congestive, chronic angle closure)</li> <li>• Secondary Glaucoma's</li> <li>• Management : common medications, laser intervention and surgical techniques</li> </ul>	8
	<b>Total number of hours</b>	<b>45</b>

## **LOW VISION CARE**

**COURSE DESCRIPTION:** This course deal with the definition of low vision, epidemiology aspect of visual impairment, types of low vision devices and its optical principles, clinical approach of the low vision patients, assistive devices for totally visually challenged, art of prescribing low vision devices and training the low vision patients and other rehabilitation measures.

**COURSE OBJECTIVES:** At the end of the course, the student will be knowledgeable in the following:

- 1 Definition and epidemiology of Low Vision
- 2 Clinical examination of Low vision subjects
- 3 Optical, Non-Optical, Electronic, and Assistive devices.
- 4 Training for Low Vision subjects with Low vision devices
- 5 Referrals and follow-up

## **TEXT BOOKS:**

- 1 Christine Dickinson: Low Vision: Principles and Practice Low vision care, 4th edition, Butterworth-Heinemann, 1998
- 2 Sarika G, Sailaja MVSE Vaithilingam: practice of Low vision –A guide book, Medical Research Foundation, 2015.

## **REFERENCE BOOKS:**

- 1 Richard L. Brilliant: Essentials of Low Vision Practice, Butterworth-Heinemann, 1999
- 2 Helen Farral: optometric Management of Visual Handicap, Blackwell Scientific publications, 1991
- 3 A J Jackson, J S Wolffsohn: Low Vision Manual, Butterworth Heinnemann, 2007

## **COURSE PLAN: (Total: 15 hours)**

- 1 Definitions & classification of Low vision
- 2 Epidemiology of low vision
- 3 Model of low vision service
- 4 Pre-clinical evaluation of low vision patients – prognostic & psychological factors; psycho-social impact of low vision
- 5 Types of low vision aids – optical aids, non-optical aids & electronic devices
- 6 Optics of low vision aids
- 7 Clinical evaluation – assessment of visual acuity, visual field, selection of low vision aids, instruction & training
- 8 Pediatric Low Vision care
- 9 Low vision aids – dispensing & prescribing aspects
- 10 Visual rehabilitation & counseling
- 11 Legal aspects of Low vision in India
- 12 Case Analysis

## **PRACTICALS (Total: 15 hours)**

- 1 Practical 1: Attending in low vision care clinic and history taking.
- 2 Practical 2:
  - 2.1 Determining the type of telescope and its magnification (Direct comparison method & calculated method)
  - 2.2 Determining the change in field of view with different magnification and different eye to lens distances with telescopes and magnifiers.
- 3 Practical 3:
  - 3.1 Inducing visual impairment and prescribing magnification.
  - 3.2 Determining reading speed with different types of low vision aids with same magnification.
  - 3.3 Determining reading speed with a low vision aid of different magnifications.

## **CONTACT LENSES I**

**COURSE DESCRIPTION:** The subject provides the student with suitable knowledge both in theoretical and practical aspects of Contact Lenses.

**COURSE OBJECTIVES:** Upon completion of the course, the student should be able to:

- 1 Understand the basics of contact lenses
- 2 List the important properties of contact lenses
- 3 Finalise the CL design for various kinds patients
- 4 Recognize various types of fitting

- 5 Explain all the procedures to patient
- 6 Identify and manage the adverse effects of contact lens

**TEXT BOOKS:**

- 1 IACLE modules 1 - 10
- 2 CLAO Volumes 1, 2, 3
- 3 Anthony J. Phillips : Contact Lenses, 5th edition, Butterworth-Heinemann, 2006
- 4 Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
- 5 E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008

**PREREQUISITES:** Geometrical optics, Visual optics, Ocular Anatomy, Ocular Physiology, Biochemistry, Ocular Microbiology, Ocular Disease, Optometric Instruments

**COURSE PLAN (Total: 30 hours)**

- 1 Introduction to Contact lenses
  - 1.1 Definition
  - 1.2 Classification / Types
- 2 History of Contact Lenses
- 3 Optics of Contact Lenses
  - 3.1 Magnification & Visual field
  - 3.2 Accommodation & Convergence
  - 3.3 Back & Front Vertex Power / Vertex distance calculation
- 4 Review of Anatomy & Physiology of
  - 4.1 Tear film
  - 4.2 Cornea
  - 4.3 Lids & Conjunctiva
- 5 Introduction to CL materials
  - 5.1 Monomers, Polymers
- 6 Properties of CL materials
  - 6.1 Physiological (Dk, Ionicity, Water content)
  - 6.2 Physical (Elasticity, Tensile strength, Rigidity)
  - 6.3 Optical (Transmission, Refractive index)
- 7 Indications and contraindications
- 8 Parameters / Designs of Contact Lenses & Terminology
- 9 RGP Contact Lens materials
- 10 Manufacturing Rigid and Soft Contact Lenses – various methods
- 11 Pre-Fitting examination – steps, significance, recording of results
- 12 Correction of Astigmatism with RGP lens
- 13 Types of fit – Steep, Flat, Optimum – on spherical cornea with spherical lenses
- 14 Types of fit – Steep, Flat, Optimum – on Toric cornea with spherical lenses
- 15 Calculation and finalising Contact lens parameters
- 16 Ordering Rigid Contact Lenses – writing a prescription to the Laboratory
- 17 Checking and verifying Contact lenses from Laboratory
- 18 Modifications possible with Rigid lenses
- 19 Common Handling Instructions

- 19.1 Insertion & Removal Techniques
- 19.2 Do's and Dont's
- 20 Care and Maintenance of Rigid lenses
  - 20.1 Cleaning agents & Importance
  - 20.2 Rinsing agents & Importance
  - 20.3 Disinfecting agents & importance
  - 20.4 Lubricating & Enzymatic cleaners
- 21 Follow up visit examination
- 22 Complications of RGP lenses

**PRACTICAL (Total: 30 hours)**

- 1 Measurement of Ocular dimensions
- 2 Pupillary diameter and lid characteristics
- 3 Blink rate and TBUT
- 4 Schrimers test, Slit lamp examination of tear layer
- 5 Keratometry
- 6 Placido's disc
- 7 Soft Contact Lens fitting – Aspherical
- 8 Soft Contact Lens fitting – Lathecut lenses
- 9 Soft Contact Lens over refraction
- 10 Lens insertion and removal
- 11 Lens handling and cleaning
- 12 Examination of old soft Lens
- 13 RGP Lens fitting
- 14 RGP Lens Fit Assessment and fluorescein pattern
- 15 Special RGP fitting (Aphakia, pseudo phakia & Keratoconus)
- 16 RGP over refraction and Lens flexure
- 17 Examination of old RGP Lens
- 18 RGP Lens parameters
- 19 Slit lamp examination of Contact Lens wearers

**CONTACT LENSES II**

**COURSE DESCRIPTION:** The subject provides the student with suitable knowledge both in theoretical and practical aspects of Contact Lenses.

**COURSE OBJECTIVES:** Upon completion of the course, the student should be able to:

- 1 Understand the basics of contact lenses
- 2 List the important properties of contact lenses
- 3 Finalise the CL design for various kinds patients
- 4 Recognize various types of fitting
- 5 Explain all the procedures to patient
- 6 Identify and manage the adverse effects of contact lens

**TEXT BOOKS:**

- 1 IACLE modules 1 - 10
- 2 CLAO Volumes 1, 2, 3
- 3 Anthony J. Phillips : Contact Lenses, 5th edition, Butterworth-Heinemann, 2006
- 4 Elisabeth A. W. Millis: Medical Contact Lens Practice, Butterworth-Heinemann, 2004
- 5 E S. Bennett ,V A Henry :Clinical manual of Contact Lenses, 3rd edition, Lippincott Williams and Wilkins, 2008

**PREREQUISITES:** Geometrical optics, Visual optics, Ocular Anatomy, Ocular Physiology, Biochemistry, Ocular Microbiology, Ocular Disease, Optometric Instruments

**COURSE PLAN: Total : 30 hours**

- 1 SCL Materials & Review of manufacturing techniques
- 2 Comparison of RGP vs. SCL
- 3 Pre-fitting considerations for SCL
- 4 Fitting philosophies for SCL
- 5 Fit assessment in Soft Contact Lenses: Types of fit – Steep, Flat, Optimum
- 6 Calculation and finalising SCL parameters
  - 6.1 Disposable lenses
  - 6.2 Advantages and availability

- 7 Soft Toric CL
  - 7.1 Stabilization techniques
  - 7.2 Parameter selection
  - 7.3 Fitting assessment
- 8 Common Handling Instructions
  - 8.1 Insertion & Removal Techniques
  - 8.2 Do's and Dont's
- 9 Care and Maintenance of Soft lenses
  - 9.1 Cleaning agents & Importance
  - 9.2 Rinsing agents & Importance
  - 9.3 Disinfecting agents & importance
  - 9.4 Lubricating & Enzymatic cleaners
- 10 Follow up visit examination
- 11 Complications of Soft lenses
- 12 Therapeutic contact lenses
  - 12.1 Indications
  - 12.2 Fitting consideration
- 13 Specialty fitting
  - 13.1 Aphakia
  - 13.2 Pediatric
  - 13.3 Post refractive surgery
- 14 Management of Presbyopia with Contact lenses

**PRACTICAL (Total: 30 hours)**

- 1 Examination of old soft Lens
- 2 RGP Lens fitting
- 3 RGP Lens Fit Assessment and fluroscein pattern
- 4 Special RGP fitting (Aphakia, pseudo phakia&Keratoconus)
- 5 RGP over refraction and Lens flexure
- 6 Examination of old RGP Lens
- 7 RGP Lens parameters
- 8 Fitting Cosmetic Contact Lens
- 9 Slit lamp examination of Contact Lens wearers
- 10 Fitting Toric Contact Lens
- 11 Bandage Contact Lens
- 12 SPM & Pachymetry at SN During Clinics
- 13 Specialty Contact Lens fitting (at SN during clinics)

**BINOCULAR VISION I**

**COURSE DESCRIPTION:** This course provides theoretical aspects of Binocular Vision and its clinical application. It deals with basis of normal binocular vision and space perception, Gross

anatomy and physiology of extraocular muscles, various binocular vision anomalies, its diagnostic approaches and management.

**COURSE OBJECTIVES:** On successful completion of this module, a student will be expected to be able to:-

- 1 Demonstrate an in-depth knowledge of the gross anatomy and physiology relating to the extraocular muscles.
- 2 Provide a detailed explanation of, and differentiate between the etiology, investigation and management of binocular vision anomalies.
- 3 Adapt skills and interpret clinical results following investigation of binocular vision anomalies appropriately and safely.

**TEXT BOOKS:**

- 1 Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.
- 2 Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
- 3 Gunter K. V. Mosby Company
- 4 Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

**PREREQUISITES:** Ocular anatomy, Physiology

**COURSE PLAN (Total: 30 hours)**

- 1 Binocular Vision and Space perception.
  - 1.1 Relative subjective visual direction.
  - 1.2 Retino motor value
  - 1.3 Grades of BSV
  - 1.4 SMP and Cyclopean Eye

- 1.5 Correspondence,
- 1.6 Fusion, Diplopia, Retinal rivalry
- 1.7 Horopter
- 1.8 Physiological Diplopia and Suppression
- 1.9 Stereopsis, Panum's area, BSV.
- 1.10 Stereopsis and monocular clues - significance.
- 1.11 Egocentric location, clinical applications.
- 1.12 Theories of Binocular vision.
- 2 Anatomy of Extra Ocular Muscles.
  - 2.1 Rectii and Obliques, LPS.
  - 2.2 Innervation & Blood Supply.
- 3 Physiology of Ocular movements.
  - 3.1 Center of rotation, Axes of Fick.
  - 3.2 Action of individual muscle.
- 4 Laws of ocular motility
  - 4.1 Donders's and Listing's law
  - 4.2 Sherrington's law
  - 4.3 Hering's law
- 5 Uniocular & Binocular movements - fixation, saccadic & pursuits.
  - 5.1 Version & Vergence.
  - 5.2 Fixation & field of fixation
- 6 Near Vision Complex Accommodation
  - 6.1 Definition and mechanism (process).
  - 6.2 Methods of measurement.
  - 6.3 Stimulus and innervation.
  - 6.4 Types of accommodation.
  - 6.5 Anomalies of accommodation – aetiology and management.
- 7 Convergence
  - 7.1 Definition and mechanism.
  - 7.2 Methods of measurement.
  - 7.3 Types and components of convergence - Tonic, accommodative, fusional, proximal.
  - 7.4 Anomalies of Convergence – aetiology and management.
- 8 Sensory adaptations
  - 8.1 Confusion
- 9 Suppression
  - 9.1 Investigations
  - 9.2 Management
  - 9.3 Blind spot syndrome
- 10 Abnormal Retinal Correspondence
  - 10.1 Investigation and management
  - 10.2 Blind spot syndrome
- 11 Eccentric Fixation
  - 11.1 Investigation and management
- 12 Amblyopia
  - 12.1 Classification
  - 12.2 Aetiology
  - 12.3 Investigation

## 12.4 Management

### **BINOCULAR VISION II**

**COURSE DESCRIPTION:** This course deals with understanding of strabismus, its classification, necessary orthoptic investigations, diagnosis and non-surgical management. Along with theoretical knowledge it teaches the clinical aspects and application.

**COURSE OBJECTIVES:** The objective of this course is to inculcate the student with the knowledge of different types of strabismus its etiology signs and symptoms, necessary investigations and also management. The student on completion of the course should be able to independently investigate and diagnose case of strabismus with comments in respect to retinal correspondence and binocular single vision. The student should be able to perform all the investigations to check retinal correspondence, state of Binocular Single Vision, angle of deviation and special investigations for paralytic strabismus.

**TEXT BOOKS:**

- 1 Pradeep Sharma: Strabismus simplified, New Delhi, First edition, 1999, Modern publishers.
- 2 Fiona J. Rowe: Clinical Orthoptics, second edition, 2004, Blackwell Science Ltd
- 3 Gunter K. Von Noorden: BURIAN- VON NOORDEN'S Binocular vision and ocular motility theory and management of strabismus, Missouri, Second edition, 1980, C. V. Mosby Company
- 4 Mitchell Scheiman; Bruce Wick: Clinical Management of Binocular Vision Heterophoric, Accommodative, and Eye Movement Disorders, 2008, Lippincot Williams & Wilkins publishers

**PREREQUISITES:** Ocular Anatomy, Ocular Physiology, Binocular Vision –I.

**COURSE PLAN: (Total: 30 hours)**

- 1 Neuro-muscular anomalies
  - 1.1 Classification and etiological factors
- 2 History – recording and significance.
- 3 Convergent strabismus
  - 3.1 Accommodative convergent squint
    - 3.1.1 Classification
    - 3.1.2 Investigation and Management
  - 3.2 Non accommodative Convergent squint
    - 3.1.3 Classification
    - 3.1.4 Investigation and Management
- 4 Divergent Strabismus
  - 4.1 Classification
  - 4.2 A& V phenomenon
  - 4.3 Investigation and Management
- 5 Vertical strabismus
  - 5.1 Classification
  - 5.2 Investigation and Management
- 6 Paralytic Strabismus
  - 6.1 Acquired and Congenital
  - 6.2 Clinical Characteristics
- 7 Distinction from comitant and restrictive Squint
- 8 Investigations
  - 8.1 History and symptoms
  - 8.2 Head Posture
  - 8.3 Diplopia Charting

- 8.4 Hess chart
- 8.5 PBCT
- 8.6 Nine directions
- 8.7 Binocular field of vision
- 9 Amblyopia and Treatment of Amblyopia
- 10 Nystagmus
- 11 Non-surgical Management of Squint
- 12 Restrictive Strabismus
  - 12.1 Features
  - 12.2 Musculo-fascical anomalies
  - 12.3 Duane's Retraction syndrome
  - 12.4 Clinical features and management
  - 12.5 Brown's Superior oblique sheath syndrome
  - 12.6 Strabismus fixus
  - 12.7 Congenital muscle fibrosis
- 13 Surgical management

**PRACTICAL (Total: 15 hours):** Deals with hand-on session the basic binocular vision evaluation techniques.

## **SYSTEMIC DISEASES**

**COURSE DESCRIPTION:** This course deals with definition, classification, clinical diagnosis, complications and management of various systemic diseases. In indicated cases ocular manifestations also will be discussed.

**COURSE OBJECTIVES:** At the end of the course, students should get acquainted with the following:

- 1 Common Systemic conditions: Definition, diagnostic approach, complications and management options
- 2 Ocular findings of the systemic conditions
- 3 First Aid knowledge

### **TEXT BOOKS:**

- 1 C Haslett, E R Chilvers, N A boon, N R Coledge, J A A Hunter: Davidson's Principles and Practice of Medicine, Ed. John Macleod, 19th Ed., ELBS/Churchill Livingstone. (PPM), 2002
- 2 Basic and clinical Science course: Update on General Medicine, American Academy of Ophthalmology, Section 1, 1999

### **COURSE PLAN (Total:45 hours)**

- 1 Hypertension
  - 1.1 Definition, classification, Epidemiology, clinical examination, complications, and management.
  - 1.2 Hypertensive retinopathy
- 2 Diabetes Mellitus
  - 2.1 Classification, pathophysiology, clinical presentations, diagnosis, and management, Complications
  - 2.2 Diabetic Retinopathy
- 3 Thyroid Disease
  - 3.1 Physiology, testing for thyroid disease, Hyperthyroidism, Hypothyroidism, Thyroiditis, Thyroid tumors
  - 3.2 Grave's Ophthalmopathy
- 4 Acquired Heart Disease
  - 4.1 Ischemic Heart Disease, Congestive heart failure, Disorders of cardiac rhythm
  - 4.2 Ophthalmic considerations
- 5 Cancer :
  - 5.1 Incidence
  - 5.2 Etiology
  - 5.3 Therapy
  - 5.4 Ophthalmologic considerations
- 6 Connective Tissue Disease

- 6.1 Rheumatic arthritis
- 6.2 Systemic lupus erythematosus
- 6.3 Scleroderma
- 6.4 Polymyositis and dermatomyositis
- 6.5 Sjogren syndrome
- 6.6 Behcet's syndrome
- 6.7 Eye and connective tissue disease
- 7 Tuberculosis
  - 7.1 Aetiology, pathology, clinical features, pulmonary tuberculosis, diagnosis, complications, treatment tuberculosis and the eye.
- 8 Herpes virus ( Herpes simplex, Varicella Zoster, Cytomegalovirus, Epstein Barr Virus)
  - 8.1 Herpes and the eye
- 9 Hepatitis ( Hepatitis A, B, C)
- 10 Acquired Immunodeficiency Syndrome
- 11 Anemia ( Diagnosis, clinical evaluation, consequences, Sickle cell disease, treatment, Ophthalmologic considerations)
- 12 Common Tropical Medical Ailments
  - 12.1 Malaria
  - 12.2 Typhoid
  - 12.3 Dengue
  - 12.4 Filariases
  - 12.5 Onchocerciasis
  - 12.6 Cysticercosis
  - 12.7 Leprosy
- 13 Nutritional and Metabolic disorders:
  - 13.1 Obesity
  - 13.2 Hyperlipidaemias
  - 13.3 Kwashiorkor
  - 13.4 Vitamin A Deficiency
  - 13.5 Vitamin D Deficiency
  - 13.6 Vitamin E Deficiency
  - 13.7 Vitamin K Deficiency
  - 13.8 Vitamin B1,B2, Deficiency
  - 13.9 Vitamin C Deficiency
- 14 Myasthenia Gravis
- 15 First Aid
  - General Medical Emergencies
  - Preoperative precautions in ocular surgeries
- 16 Psychiatry
  - 16.1 Basic knowledge of psychiatric condition and Patient Management
- 17 Genetics
  - 17.1 Introduction to genetics
  - 17.2 Organisation of the cell
  - 17.3 Chromosome structure and cell division
  - 17.4 Gene structure and basic principles of Genetics.
  - 17.5 Genetic disorders and their diagnosis.
  - 17.6 Genes and the eye



17.7 Genetic counseling and genetic engineering.

## **PUBLIC HEALTH AND COMMUNITY OPTOMETRY**

**COURSE DESCRIPTION:** Introduction to the foundation and basic sciences of public health optometry with an emphasis on the epidemiology of vision problems especially focused on Indian scenario.

**COURSE OBJECTIVES:** At the end of the course students will be knowledgeable in the following areas:

- 1 Community based eye care in India.
- 2 Prevalence of various eye diseases
- 3 Developing Information Education Communication materials on eye and vision care for the benefit of the public
- 4 Organize health education programmes in the community
- 5 Vision screening for various eye diseases in the community and for different age groups.

### **TEXT BOOKS:**

- 1 GVS Murthy, S K Gupta, D Bachani: The principles and practice of community Ophthalmology, National programme for control of blindness, New Delhi, 2002
- 2 Newcomb RD, Jolley JL : Public Health and Community Optometry, Charles C Thomas Publisher, Illinois, 1980
- 3 K Park: Park's Text Book of Preventive and Social Medicine, 19th edition,
- 4 Banarsidas Bhanot publishers, Jabalpur, 2007

**REFERENCE BOOKS:** MC Gupta, Mahajan BK, Murthy GVS, 3rd edition. Text Book of Community Medicine, Jaypee Brothers, New Delhi, 2002

**PREREQUISITES:** Ocular Disease, Visual optics, Optometric Instruments, Clinical Examination of Visual System

**COURSE PLAN (Total: 30 hours)**

- 1 Public Health Optometry: Concepts and implementation, Stages of diseases
- 2 Dimensions, determinants and indicators of health
- 3 Levels of disease prevention and levels of health care patterns
- 4 Epidemiology of blindness – Defining blindness and visual impairment
- 5 Eye in primary health care
- 6 Contrasting between Clinical and community health programs
- 7 Community Eye Care Programs
- 8 Community based rehabilitation programs
- 9 Nutritional Blindness with reference to Vitamin A deficiency
- 10 Vision 2020: The Right to Sight
- 11 Screening for eye diseases
- 12 National and International health agencies, NPCB
- 13 Role of an optometrist in Public Health
- 14 Organization and Management of Eye Care Programs – Service Delivery models
- 15 Health manpower and planning & Health Economics
- 16 Evaluation and assessment of health programmes
- 17 Optometrists role in school eye health programmes
- 18 Basics of Tele Optometry and its application in Public Health

**Information, Education and Communication for Eye Care programs**

## **OCCUPATIONAL OPTOMETRY**

**COURSE DESCRIPTION:** This course deals with general aspects of occupational health, Visual demand in various job, task analysing method, visual standards for various jobs, occupational hazards and remedial aspects through classroom sessions and field visit to the factories.

**COURSE OBJECTIVES:** At the end of the course the students will be knowledgeable in the following aspects:

- 1 In visual requirements of jobs;
- 2 In effects of physical, chemical and other hazards on eye and vision;
- 3 To identify occupational causes of visual and eye problems;
- 4 To be able to prescribe suitable corrective lenses and eye protective wear and
- 5 To set visual requirements, standards for different jobs.

**TEXT BOOKS:**

- 1 PP Santanam, R Krishnakumar, Monica R. Dr. Santanam's text book of Occupational

optometry. 1st edition, Published by Elite School of optometry , unit of Medical Research Foundation, Chennai, India , 2015

- 2 R V North: Work and the eye, Second edition, Butterworth Heinemann, 2001

**REFERENCE BOOKS:**

- 1 G W Good: Occupational Vision Manual available in the following website: [www.aoa.org](http://www.aoa.org)
- 2 N.A. Smith: Lighting for Occupational Optometry, HHSC Handbook Series, Safchem Services, 1999
- 3 J Anshel: Visual Ergonomics Handbook, CRC Press, 2005
- 4 G Carson, S Doshi, W Harvey: Eye Essentials: Environmental & Occupational Optometry, Butterworth-Heinemann, 2008

### **COURSE PLAN: (Total: 15 hours)**

- 1 Introduction to Occupational health, hygiene and safety, international bodies like ILO, WHO, National bodies etc.
  - 1.1 Acts and Rules - Factories Act, WCA, ESI Act.
- 2 Electromagnetic Radiation and its effects on Eye
- 3 Light – Definitions and units, Sources, advantages and disadvantages, standards
- 4 Color – Definition, Color theory, Color coding, Color defects, Color Vision tests
- 5 Occupational hazards and preventive/protective methods
- 6 Task Analysis
- 7 Industrial Vision Screening – Modified clinical method and Industrial Vision test
- 8 Vision Standards – Railways, Roadways, Airlines
- 9 Visual Display Units
- 10 Contact lens and work

### **GERIATRIC OPTOMETRY & PAEDIATRIC OPTOMETRY**

**COURSE DESCRIPTION:** This course deals with general and ocular physiological changes of ageing, common geriatric systemic and ocular diseases, clinical approach of geriatric patients, pharmacological aspects of ageing ,and spectacle dispensing aspects in ageing patients.

**COURSE OBJECTIVES:** The student on taking this course should

- 1 Be able to identify, investigate the age related changes in the eyes.
- 2 Be able to counsel the elderly
- 3 Be able to dispense spectacles with proper instructions.
- 4 Adequately gained knowledge on common ocular diseases.

**TEXT BOOKS:** A.J. ROSSENBLOOM Jr & M.W.MORGAN: Vision and Aging, Butterworth-Heinemann, Missouri, 2007.

#### **REFERENCE BOOKS:**

- 1 OP Sharma: Geriatric Care –A textbook of geriatrics and Gerontology, viva books, New Delhi, 2005
- 2 VS Natarajan: An update on Geriatrics, Sakthi Pathipagam, Chennai, 1998
- 3 DE Rosenblatt, VS Natarajan: Primer on geriatric Care A clinical approach to the older patient, Printers Castle, Cochin, 2002

**PREREQUISITES:** Ocular anatomy, Physiology, Ocular Disease

### **COURSE PLAN (Total: 20 hours)**

- 1 Structural , and morphological changes of eye in elderly
- 2 Physiological changes in eye in the course of aging.

- 3 Introduction to geriatric medicine – epidemiology , need for optometry care, systemic diseases (Hypertension, Atherosclerosis, coronary heart disease, congestive Heart failure, Cerebrovascular disease, Diabetes, COPD)
- 4 Optometric Examination of the Older Adult
- 5 Ocular diseases common in old eye, with special reference to cataract, glaucoma, macular disorders, vascular diseases of the eye
- 6 Contact lenses in elderly
- 7 Pharmacological aspects of aging
- 8 Low vision causes, management and rehabilitation in geriatrics.
- 9 Spectacle dispensing in elderly – Considerations of spectacle lenses and frames

## **PEDIATRIC OPTOMETRY**

**COURSE DESCRIPTION:** This course is designed to provide the students adequate knowledge in theoretical and practical aspects of diagnosis, and management of eye conditions related to paediatric population. Also it will inculcate the skill of transferring / communicating the medical

information to the attender / patient by the students. The scope of this subject is to train the optometrists to develop a systematic way of dealing with children below 12, so as to implement primary eye care and have better, specialized management of anomalies.

**COURSE OBJECTIVES:** At the end of the course the student is expected to:

- 1 Have a knowledge of the principal theories of childhood development, and visual development
- 2 Have the ability to take a thorough paediatric history which encompasses the relevant developmental, visual, medical and educational issues
- 3 Be familiar with the accommodative-vergence system, the genesis of ametropia, the disorders of refraction, accommodation and vergence, and the assessment and management of these disorders
- 4 Be familiar with the aetiology, clinical presentation and treatment of amblyopia, comitant strabismus and commonly presenting incomitant strabismus
- 5 Have a knowledge of the epidemiology of eye disease in children, the assessment techniques available for examining visual function of children of all ages and an understanding varied management concepts of paediatric vision disorders
- 6 Have knowledge of the art of dispensing contact lens, low vision aids and referral to the surgeon or other specialists at the appropriate timing.
- 7 Have a capacity for highly evolved communication and co-management with other professionals involved in paediatric assessment and care

**TEXT BOOKS:**

- 1 Pediatric Optometry - JEROME ROSNER, Butterworth, London 1982
- 2 Paediatric Optometry –William Harvey/ Bernard Gilmartin, Butterworth –Heinemann, 2004

**REFERENCE BOOKS:**

- 1 Binocular Vision and Ocular Motility - VON NOORDEN G K Burian Von Noorden's, 2nd Ed., C.V. Mosby Co. St. Louis, 1980.
- 2 Assessing Children's Vision. By Susan J Leat, Rosalyn H Shute, Carol A Westall.45 Oxford: Butterworth-Heinemann, 1999.
- 3 Clinical pediatric optometry. LJ Press, BD Moore, Butterworth- Heinemann, 1993

**PREREQUISITES:** Ocular anatomy, Physiology, Ocular Disease

**COURSE PLAN (Total: 25 hours)**

- 1 The Development of Eye and Vision
- 2 History taking Paediatric subjects
- 3 Assessment of visual acuity
- 4 Normal appearance, pathology and structural anomalies of
  - 4.1 Orbit, Eye lids, Lacrimal system,
  - 4.2 Conjunctiva, Cornea, Sclera Anterior chamber, Uveal tract, Pupil
  - 4.3 Lens, vitreous, Fundus Oculomotor system
- 5 Refractive Examination
- 6 Determining binocular status

- 7 Determining sensory motor adaptability
- 8 Compensatory treatment and remedial therapy for : Myopia, Pseudomyopia, Hyperopia, Astigmatism, Anisometropia, Amblyopia
- 9 Remedial and Compensatory treatment of Strabismus and Nystagmus
- 10 Paediatric eye disorders : Cataract, Retinopathy of Prematurity, Retinoblastoma, Neuromuscular conditions (myotonic dystrophy, mitochondrial cytopathy), and Genetics
- 11 Anterior segment dysgenesis, Aniridia, Microphthalmos, Coloboma, Albinism
- 12 Spectacle dispensing for children
- 13 Paediatric contact lenses
- 14 Low vision assessment in children

### **RESEARCH PROJECT/DISSERTATION Total: 30 hours**

Team of students will be doing a research project under the guidance of a supervisor ( who could be optometrists/vision scientists/ ophthalmologist). Student will get the experience of doing a research in systematic approach – identifying the primary question, literature search, identifying the gaps in the literature, identifying the research question, writing up the research proposal, data collection, data analysis, thesis writing and presentation.

Project is spread through sixth to eighth semester.

### **Fourth year**

The internship time period provides the students the opportunity to continue to develop confidence and increased skill in diagnosis and management. Students will demonstrate competence in beginning, intermediate, and advanced procedures in above areas. Students will participate in advanced and specialized treatment procedures. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. The students are expected to work for minimum 6 hours per day and this may be more depending on the need and the healthcare setting.

During these semesters students also will continue the research work allotted during the sixth semester and submit the final report and make presentation in front of the experts.

Internships postings can be in the following locations: Eye Hospitals, Eye clinics in general hospital, Independent eye clinics, Optometric clinics in eye hospitals, general hospitals or optical showrooms, optical showrooms and other relevant locations wherein the learning objective can be achieved. Short period of training to eye care (instruments, optical, contact lens) related manufacturing set-ups, corporates and nongovernmental organisations.

### **Skills based outcomes and monitorable indicators for Optometrist**

#### **First year:**

- 1.1 Role play
- 1.2 Clinical Observations
- 1.3 Vision Check

1.4 Basic Lensometry

**Second year:**

- 1 History taking
- 2 CEVS practical
- 3 Refraction Hands On including optical dispensing
- 4 Clinical Observations
- 5 Vision screening camps

**Third year:**

- 1 Clinical Observation
- 2 Hands-on under senior optometrists
- 3 Case reporting
- 4 Case discussion
- 5 Vision screening camps
- 6 Diagnostic interpretations

**Internship:**

- |                             |      |
|-----------------------------|------|
| 1. Primary Eye Care         | 25 % |
| 2. Dispensing Optics        | 25 % |
| 3. Contact Lens             | 10%  |
| 4. Low Vision Aids          | 10%  |
| 5. Orthoptics               | 10%  |
| 6. Diagnostics              | 10 % |
| 7. Anterior Segment clinic  | 5%   |
| 8. Posterior Segment Clinic | 5%   |

Year	Procedures	Minimum Number	Comments
I year	Role Play ( Patient- Optometrist)	3 cases	
	Clinical Observation and Report writing	6 cases	
	Vision Check ( Snellen's Chart) – Distance + Near	12 cases	
	Lensometry (Spherical lenses)		
II year	History taking <ul style="list-style-type: none"> <li>- General</li> <li>- Specific</li> <li>- Conditions</li> </ul>	9 cases	Can practice on the following complaints : Blurred Vision, Headache, Pain, redness, Watering, Flashes, Floaters, Blackspots
	Lensometry	100 cases	Simple Sphere, Simple cylinder, Spherocylinder (90, 180, Oblique degrees), Bifocals, PAL

	Vision Check ( log MAR) Pinhole acuity	100 cases	Simulation, especially to show and ask the students to interpret the findings.
	Extraocular Motility	10 cases	
	Cover test	10 cases	Video output Simulation of various conditions
	Alternate Cover test	10 cases	Video output Simulation of various conditions
	Hirschberg test	10 cases	Video output Simulation of various conditions
	Modified Krimsky test	3 cases	Video output Simulation of various conditions
	Push up test (Amplitude of	10 cases	
<b>Year</b>	<b>Procedures</b>	<b>Minimum Number</b>	<b>Comments</b>
	Accommodation)	(1 case in presbyopic age)	
	Push up test ( Near point of Convergence)	10 cases	
	Stereopsis test	10 cases	
	Tear Break up time	10 cases	
	Amsler's Grid test	10 cases (simulate)	Simulation of various conditions
	Photostress test	10 cases ( Normals)	
	Color vision test	10 cases	
	Schirmer's test	10 cases	
	Confrontation test	10 cases	
	Slit lamp illumination	3 cases	
	Slit lamp examination	10 cases	
	Finger tension	10 cases (Normals)	
	Schiotz Tonometry	10 cases (Normals)	
	Applanation Tonometry	10 cases (Normals)	
	Negative Relative Accommodation	10 cases	
	Positive Relative Accommodation	10 cases	
	von Herick Grading of Anterior chamber depth	10 cases	
	Accommodative facility( $\pm 2.00$ D)	10 cases	
	Corneal Sensitivity test	10 cases	
	IPD	10 cases	
	Proptosis evaluation	1 demo	Video demonstration of cases
	Ptosis evaluation	1 demo	Video demonstration of cases
	Pupillary evaluation -Direct -Consensual -RAPD	10 cases	
	HVID	10 cases	
	Maddox rod (Phoria)	10 cases	
	Negative Fusional vergence	10 cases	
	Positive Fusional Vergence	10 cases	

II year	Retinoscopy- Static, Dynamic and Cycloplegic Retinoscopy	25 + 25 +25 cases	Model eye for retinoscopy.
	Keratometry	25 cases	
	Subjective Refraction JCC Clock Dial Duochrome Borish Delayed	25 cases	
	Addition calculation	25 cases	Give more simulated problems and discuss on it
III year	Direct ophthalmoscope	10 cases ( Normals)	Show slides of various commonly seen retinal conditions
	Visual Field chart interpretation	10 cases – discussion	Both kinetic and Static
<b>Year</b>	<b>Procedures</b>	<b>Minimum Number</b>	<b>Comments</b>
	B scan Interpretation	10 cases – discussion	
	A scan chart Interpretation	10 cases – discussion	Discussion having different types of wave patterns
	Case Analysis	10 cases	
	+90 D lens	10 cases ( Normals)	Slides of various Cup: Disc ratios can be shown
III year	Gonioscopy	5 cases ( Normals)	Slides of abnormal angles
	Posting in optometry clinics	5+5+5+5+10 cases	Pediatric/contact lens/Low vision/ Orthoptics/ GOPD
	Camps	4 camps	School screening, Cataract
	IDO (on each other)	10 cases(Normals)	Slides of abnormal fundus
	Case Analysis -	5+ 5+ 5+ 5 cases	Pathology Binocular Vision Clinical Refraction Dispensing optics
IV year <b>CLINICAL INTERNSHIP</b>	General OPD (History taking –DO)	500 cases	Weekly 1 case report submission
	Contact Lens	20 cases ( 5 RGP+ 5 Soft + 5 toric )	Totally 3 different case reports submission at the end of the postings
	Opticals	100 cases	Weekly 1 case report submission
	Low Vision care Clinic	10 cases	Totally 3 different case reports submission at the end of the postings
	Binocular Vision clinic	10 cases	Totally 3 different case reports submission at the end of the postings
	Ophthalmology clinic (Common eye conditions)	50 cases	Totally 3 different case reports submission at the end of the postings
	Camps	10 camps	Camp report submission

#### Choice of Electives in the programs

- Electives: The choice of electives and option to choose specialties like eye banking , ocular prosthesis , ocular imaging, electrophysiology , vision therapy , refractive surgery etc. will be time to time added as per the changing trends.

**TEMPLATE OF QUESTION PAPER ( 1st – YEAR )**

**SANTOSH DEEMED TO BE UNIVERSITY**

**COURSE : B.OPTOMETRY**

**YEAR ; 1<sup>st</sup> YEAR**

**SUBJECT**

**Time : 3hour**

**Total marks : 80**

**Section : A**

**Time : 11/2 hour**

**40Marks**

**1. Write shorts notes on :**

**( 4 X 5 = 20)**

**A)**

**B)**

**C)**

**D)**

**2 Describe \_\_\_\_\_ (10)**

**3. Describe \_\_\_\_\_ (10)**

**Section : B**

**Time : 11/2 hour**

**40Marks**

**1. Write shorts notes on :**

**( 4 X 5 = 20)**

**A)**

**B)**

**C)**

**D)**

**2 Describe \_\_\_\_\_ (10)**

**3. Describe \_\_\_\_\_ (10)**

**TEMPLATE OF QUESTION PAPER ( 2<sup>nd</sup> & 3<sup>rd</sup> – YEAR )**

**SANTOSH DEEMED TO BE UNIVERSITY**

**COURSE : B.OPTOMETRY**

**YEAR ; 2<sup>nd</sup> YEAR**

**SUBJECT**

**Time : 3hour**

**Total max marks : 80**

**Section : A – M.C.Q**

**Time : 20 mins**

**(20x1 = 20)**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.
- 17.
- 18.
- 19.
- 20.

**Section B – Short Answer type ( 30 marks )**

1. Write a notes on \_\_\_\_\_ (6)
2. Describe \_\_\_\_\_ (6)
3. Describe \_\_\_\_\_ (6)
4. Describe \_\_\_\_\_ (6)
5. Describe \_\_\_\_\_ (6)

**Section – C – Essay type answers (30 marks )**

6. explain \_\_\_\_\_ (15)
7. Write an essay on \_\_\_\_\_ (15)

## **THEORY SUBJECTS FOR FIRST YEARS :-**

1. basic anatomy and ocular anatomy
2. basic physiology and ocular physiology
3. general biochemistry and ocular biochemistry
4. physical optics and geometric optics
5. optometric optics I

## **THEORY SUBJECT FOR SECOND YEAR**

1. basic and ocular pathology/microbiology/pharmacology
2. optometric optics II
3. clinical exam of visual system & ophthalmic instrument
4. Ocular disease
5. visual optics
6. Low vision aid & optometric investigation

## **THEORY SUBJECT FOR THIRD YEAR**

1. Contact lens
2. binocular vision and advanced orthoptics
3. major eye disease and systemic disease and aeye
4. public health , cummunity and occupational optometry
5. pediatric and geriatric optometry
6. dispensing optics



Santosh Deemed to be University  
No1 Santosh Nagar, Pratap Vihar, Ghaziabad , Uttarpradesh .....

**SANTOSH DEEMED TO BE UNIVERSITY  
PRATAP VIHAR, GHAZIABAD, UP**

**BACHELOR OF SCIENCE IN CLINICAL NUTRITION & DIETETICS**

**PROPOSED GUIDELINE & SYLLABUS**

**EFFECTIVE FROM AUGUST (2021)**

**SESSION 2021-2022**

**DURATION – 3 YEARS**



**DEPARTMENT OF GENERAL MEDICINE  
SANTOSH MEDICAL COLLEGE HOSPITALS  
NO.-1, AMBEDKAR ROAD, GHAZIBAD, UP.**

The Yearly Theory Examination Papers in 4 Sections containing 20 Marks of each section which should cover complete Syllabus viz:

I.	Short Notes	-	4 x 5 Marks	= 20 Marks
II.	Long Notes (Problem Based)	-	2 x 10 Marks	= 20 Marks
III.	Long Question	-	1 x 20 Marks	= 20 Marks
IV.	MCQs	-	20 x 1 Mark	= 20 Marks

<b>Total Theory</b>	<b>80 Marks</b>
<b>Internal Assessment</b>	<b>20 Marks</b>
<b>Viva</b>	<b>20 Marks</b>
<b>Practical Internal</b>	<b>20 Marks</b>
<b>University Practical</b>	<b>60 Marks</b>
<hr/>	
<b>Total</b>	<b>200 Marks</b>

Total Marks for each paper is proposed to be 200 Marks Maximum and a student shall be declared to have passed if he/she has secured more than 50 % in Theory Components including viva and 50 % in Practical components.

**PROGRAM: -Bachelor of Science in Clinical Nutrition and Dietetics**

**(B.Sc. CND)**

**STUDY & SYLLABUS- EVALUATION SCHEME**

**B.Sc. CND 1<sup>st</sup> Year**

S.No	subject	Internal Assessment weightage / Marks (Per Paper)	University Theory Marks (Per paper)	Viva	Practical Internal	Practical University	TOTAL
1.	Basic Nutrition-1	20	80	20	20	60	200
2.	Food Science	20	80	20	20	60	200
3.	Human Physiology	20	80	20	20	60	200
4.	Nutritional Biochemisty	20	80	20	20	60	200
5.	Basics of Computer	20	80	20	20	60	200

**B.Sc. CND 2<sup>nd</sup> Year**

S.No	subject	Internal Assessment weightage / Marks (Per Paper)	University Theory Marks (Per paper)	Viva	Practical Internal	Practical University	TOTAL
1.	Basic Dietetics	20	80	20	20	60	200
2.	Food Microbiology	20	80	20	20	60	200
3.	Food Processing & Preservation	20	80	20	20	60	200

4.	Personnel Management	20	80	20	20	60	200
5.	Family Meal Management	20	80	20	20	60	200

**B.Sc. CND 3<sup>rd</sup> Year**

S.No	subject	Internal Assessment weightage / Marks (Per Paper)	University Theory Marks (Per paper)	Viva	Practical Internal	Practical University	TOTAL
1.	Community Nutrition	20	80	20	20	60	200
2.	Advanced Dietetics-I	20	80	20	20	60	200
3.	Advanced Dietetics-II	20	80	20	20	60	200
4.	Dietetics Counselling	20	80	20	20	60	200
5.	Maternal and Child Nutrition	20	80	20	20	60	200

# **SYLLABUS**

# **Bachelor of Science in Clinical Nutrition and Dietetics**

**(B.Sc. CND)**

**1st Year**

## **PAPER-I : BASIC NUTRITION**

B.Sc. Clinical Nutrition (B.SC.-CN) First Year BASIC NUTRITION

Introduction to nutrition - Food as source of nutrients, functions of food, definition of nutrition, nutrients & energy, adequate, optimum & good nutrition, malnutrition.

Nutrition - Fitness, Athletics & Sports.

Food guide - Basic five food groups How to use food guide (according to R.D.A.)

Interrelationship between nutrition & health : - Visible symptoms of goods health

Use of food in body - Digestion, Absorption, transport & utilization.

Role of fibres in human nutrition.

Carbohydrates: Functions, classification, food sources, storage in body.

Fats & oils : composition, saturated and unsaturated fatty acids, classification, food sources, function of fats.

Proteins - composition, sources, essential & non-essential amino acids, functions, Protein deficiency. 10. Water - as a nutrient, function, sources, requirement, water balance & effect of deficiency.

Minerals - macro & micronutrients. - Functions, sources. Bioavailability and deficiency of Calcium, Iron, Iodine, Sodium & Potassium (in very brief)

Vitamins (water & fat soluble) - definition, classification & functions.

Effect of cooking & heat processing on the nutritive value of foods.

Processed supplementary foods. 15. Food sanitation in hygiene

### **PRACTICAL**

Use and care of kitchen equipments.

2. Controlling techniques - Weights and measures standard, household measures for raw and cooked food.

Food preparation and classifying recipes as good, moderate or poor, sources of specific nutrients, Amount of ingredients to be in standard recipe –

a) Portion size –

b) Beverages - tea, coffee, cocoa, fruit juice, milk, milk shakes.

c) Cereals and flour mixtures - basic preparation & their nutritive value - boiled rice and rice pulao, chapati, puri, paratha, sandwiches, pastas, pancakes, cookies & cakes.

Vegetables & fruits - Simple salads, Dry vegetables, Curries, fruits preparation using fresh and dried stewed fruit, fruit salad

Mix and milk products Porridges, Curds, paneer and their commonly made preparations, Milk based simple desserts and puddings, custard, kheer, ice cream

Meat - cuts of meat - Meat preparations, Poultry, Fish, hard and soft cooked, poached, scrambled, fried omlette & egnogs.

Soups - Basic, clear and cream soups.

Snacks- Pakoras, cheese toast, upma, pohe, peanut, chikki, til & laddo

## **FOOD SCIENCE**

Min. Hrs - Theory : 80 hrs & Practical : 80 hrs. THEORY

1. Cereal- Structure and composition, Nutritional value, Processing- Milling, polishing. Parboiling,

flaking, parching, roasting, use in variety of preparations selection, storage and care, breakfast

cereals. 2. Pulses: composition and nutritional value, processing, soaking, germination.

3. Cooking and fermentations: Toxic constituents of pulses, Lathyrism.

4. Nuts and oil seeds: Nutritive value , importance & classification.

5. Milk and milk products: Composition of milk, properties and effect of heat, nutritional

importance, milk processing, milk products.

6. Flesh foods- selection, storage, uses and nutritional aspects of meat, fish and poultry, spoilage of

fish. 7. Fruits and vegetables: Classifications, composition and importance in human nutrition

storage, cooking of vegetables, changes during cooking, effect of heat, acid and alkali.

8. Sugar and Sugar products (a) Form of sugar and liquid sweetness. (b) Caramelization,

Hydrolysis, Crystallization (c) Indian confectionery

9. Beverages: Coffee, tea, and cocoa, processing composition and preparation, spices and

condiments, types and composition.

10. Fats and oils: Types, role of fat in cookery.

11. Egg - composition & classification of egg & egg products, its nutritive value.

12. Baking - Types of bake products & its nutritive value.

13. Role of spices in food science - Importance, composition & classification.

#### PRATICAL

1. Detection of toxins and adulterants of some of the common foods.

2. Preparation of some confectionary products.

3. Preparations of some traditional, fermented and other products.

4. Preparation of soyabean products and their acceptability test.

5. Survey of marketed processed and labeling of processed food items.

6. Nutritional value & criteria of food selection in Indian diet according to ICMR. 7.

Visit to

confectionaries.

## **HUMAN PHYSIOLOGY**

Theory : 100 hrs & Practical : 80 hrs.

THEORY 1. Cell - Structure and function

Blood - Blood cells, Haemoglobin, Blood groups, Coagulation Factors , Anaemia

Skeletal System -Bones, joints & bone deformities in brief.

Cardiovascular system Heart rate, Cardiac cycle, cardiac output, blood pressure, hypertension, radial pulse.

Lymphatic system -Lymph glands and its function, spleen -structure and functions.

Respiratory System -Ventilation , Functions , Lungs volumes and capacities.

Gastrointestinal System -Process of digestion in various parts.

Endocrinology List of Endocrine glands, Hormones : Their secretion and functions (in brief).

Excretion system -Structure of nephron , Urine formation

Central Nervous System Parts, Sliding Filament Theory , Neuro Muscular Junction , Wallerian Degeneration, Motor Nervous system - Upper motor neuron system & lower motor neuron system. Sensory nervous system, Sympathetic Nervous system & Parasympathetic nervous system.

Skin - Structure and functions

Reproductive system Structure and functions of male & female reproductive organs, menstruation, puberty, menopause, fertilization and development of fertilized ovum, placenta and its function.

Special senses Structure and function of eye and ear, common diseases of eye and ear (in brief)

## PRACTICAL

Compound Microscope 2.Determination of Blood groups.

Measurement of Human blood pressure.

Respiratory rate and pulse rate

5.Estimation of haemoglobin

6.RBC Estimation

7.WBC Estimation

8.ESR Estimation

## NUTRITIONAL BIOCHEMISTRY

Basics of energy metabolism, nutrition & dietetics - Unit of measuring energy, calorific value of food, BMR & factors affecting it, SDA of food, calculation of energy requirement, balanced diet, nutrition in health & diseases (protein energy malnutrition).

Chemistry of carbohydrates & their related metabolism - Introduction, definition, classification, biomedical importance Brief outline of metabolism : Glycogenesis & glycogenolysis (in brief), Glycolysis, citric acid cycle & its significance, HMP shunt & Gluconeogenesis (in brief), regulation of blood glucose level.

Amino acids - Definition, classification, essential & non essential amino acids.

Chemistry of Proteins & their related metabolism - Introduction, definition, classification, biomedical importance Metabolism: Transformation, Decarboxylation, Ammonia formation & transport, Urea cycle.

Chemistry of Lipids & their related metabolism - Introduction, definition, classification, biomedical importance, essential fatty acids, identification of fats & oils (saponification no, acid no, iodine no, acetyl no, reichertmiesel no. etc.) Brief outline of metabolism: Beta oxidation of fatty acids, Ketosis, Cholesterol & its clinical significance, Lipoproteins in the blood composition & their functions in brief, Atherosclerosis.

Enzymes - Introduction, definition, classification, coenzymes, isoenzymes, properties, factors affecting enzyme action, enzyme inhibition, diagnostic value of serum enzymes - Creatinine kinase, Alkaline phosphatase, Acid phosphatase, LDH, SGOT, SGPT, Amylase, Lipase, Carbonic anhydrase etc.

Acid base balance concepts & disorders - pH, Buffers, Acidosis, Alkalosis 8.  
Hormones - Classification, general mode of action, hormones of Pituitary, Thyroid, Parathyroid, Adrenals, Reproductive Glands, Pancreas, hormonal disorders, counter regulatory hormones.

Vitamins - Water & fat soluble vitamins, sources, requirement, deficiency disorders & biochemical functions.

Water metabolism Distribution of fluids in the body, ECF, ICF, Water metabolism, dehydration. 11. Hyperglycemia & hypoglycemia - Diabetes mellitus - definition, types, features, gestation diabetes mellitus , glucose tolerance test, glycosurias, Hypoglycemia & its causes

Liver functions and their assessment - Based on - a) Carbohydrate metabolism b) Protein metabolism c) Lipid Metabolism d) Measurements of serum enzyme levels e) Bile pigment metabolism : Jaundice - its types and their biochemical findings.

Renal functions tests - Various tests, GFR & clearance.

Tumor markers & their clinical applications - Including oncofetal antigens, CEA etc.

General concepts & functions of immunoglobulins

**PRACTICAL**

Identification of carbohydrates (Qualitative Tests)

Identification of proteins (Qualitative Tests)

To study general properties of the enzyme Urease & Achromatic time of salivary amylase.

Estimation of glucose in urine by Benedict's methods

Urine analysis - normal & abnormal constituents of urine.

Blood glucose estimation.

7. Renal Function test

**BASICS OF COMPUTER**

Min. Hrs - Theory : 40 hrs & Practical : 20 hrs.

Introduction to computer – I/O devices – memories – RAM and ROM – Different kinds of ROM – kilobytes, MB, GB their conversions – large computer – Medium, Micro, Mini computers – Different computer languages – Number system – Binary and decimal conversions – Different operating system – MS DOS – Basic commands – MD, CD, DIR,TYPE and COPY CON commands – Networking – LAN, WAN,MAN(only basic ideas)

Typing text in MS word – Manipulating text – Formatting the text – using different font sizes, bold, italics – Bullets and numbering – Pictures, file insertion – Aligning the text and justify – choosing paper size – adjusting margins – Header and footer, inserting page No's in a document Printing a file with options – Using spell check and grammar – Find and replace – Mail merge – inserting tables in a document.

Creating table in MS-Excel – Cell editing – Using formulas and functions – Manipulating data with excel – Using sort function to sort numbers and alphabets – Drawing graphs and charts using data in excel – Auto formatting – Inserting data from other worksheets.

Preparing new slides using MS-POWERPOINT – Inserting slides – slide transition and animation – Using templates – Different text and font sizes – slides with sounds – Inserting clip arts, pictures, tables and graphs – Presentation using wizards.

Introduction to Internet – Using search engine – Google search – Exploring the next using Internet Explorer and Navigator – Uploading and Download of files and images – E-mail ID creation – Sending messages – Attaching files in E-mail – Introduction to “C” language – Different variables, declaration, usage – writing small programs using functions and sub – functions.

## PRACTICAL

Typing a text and aligning the text with different formats using MS-Word Inserting a table with proper alignment and using MS-Word

Create mail merge document using MS-word to prepare greetings for 10 friends Preparing a slide show with transition, animation and sound effect using MSPowerpoint Customizing the slide show and inserting pictures and tables in the slides using MS-powerpoint

Creating a worksheet using MS-Excel with data and use of functions Using MS-Excel prepare a worksheet with text, date time and data Preparing a chart and pie diagrams using MS-Excel

Using Internet for searching, uploading files, downloading files creating e-mail ID Using C language writing programs using functions

B.Sc. Clinical Nutrition (B.SC.-CN) Second Year BASIC DIETETICS

Min. Hrs - Theory : 100 hrs & Practical : 80 hrs.

## **2<sup>ND</sup> YEAR**

### **BASIC DIETETICS**

1. Role of dietitian: The hospital & community.
2. Basic concepts of diet therapy.
3. Principles of diet therapy & therapeutic nutrition for changing needs. It should cover all age groups.
4. Adaptation of normal diet for changing needs.
5. Routine hospital diets - Regular diet, light diet, full liquid and tube feeding.
6. Modification of diet - Febrile conditions, infections and surgical conditions.
7. Diets for gastro - intestinal disorders, constipation, diarrhoea, peptic ulcer.
8. Diet for renal diseases - Nephritis, Nephrotic syndrome and renal failure.
9. Diet for obesity and cardiovascular disorders.
10. Diet for Diabetes mellitus.
11. Diet & nutrition in kidney diseases.
12. Nutrition in cancer.
13. Nutrition in Immune system dysfunction, AIDS & Allergy.
14. Nutrition support in metabolic disorders.
15. Nutrition in burns and surgery.
16. Nutrition - Addictive behaviour in anorexia, nervosa, bulimia & alcoholism.
17. Nutrient drug interaction.
18. Feeding the patients - Psychology of feeding the patient, assessment of patient needs.
19. Feeding infants & children - problems in feeding children in hospitals.
20. Nutrition & diet clinics - Patients checkup and dietary counseling, educating the patient and followup .

## PRACTICAL

1. Standardization of common food preparations.
2. Planning, preparation and calculation of following diets:
  - a) Normal diet.
  - b) Liquid diet
  - c) Soft diet
  - d) High and low caloric diet
  - e) Bland diet for peptic ulcer
  - f) Diet for Viral hepatitis and cirrhosis
  - g) Diet for Diabetes mellitus
  - h) Diet for Hypertension and Atherosclerosis
  - i) Diet for Nephritis and Nephrotic syndrome
  - k. Low and medium cost diets for P.E.M., Anemia & vitamin A deficiency

## FOOD MICROBIOLOGY

Min. Hrs - Theory : 80 hrs & Practical : 80 hrs.

### THEORY

1. Introduction of microbiology and its relevance to everyday life. General characteristics of bacteria, fungi, virus, protozoa, and algae .
2. Growth of microorganisms: Growth curve, effect of environmental factors in growth of microorganism - pH , water activity , oxygen availability, temperature and others.
3. Microbiology of deficient food: Spoilage. Contamination sources, types, effect on the following:
  - a. Cereal and cereal products
  - b. Sugar and sugar products.
  - c. Vegetables and fruits
  - d. Meat and meat products.
  - e. Fish, egg and poultry, Milk and milk products
  - g. Canned foods.
4. Environmental microbiology:
  - a. Water and water borne diseases.
  - b. Air and air borne diseases.
  - c. Soil and soil borne diseases.
  - d. Sewage and diseases.
5. Beneficial effect of microorganisms.
6. Relevance of microbial standards for food safety.
7. Waste product handling : -
  - a. Planning for waste disposal.
  - b. Solid wastes and liquid wastes.

8. Microbial intoxication and infections: Sources of contamination of food, toxin production and physiological action, sources of infection of food by pathogenic organisms, symptoms and method of control.

9. Relevance of microbiology standards for food safety.

#### PRACTICAL

1. Study of equipments in a microbiology lab.

2. Preparation of laboratory media and special media, cultivation of bacteria, yeasts and moulds.

3. Staining of bacteria: gram-staining.

4. Cultivation and identifications of important molds and yeast in food items.

5. Demonstration of available rapid methods and diagnostic kits used in identification of microorganisms or their products.

6. Visits (at least two) to food processing units or any other organization dealing with advanced methods in food microbiology.

### **FOOD PROCESSING & PRESERVATION**

Min Hrs Theory: 100 hrs & practical 80 hrs

#### Theory

1. Introduction. Food processing and it's importance , processing technology of foods and nutritional implications for the following :

Cereals & Pulses – wheat grain characteristics and it's products

Rice processing , Pulses processing and their elimination of toxic factors

Fermentation

Germination

2. Nuts & oilseeds – oilseeds processing , solvent extraction purification , hydrogenation and tempering products – butter , margarine etc .

3 . - Physical principles in food processing operations .

Chemical principles of food processing .

Chemical and biochemical reactions affected food quality and safety .

4. Fundamentals of food preservation .

- concept .

- Importance of food preservation .

- Principles of food preservation .

- Techniques / Methods of food preservation .
5. Microorganisms in food .
    - Introduction .
    - Types of microorganisms .
    - conditions for growth .
    - Food spoilage – its cause and their control .
    - Perishable , semi perishable and non perishable foods .
    - Factors affecting the growth of microorganisms in the food .
  6. Preservation by preservatives .
    - concept and definition
    - Types
      - Natural preservatives
      - Synthetic preservatives
  7. Irradiation
    - concept , definition
    - Principles of irradiation
    - types of irradiation
    - Application
  8. Preservation by drying .
    - concept , history .
    - Types of drying and dryers .
    - Treatment prior for drying .
  9. Food laws and standards .
    - Responsible agencies for safe food .
    - Present regulations / order/ standard related to foods .
  10. Some Recent concept in food Technology.
    - Biotechnology in food.
    - Algae as food – spirulina .
    - Low cost nutrient supplement's.
    - Packaging of foods .

Practical.

Identification of lab equipment.

Identification of class 1 & class 2 preservatives.

Identification of spoiled food.

Preparation of products by using salt as preservatives ( any two)

Preparation of products by using sugar as preservatives ( any two)

Preparation of products by using oil as preservatives ( any two)  
Preparation of products by using chemical preservatives ( any two)  
Freezing of fruits .  
Steaming, Blanching of vegetables.  
Preservation of fruits by syruring

## **PERSONNEL MANAGEMENT**

Min. Hrs - Theory: 100 hrs & Practical: 80 hrs.

### **THEORY**

#### **1. Organization and management**

: a) Definition and types of organization.

b) Definition- functions and tools of management.

c) Technique of effective management and its application to food preparation and science.

#### **2. Food material management:**

a) Meaning, definition, and importance.

b) Food selection, purchasing, receiving and storeroom management.

c) Control in relation to the above operations (material planning, budgeting, material identification, modification and standardization, inventory control, store keeping, definition, objectives, functions, factors underlying successful storekeeping, duties and responsibilities of a storekeeper, purchasing, organization, principle, procedure, systems and quality control).

3. Personnel Management: Recruitment, selection and training of personalities, work standards, productivity, supervision, performance appraisal and motivation incentives for effective performances.

4. Labour policies and legislation: (Personnel policies related to salaries, other

emoluments, allowances, leave, uniform and other prize benefit, laws and organization)- Laws

affecting food service institution to study the following: (hospital, flight kitchen, hotel, restaurant,

canteen, Industrial) - a. Organization b. Physical plan and layout. c. Food and silver equipment

d. Sanitation and hygiene with personal emphasis on Hospital.

## PRACTICAL

Visit and appraisal of any two medical organizations.

1. Work simplification: food preparation, Calculating work unit, time norms etc.
2. Costing, accounting, budgeting, purchase.
3. Storekeeping: Listing and management of food items in the store.
4. Personnel recruitment: Preparations of a project and report making.
5. Maintenance of the clothing for persons and staff involved in kitchen area.
6. Prepare an inventory for evaluating staffs personal hygiene.

## FAMILY MEAL MANAGEMENT

Min. Hrs - Theory: 100 hrs & Practical: 80 hrs.

### THEORY

1. Introduction to meal management - balanced diet, food groups & the planning of balance diet.
2. Food guides for selecting adequate diet .
3. Diet therapy
4. Diet & stress in current scenario.
5. Meal planning for the family.
6. Indian meal patterns - vegetarian & non-vegetarian.
7. Food faddism & the faulty food habits.
8. Nutritive value of common Indian recepies.
9. Nutrition in pregnancy - Physiological stages of pregnancy, nutritional requirements. food selection, complication of pregnancy.
10. Nutrition during lactation - Physiology of lactation, nutritional requirements
11. Nutrition during infancy - growth & development, nutritional requirements, breast feeding, infant formula, introduction of supplementary foods.
12. Nutrition during early childhood (Toddler/Preschool)- Growth & nutrient need, nutrition related problems, feeding patterns.
13. Nutrition of school children- Nutritional requirement, importance of snacks, school lunch.
14. Nutrition during adolescence - Growth & nutrient needs, food choices, eating habits, factor influencing needs.

5. Nutrition during adulthood - Nutritional requirements, feeding pattern.
16. Geriatric nutrition: Factors affecting food intake and nutrient use, nutrient needs, nutrition related problems.

#### PRACTICAL

Planning , preparation and nutritional evaluation of diets in relation to activity levels and physiological state.

1. Planning and preparation of a balanced diet for a pregnant woman.
2. Diet during complication of pregnancy.
3. Planning and preparation of a balanced diet for a lactating woman.
4. Preparation of weaning foods.
5. Planning and preparation of a balanced diet for pre-school child.
6. Balanced diet for school going child. Preparation of packed lunch.
7. Planning and preparation of a balanced diet for adolescence.
8. Planning of meals for adult belonging to different income group.
9. Planning meal for senior citizen.

### **B.Sc. in Human Nutrition (B.SC.-CN) Third Year COMMUNITY NUTRITION**

Min. Hrs - Theory : 100 hrs & Practical : 80 hrs.

#### THEORY

1. Nutrition and health in National development.
2. Malnutrition- meaning. factors contributing to malnutrition, over nutrition.
3. Nutritional disorders- Epidemiology, clinical features, prevention and dietary treatment for Protein Energy malnutrition, nutritional anaemias & vitamin deficiency disorders .
4. Methods of assessing nutritional status: a) Sampling techniques , Identifications of risk groups, b) Direct assessment - Diet surveys, anthropometric, clinical and biochemical estimation. c) Indirect assessment- Food balance sheet, ecological parameters and vital statistics.
5. Improvement of nutrition of a community: a) Modern methods of improvement or nutritional quality of food, food fortification, enrichment and nutrient supplementations. b) Nutrition education themes and messages in nutrition and health, Antenatal and postnatal care.

6. Nutritional and infection relationship : Immunization and its importance, Food borne infection and intoxication diseases, foods involved, methods of prevention, Infestation of food borne diseases , Outbreak, Prevention signs and control of infection.
7. National and International agencies in uplifting the nutritional status -WHO, UNICEF, CARE, ICMR, ICAR, CSIR, CFTRI. Various nutrition related welfare programmes, ICDS, SLP, MOM, and others (in brief).
8. Community nutrition programme planning - Identification of problem, analysis of causes, resources constraints, selection of interventions, setting a strategy, implementations and evaluation of the programme.

#### PRACTICAL

1. Diet and nutrition surveys: (Identified field area in the specific no. of families)
  - a) Identification of vulnerable and risk groups.
  - (b) Diet survey for breast-feeding and weaning practices of specific groups.
  - (c) Use of anthropometric measurement in children.
2. Preparation of visual aids.
3. Field visit to (a) Observe the working of nutrition and health oriented programmes (survey based result). (b) Hospitals to observe nutritional deficiencies.

#### ADVANCE DIETETICS

Total Theory: 100 Hours and Practical: 80 Hours

#### **ADVANCED DIETETICS - I**

Concept of Diet therapy: growth and source of dietetics, purpose, and principles of therapeutic diets, modification of normal diet, classification of therapeutic diets.

Role of Dietician: Definition of nutritional care, interpersonal relationship with patient, planning and implementing dietary care, Team approach to nutritional care.

Routine hospital diets: Preoperative and postoperative diets, study and review of \ hospital diet. Basic concepts and methods of - (a) Oral feeding (b) Tube feeding (c) Parental nutrition (d) Intravenous feeding.

Pregnancy- Physiology changes in pregnancy, weight gain during pregnancy, food and nutrient requirements complication of pregnancy, and their nutritional management.

Elderly - Physical and physiological changes, nutritional requirements, the problem of old age, nutrients influencing the aging process.

Nutrition, Infection, and Immunity.

Eating disorder - Anorexia nervosa Bulimia underweight.

Introduction of nutraceutical relationship between nutraceutical, foods and Medicines.

Diet, Nutrient and drug interaction, the effect of drugs of ingestion, digestion, absorption and metabolism of nutrients, the effect of drug dose on food, nutrients, and nutritional status.

Inborn error of metabolism and their dietary management and physical changes during this disorder Antioxidant, free radicals scavenging activity. How antioxidants and phytochemicals functional food helpful for the degenerative disease or non-communicable disease

#### **PRACTICAL:**

Planning and formulation of food exchange list.

Planning preparation and evaluation of diets for pregnant women.

Planning; preparation and evaluation of diets for old age patient like denture problems digestive issue and their special 'needs

Planning Preparation and calculation of gluten free diet and lactose free diet

Evaluate and analysis of gluten free lactose free food products available in the market

Survey for different Nutraceuticals available in the market.

#### **ADVANCED DIETETICS -II**

Adaptation of normal diet, Progressive diet - general & modified diet

Diet in surgical conditions, burns and cancer.

Obesity and leanness- causes, complication and health effects, dietary treatment and other recommendation.

Diet in fever and infections- Types- metabolism in fever, general dietary consideration diet in influenza, typhoid fever, recurrent malaria and Tuberculosis. Diet in gastritis, peptic ulcer- symptoms, clinical findings, treatment, dietary modification, adequate nutrition, amount of food, and intervals of feeding, Chemically and mechanically irrigating foods, four stage diet (Liquid, soft, convalescent, liberalized diet).

Diet in disturbances of small intestine and colour.

Diarrhoea- (child and adult) - classification, modification of diet, fibre, residue. fluids & nutritional adequacy.

Constipation- flatulence - dietary considerations.

Ulcerative colitis (adults) - symptoms, dietary treatment.

Spruce, coeliac disease - disaccharide intolerance, dietary treatment.

Diet in diseases of the liver, gall bladder and pancreas,

a) Etiology, symptoms and Dietary treatment in - Jaundice, hepatitis, cirrhosis and hepatic coma.

b) Role of alcohol in liver diseases. \

c) Dietary treatment in cholecystitis, cholelithiasis and pancreatitis.

Gout- Nature and occurrence of uric acid, causes, symptoms and diet.

Diet in allergy and skin disturbances: Definition, classification, manifestations, common food allergies and test and dietetic treatment.

Diet in Diabetes mellitus:

a) Incidence and predisposing factors.

b) Symptoms- types and tests for detection.

c) Metabolism in diabetes

d) Dietary treatment & meal management

e) Hypoglycemic agent, insulin and its types.

f) Complication of diabetes.

Diet in Renal diseases: Basic renal function, symptoms and dietary treatment in acute and chronic glomerulonephritis, Nephrosis, renal failure, dialysis. urinary calculi-causes & treatment, acid and alkali producing and neutral foods and dietary treatment.

Diet in Cardiovascular diseases: Role of nutrition in cardiac efficiency, incidence of Atherosclerosis, dietary principles, Hyperlipidemia, Hypertension-causes and dietary treatment, Sodium restricted diet, level of sodium restriction, sources of sodium, danger of severe sodium restriction.

PRACTICAL

Planning, preparations with correlating the Biochemical values and calculations of diets with modified-

- (a) Consistency
- (b) Fibre and residue
- (c) Diet for Diarrhoea and constipation
- (d) Diet for peptic ulcer.
- (e) Diet for liver disease.

Planning, preparation and calculation of diets in fever and infections.

Planning, preparation and calculation of diets for insulin dependent Diabetes mellitus, Planning, snacks, deserts and beverages for diabetes.

Planning, preparation and calculation of diet in cardiovascular diseases.

Planning, preparations and calculation of diet in Kidney failure, Kidney transplant, Renal complication & Kidney stones.

Planning, preparations and calculation of diet in Cancer, Trauma (burns) & Surgery.

## **DIETETICS AND COUNSELLING**

Min. Hrs - Theory : 100 hrs & Practical : 80 hrs.

### **THEORY**

1. Practical consideration in giving dietary advice and counseling - a) Factors affecting and individual food choice. b) Communication of dietary advice c) Consideration of behaviour modification d) Motivation.
2. Counseling and educating patient a) Introduction to nutrition counseling b) Determining the role of nutrition counselor c) Responsibilities of the nutrition counselor d) Practitioner v/s client managed care e) Conceptualizing entrepreneur skills and behavior f) Communication and negotiation skills.
3. Teaching aids used by dietitians- charts, leaflets, posters etc., preparation of teaching material for patients suffering from Digestive disorders, Hypertension, Diabetes, Atherosclerosis & Hepatitis and cirrhosis.

4. Computer application a) Use of computers by dietitian b) Dietary computations  
c) Dietetic management d) Education/ training e) Information storage f) Administrations g) Research

5. Computer application a) Execution of software packages b) Straight line, frequency table, bar diagram, pie chart, Preparation of dietary charts for patients c) Statistical computation- mean, median, standard deviation, conclusion and regression test.

#### PRACTICAL

1. Project planning for any one disease.
2. Computer application for different diseases.
3. Submitting computed data.
4. Preparations of teaching aids in the field of nutrition.
5. Preparation of case history of a patient and feeding of information in the hard disc.

### **MATERNAL AND CHILD NUTRITION B.SC CLINICAL NUTRITION [3<sup>RD</sup> YEAR]**

Nutrition during pregnancy Nutritional requirement during pregnancy and modification of existing diet and supplementation .

Common problems of pregnancy and their management vomiting and nausea , pica , pregnancy induced hypertension , obesity , GDM , thyroid .

Physiological and psychological changes during pregnancy .

Nutrition during Lactation . Nutritional requirement during lactation and dietary management and food supplements , importance of breast feeding.

Nutrition during infancy and introduction of complementary feeding initiation and management of weaning .

Dietary management of children during fever , diarrhoea, pneumonia.

Nutrition and healthcare programmes for mother and child , immunization scheduled for infant and children .

Nutrition related disorder in early childhood eg- PEM AND PCM.

Nutritional requirements for preterm babies and low birthweight baby .

Nutritional requirement for school going children and their packed Lunch .

Diabetes in children [type 1] factors affecting symptoms ,insulin therapy and dietary management .

Obesity in children causes prevention and dietary treatment .

## PRACTICAL

Diet planning for pregnant lady according to trimester.

Diet planning for GDM.

Diet planning for lactating mother.

Supplementataion food for children [Energy bar ,protein bar ].

Planning for weaning foods .

School visit

Case study for pregnant lady and their baby

**SANTOSH DEEMED TO BE UNIVERSITY  
PRATAP VIHAR, GHAZIABAD, UP**

**M.Sc. MEDICAL IMAGING TECHNOLOGY**

**PROPOSED GUIDELINE & SYLLABUS**

**EFFECTIVE FROM AUGUST (2021)  
SESSION 2021-2022  
DURATION – 2 YEARS**



**DEPARTMENT OF RADIO DIAGNOSIS  
SANTOSH MEDICAL COLLEGE HOSPITALS  
NO.-1, AMBEDKAR ROAD, GHAZIBAD, UP.**

## **COURSE M.Sc. MEDICAL IMAGING TECHNOLOGY (M.Sc. MIT)**

**INTRODUCTION: -----**

**AIMS : -----**

**OBJECTIVES:-----**

**NO OF SEATS : 10 (TEN)**

**DURATION-2 YEARS**

### **ELIGIBILITY**

The Candidates who possess B.Sc. Allied Health Sciences/ Medical Laboratory Technology/ Biochemistry/ Microbiology or its equivalent qualifications from a Recognized Institution/ University.

### **COMMENCEMENT OF THE COURSE**

**August, 2021**

**ATTENDANCE: - minimum attendance for the course to be shown by the student is 80% in each year.**

**PROGRAM: -Master of Science in Medical Imaging Technology**

## STUDY & SYLABUS – EVALUATION SCHEME

### M.Sc. MIT 1<sup>st</sup> Year

YEAR	PAPER TITLE	INTERNAL ASSESSMENT [THEORY]	UNIVERSITY [THEORY]	VIVA	INTERNAL ASSESSMENT [PRACTICAL]	UNIVERSITY [PRACTICAL]	TOTAL
<b>1<sup>ST</sup> YEAR 4 Papers</b>	1. Human anatomy and physiology.	20	80	20	10	20	150
	2. Radiation Physics, hazardous, prevention and protection.	20	80	20	10	20	150
	3. Conventional radiological Imaging.	20	80	20	10	20	150
	4. Radiographic imaging Techniques & procedures	20	80	20	10	20	150

### MIT 2<sup>nd</sup> Year

YEAR	PAPER TITLE	INTERNAL ASSESSMENT [THEORY]	UNIVERSITY [THEORY]	VIVA	INTERNAL ASSESSMENT [PRACTICAL]	UNIVERSITY [PRACTICAL]	TOTAL
<b>2<sup>ND</sup> YEAR 3 + 1 papers</b>	1. Quality assurance and quality control in diagnostic radiology and nuclear medicine.	20	80	20	10	20	150
	2. Advance technique and instrumentations in Mammography, DEXA, CT, Ultrasound, MRI and Interventional radiological techniques.	20	80	20	10	20	150
	3. Biostatistics and Dissertation.	20	80	20	10	20	150
	<b>[FULLY INTERNAL PAPER]</b>					150	150
<b>TOTAL</b>		140	560	140	70	290	1200

**M.Sc. MIT 1<sup>ST</sup> Year**

**PAPER-1**

**SUBJECT: - HUMAN ANATOMY& PHYSIOLOGY**

**UNIT- 1** Gross Anatomy, Radiological and Surface Anatomy of Human Body  
Introduction: human body as a whole, structure of cell and tissues of body: epithelial tissue, connective tissue, muscle tissue and nervous tissue

**UNIT-II** Anatomy of the various systems of body Skeletal system: Classification of bones- Axial skeleton, Appendicular skeleton, Bones – structure and functions, - formation of bone, growth of skeleton, centers of ossification, fracture and dislocation, disease of bones, and Radiological and Surface Anatomy. Joints: Classification of joints with example, anatomy of various joints of head and neck, trunk and limbs.

**UNIT-III** Muscular system- Types of muscles, Position and actions of chief muscles of the body Cardiovascular System: Anatomy of Pericardium and heart, blood vessels, types of blood circulation Respiratory System: Nasal passages and para nasal sinuses, pharynx and larynx, trachea, bronchi, lungs and pleura.

**UNIT-IV** Gastro-intestinal System: Parts of GIT, Oral cavity salivary glands, Esophagus, stomach, small and large intestine, liver, gall bladder, pancreas Urinary System: Kidney, ureter, urinary bladder, and urethra Reproductive System: Parts of male and female reproductive system, location, functions, mammary gland Endocrine Glands: Location, structure and functions of pituitary, thyroid, parathyroid, supra-renal and pancreas.

**UNIT-V** Nervous System and sense organs: structure and function of neuron, sub divisions of nervous System: central and autonomic nervous system-parts, structure and functions, ventricles of brain, CSF circulation Sense Organs: structure and function of the eye, ear, tongue, nose, skin Surface landmarks and topography of organs on the surface of the body for radiographic positioning

**M.Sc. MIT 1<sup>ST</sup> Year**

**PAPER-2**

**SUBJECT:- RADIATION PHYSICS, RADIATION HAZARDS PREVENTION AND PROTECTION**

**RADIATION PHYSICS:**

**UNIT I** - X-rays: Discovery of x-rays-X-ray production and properties: Bremsstrahlung radiation Characteristics X-Rays, factors affecting X-ray emission spectra, X-ray quality and quantity, HVL measurements, heel effect, soft and hard X-Rays, added and inherent filtration, reflection and transmission targets.

**UNIT II** - Interaction of ionizing radiation with matter-Types of interactions of X-and gamma radiation, Photoelectric & Compton, Pair production, annihilation radiation.

**UNIT III** - Interaction of X and gamma rays: Transmission through matter, law of exponential attenuation, half value layer, and linear attenuation coefficient-coherent scattering-photonuclear disintegration-Particle interactions. Interactions of X rays and Gamma rays in the body; fat-soft tissue -bone-contrast media-total attenuation coefficient-relative clinical importance.

**UNIT IV** - Exponential attenuation (linear/mass attenuation coefficients), Half Value Thickness (HVT), Tenth Value Thickness (TVT), dependence on energy and atomic number.

**UNIT V** - Radiation intensity and exposure, photon flux and energy flux density.

**UNIT VI** - LET, range of energy relationship for alpha, beta particles with X-Rays.

**UNIT VII** - X-ray tube: historical aspects, construction of X-ray tubes, requirements for X-ray production (Electron source, target and anode material), tube voltage, current, space charge, early X-ray tubes (Coolidge tubes, tube envelope and housing) cathode assembly, X-ray production efficiency, advances in X-ray tubes, anode angulation and rotating tubes-line focus principle - space charge effect, tube cooling-Modern X-ray tubes-stationary anode, rotating anode, grid controlled X-ray tubes, heel effect, off focus radiation, tube insert and housing-Tube rating Quality and intensity of x-rays-factors influencing them.

**UNIT VIII** - Grid controlled and high speed tubes, focal spot size, speed of anode rotation, target angle, inherent filtration, radiation leakage and scattered radiation).Interlocking and X-ray tube overload protection.

**UNIT IX** - Heat dissipation methods, tube rating, heat units, operating conditions and maintenance and Q.A procedures.

**UNIT X** - Filament current and voltage, X-ray circuits (primary circuit, auto transformer), types of exposure switch and timers, principle of automatic exposure control (AEC) and practical operation, filament circuit, high voltage circuits, half wave, full wave rectification, three phase circuits. Types of generators, 3 phase, 6 and 12 pulse circuits-high frequency generators-falling load generators Capacitors discharge and grid control systems.

**UNIT XI** - X-ray generator circuits: Vacuum tube diodes-semi-conductor diodes-transistor Rectification- half and full wave-self rectification-X-ray generator; filament circuit-kilo Voltage circuit-single phase generator-three phase generator-

constant potential generator-Fuses, switches and interlocks- Exposure switching and timers-HT cables-earthen.

**UNIT XII**-Physical quantity, its unit and measurement: Fundamental and derived quantity, SI unit, various physical/radiation quantity used in Diagnostic Radiology and its unit (for example, Kvp, mA, mAs, Heat unit (HU)).

**UNIT XIII**-Radiation quantities and units: Radiation intensity-exposure, roentgen, its limitations kerma and absorbed dose-electronic equilibrium-rad, gray, conversion factor for roentgen to radquality factor-dose equivalent-rem, Sievert. Quality factor, dose equivalent, relationship between absorbed dose and equivalent dose.

**UNIT XIV**-Radiation detection and measurements: Principle of radiation detection-Basic principles of ionization chambers, proportional counters, G.M counters and scintillation detectors. Measuring system: free ionization chamber-thimble ion chamber-condenser chamber- secondary standard dosimeter-film dosimeter-chemical dosimeter-Thermo Luminescent Dosimeter-Pocket dosimeter.

### **RADIATION HAZARDS PREVENTION AND PROTECTION:**

**UNIT I** - Radiation protection, Natural and background radiation (cosmic, terrestrial),Principles of radiation protection, Time - distance and shielding, shielding calculation and radiation survey, Personnel dosimeters (TLD and film badges), occupational exposure, radiation protection of self and patient, ICRP, NRPB, NCRP and WHO guidelines for radiation protection, pregnancy and radiation protection, Revision of Somatic & Genetic Radiation effects, Units Detection & measurements Radiation protection Standards, radiation surveys & regulations. Patient Protection

**UNIT II** - Biological effects of Ionizing Radiation, Ionization, excitation and free radical formation, hydrolysis of water, Action of radiation on cell, DNA, RNA, chromosome, tissue and organ, cytoplasm, cellular membranes, effects of whole body and acute irradiation.

**UNIT III** - Dose fractionation. Effects of ionizing radiation on each of major organ system including fetus stochastic and non-stochastic effects. Mean and lethal dose, direct and indirect effects, multi target and multi hit theory, stochastic and deterministic effects-Acute exposure and chronic exposure-LD50 - factors affecting radio sensitivity

**UNIT IV**- Measuring systems – free air ionization chamber – thimble ion chamber – condenser chamber – Secondary standard dosimeters – film dosimeter – chemical dosimeter- Thermoluminescent Dosimeter. -Pocket dosimeter Radiation survey meter- wide range survey meter -zone monitor-contamination monitor their principle function and uses. Advantages & disadvantages of various detectors & its appropriateness of different detectors for different type of radiation measurement.

**UNIT V**- Biological effects of non-ionizing radiation like ultrasound, lasers, IR, UV and magnetic fields.

**M.Sc. MIT 1<sup>ST</sup> Year**

**PAPER-3**

**SUBJECT-CONVENTIONAL RADIOLOGICAL AND IMAGING EQUIPMENTS**

**UNIT- I** X-ray tubes: x-ray tube, construction working and limitations, stationary anode x – ray tube; construction, working, methods of cooling the anode, rotating anode x - ray tube: construction, working rating chart, speed of anode rotation, angle of anode inclination, dual focus and practical consideration in choice of focus, anode heel effect.

**UNIT-II** Cassettes: Structure and function, Types, Design features and consideration with loading/unloading, Care and maintenance (cleaning)

**UNIT-III** Intensifying Screen & Filters: Structure and functions, common phosphors used for determination of relative speeds, types, screen mounting, care and maintenance of film screen contact.

**UNIT-IV** Control of scattered radiation: Beam limiting devices: cones, diaphragms, light beam collimator, beam centering device, methods to verify beam centering and field alignment.

**Grid:** Purpose and function, grid ratio, grid cut-off effect on radiation exposure, use of grid, structure and materials.

**Types:** Stationary, parallel, focused, cross-hatch Moving grids.  
Purpose/advantages/disadvantages

**UNIT-V** Fluoroscopic: Fluorescence and phosphorescence - description, fluorescent materials used in fluoroscopic screens, construction of fluoroscopic screen and related accessories, tilting table.

**UNIT-VI** Dental X-Ray & OPG.

**UNITVII-** DEXA SCAN.

**SUBJECT- RADIOGRAPHIC AND IMAGING TECHNIQUES &  
PROCEDURES**

**UNIT-I** Introduction to X-Rays, Properties of X-Rays, X-Ray production, Bremsstrahlung phenomenon, factors affecting X-Ray emission spectra, X-Ray quality and quantity.

**UNIT-II** Film: Types, composition of single and double coated radiographic films, Screen & Non-Screen films, structure of film, characteristic curve. Characteristics (speed, base + fog, gamma, latitude), Film storage rules and guidelines, film handling and care (size, construction and function), film contrast.

**UNIT-III** Introduction, purpose and location of dark room, layout of dark room, entrance, pass box, hatch, hangers, safe light, criteria of safe light, safe light test.

**UNIT-IV** Image formation, latent image processing, manual processing. Developer, fixer, rinsing components, replenisher. Manual technique of developing film.

**UNIT-V** Automatic processing: Automatic film processor, common errors in processing.

**UNIT-VI** Radiographic positioning

**UNIT-VII** Special Radiographic/Radiological procedures. Selection of Fluoroscopic Equipment, general considerations, responsibility of radiographers. Patient Preparation, Indications Contraindications Technique Post Care and Preparation of Drug Trolley/Tray, Radiation Safety. Contrast Media - Positive and Negative, Ionic & Non – Ionic, Adverse Reactions to Contrast Media and Patient Management, Emergency Drugs in the Radiology Department, Aseptic technique for the following procedures.

**UNIT-VIII Gastrointestinal Tract:** Barium swallow, pharynx and esophagus. Barium meal and follow through. Hypotonic duodenography. Small bowel enema. Barium Enema routine projections for colon and rectum, colonic activators; double contrast studies; colostomy. Special techniques for specific disease to be examined. Including water soluble contrast media - e.g. gastrographic studies. Including CT, US and MRI Special Imaging Techniques.

**Salivary glands:** Routine technique, procedure -sialography.

**Biliary system:** Plain film radiography. Intravenous cholangiography. Percutaneous cholangiography, Endoscopic retrograde choleangio-pancreatography (ERCP). Operative cholangiography, post-Operative cholangiography (T-tube Cholangiography). Including CT, US and MRI Special Imaging Techniques.

**Sinography:** Routine technique and procedure and techniques.

**UNIT-IX Urinary system:** Intravenous urography, retrograde pyelography. Antegrade pyelography. Cystography and micturatingcystourethrography. Urethrography (ascending) renal puncture. Including CT, US and MRI Special Imaging Techniques.

**Reproductive system:** All the Techniques relating to Male and Female reproductive system including Hysterosalpingography.

**Breast Imaging:** Mammography: Basic views, special views, wire localization. Ductography, Tomosynthesis, ABVS, Various Biopsy Techniques including Prone Table Biopsy, CT, US and MRI Special Imaging Techniques

**Respiratory system:** Bronchography: Including CT, US and MRI Special Imaging.

**Central Nervous System:** Myelography. Cerebral studies. Ventriculography etc. including CT, US and MRI Special Imaging Techniques.

**Arthrography:** Shoulder, Hip, Knee, Elbow joints etc. including CT, US and MRI Special Imaging Techniques

**UNIT-X Angiographic Studies:** Carotid Angiography (4 Vessel angiography). Thoracic and Arch Aortography. Selective studies: Renal, SMA, Coeliac axis. Vertebral angiography. Femoral arteriography. Angiocardiography, Peripheral angiography

**Venography:** Peripheral venography. Cerebral venography. Inferior and superior venocavography.

**M.Sc. MIT 2<sup>nd</sup> Year**

**PAPER-1**

**SUBJECT- QUALITY ASSURANCE AND QUALITY CONTROL IN DIAGNOSTIC  
RADIOLOGY AND IMAGING**

**UNIT I**

Various Radiographic equipment and accessories.

Component parts labelling .

Equipment used for sonography, computed radiography, CT, MRI and digital radiography

Differences in various types and models and portable radiographic equipment

**UNIT II**

X- Ray tubes

Theory of the operation of x-ray tube construction and function of an x ray tube.

Determine the maximum allowable exposure factors for various radiographic procedures using x ray tube rating chart

Determine the rate of anode and tube housing cooling x ray tube warm-up procedure of radiographic equipment for various manufactures

**UNIT III**

Image quality

Image contrast, ABC (automatic brightness control), noise, sharpness magnification, spatial and temporal resolution

## **UNIT IV**

Safety checks of radiographic equipment

Safety checks of radiographic equipment and accessories such as lead apron and gloves and collimator accuracy

Quality control and quality assurance

Identify symptoms of malfunction in radiographic equipment

## **UNIT V**

Quality control and quality assurance

Quality assurance and quality control of x ray, CT,MRI ,USG, DEXA, DR,CR, Fluoroscopy, mammography, DSA, portable equipment .

Quality of dark room, PC, PNDT act and its rules.

**M.Sc. MIT 2<sup>nd</sup> Year**

**PAPER-2**

**SUBJECT-ADVANCE TECHNIQUE AND INSTRUMENTATION OF ULTRASOUND,  
MAMMOGRAPHY DEXA, CT, ULTRASOUND, MRI AND INTERVENTIONAL  
RADIOLOGICAL TECHNIQUES**

**UNIT – I Mammography**

Dedicated mammographic unit and its special features, Mammographic Positioning and technical considerations, film screen mammography, digital mammography, Tomosynthesis.

**UNIT – II Ultrasound**

Principle & history of Ultrasound, advantages and disadvantages of ultrasound, Types of Ultrasounds, Equipment description, Indication and Clinical Application, Physics of ultrasound imaging, Physics of transducers, Physics of Doppler, Ultrasound tissue characterization, Potential for three-dimensional ultrasound, Artifacts in ultrasound, Comparison of ultrasound equipment Computerization of data, Image recording, Ultrasound jelly & Safety of ultrasound.

**UNIT – III USG Contrast Media**

**Production of ultrasound:** Piezoelectricity, Medical ultrasound transducer: Principle, construction and working, characteristics of US beam. Types of Ultrasound Contrast media and its advantages

## **UNIT – IV Echocardiography**

Introduction, indication and image formation. Uses of color Doppler in echocardiography and equipment description with the transducer

## **UNIT V** Ultrasound display modes: A, B, M

**Real-time ultrasound:** Line density and frame rate, Real-time ultrasound transducers: mechanical and electronic arrays, ultrasound artifacts, ultrasound recording devices, and Distance, area & volume measurements. Techniques for imaging different anatomic areas, ultrasound artifacts, biological effects and safety.

**Doppler Ultrasound-** Patient preparation for Doppler, Doppler artifacts, vascular sonography, Elastography, HIFU, ABVS etc.

**UNIT VI Basic Computed Tomography-** Basic principles of CT, generations of CT, CT instrumentation, image formation in CT, CT image reconstruction, Hounsfield unit, CT image quality, CT image display.

**UNIT VII Advanced Computed Tomography** - Helical CT scan: Slip ring technology, advantages, multi detector array helical CT, cone – beam geometry, reconstruction of helical CT images, CT artifact, CT angiography, CT fluoroscopy, HRCT, post processing techniques: MPR, MIP, Min IP, 3D rendering: SSD and VR, CT Dose, patient preparation, Imaging techniques and protocols for various parts of body, CT contrast enhanced protocols – CT angiography – (Aortogram, selective angiogram head, neck and peripheral) image documentation and Filing, maintenance of equipment and accessories.

## **UNIT-VIII** Advanced technique & instrumentation of MRI

**Basic Principle:** Spin – precession – relaxation time – pulse cycle – T1 weighted image – T2 weighted image – proton density image.

**Pulse sequence:** Spin echo pulse sequence – turbo spin echo pulse sequence - Gradient echo sequence – Turbo gradient echo pulse sequence - Inversion recovery sequence – STIR sequence– SPIR sequence – FLAIR sequence – Echo planar imaging – Advanced pulse sequences.

**MR Instrumentation:** Types of magnets – RF transmitter – RF receiver – Gradient coils – shim coils – RF shielding – computers.

**Image formation:** 2D Fourier transformation method – K-space representation – 3D Fourier imaging – MIP.

**MR contrast media** – MR angiography – TOF & PCA – MR Spectroscopy – functional MRI

M.Sc. MIT 2<sup>nd</sup> Year

PAPER-3

**SUBJECT-BIOSTATISTICS AND DISSERTATION**

**UNIT I**

Rationale: The objective of this module is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings. The students will also be made aware of the need of biostatistics and understanding of data, sampling methods, in addition to being given information about the relation between data and variables.

**UNIT II**

Research Methodology:

Introduction to research

methods Identifying research

problem Ethical issues in

research Research design

Basic Concepts of Biostatistics

Types of Data

**UNIT III**

Research tools and Data collection methods, sampling methods, Developing a research proposal.

**UNIT IV**

Biostatistics:

Need of biostatistics

What is biostatistics: beyond definition

Understanding of data in biostatistics

How & where to get relevant data

Relation between data & variables

Type of variables: defining data set

Collection of relevant data: sampling methods

## **UNIT V**

Construction of study: population, sample, normality and its beyond (not design of study, perhaps), Summarizing data on the pretext of underlined study,

Understanding of statistical analysis (not methods)

**SANTOSH DEEMED TO BE UNIVERSITY**

**PRATAP VIHAR, GHAZIABAD, UP**

**MASTER OF SCIENCE IN MEDICAL LABORATORY TECHNOLOGY**

**PROPOSED GUIDELINE & SYLLABUS**

**EFFECTIVE FROM AUGUST (2021)**

**SESSION 2021-2022**

**DURATION – 2 YEARS**



**DEPARTMENT OF PATHOLOGY**

**SANTOSH MEDICAL COLLEGE HOSPITALS**

**NO.-1, AMBEDKAR ROAD, GHAZIBAD, UP.**

The Yearly Theory Examination Papers in 4 Sections containing 20 Marks of each section which should cover complete Syllabus viz:

- I. Short Notes - 4 x 5 Marks = 20 Marks
- II. Long Notes - 2 x 10 Marks = 20 Marks  
(Problem Based)
- III. Long Question - 1 x 20 Marks = 20 Marks
- IV. MCQs - 20 x 1 Mark = 20 Marks

<b>Total Theory</b>	<b>80 Marks</b>
<b>Internal Assessment</b>	<b>20 Marks</b>
<b>Viva</b>	<b>20 Marks</b>
<b>Practical Internal</b>	<b>20 Marks</b>
<b>University Practical</b>	<b>60 Marks</b>
<hr/>	
<b>Total</b>	<b>200 Marks</b>

Total Marks for each paper is proposed to be 200 Marks Maximum and a student shall be declared to have passed if he/she has secured more than 50 % in Theory Components including viva and 50 % in Practical components.

**SANTOSH DEEMED TO BE UNIVERSITY, GHAZIABAD, DELHI NCR**  
**PROPOSAL FOR FOLLOWING UNIQUE PATTERN FOR THE NEW COURSE INTRODUCED**

S.No	Course	Year	No. of Papers	Internal Assessment weightage / Marks (Per Paper)	University Theory Marks (Per paper)	Viva	Practical Internal	Practical University	Other Remarks
1.	B.Optom	1 <sup>st</sup>	5	20	80	20	20	60	It is proposed that each paper will be assessed for 200 Marks including internal assessment and Internal Practical
		2 <sup>nd</sup>	5	20	80	20	20	60	
		3 <sup>rd</sup>	5	20	80	20	20	60	
2.	B.Sc. Clinical Nutrition & Dietetics	1 <sup>st</sup>	5	20	80	20	20	60	
		2 <sup>nd</sup>	5	20	80	20	20	60	
		3 <sup>rd</sup>	5	20	80	20	20	60	
3.	M.Sc. Clinical Psychology	1 <sup>st</sup>	4	20	80	20	20	60	
		2 <sup>nd</sup>	4	20	80	20	20	60	

S.No	Course	Year	No. of Papers	Internal Assessment weightage / Marks (Per Paper)	University Theory Marks (Per paper)	Viva	Practical Internal	Practical University	Other Remarks
4.	M.Sc. Trauma and Critical Care	1 <sup>st</sup>	4	20	80	20	20	60	It is proposed that each paper will be assessed for 200 Marks including internal assessment and Internal Practical
		2 <sup>nd</sup>	4	20	80	20	20	60	
5.	M.Sc. Medical Imaging Technology	1 <sup>st</sup>	4	20	80	20	20	60	
		2 <sup>nd</sup>	4	20	80	20	20	60	
6.	M.H.A	1 <sup>st</sup>	4	20	80	20	20	60	
		2 <sup>nd</sup>	4	20	80	20	20	60	
7.	M.Sc. Medical Lab Technology	1 <sup>st</sup>	4	20	80	20	20	60	
		2 <sup>nd</sup>	4	20	80	20	20	60	
8.	M.S.W. Community Medicine	1 <sup>st</sup>	4	20	80	20	20	60	
		2 <sup>nd</sup>	4	20	80	20	20	60	

S.No	Course	Year	No. of Papers	Internal Assessment weightage / Marks (Per Paper)	University Theory Marks (Per paper)	Viva	Practical Internal	Practical University	Other Remarks
9.	M.Sc. Sports Medicine and Exercise Sciences	1 <sup>st</sup>	4	20	80	20	20	60	It is proposed that each paper will be assessed for 200 Marks including internal assessment and Internal Practical
		2 <sup>nd</sup>	4	20	80	20	20	60	

## CONTENTS

### Master in Medical Lab Technology (Pathology) M Sc. M.L.T. 1st YEAR

1. Human Anatomy & Physiology
2. Clinical Biochemistry
3. Clinical Pathology
4. Clinical Microbiology

#### Practical

1. Human Anatomy & Physiology
2. Clinical Biochemistry
3. Clinical Pathology
4. Clinical Microbiology

### Master in Medical Lab Technology (Pathology) M Sc. M.L.T. 2ND YEAR

1. Clinical Hematology
2. Blood Transfusion & immune hematology
3. HistoPathology and histotechniques
4. cytopathology and cytotechniques

#### Practical

1. Blood Transfusion & Immunohematology
  2. Histopathology
  3. Cytopathology
  4. hematology
- Dissertation (Pathology) & Viva

## M.Sc. (MLT) Pathology- scheme and syllabus

### M Sc. M.L.T (PATHOLOGY)

#### PAPER:- HUMAN ANATOMY & PHYSIOLOGY

#### Anatomy

##### *Syllabus:*

**UNIT-1 Introduction:** Overview of the structure organization of the human body; anatomical terminology of positions & locations, planes.

**Cell:** Cell morphology and diversity; introduction to ultra structure and function of cell organelles.

**Skeletal Muscles:** Major skeletal muscles of the head, neck, thorax, abdomen and upper and lower limbs.

**General Osteology:** General morphology of bones; structural classification of bones, development and growth of skeletal tissue and bones.

**General Astrology:** Structural and functional classification of joints; general morphology of a synovial joint and associated structures; movements made available by synovial joints.

**Detailed Osteology and Astrology Practical:** Naming and identification of osteological features of individual human bones; Bones of Upper limbs – Clavicle, Scapula, Humerus, Radius, Ulna; Lower limbs – Femur, Hip bones, Sacrum, Tibia, Fibula, Ribs, Sternum  
Vertebral Column. Naming, identification and application of classification to the major joints of the human body; examples of variability in the human skeleton.

**UNIT-2 Cardiovascular System:** Macroscopic features, function and location of the adult and the location of major arteries and veins; macroscopic features of blood vessels including arteries, veins and capillaries; morphological features of the cellular components of blood.

**Lymphatic System:** Macroscopic features, major function and location of the lymphatic vascular structures, lymph nodes, tonsils and other mucosa-associated lymphatic tissue, spleen and thymus; microscopic anatomy of lymph nodes.

**Nervous System:** Macroscopic features and major functions of the brain brief structure, location & function of cerebrum, cerebellum & brain stem and spinal cord; morphological features and major function of the contents of the peripheral nervous system and autonomic nervous system.

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**Respiratory System:** Macroscopic features and major functions of the nasal cavity, paranasal sinuses, pharynx, larynx, trachea, bronchi, lungs and thoracic wall including the thoracoabdominal diaphragm.

**Digestive System:** Macroscopic features and major functions of the mouth, salivary glands,

pharynx, oesophagus, stomach, small and large intestines, liver pancreas, biliary system and peritoneal cavity.

**UNIT-3 Urinary System:** Macroscopic features, major functions and location of the kidneys, ureters, urinary bladder and the urethra.

**Endocrine System:** Macroscopic features, location and basic function of the hypothalamus, pituitary gland, thyroid gland, parathyroid glands, suprarenal glands, pineal gland and organs with a minor endocrine function.

**Male Reproductive System:** Macroscopic features, Major functions and location of the scrotum, testes, epididymis, ductus deferens, inguinal canal, seminal vesicles, prostate gland, bulbourethral gland and penis.

**Female Reproductive System:** Macroscopic features, major functions and location of the ovaries, uterine tubes, uterus, vagina and external genitalia.

**Special Senses:** Macroscopic features and major functions of the contents of the orbital cavity, the eyeball, lacrimal apparatus, and external, middle and internal ear.

**UNIT-4 Upper Limb:** Relevant osteology; detailed plain radiographic anatomy of skeletally mature individuals.

**Head and Neck:** Relevant osteology of the skull and cervical vertebrae; surface anatomy, lymphatics major blood vessels and nerves of the head and neck; regional anatomy of the brain and its meninges.

**UNIT-5 Histology:** macroscopic and microscopic studies of epithelial tissue, general connective tissue, cartilaginous tissue, bone tissue, muscle tissue, nervous tissue and the integument; major functional advantages of each tissue type.

**Anatomy Practical:**

- Demonstration of bones identification and side determination upper limb-clavicle, scapula, humerus, radius, ulna, lower limb-femur, Hip bone, Tibia, Fibula, Vertebral Column, Ribs, Sternum, Sacrum
- Demonstration of heart.
- Demonstration of different parts of respiratory system and normal X-rays- lungs.
- Demonstration of the part of digestive system and normal X-rays- stomach, small intestine, large intestine, liver.
- Embalming of human cadavers for teaching purposes & social/ funeral embalming.
- Surface anatomy on cadaver.

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- Demonstration of major vessels of the body-Aorta, subclavian, carotid, brachial, radial, ulnar, femoral, renal.
- Demonstration of bones & joints of the limb in normal X-ray.
- Demonstration of major muscles of the body-limbs, head & neck.
- Demonstration of other organs—spleen, testis, uterus.
- Histology-General epithelium, connective tissue, gland, bone, cartilage lymphoid tissue Systemic-Lung, Esophagus, Stomach, Small Intestine, Pancreas, Liver, Kidney, Pituitary Gland, Thyroid, Testis, Ovary.

**PARAMEDICAL SYLLABUS – PHYSIOLOGY (M.Sc.)**

**General Physiology:** Cell: Structure and function of a cell, Transport across the cell membrane, Passive Transport: Diffusion (Simple and Facilitated), Osmosis (Osmotic pressure, Tonicity), Active transport: Primary ( $\text{Na}^+\text{K}^+$  ATPase), Secondary, Carrier type (Uniporters, Symporters, Antiporters), Vesicular (Endocytosis and Exocytosis), Tissues: Definition and classification (Epithelial, Connective, Muscular, Nervous), Body water and body fluids: Distribution of total body water, Ionic composition of body fluids, Concept of pH and  $\text{H}^+$  concentration. The Membrane Potentials: Resting membrane potentials (Genesis & function), Action Potential

**Blood: Composition** and functions of blood, Hemoglobin (Normal values and time), Blood Cells: RBCs, WBCs, Platelets (Development, structure and functions), Coagulation of blood and bleeding disorders, Haemophilia, Purpura, Blood groups (ABO, Rh) Uses, Lymphoid tissues (types) and immunity, Immune system (Natural and Acquired), Applied: Anaemia (Types), Jaundice, Hemophilia

**Gastrointestinal Tract:** Organization of structure of GIT, Functions of digestive system, Innervation of GIT (Enteric Nervous System). Mouth (Oral Cavity): Boundaries, Tongue, Teeth, Composition and functions of saliva, Mastication (chewing), Swallowing (Deglutition) Stages. Stomach: Structure,

Functions of stomach and innervation, Composition and functions of gastric juice, Regulation of secretion of gastric juice, Gastric motility and emptying. Pancreas: Structure, Nerve supply, Composition, functions and regulation of secretion of pancreatic juice. Liver: Structure, Functions and Liver function tests Bile: Composition, functions and control of secretion. Gall Bladder: Functions of gall bladder. Small Intestine: Intestine juice, Digestion and movements. Large Intestine: Structure, movements, absorption and secretion, dietary fibers. Digestion and absorption in GIT: Digestion and absorption of carbohydrates, lipids and proteins. Food and nutrition: constituents of a normal diet, Balanced diet, Applied aspect (Deficiency diseases, Kwashiorkor, Marasmus)

**Respiratory System:** Structure and functions of respiratory system, Air Passages: Nose and nasal cavity, pharynx, larynx, tracheobronchial tree, lungs, respiratory membrane, pleura, Properties of gases: Partial Pressure, composition of dry air, Functions of respiratory system: Lung defense mechanism and pulmonary circulation. Mechanics of respiration: Mechanism of breathing (Inspiration and Expiration), Alveolar Surface Tension (Action of surfactant), Alveolar Ventilation: Dead space (Anatomical and Physiological), Diffusion capacity of lungs (Clinical Significance), Lung volumes and capacities (Static: Tidal Volume, Residual Volume, Vital Capacity, Total Lung capacity; Dynamic: FEV1, FEV2, FEV3, Minute/Pulmonary Ventilation, Maximum Voluntary Ventilation). Transport of gases: Oxygen transport [Carriage of oxygen in blood; Dissolved form & combined with hemoglobin, Carriage of oxygen in the body; In tissues (At rest and during exercise), In lungs]. Carbon-di-oxide transport [Carriage of Carbon-di-oxide in blood; In dissolved form, carbamino form (In plasma and RBCs), as bicarbonate, Carriage of Carbon-dioxide in lungs], Oxygen hemoglobin dissociation curve (Shift to right & Shift to left). Regulation of respiration: Nervous Regulation of respiration [Automatic control via Medullary and Pontine Respiratory centers, Voluntary control of respiration], Genesis of respiration (Inspiration and Expiration), Factors affecting respiration [Chemical and non-chemical stimuli], Chemical Regulation of respiration [Peripheral chemoreceptors (Carotid bodies and Aortic bodies) and Central (Medullary) chemoreceptors]. Physio clinical aspects: Dyspnea, Apnea, Hypoxia

**Cardiovascular System:** General Cardiac chambers (Valves in the heart, Heart sounds, Pacemaker tissue of the heart), Properties of Cardiac Muscle, Cardiac Cycle, Electrocardiogram (ECG), Circulation: Functions, Pressure changes in vascular system, Organization and functions of vascular system, Distribution of major vessels in the body, Lymphatic system, Regulation of cardiovascular system: Local (Basic Myogenic tone), Systemic: Chemical, Neural (Autonomic and medullary; Baroreceptors and Chemoreceptors) Heart Rate: Definition, Factors affecting HR and its control, Cardiac Output: Definition, Distribution and control, Arterial Blood Pressure: Definition, factors affecting and regulation

**Excretory System:** Anatomy and Physiology of Urinary System, Kidney: Structure, Organization and functions of Glomerulus, Glomerular membrane, Blood supply Functions of kidney: Formation of urine, Regulation of water balance, Regulation of electrolyte balance, Regulation of acid-base balance, Endocrine functions of kidney, Urinary Passages: Ureters, Urinary Bladder (Structure and function, Higher control of micturition)

**Endocrine System:** Definitions, Control (Neural and endocrine), Characteristics of hormones, Pituitary Gland: Physiological anatomy (Anterior, intermediate and posterior lobe), Anterior Pituitary – Six Hormones (GH, PRL, TSH, ACTH, LH, FSH, Growth Hormone (GH): Control and actions, Applied (Gigantism, Acromegaly, Dwarfism), Prolactin (PRL): Control and actions of PRL, Posterior Pituitary, ADH (Anti diuretic hormone): Control of ADH secretion, Actions of ADH, Applied, Oxytocin: Actions and Control of oxytocin secretion, Intermediate lobe of Pituitary, MSH (Melanocyte stimulating hormone), Thyroid Gland: Physiological anatomy, Types of hormones (T3 and T4), Regulation of thyroid secretion, Actions of thyroid hormone: Calorigenic, On carbohydrate metabolism, On lipid metabolism, On growth and development, Effect on nervous system, Applied (Goiter, Hypothyroidism, Hyperthyroidism), Parathyroid, Calcitonin and Vitamin-D: Role of calcium in metabolic processes, Distribution, Absorption and fate of calcium in the body, Hormones regulating calcium metabolism (Vitamin-D, PTH, Calcitonin), Applied (Rickets, Osteomalacia & Adult Rickets, Hyperparathyroidism), Adrenal Cortex: Physiological Anatomy of adrenal gland, Regulation of glucocorticoid secretion, Actions of glucocorticoids, Cushing's Syndrome, Mineral corticoids (Aldosterone, Actions of aldosterone, Regulation of aldosterone secretion, Addison's Disease), Sex Hormones, Adrenal Medulla: Physiological Anatomy, Actions of catecholamine's, Actions (CVS, carbohydrate metabolism, lipid metabolism, BMR, CNS, Eyes, Urinary bladder, skin), Pancreas: Physiological Anatomy, Glucagon, Insulin (Actions), Applied (Diabetes Mellitus; Causes, Signs and

symptoms), Thymus and Pineal Gland: Thymus: Functions, immunological role of thymus, Pineal gland: General features, Functions, control

**Reproductive System:** Physiology of reproduction: Sex determination and sex differentiation, Puberty: Control of onset and stages, reproductive hormones; Gonadotropin (FSH & LH), Male Reproductive System: Testis: Structure and functions, Spermatogenesis, Structure of the sperm, Seminal tract and related glands, supporting structure, seminal fluid (semen), Endocrine functions of testis (Testosterone, Control of testicular activity) Female Reproductive System, Female reproductive tract: Uterus and related structures, ovaries, ovarian hormones (Estrogen, Progesterone and Relaxin), Female Sexual Cycle: Changes in the ovaries and uterus (Menstrual cycle), Vagina and gonadotropin secretion Contraceptive measures

**Central Nervous System:** Organization and functions of nervous system Brain: Cerebral Hemisphere (Cerebrum), Basal Ganglia, Thalamus, Hypothalamus Brain stem: Midbrain, Pons, Medulla, Reticular formation, Cerebellum Spinal Cord: Structure and functions, Ascending (Sensory) tracts, Motor (Descending) tracts Cerebrospinal Fluid Peripheral Nervous system, Somatic Nervous System: Spinal nerves, Reflexes, Mono and Polysynaptic reflexes, Cranial nerves, Autonomic Nervous system (ANS): Sympathetic and Parasympathetic

**Special Senses:** The Smell: Olfactory receptors, Olfactory pathway, Physiology of olfaction, The Taste: Taste Receptors (Taste buds), Taste Pathway, Physiology of taste The Ear: Physiological Anatomy (External ear, Middle Ear, Inner ear, Cochlea), Physical Properties of sound, Mechanism of hearing, The Eye: Physiological Anatomy (Sclera, Choroid, Retina, Crystalline lens, photoreceptors), Visual Pathway, Image forming mechanism of eye, Visual Acuity, Visual reflexes, Accommodation, Defects of image forming mechanisms, Lacrimal Apparatus (Lacrimal gland, Lacrimal canaliculi, nasolacrimal duct, tears or Lacrimal fluid)

**Skin and Temperature:** Structure and function of skin, Temperature Regulation

#### **Practical**

Haemoglobinometry

- White Blood Cell count
- Red Blood Cell count
- Determination of Blood Groups
- Leishman's staining and Differential WBC count
- Determination of packed cell Volume
- Erythrocyte sedimentation rate [ESR]
- Calculation of Blood indices

- Determination of Clotting Time, Bleeding Time

## **PAPER:- CLINICAL BIOCHEMISTRY**

### **Syllabus**

1ST YEAR:

- 1) **Cell and Membrane:** Basic structure and function of the cell. Structure of the cell membrane. Functions of the cell membrane Transport through the cell membrane: active, passive, facilitated. Membrane proteins and functions.
- 2) **Chemistry of Carbohydrates:** definition, classification. Isomerism, optical isomerism, Structural presentation of monosaccharide's, The various chemical reactions of carbohydrates and their derivatives. Disaccharides and polysaccharides, Metabolism.
- 3) **Chemistry of Lipids:** definition, Classifications, properties , classifications. Fatty acids types and uses, Glycerides, Phospholipids, Glycolipids, Ecosanides, Steroids, Cholestrol, Lipoproteins, Amphipathic lipids and lipid bi layer, Metabolism.
- 4) **Chemistry of Amino acids and proteins:** definition of amino acids, Classification based on structure, requirement, metabolic fate, solubility, Physical properties of Amino acids, Chemical properties of amino acids. iso electric pH. Non standard amino acids, Metabolism. Proteins: Definition, Structure, structural classification, Functional classification. Peptide bonds an structural Motifs in protein such as A helix, B pleated sheets etc, Reactions of proteins such as denaturation, heat coagulation, salting out, reaction with acids, reactions with alkali, precipitations by heavy metals, precipitations by organic solvents, precipitation by alkaloid reagents.
- 5) **Nucleotides and nucleic acids:** Nucleotides, Purines and Pyrimidines. Sugars in nucleotides, DNA structure, Coiling and packaging of DNA, Histones, Genes and chromosomes. RNA types and structure of RNA & Metabolism.
- 6) **Vitamins:** Fat soluble and water soluble vitamins, Uses of Vitamins, Deficiency disorders.
- 7) **Nutrition:** Diet, calculation of balanced diet, disorders of protein energy malnutrition.
- 8) **Water and electrolytes,** Acid Base balance: ECF, ICF, Intra cellular and extra cellular electrolytes. Dehydration. Acidosis, alkalosis, Buffers, Means of maintaining pH.
- 9) Enzymes
- 10) Liver function test
- 11) Kidney function test
- 12) Thyroid function test
- 13) Molecular Biochemistry- DNA Replication, Transcription & Translation, Regulation of Genetic expression
- 14) Genetic Techniques; PCR, gene therapy
- 15) Hemoglobin metabolism
- 16) Hormones- Mechanism of Hormone action.

### **Practical-Clinical Biochemistry**

- Laboratory safety : Fire, chemical, radiation ,handling of biological specimens, waste
- Disposal regulations, workplace hazardous.
- Specimen collection, identification, transport, delivery and preservation.
- Patient preparation for tests.
- Anticoagulants' and preservatives
- Regulations and precautions regarding transport of biological specimens
- Preparation of high quality water
- pH determination
- Preparation of buffers and determination of pH
- Measurement of radioactivity
- Practical's related to solvent extraction, Partition coefficient, Dialysis, Concentration,
- Desalting and Ultracentrifugation.
- Calibration of equipments and laboratory wares.
- Familiarization and usage of Colorimetry, specterophotometry, fluorimetry,
- flame photometry, atomic absorption spectroscopy, nephelometry, osmometry,
- Chemiluminescence, ion selective electrodes, flowcytometry.
- Chromatography : - Paper, Thin layer, Gel filtration, Ion exchange, HPLC, GLC,

- Separation of various sugars, amino acids, lipids, drugs toxins etc. Urine amino gram.
- Electrophoresis: - Paper, Agarose gel, Cellulose acetate, PAGE, SDS-PAGE. Separation
- of serum proteins, lipoproteins, haemoglobin, globin chain and isoenzymes
- Tissue homogenization and cell disruption
- Cell fractionation methods
- Extraction of glycogen and its estimation
- Extraction of protein and its estimation
- Extraction of lipids and estimation of total lipids, glycolipid, phospholipids and cholesterol.
- Determination of saponification number and iodine number from oils
- Estimation of lactic acid and pyruvic acid
- Qualitative analysis of carbohydrate
- Detection of unknown sugars
- Qualitative analysis of proteins
- Isolation of DNA and RNA
- Estimation of DNA and RNA
- Agarose gel electrophoresis of DNA

**PAPER:- CLINICAL PATHOLOGY**

- ☒ Examination of Urine - Routine and Special tests
- ☒ Examination of Stool - Routine and Special tests
- ☒ Examination of Sputum - Routine and Special tests
- ☒ Semen examination - Routine and Special tests
- ☒ Examination of CSF - Routine and Special tests
- ☒ Examination of various body fluids-Pleural Fluid, Pericardial Fluid, Synovial Fluid, Ascetic Fluid
- ☒ Various methods of detecting HCG levels
- ☒ Structure and molecular organization of Chromosomes
- ☒ Identification of human chromosomes
- ☒ Karyotyping
  - Direct chromosome preparation of Bone Marrow cells
  - Culture techniques
- ☒ Banding techniques
- ☒ Sex Chromatin bodies
- ☒ Autoradiography of human chromosomes
- ☒ Chromosome Identification by image analysis and Quantitative cytochemistry
- ☒ Clinical Manifestations of chromosome disorders
- ☒ Anemia and other disorders of Erythropoiesis
- ☒ Disorders of Leucopoiesis
- ☒ Homeostasis & its investigations
- ☒ Investigations of Thrombotic tendency
- ☒ Laboratory control of Anticoagulant , Thrombotic and platelet therapy
- ☒ Collection and handling of Blood
- ☒ All Routine and special Hematological Investigations
- ☒ Blood and Bone Marrow preparations
- ☒ Leucoproliferative disorders with special references to Leukemia
- ☒ Automation in Hematology
- ☒ Cytochemistry of Leukemic cells
- ☒ Amniocentesis
- ☒ Bone marrow transplantation
- ☒ Application of different Microscopes
- ☒ Preparations of various Reagents and Stains used in Hematology
- ☒ Immunophenotyping
- ☒ Flowcytometry
- ☒ Molecular techniques in Hematology

## **Practical Clinical Pathology**

- Examination of Urine - Routine and Special tests
- Examination of Stool - Routine and Special tests
- Examination of Sputum - Routine and Special tests
- Semen examination - Routine and Special tests
- Examination of CSF - Routine and Special tests
- Examination of various body fluids-Pleural Fluid, Pericardial Fluid, Synovial Fluid, Ascetic Fluid
- Various methods of detecting HCG levels
- Structure and molecular organization of Chromosomes
- Identification of human chromosomes
- Karyotyping
- Direct chromosome preparation of Bone Marrow cells
- Culture techniques
- Banding techniques
- Sex Chromatin bodies
- Autoradiography of human chromosomes
- Chromosome Identification by image analysis and Quantitative cytochemistry
- Clinical Manifestations of chromosome disorders
- Organization of Histology Laboratory

## **PAPER:- CLINICAL MICROBIOLOGY**

### **CLINICAL MICROBIOLOGY**

#### **THEORY**

#### **UNIT I**

#### **GENERAL MICROBIOLOGY**

1. History and Pioneers in microbiology
2. Microscopy
3. Morphology of bacteria and other microorganism
4. Nomenclature and classification of microbes
5. Growth and nutrition of bacteria
6. Sterilization and disinfection
7. Bacterial toxins
8. Bacterial genetics
9. Antibacterial substances used in the treatment of infection and drug resistance in bacteria
10. Bacterial ecology-Normal flora of human body, Hospital environment, Air, Water and Milk

#### **UNIT II**

#### **IMMUNOLOGY**

1. Normal immune system
2. Innate immunity and acquired immunity
3. Antigens
4. Immunoglobulin
5. Complement
6. Antigen-Antibody reactions
7. Cell mediated immunity & humoral immunity
8. Hypersensitivity
9. Immunodeficiency
10. Auto-immunity

#### **UNIT III**

#### **SYSTEMIC BACTERIOLOGY**

1. Isolation, description and identification of bacteria
2. Staphylococcus and Micrococcus
3. Streptococcus
4. Neisseria
5. Corynebacterium
6. Bacillus:The Aerobic spore bearing bacilli

7. Clostridium: The anaerobic spore bearing bacilli
8. Enterobacteriaceae
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9. Vibrios and Campylobacter
10. Haemophilus and Bordetella
11. Brucella
12. Mycobacteria
13. Actinomyces and Nocardia
14. Pseudomonas
15. Spirochaetes
16. Chlamydiae
17. Rickettsiae
18. Mycoplasma & Ureaplasma

#### **UNIT IV**

##### **VIROLOGY**

1. Classification of viruses
2. Morphology, Virus structure
3. Viral replication
4. Pathogenicity of viruses
5. Bacteriophages
6. Pox viruses
7. Herpes viruses
8. Arboviruses
9. Orthomyxovirus
10. paramyxoviruses
11. Enteroviruses: Polio & other enteric viruses
12. Hepatitis viruses
13. Rabies viruses
14. Human immunodeficiency viruses

#### **UNIT V**

##### **PARASITOLOGY**

1. Protozoan parasites of medical importance  
Entamoeba, Giardia, Trichomonas, Leishmania, Trypanosoma, Plasmodium, Toxoplasma, Pneumocystis Carinii
2. Helminths: All those medically important helminths belonging to Cestodes, Trematodes and Nematodes  
Cestodes: Diphylobothrium, Taenia, Echinococcus, Hymenolepis,  
Nematodes: Trichuris, Trichinella, Strongyloides, Ancylostoma, Ascaris, Enterobius, Filarial worms, Dracunculus medinensis, etc.

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#### **UNIT VI**

##### **MYCOLOGY**

1. The morphology and reproduction in fungi
2. Classification of fungi
3. Opportunistic fungi
4. Superficial mycotic infections
5. Fungi causing subcutaneous mycoses
6. Fungi causing systemic infections
7. Laboratory diagnosis of fungal infections

#### **UNIT VII**

##### **CLINICAL MICRO BIOLOGY**

1. Laboratory diagnosis of Meningitis, Lower respiratory tract infection, Upper respiratory infection, Genital tract infection.
2. Gastroenteritis
3. Blood stream infection
4. Hospital acquired infection and Biomedical waste management

##### **Practical**

## **SKILLS TO ACQUIRE**

### **BACTERIOLOGY**

1. Aseptic practice in Lab and safety precautions
2. Washing and Sterilization of glasswares
3. Care and operation of microscopes viz. Dark ground, Phase contrast and Fluorescent microscope,(Electron microscope).
4. Operation and maintenance of Autoclave, Hot air oven, Distillation plants, Filters like Sietz and Membrane and sterility test and Testing of disinfectant-Phenol coefficient test and its uses.
5. Care and maintenance of common laboratory equipments
6. Collection of specimens for Microbiological investigations
7. Preparations of stains viz. Grams, Alberts, Capsules, Spores, Ziehl Neelsons,etc and performing of staining
8. Preparation and pouring of media- Nutrient agar, Blood agar, Mac Conkey agar, Sugars, Kligler iron agar, Robertson's cooked meat, Lowenstein Jensen, Sabouraud's
9. Preparation of reagents-Oxidase, Kovac, etc
10. Identification of bacteria of medical importance upto species level(except Anaerobes which could be upto generic level)
11. Preparation of antibiotics discs: performance of Kirby Bauer, Stokes, etc
12. Disposal of contaminated materials
13. Quality control of media, reagents, etc.
14. Techniques for Anaerobiosis

### **IMMUNOLOGY**

1. Collection and preservation of serum.
2. Performance of common serological test
3. Immuno electrophoresis
4. ELISA
5. CD4
6. Skin test - Montoux test

### **MYCOLOGY**

1. Collection and processing of clinical specimens for fungi.
2. Special techniques like Wood lamp examination, hair baiting techniques, slide cultures.
3. Stoke cultures maintenance

### **PARASITOLOGY**

1. Examination of faeces for ova and cysts: Direct and Concentration method.
2. Egg counting techniques.
3. Examination of peripheral blood, Urine, CSF, and other fluids for parasites.
4. Permanent staining technique for parasites.

### **VIROLOGY**

1. Preparation and identification of CPE in various tissue cultures.
2. Serological test for viral infections
3. Handling of experiment animals and collection of various samples for evidence of viral infections in animals.

1. Laboratory diagnosis of AIDS
2. Laboratory diagnosis of Hepatitis
3. Laboratory diagnosis of Dengue
4. Safety measures

### **PAPER:- CLINICAL HEMATOLOGY**

1. Red Blood Cells :
  - a. Normal morphology count
  - b. Isolation from whole blood & count
  - c. Effect on count & morphology of physiochemical parameters & the diseased state
  - d. Red cell anomalies & their relevance w.r.t. normal & diseased state
2. Blood Transfusion :
  - a. Pre-requisitment & the complication of mis-matched transfusion.
  - b. Methods of blood matching

### 3. White blood cells & platelets;-

- a. Morphology count & methods of isolation
- b. Effect on count & morphology of cell by the physiochemical parameters, diseased. State & the relevance of condition of the diseases

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#### 1. Anaemia's :

- a. Definition (in general) & courses
- b. Types of anemia & their classification
- c. Physiochemical, characteristic features & etiology of a plastic anemia, hemolytic, megaloblastic
- d. Clinical features & diagnosis

#### 5. Leukaemia

- a. Definition (in general) & their etiology
- b. Classification of leukaemia
- c. FAB classification
- d. Etiologies, physiochemical features of different type of leukaemia, with reference to clinical states
- e. Diagnosis of different types of leukaemias

#### 6. Coagulation studies;

- a. General pathway (intrinsic & extrinsic)
- b. Properties (physiochemical) mode of action of coagulation factors
- c. Platelet studies, platelet function tests (for different Coagulation factors) > Effect of promoters & inhibitors at different steps in coagulation, their solution & mode of action.
- d. Diseases associated with coagulation disorders, their etiology & characteristics features.

#### 7. Red Cell mass studies'

- a. Chemical method & radioactive methods
  - b. Red Cell function studies
- ☒ Anaemia and other disorders of Erythropoiesis
  - ☒ Disorders of Leucopoiesis
  - ☒ Haemostasis & its investigations
  - ☒ Investigations of Thrombotic tendency
  - ☒ Laboratory control of Anticoagulant , Thrombotic and platelet therapy
  - ☒ Collection and handling of Blood
  - ☒ All Routine and special Haematological Investigations
  - ☒ Blood and Bone Marrow preparations
  - ☒ Leucoproliferative disorders with special references to Leukaemias
  - ☒ Automation in Haematology
  - ☒ Cytochemistry of Leukaemic cells
  - ☒ Amniocentesis
  - ☒ Bone marrow transplantation
  - ☒ Application of different Microscopes
  - ☒ Preparations of various Reagents and Stains used in Haematology
  - ☒ Immunophenotyping

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#### ☒ Flowcytometry

#### ☒ Molecular techniques in Haematology

#### **Practical- Clinical Hematology**

- Haemopoiesis
- Anaemia and other disorders of Erythropoiesis
- Disorders of Leucopoiesis
- Haemostasis & its investigations
- Investigations of Thrombotic tendency
- Laboratory control of Anticoagulant , Thrombotic and platelet therapy
- Collection and handling of Blood
- All Routine and special Haematological Investigations
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- Automation in Haematology
- Cytochemistry of Leukaemic cells
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- Bone marrow transplantation
- Application of different Microscopes
- Preparations of various Reagents and Stains used in Haematology
- Immunophenotyping
- Flowcytometry
- Molecular techniques in Haematology

**PAPER :- Blood Transfusions & IMMUNOHEMATOLOGY**

**Unit I** Reception, labeling and recording of laboratory investigations

Cleaning of glassware, pipettes, E.S.R. tubes and counting chambers

Preparation of capillary pipette, distilled water, reagents, buffers

**Unit II** Collection of blood, preparation of blood smear, staining of blood and bone marrow smears.

**Unit III** Measurement of hemoglobin, counting of leucocytes, erythrocytes, platelets and reticulocytes.

Recognition of blood cells in peripheral blood smears

**Unit IV** Determination of haematocrite and E.S.R., preparation of haemolysate and determination of alkali resistant

hemoglobin, paper electrophoresis of hemoglobin.

Test for sickle celling, bleeding time, coagulation time, prothrombin time, and kaolin cephalin clotting time.

**Unit V** Abo blood grouping and Rh typing

Performance of direct and indirect coombs test, red cell agglutination test (screening Paul bunnell test).

**Unit VI** Preparation for the demonstration of L.E. Cell phenomenon.

**Unit VII** Blood donor selection & screening

Blood collection and preservation, principle of clearing and preparing transfusion bottle and tubing sets – preparation and composition of anticoagulant – preservative solutions.

**Unit VIII** Transfusion reaction and their investigations

**Immunoematology**

1 Blood & blood group antigens: General characteristics of ABO, Lewis, Rh, Mn & Xg antigens.

Leucocyte & platelet & is antigens. Blood transfusion, Erythroblastosis fetalis.

2 Molecular structure of hemoglobin. Genetic significance of Hemoglobin, structural variation, chemical & biochemical characteristics of Hemoglobin biosynthesis.

**1. Blood Grouping**

- Introduction
- Human Blood Group system
- ABO Subgroups
- Red Cell Antigen
- Natural Antibodies
- Rh. System
- Rh. Antigens & Rh Antibodies
- Hemolytic Diseases of New born & Prevention
- Principle of Blood grouping, antigen-antibody reaction.
- Agglutination, Haemagglutination, Condition required for antigen antibody reaction
- Blood grouping techniques-Cell grouping, Serum grouping
- Method for ABO grouping Slide & Tube Method Cell grouping Serum grouping Rh grouping by slide & tube method
- Difficulties in ABO grouping
- Rouleaux formation how it interferes with Blood grouping
- Auto agglutinins.
- Antiserum used in ABO test procedures, Anti-A, Anti-B, Anti-AB Antiserum
- Inheritance of the Blood groups;
- Control A & B Cells preparation Auto Control
- Medical applications of Blood groups

**2. Blood Transfusion**

- Principal & Practice of blood Transfusion
- Blood Transfusion service at District Level
- Guide lines for the use of Blood Appropriate use of Blood Quality Assurance
- Antilogous Blood Transfusion practices.
- Objectives of Quality Assurance in Blood Transfusion services, Standard operating procedures for usage, donation & storage of blood screening of donor compatibility testing, safety procurement of supplies.

### **3. Blood Donation**

- Introduction
- Blood donor requirements
- Criteria for selection & rejection
- Medical history & personal details
- Self-exclusion
- Health checks before donating blood
- Screening for TTI

### **4. Blood Collection**

- Blood collections packs
- Anticoagulants
- Taking & giving sets in Blood transfusion
- Techniques of collecting blood from a doctor
- Instructions given to the donor after blood donation
- Adverse donor reaction

### **5. Testing Donor Blood**

- Screening donor's blood for infectious agents –HIV, HCV, HBV, Trepanoma palladium, Plasmodium HTLV.
- Bacterially contaminated Blood

### **6. Blood Donor Records**

- Blood donation record book
- Recording results.
- Blood donor card

### **7. Storage & Transport**

- Storage of blood
- Changes in blood after storage
- Gas refrigerator
- Lay out of a blood bank ref refrigerator
- Transportation

### **8. Maintenance of Blood Bank Records**

- Blood bank temperature sheet
- Blood bank stock sheet
- Blood transfusion request form.

### **9. Compatibility Testing**

- Purpose
- Single tube compatibility techniques using AHG reagent
- Emergency compatibility testing
- Difficulties in cross matching
- Labeling & Issuing cross-matched blood

### **10. Blood Components**

- Collection of blood components of fractional transfusion
- Platelets packed Red Cell Platelet rich Plasma, Platelets concentrate
- Preparation of concentrated (packed) Red Cells
- Techniques of preparation.

### **11. Blood Transfusion Reaction**

- Investigation of a Transfusion reaction
- Hemolytic transfusion reaction
- Actions to take when transfusion reaction occurs.

### **Practical Blood Transfusion**

- **Blood Bank Administration**

a) Record Keeping

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b) Computerization in blood transfusion services.

c) Blood grouping ABO

d) PH typing various techniques.

• **Cross Matching**

a) Tube test

b) Slide Test

c) DU Test

d) Sub Grouping Test

• **Coomb's Test**

a) Direct comb's test

b) Indirect comb's test

• Compatibility testing for blood transfusion cross matching test.

a) 5% cell suspension and 10% cell suspensions.

b) HIV and AIDS demonstration

• Haemopoiesis

• Anaemia and other disorders of Erythropoiesis

• Disorders of Leucopoiesis

• Haemostasis & its investigations

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• Application of different Microscopes

• Preparations of various Reagents and Stains used in Haematology

• Immunophenotyping

• Flowcytometry

• Molecular techniques in Haematology

**PRACTICAL**

1. Basic Hematological Techniques, Characteristic of good technician, Preparation of specimen collection material, Lab. Request from, Basic steps for drawing a blood specimen by vein puncture. Complication of vein puncture, Patient after care, Specimen rejectin criteria for blood specimen, Hemolytic of blood, Blood collection by skin puncture (Capillary Blood), Arterial puncture, Deciding specimen types and selection of , Anticoagulant-EDTA, Citrate, Oxalate, Heparin, sodium fluoride., Separation of serum, Separation of plasma, Changes in blood on keeping, Maintenance of specimen identification, Transport of the specimen, Effect of storage on Blood Cell Morphology,

1. Universal precautions.

2. Basic requirements for hematology laboratory

3. Glassware's for Hematology

4. Equipments for Hematology

5. Anticoagulant vial preparation

6. Complete Blood Counts

7. Determination of Hemoglobin

8. TRBC Count by Hemocytometers

9. TLC by Hemocytometer

10. Differential Leukocyte count

11. Determination of Platelet Count.

12. Determination of ESR by win robes

13. Determination of ESR by Wintergreen's Method

14. Determination of PCV by Wintrobe's
15. Erythrocyte Indices-MCV, MCH MCHC
16. Reticulocyte Count
17. Absolute Eosinophil Count
18. Morphology of Red Blood Cells
19. Blood grouping & Cross Matching
20. Reserves grouping
21. Antiglobulin test
22. Rh. Typing
23. Donor Blood Connection Techniques
24. Laboratory in Good Criteria for Safe Blood Collection, Quality control in Blood Banks. Risk assessment for AIDS and Serum hepatitis.
24. Basic knowledge of disease transmissible disease example HIV, Serum hepatitis B and C, VDRL, and Malaria

**Paper:- Histopathology**

**Introduction to Histology**, the cell, cell Organelles, nucleus, cell division, tissues, fresh & fixed tissues.

Different types of Embedding Viz. Wax, Resin, and Cryostat etc. Basic Cytology

**Theory of Histopathology** Reception of specimens, Histopathology of Tumor cell, Histopathology of Liver Kidney Adrenal Ovary Testis.

**Fixation of tissue**, different kind of fixatives, simple fixative, compound fixative, formaldehyde, mercuric chloride, osmium, Picric acid, alcohols, other acids, formalin, buffered formalin, osmic acid, Zenker's soln, Healy's soln, cytological fixatives, nuclear fixatives, fixation of smear etc., decalcification, method of decalcification, assessment of decalcification, soln for decalcification.

**Processing of tissue**, dehydration, impregnation in the wax, manual and automatic tissue processor, gelatin embedding, celloidin embedding, double embedding, cytological fixatives, preparation of different smears, vaginal, sputum, membrane.

**Microtome, instrument**, principle, use in section cutting, parts and working of commonly used microtome, different kinds of microtome, rotary, base sledge, sliding, low temperature microtome, cryostat, microtome knives, honing and stropping knives.

**Section cutting or paraffin sections**, section preparation from frozen sections, fixing of tissue to slide, preparation of celloidin section and fixation. Staining techniques, natural dyes, synthetic dyes, basic and acidic dyes, haematoxylin staining, Pap, flicker & Conn, methanamine silver nitrate, Ziehl-Neelsen's stain, propylene glycol sudan technique, Papanicolaou, Harn's alum, Haematoxylin, acridine orange technique.

**Unit I:** Handling of fresh histological specimen (tissues) cryo/frozen sections of fresh and fixed tissues freeze drying Lipids identification and demonstration Micro organisms in tissues various staining technique for their demonstration and identification Nucleic acids DNA and RNA special stains and procedures Cytoplasm constituents and their demonstration Cervical cytology basis of detection of malignant and premalignant lesions Hormonal assessment with cytologic techniques and sex chromatin and pregnancy tests Cells and organs of immune system Immunoglobulin's antibodies and humoral immune response Allergy Rheumatological diseases and investigations.

**Unit II Method of preparing stains**

Method of preparing stains & Fixatives. Theory of Tissue processing and embedding, Theory of H & E staining.

**Unit III Use Microtome Tissues section**

Introduction, cutting Embedding and preparation of blocks Fixation of Tissue with DPX mount Theory of frozen section preparation.

**Unit IV Preparation of smear**

Preparation of smear for Fine needle aspiration cytology Pap's smear theory and identification of cells in a normal vaginal smear.

**Unit V Stool examination**

Normal abnormal constituent.

Normal and abnormal constituent of Urine, Normal and abnormal constituent of amniotic fluid Normal and abnormal constituent of Semen analysis.

### **Equipment used in histopathology, their merits and demerits and care to be taken:**

- a. Tissue processor
  - b. Microtome
  - c. Knife sharpener
  - d. Automatic slide strainer
  - e. Knives
  - f. Freezing microtome cryostat
  - g. Hot plate
  - h. Water bath
4. Decalcification-method, advantage and disadvantage of each method.
5. Frozen section and Cryostat techniques, staining and mounting technique morbid anatomy
6. Tissue processing-fixation Dehydrate, clearing impregnation in paraffin. Making of paraffin block and section cutting errors in section cutting and there correction.
7. Preparation of different types special stains. Histo-chemical and Cyto-chemical techniques Immune Cytochemical staining.

### **Practical**

- Organisation of Histology Laboratory
- Histological equipments
- Reception and recording of tissue specimen
- Tissue processing and Microtomy including frozen
- Theory of staining
- Preparation and quality control of all routine and special stains used in istopathology
- All staining techniques and their interpretation
- Immunohistochemistry
- Molecular markers of malignant neoplasms
- Molecular techniques
- Immunofluorescent techniques
- Enzyme histochemistry
- Museum techniques
- Autopsy Techniques
- Automation in Histological Techniques
- Histopathology, Reception of specimens, Histopathology of Tumor cell
- Histopathology of Liver, Kidney, Adrenal, Ovary, Testies
- Method of preparing stains & Fixatives.
- Use of Microtome, Tissue section cutting
- Embedding and preparation of blocks
- Fixation of Tissue with DPX mount
- Reception and recording of tissue specimen
- Tissue processing and Microtomy including frozen
- Theory of staining
- Preparation and quality control of all routine and special stains used in Histopathology
- All staining techniques and their interpretation
- Immunohistochemistry
- Molecular markers of malignant neoplasms
- Molecular techniques
- Immunofluorescent techniques
- Enzyme histochemistry
- Museum techniques
- Autopsy Techniques
- Automation in Histological Techniques

### **Paper:- CYTOLOGY**

#### **Cytology**

Handling of fresh histological specimen (tissues) cryo/frozen sections of fresh and fixed tissues, freeze drying Lipids identification and demonstration Micro-organisms in tissues-various staining

technique for their demonstration and identification  
Nucleic acids, DNA and RNA special stains and procedures  
Cytoplasmic constituents and their demonstration.

Cervical cytology-basis of detection of malignant and premalignant lesions.

Hormonal assessment with cytologic techniques and sex chromatin and pregnancy test.

Cells and organs of immune system  
Immunoglobulins, antibodies and humoral immune response

Allergy  
Rheumatologic diseases and investigations.

Tissues requiring special treatment i.e. eye ball  
Bone marrow biopsy under calcified bones.

Neuropathology techniques  
Enzyme histochemistry demonstrations of phosphatases dehydrogenases oxidases and peroxidases etc.

Electron microscope working principles components and allied techniques for electron microscopy  
ultra-microtomy  
Museum techniques  
Aspiration cytology principles indications and utility of the techniques with special emphasis on role of cytotechnician in FNAC clinics  
Infection and immune system  
Cancer Immunology

Tissue typing for kidney transplant

### **Practical cytology**

- Morphology and Physiology of cell
- Cytology of
  - Female genital Tract
  - Urinary Tract
  - Gastrointestinal Tract
  - Respiratory Tract
  - Effusions
  - Miscellaneous Fluids
- Collection, Preservation, Fixation and Processing of various Cytological Specimen
- Preparation and Quality control of various stains and reagents used in cytology
- All routine and special Staining techniques in cytology
- FNAC
- Immunocytochemistry
- Automation in Cytology

### **Dissertation**

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☒ **Viva- voce:** -

**SANTOSH DEEMED TO BE UNIVERSITY**

**PRATAP VIHAR, GHAZIABAD, UP**

**MASTER OF SCIENCE IN CLINICAL PSYCHOLOGY**

**PROPOSED GUIDELINE & SYLLABUS**

**EFFECTIVE FROM AUGUST (2021)**

**SESSION 2021-2022**

**DURATION – 2 YEARS**



**DEPARTMENT OF PSYCHIATRY**

**SANTOSH MEDICAL COLLEGE HOSPITALS**

**NO.-1, AMBEDKAR ROAD, GHAZIBAD, UP.**

The Yearly Theory Examination Papers in 4 Sections containing 20 Marks of each section which should cover complete Syllabus viz:

- I. Short Notes - 4 x 5 Marks = 20 Marks
- II. Long Notes - 2 x 10 Marks = 20 Marks  
(Problem Based)
- III. Long Question - 1 x 20 Marks = 20 Marks
- IV. MCQs - 20 x 1 Mark = 20 Marks

<b>Total Theory</b>	<b>80 Marks</b>
<b>Internal Assessment</b>	<b>20 Marks</b>
<b>Viva</b>	<b>20 Marks</b>
<b>Practical Internal</b>	<b>20 Marks</b>
<b>University Practical</b>	<b>60 Marks</b>
<hr/>	
<b>Total</b>	<b>200 Marks</b>

Total Marks for each paper is proposed to be 200 Marks Maximum and a student shall be declared to have passed if he/she has secured more than 50 % in Theory Components including viva and 50 % in Practical components.

**SANTOSH DEEMED TO BE UNIVERSITY, GHAZIABAD, DELHI NCR  
PROPOSAL FOR FOLLOWING UNIQUE PATTERN FOR THE NEW COURSE INTRODUCED**

S.No	Course	Year	No. of Papers	Internal Assessment weightage / Marks (Per Paper)	University Theory Marks (Per paper)	Viva	Practical Internal	Practical University	Other Remarks
1.	B.Optom	1 <sup>st</sup>	5	20	80	20	20	60	It is proposed that each paper will be assessed for 200 Marks including internal assessment and Internal Practical
		2 <sup>nd</sup>	5	20	80	20	20	60	
		3 <sup>rd</sup>	5	20	80	20	20	60	
2.	B.Sc. Clinical Nutrition & Dietetics	1 <sup>st</sup>	5	20	80	20	20	60	
		2 <sup>nd</sup>	5	20	80	20	20	60	
		3 <sup>rd</sup>	5	20	80	20	20	60	
3.	M.Sc. Clinical Psychology	1 <sup>st</sup>	4	20	80	20	20	60	
		2 <sup>nd</sup>	4	20	80	20	20	60	

S.No	Course	Year	No. of Papers	Internal Assessment weightage / Marks (Per Paper)	University Theory Marks (Per paper)	Viva	Practical Internal	Practical University	Other Remarks
4.	M.Sc. Trauma and Critical Care	1 <sup>st</sup>	4	20	80	20	20	60	It is proposed that each paper will be assessed for 200 Marks including internal assessment and Internal Practical
		2 <sup>nd</sup>	4	20	80	20	20	60	
5.	M.Sc. Medical Imaging Technology	1 <sup>st</sup>	4	20	80	20	20	60	
		2 <sup>nd</sup>	4	20	80	20	20	60	
6.	M.H.A	1 <sup>st</sup>	4	20	80	20	20	60	
		2 <sup>nd</sup>	4	20	80	20	20	60	
7.	M.Sc. Medical Lab Technology	1 <sup>st</sup>	4	20	80	20	20	60	
		2 <sup>nd</sup>	4	20	80	20	20	60	
8.	M.S.W. Community Medicine	1 <sup>st</sup>	4	20	80	20	20	60	
		2 <sup>nd</sup>	4	20	80	20	20	60	

S.No	Course	Year	No. of Papers	Internal Assessment weightage / Marks (Per Paper)	University Theory Marks (Per paper)	Viva	Practical Internal	Practical University	Other Remarks
9.	M.Sc. Sports Medicine and Exercise Sciences	1 <sup>st</sup>	4	20	80	20	20	60	It is proposed that each paper will be assessed for 200 Marks including internal assessment and Internal Practical
		2 <sup>nd</sup>	4	20	80	20	20	60	

## **RESTRUCTURED SYLLABUS-MSc- CLINICAL PSYCHOLOGY**

This is two (2) years PG course, comprises of eight (8) papers

MSc-1<sup>ST</sup> yr. There will be four (4) papers & in 2<sup>nd</sup> yr. again there will be four papers.

Each paper will consist of two sections (A & B). Each section will comprise of 50 marks therefore as a whole each paper will be of 100 marks.

Structuring is as follows:

<b>SNO</b>	<b>PAPERS-FIRST YR</b>	<b>MARKS</b>	<b>SNO</b>	<b>PAPERS-SECOND YR</b>	<b>MARKS</b>
1.	Applied Psychology (Abnormal Psychology, Clinical Psychology, Cognitive Psychology & Neuropsychology)	100	5.	Psychotherapy & Educational Psychology & (Slow Learning & Learning Disability)	100
2.	Bio- Psycho-Social Perspective of Behaviour & Personality Orientation	100	6.	Community Psychology	100
3.	Life Span & Development of Behaviour & Social Psychology (Advanced)	100	7.	Mental Health Healing Practices, Rehabilitation & Stress Management	100
4.	Research Methodology & Statistics	100	8.	Elective Paper (any one) A. Clinical Psychology B. Counselling Psychology C. Industrial/ Organisational Behaviour	100 (Internal)

**DETAILS OF EACH PAPER ARE AS UNDER:**

COURSE	FIRST YEAR	T	P	C/ Pr /A
PAPER-1	<b>APPLIED PSYCHOLOGY (ABNORMAL PSYCHOLOGY, CLINICAL PSYCHOLOGY, COGNITIVE PSYCHOLOGY &amp; NEUROPSYCHOLOGY) &amp; PSYCHOPATHOLOGY (100 HRS) (100 MARKS)</b>			
	<b><u>SECTION-A (50 HRS) (50 MARKS)</u></b>			
UNIT I	<b>BACKGROUND:</b> Defining Psychology, Origin, Nature, Scope & Its Application,			
Unit II	<b>KEY CONCEPTS:</b> Attention, Perception, Learning, Memory, Intelligence, Thinking, Emotions & Motivation.			
UNIT III	<b>EXCECUTIVE FUNCTIONING:</b> Orientation & Application in Clinical Practices		1	
UNIT IV	<b>ABNORMAL PSYCHOLOGY, CLINICAL PSYCHOLOGY &amp; COGNITIVE PSYCHOLOGY-</b> <ul style="list-style-type: none"> <li>• Different Approaches</li> <li>• Different Assessment.</li> <li>• Role of clinical psychologist</li> <li>• Courses &amp; Job opportunities</li> </ul>			A
UNIT V	<b>NEURO-PSYCHOLOGY &amp; NEURO-PSYCHOLOGICAL REHABILITATION:</b> <ol style="list-style-type: none"> <li>a. Conceptual orientation, assessment &amp; diagnosis</li> <li>b. Neuro psychological rehabilitation in following condition: Head injury trauma (chronic)</li> </ol> Psychological disorder in neuro-psychological rehabilitation & neuro-biofeedback.		1	C
	<b><u>SECTION- B-(50 HRS) (50 MARKS)</u></b>			
	<b>PSYCHOPATHOLOGY</b>			

UNIT VI	<b>PSYCHOPATHOLOGY:</b> 1. a. Classification & Theoretical Model a) Approaches in Psychopathology b) Psychodynamic & Phenomenological Approach, c) Descriptive approach d) Interruptive approach e) Experimental approach 1. Definition of Mental Health Disorder 2. Sign & symptoms of various psychological disorders 3. System Of Classification (ICD-10, DSM-V) 4. Approaches to clinical case formulation, principal & provisional diagnosis based on classification system (ICD-10 & DSM-V)	1		2C
UNIT VII	<b>PSYCHOPATHOLOGY &amp; NEURO-COGNITIVE DISORDER:</b> characteristics, Sign & symptoms & etiology: a. Dementia b. Delirium c. Head injury d. Epilepsy Amnesia			2C
UNIT VIII	<b>PSYCHOPATHOLOGY &amp; BEHAVIOURAL DISORDER DUE TO PSYCHO-ACTIVE SUBSTANCE USE:</b> Alcohol, opioid, cannabinoids, cocaine, stimulants, hallucinogens, tobacco, volatile, solvents & multiple drug use.			
UNIT IX	<b>PSYCHOPATHOLOGY OF THOUGHT DISORDER:</b> Schizophrenia, schizotypal & delusional disorder			
UNIT X	<b>MOOD &amp; AFFECTIVE DISORDER</b>			
UNIT XI	<b>PSYCHOPATHOLOGY OF NEUROTIC, STRESS-RELATED AND SOMATOFORM DISORDERS:</b>			
UNIT XII	<ul style="list-style-type: none"> <li>• Personality disorder</li> <li>• Mental retardation, Slow learning &amp; Childhood disorder</li> <li>• ADD, ADHD, Conduct Disorder</li> </ul>			

**HELP READING:**

**FOR SECTION-A**

**Text Books:**

1. Baron, R.A. (2004). *Psychology*, 5th ed. New Delhi: Pearson education
2. Morgan, C.T., King, R.A., Weisz, J.R., & Schopler, J. (1993). *Introduction to Psychology*, 7<sup>th</sup> ed. New Delhi: Tata McGraw Hill.

**Reference Book**

1. Bootzin, R., & Bower, G.H. (1991). *Psychology today- An Introduction*. 7th ed. New York: Mc Graw Hill Inc.
2. Coon, D. (1983). *Introduction to Psychology: Exploration and Application*. New York: West Publishing Co.
3. Feldman, R. (2011). *Understanding Psychology*, 10th edition. New Delhi: Tata McGraw Hi
4. Santrock, J.W. (2006). *Psychology Essentials (Updated 2<sup>nd</sup> ed.)*. New Delhi: Tata McGraw Hill.
5. Coon, D., & Mitterer, J.O. (2007). *Introduction to Psychology (11<sup>th</sup> ed.)*. New Delhi: Cengage Learning India Pvt Ltd.
6. Synder. C.R., Lopez, S. J., & Pedrotti, J.T. (2011) *Positive Psychology – The scientific and practical explorations of human strengths (2<sup>nd</sup> Ed)*. New Delhi: Sage Publications.
7. Baumgardner, S.R., & Crothers, M.K. (2015). *Positive Psychology*. New Delhi. Dorling Kindersley (India) Pvt Ltd

## **FOR SECTION B**

### **Text Books:**

1. Blaney, PH, Krueger RF & Million T. (2015). *Oxford Textbook of Psychopathology*, III Ed. London: Oxford University Press.
2. Sarason, I.G., & Sarason, B.R., (2005) *Abnormal Psychology- The problem of Maladaptive behavior*. India: Dorling Kindersly.
3. Colman                      *Abnormal psychology*
4. Page                              *Abnormal Psychology*

### **Reference Books:.**

1. ICD-10                      *International Classification of Disorders: WHO*
2. Fish                              *Psychopathology*
3. Casey p & Kelly B (2007). *Fish's Clinical Psychopathology- Signs and Symptoms in Psychiatry*, III Ed. Gaskell.
4. Sadock, B.J., & Sadock, V.A. (2007) (2003). *Kaplan & Sadock's Synopsis of psychiatry: Behavioural sciences/clinical psychiatry (9th. Ed.)*. Philadelphia: Lippincott Williams & Wilkins.
5. Ahuja N (2002). *A short text book of Psychiatry (5th edition)*. New Delhi. Jaypee Brothers.
6. Hecker, S.E. & Thorpe, G.L. (2005). *Introduction to clinical psychology: Science, practice & ethics*. Delhi: Pearson Education, Inc.
7. *Diagnostic and Statistical Manual of Mental Disorders: DSM-5*. Arlington, VA: American Psychiatric Publishing, 2013.

8. Barlow, D. H., & Durand, V.M. (2015). Abnormal Psychology. An Integrative Approach. 7<sup>th</sup> edition. New Delhi. Cengage Learning India Private Ltd.
9. Nolen-Hoeksema, S. (2017) Abnormal Psychology. 7<sup>th</sup> Edition. New York. McGraw Hill
10. Butcher, J.N., Hooley, J.M., & Mineka, S. (2013). Abnormal Psychology. 16<sup>th</sup> Edition. Upper Saddle River. Pearson Education Inc.
11. American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.).

COURSE	FIRST YEAR	T	P	C/P/ A
PAPER-2	<b>BIO- PSYCHO-SOCIAL PERSPECTIVE OF BEHAVIOR &amp; PERSONALITY ORIENTATION (100 HRS) (100 MARKS)</b>			
	<b>SECTION A (50 HOURS) (50 MARKS)</b>			
	<b>BIO- PSYCHO-SOCIAL PERSPECTIVE OF BEHAVIOR</b>			
UNIT I	Bio-psychosocial basis of behaviour in terms of aetiology (predisposing, precipitating & perpetuating factors in combination) (Heredity & Constitutional Factors)			
UNIT II	<b>ANATOMY AND FUNCTIONAL STATUS OF NERVOUS SYSTEM:</b> <ol style="list-style-type: none"> <li>a. Structure of neuron, Types of neurons, Functions of neurons, Synapse &amp; Neuronal Conduction.</li> <li>b. Synaptic conduction &amp; neurotransmitters</li> <li>c. Brain Lobes: frontal, temporal, &amp; occipital.</li> <li>d. Brain: forebrain, midbrain, hindbrain, cerebellum, Cerebra &amp; Cerebral cortex.</li> <li>e. Central nervous System: Brain &amp; Spinal Cord.</li> <li>f. Peripheral Nervous System: Somatic Nervous System &amp; autonomic Nervous System, Sympathetic Nervous System &amp; Parasympathetic Nervous System.</li> <li>g. Endocrine Nervous System.</li> </ol>			
UNIT III	<b>ATTENTION:</b> <ol style="list-style-type: none"> <li>a. Sensation &amp; Threshold</li> <li>b. Vigilance, distraction, fluctuation, common sensical errors &amp; effect of anxiety &amp; attention.</li> <li>c. Perception: perception &amp; its relation with sensation &amp; attention.</li> <li>d. Synaesthesia, Subliminal perception. Perceptual constancy &amp; the dimensional perception.</li> <li>e. Perception: depth, time, visual and auditory Perception.</li> <li>f. Haptic Perception (touch).</li> </ol>			2C

	g. Subliminal perception. Agnosia.			
UNIT IV	A. <b>PSYCHOLOGICAL PERSPECTIVE-</b> Personality, Parenting & Development, Adjustment & Stress B. <b>SOCIAL PERSPECTIVE-</b> family, neighbour, school & other environmental variables		2	
UNIT V	<b>META-COGNITION:</b> a. Concept of meta-cognition. b. Meta-cognition & learning difficulties issues in meta-cognition. c. Individual differences in meta-cognition.			
	<b>SECTION B (50 HOURS) (50 MARKS)</b>			
	<b>PERSONALITY ORIENTATION</b>			
UNIT VI	a. Introduction b. Definition of personality c. Personality & self –the difference Relevance of personality in clinical psychology.			
UNIT VII	<b>DYNAMIC THEORIES OF PERSONALITY:</b> a. Sigmund Freud b. Alfred Adler c. Caren Henry d. Eric fromm			
UNIT VIII	<b>TRAITS (DISPOSITIONAL) &amp; DIMENSIONAL APPROACHES OF PERSONALITY:</b> a. Allport b. Eysenck c. Cattell R.B d. McCrae and Costa e. Single trait approach (Type-A, Type-B, Type-c, Type-D etc.)			
UNIT IX	<b>BEHAVIOURAL APPROCHES TO PERSONALITY</b> a. Pavlov b. Skinner c. Mowrer d. Hull			
UNIT X	<b>HUMANISTIC /EXISTENTIAL</b> a. Carl Rogers b. Abraham Maslow c. May Frankel			
UNIT XI	<b>OTHER THEORIES IN PERSONAL CONTRACT</b> a. Gestalt Theory b. Personal Construct Theory			
UNIT XII	<b>ASSESSMENT OF PERSONALITY</b> a. Conscious (rating scale, inventories, questionnaire & schedule) b. Unconscious (Projective tests methods of assessment)		2 + 2	

**FOR SECTION A**

## **HELP READINGS:**

1. Schneider M Alles (1990). An introduction to Physiological Psychology (3rd Edition) USA: Random House.
2. Walsh K. (2008). Neuropsychology. New Delhi: B.I. Churchill Livingstone Pvt. Ltd
3. Golden, C.J. & Charles, C.T. (1981). Diagnosis & Rehabilitation in clinical neuropsychology. New York: Spring Field.

### **Reference Books**

1. Kolb, B. & Whishaw, I.Q. (2007). Fundamentals of human neuropsychology (6th ed). New York: Worth Publishers.
2. Kandel, E.R. Schwartz, J.H. & Jessel, T.M. (2000). Principles of neural science (4th.ed.). New York: McGraw-Hill.
3. Leukel, F. (1985). Introduction to physiological psychology (3rd.ed.). New Delhi: CPS Publishers.
4. Kalat, J.W. (2013). Biological Psychology. 11<sup>th</sup> edition. Cengage Learning.

## **FOR SECTION B**

### **HELP READING:**

#### **Text Books:**

1. Schultz D. P. & Schultz S. E(2017), Theories of Personality (10<sup>th</sup> Edn). Wadsworth Cengage Learning.
2. Hall, C. S., Lindzey, G., & Campbell, J. B. (1998). *Theories of personality*. New York: J. Wiley & Sons.

#### **Reference Books:**

1. Pervin, Oliver P. John - (1999 ) *Handbook of Personality: Theory and Research*, Guilford Press.
2. Allen (1997 ) *Personality Theories, Development, Growth & Diversity*. 2nd edition. Allyn& Bacon
3. Friedman (2003) *Personality: Classic Theories and Modern Research*. 2nd Edition: Pearson Education.
4. Freeman, F.S.(1971). *Theory and Practice of Psychological Testing* (3rd ed.).New Delhi: Oxford and IBH publishing Co.

5. Ewen, R.B. (2010) *An Introduction to theories of personality*. 7<sup>th</sup> edition. USA Taylor & Francis group
6. Schultz, D.P. & Schultz, S .E. (2005). *Theories of personality*. 8<sup>th</sup> edition. New Delhi: Cengage Learning India Private Ltd.

COURSE	FIRST YEAR			
PAPER-3	<b>LIFE SPAN &amp; DEVELOPMENT OF BEHAVIOUR &amp; SOCIAL PSYCHOLOGY (ADVANCED) (100 HRS) (100 MARKS)</b>			
UNIT	TOPICS	T	P	C/Pr/A
	<b>SECTION-A (50 HRS) (50 MARKS)</b>			
	<b>LIFE SPAN &amp; DEVELOPMENT OF BEHAVIOUR</b>			
UNIT I	<b>CHILD DEVELOPMENT:</b> a. Introduction b. Concept of development c. Growth & development; d. prenatal development e. Infantile developmental stage f. Early, middle and late childhood g. Adolescent h. Young & late adulthood i. Old age.			
UNIT II	<b>FIELDS OF HUMAN GROWTH &amp; DEVELOPMENT:</b> a. Sensory development b. Motor development c. Adaptive development d. Social development e. Cognitive development f. Communication development. g. Methods of studying behaviour barriers of psychology.		1	1
UNIT III	<b>THEORIES OF HUMAN DEVELOPMENT:</b> a. Arnold Gesell's Theory of development b. Jean Piaget theory of development c. Sigmund Freud theory of development d. Erick-Erickson theory of development e. Vygotsky theory of development f. Maline Clinin's theory of development.			
UNIT IV	<b>1. ETIOLOGICAL BASIS OF DEVELOPMENTAL DISORDERS:</b> a. Genetic b. Psychological & social c. Miscellaneous			
UNIT V	<b>TYPES OF DEVELOPMENTAL DISORDERS:</b> a. Sensory. b. Motor/neurological c. Communication d. Cognitive e. Temperamental & behavioural f. Social g. Emotional		2	
UNIT VI	<b>ASSESSMENT OF DEVELOPMENTAL DISORDERS:</b> a. Motor & sensory b. Speech & language		2	

	<ul style="list-style-type: none"> <li>c. Cognitive</li> <li>d. Social &amp; emotional</li> <li>e. Adaptive</li> <li>f. Cultural aspects in development- family</li> <li>g. Development of child and adolescent in Indian Context, Physical, Emotional, Social &amp; moral.</li> </ul>			
	<b>SECTION B</b>			
	<b>SOCIAL PSYCHOLOGY (ADVANCED) (50 HRS) (50 MARKS)</b>			
UNIT I	<ul style="list-style-type: none"> <li>a. Introduction</li> <li>b. Social psychology in medical settings</li> <li>c. Bio-psycho-social methods of diseases</li> <li>d. Importance of psychologists patient relationship in brings about change</li> <li>e. Does or don't s in communication</li> <li>f. Social climate in medical institution set up.</li> </ul>			
UNIT II	<b>SOCIAL ANATOMY /Social PHYSIOLOGY/SOCIAL BIOCHEMISTRY/SOCIAL PATHOLOGY:</b> <ul style="list-style-type: none"> <li>a. Social disorganization</li> <li>b. Crime &amp; delinquency</li> <li>c. Suicide &amp; Exide</li> <li>d. Probability &amp; unemployment</li> <li>h. Dowry/ gambling/ and robbery.</li> </ul>			A
UNIT III	<b>FACTORS THAT INFLUENCE PERSON'S PERCEPTION:</b> <ul style="list-style-type: none"> <li>a. Influence of person's perception &amp; inter personal relation</li> <li>b. Positive &amp; negative perception</li> <li>c. Helios effect –positive &amp; negative helio effect</li> <li>d. Fundamental attribution errors.</li> </ul>			
UNIT IV	<b>ATTITUDE &amp; MEASUREMENT:</b> <ul style="list-style-type: none"> <li>a. Introduction</li> <li>b. Attitude theories</li> <li>c. Factors influencing attitude formation</li> <li>d. Strategies to bring about attitude change.</li> </ul> Stereotype & prejudice Measurement of attitude		1	
UNIT V	<b>STIGMA IN THE FIELD OF MENTAL HEALTH:</b> <ul style="list-style-type: none"> <li>a. Introduction</li> <li>b. Definition of stigma</li> <li>c. Factors influencing attitude formation in relation to stigma.</li> <li>d. Stigma &amp; various medical condition for example: Tuber chlorosis, leprosy, cancer &amp; AIDS.</li> <li>e. Stigma in order to mental disorders in order to alcohol &amp; drug Abuse with special reference to socio-cultural factors.</li> <li>f. Capabilities required to deal with stigma.</li> <li>g. Relevance to social change to root out stigma.</li> </ul>			Pr
UNIT VI	<b>GROUP &amp; LEADERSHIP</b> <ul style="list-style-type: none"> <li>a. Introduction about group &amp; leadership.</li> </ul>			

	<ul style="list-style-type: none"> <li>b. Group dynamic</li> <li>c. Style &amp; leadership</li> <li>d. Relevance of group &amp; medical condition of social psychology.</li> <li>e. How to form a group</li> <li>f. Formation of leader</li> <li>g. How to form a support group in order to deal with cancer, tuber chlorosis, &amp; AIDS.</li> <li>h. How to form a support group in order to mental disorders in order to alcohol &amp; drug Abuse with special reference to socio-cultural factors.</li> <li>h. How to run a group effectively.</li> </ul>			
UNIT VII	<p><b>WHAT IS HEALTH EDUCATION:</b></p> <ul style="list-style-type: none"> <li>a. Introduction.</li> <li>b. Concept of health &amp; hygiene (biological, psychological &amp; sociological).</li> <li>c. Who provide health education?</li> <li>d. Health &amp; pandemic psychology.</li> </ul> <p>Practice of health education- health protection, health promotion &amp; health prevention.</p>			
UNIT VIII	<p><b>SOCIAL INTERACTION</b></p> <ul style="list-style-type: none"> <li>a. Social adjustment or adaptation.</li> <li>b. Social motives &amp; ethics</li> </ul>			

**HELP READING:**

**Text Books:**

1. Hurlock, E. B. (2001). *Developmental psychology*. Tata McGraw-Hill Education
2. Papalia, D. E., Olds, S. W., & Feldman, R. D. (2007). *Human development*. McGraw-Hill.

**Reference Books:**

1. Hoffman, L. N. W., Hoffman, L., Paris, S. G., & Hall, E. (1994). *Developmental psychology today*. McGraw-Hill College.
2. Papalia, D. E., Gross, D. L., & Feldman, R. D. (2003). *Child development: A topical approach*. McGraw-Hill Humanities, Social Sciences & World Languages.
3. Miller, P. H. (2002). *Theories of developmental psychology*. Macmillan.
4. Stricker, G. (1982). *Handbook of developmental psychology*. Prentice Hall.
5. Willem Doise, & Cornelis FM Van Lieshout. (1998). *Life-span developmental psychology*. John Wiley & Sons.
6. Papalia, D.E., Olds, S.W. & Feldman, R.D. (2009) *Human Development* (11th ed.) New York: Mcgraw- Hill

**FOR SECTION B**

## **HELP READING:**

### **Text Books:**

1. Baron, R. A., Bryne, D., & Branscombe, N. R. (2009). *Social Psychology*. 12th Ed. New Delhi: Pearson Education.
2. Shelly Taylor, *Social Psychology*, Pearson Education, 12<sup>th</sup> Edition, New Delhi, 2011.
3. Kool, V.K. & Agraval, R. (2006). *Applied Social Psychology*, New Delhi: Atlantic Publishers.
4. *Social Psychology*, Lindgren

### **Reference Books:**

1. Ann Cartwright (1964), *Human Relations and Hospital Care*, Routledge & K. Paul.
2. David Dickson, Owen Hargie, N. C. (Norman C.) Morrow (1997), *Communication Skills Training for Health Professionals*, Nelson Thornes.
3. Robin M. Kowalski, Mark R. Leary (Ed) (2004), *The Interface of Social and Clinical Psychology*, Psychology Press, UK.
4. Shirlynn Spacapan Oskamp (1988) *The Social Psychology of Health*, Sage Publications, India.
5. Myers, D.G. & Twenge, J.M. (2017). *Social Psychology*, International Student Edition. (12th edition). New York: McGraw – Hill Education.
6. Branscombe, N.R., Baron, R.A. & Kapur, P. (2017). *Social Psychology*. (14th edition). India: Pearson India Education Services Pvt Limited.

COURSE	FIRST YEAR	T	P	C/A
PAPER-4	<b>RESEARCH METHODOLOGY &amp; STATISTICS (100 HRS) (100 MARKS)</b>			
	<b>SECTION A</b>			
	<b>RESEARCH METHODOLOGY (50 HRS) (50 MARKS)</b>			
UNIT I	<b>Introduction</b> <ol style="list-style-type: none"> <li>a. What is research?</li> <li>b. Salient feature of scientific research.</li> <li>c. Concept of applied or basic research.</li> <li>1. Variables <ol style="list-style-type: none"> <li>a. Types of variables</li> <li>b. Controlling techniques of variables.</li> </ol> </li> <li>2. Quantitative &amp; qualitative research. <ol style="list-style-type: none"> <li>a. Problem hypothesis</li> <li>b. Development of quantitative &amp; qualitative research.</li> </ol> </li> <li>3. Types of research</li> <li>4. Purpose of research</li> <li>5. Data interpretation and report writing.</li> </ol>			1-A
UNIT II	<b>METHODS OF DATA COLLECTION:</b> <ol style="list-style-type: none"> <li>5. Observation <ol style="list-style-type: none"> <li>a. Types of observation <ol style="list-style-type: none"> <li>1. Participant Observation &amp; 2 Non-Participant Observation</li> </ol> </li> <li>b. Interviewing</li> <li>c. Questionnaire</li> <li>d. Schedule</li> <li>e. Content Analysis</li> </ol> </li> <li>2. Secondary source of data collection; <ol style="list-style-type: none"> <li>a. Design &amp; survey</li> </ol> </li> <li>3. What is measurement</li> <li>4. Scale of measurement</li> <li>5. Development of scale of measurement <ol style="list-style-type: none"> <li>I. Nominal, II. Ordinal, III. Interview &amp; IV. Ratio</li> </ol> </li> <li>6. Concept of developing the scale <ol style="list-style-type: none"> <li>a. Rating &amp; attributing scale</li> <li>b. Reliability &amp; validity of scale</li> <li>c. Sampling &amp; techniques</li> </ol> </li> <li>7. Probabilistic &amp; non-probabilistic samples <ol style="list-style-type: none"> <li>a. Precision in sampling</li> <li>b. Confidence &amp; determining the sample size</li> <li>c. Optimal sample size &amp; statistic software.</li> </ol> </li> </ol>			1-A
UNIT III	<b>EPIDEMIOLOGY:</b> <ol style="list-style-type: none"> <li>1. Introduction</li> <li>2. Epidemiological method</li> <li>3. Definition &amp; scope</li> <li>4. Health &amp; diseases</li> <li>5. Measures use in epidemiology</li> <li>6. Study design</li> <li>7. Biased epidemiology</li> </ol>			

	8. Relevance of epidemiology 9. Surveillance			
UNIT IV	<b>LABORATORY EXPERIMENTAL DESIGN:</b> a. Basic laboratory design b. Completely randomise design c. Randomise block design d. Latin square design in complete block design e. Cross over & factorial design			
	<b>SECTION-B – STATISTICS (50 HRS) (50 MARKS)</b>			
UNIT V	a. Introduction b. Role of bio-statistic in research c. Descriptive statistics research d. Random variables e. Expected value and variance f. Probability distribution g. Discrete & continuous h. Correlation & regression i. Partial & multiple correlation j. Multiple liner regression k. Logistic regression l. Passion regression			
UNIT VI	<b>STATISTICAL INFERENCES</b> a. Estimating & testing of hypothesis b. Types of error c. Power d. p-value e. Confidence interval f. t-test/ Z-test/ Anova Analysis/chi square & other non-parametric test g. Multivariate method- factor analysis, principal compound and partial least square. h. Cluster analysis- a- discernment analysis, canonical analysis (only application).			

### HELP READINGS:

#### Text Books:

Research Methodology

1. McBurney, DH: Research Methods, Thomson Asia Pvt. Ltd. Singapore, 2002.

2. Cooper DR and Schindler RS: Research Methods, Tata McGraw- Hill Publishing Company Limited, 2000

4. Kothari CR: Research Methods: Methods and Techniques New Age International Publishers- 2004

5. Ranjit Kumar Research Methodology: A step by Step Guide to Beginners. SAGE Publishers-2014.

**Reference Books:**

1. Danial WW, Biostatistics: A Foundation for Analysis of Health Sciences, John Wiley Publishers-2009
2. Kirkwood BR and Sterne JAC: Essentials of Medical Statistics , Blackwell Publishers,2003
3. Rosner B & Rosner R: Fundamentals of Biostatistics by. Cergage Learning Inc. 2010
4. Flick U. Introducing Research Methodology- A Beginners Guide to Doing a Project Sage Publishers, 2011.
5. Glantz SA: Primer of Biostatistics, McGraw Hill Publishers, 2011
6. Indrayan A: Medical Biostatistics, Chapman and Hall/CRC, 2012
7. Baldi B and Moore DS: The Practice of Statistics in Life Sciences, W.H. Freeman Publishers, 2014

## SECOND YEAR

COURSE	SECOND YEAR	T	P	C/Pr /A
PAPER-5	<b>COMMUNITY PSYCHOLOGY &amp; GERIATRIC PSYCHOLOGY (100 HRS &amp; 100 MARKS)</b>			
	<b>SECTION A (50 HRS) (50 MARKS)</b>			
UNIT I	<b>COMMUNITY PSYCHOLOGY</b>			
	<ul style="list-style-type: none"> <li>a. Introduction</li> <li>b. Definition, nature, scope of clinical Psychology</li> <li>c. Fields &amp; application of clinical psychology</li> </ul> History of community psychology			
UNIT II	<b>ECOLOGICAL HEALTH:</b> <ul style="list-style-type: none"> <li>a. Population</li> <li>b. Pollution</li> <li>c. Alienation</li> <li>d. Urbanization</li> </ul>			Pr
UNIT III	<b>PREVENTION, PROTECTION &amp; PROMOTION:</b> <ul style="list-style-type: none"> <li>a. Concept (prevention, protection &amp; promotion)</li> <li>b. Perspective</li> <li>c. Prevention-primary, secondary &amp; territory.</li> <li>d. Community based therapeutic programmes.</li> </ul>			Pr
UNIT IV	<b>MODELS:</b> <ul style="list-style-type: none"> <li>a. Behaviouristic model</li> <li>b. Mental health model</li> <li>c. Organizational model</li> <li>d. Social action model</li> <li>e. <b>Ecological model:</b> Noise, crowding, architectural factors, economic factors, in national social environment, Kelly's studies on coping in high stress environment. Social Cultural model</li> </ul>			
UNIT V	<ul style="list-style-type: none"> <li>• <b>EPIDEMIOLOGY:</b> <ul style="list-style-type: none"> <li>a. Prevalence</li> <li>b. Incidences</li> <li>c. Morbidity</li> <li>d. How epidemiology studies help in identifying possible causes</li> </ul> </li> </ul>			
UNIT VI	<b>COMMUNITY CARE OF MENTAL ILLNESS</b> <ul style="list-style-type: none"> <li>a. Drawbacks of long term institutional psychiatric care</li> <li>b. Deinstitutionalization of mental ill</li> <li>c. Advantages &amp; disadvantages of community care of the mentally ill</li> <li>d. Mental health movement</li> </ul>			Pr
UNIT VII	<b>PROMOTING COMMUNITY HEALTH:</b> <ul style="list-style-type: none"> <li>a. Issues related to poverty, minority status &amp; health.</li> <li>b. Early community identification programme.</li> <li>c. Promotion &amp; community Health by reducing environmental hazard.</li> </ul> Encouraging public participation information of public health policies.			Pr
	<b>SECTION B (50 HRS) (50 MARKS)</b>			

UNIT I	<b>GERIATRIC PSYCHOLOGY</b>			
	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Definition, nature, and scope of clinical psychology.</li> <li>• Development of geriatric psychology.</li> <li>• Relation between geriatric population and medical care.</li> <li>• Relevance of old age homes and geriatric care giver.</li> </ul>			
UNIT II	<b>ELDERLY PATIENTS:</b> <ul style="list-style-type: none"> <li>• How to interview the elderly patients.</li> <li>• Psychological development of elderly people.</li> <li>• Pre-retirement counselling &amp; generation of social support.</li> </ul>			C
UNIT III	<b>COGNITIVE IMPAIRMENT AND DISORDERS AMONG ELDERLY:</b> <ul style="list-style-type: none"> <li>• Generalized intellectual (delirium) impairment.</li> <li>• Memory disorder –dementia- <ul style="list-style-type: none"> <li>a. Types of dementia Alzheimer’s disorder.</li> </ul> </li> </ul>		1	
UNIT IV	<b>MENTAL DISORDERS AMONG ELDERLY</b> <ul style="list-style-type: none"> <li>• Depression</li> <li>• Suicidal behaviour</li> <li>• Psychotic disturbances.</li> </ul>		1	
UNIT V	<b>VARIOUS OTHERS GERIATRIC CONDITIONS:</b> <ul style="list-style-type: none"> <li>• Adjustment disorder</li> <li>• Sleep disorder</li> <li>• Sexuality &amp; sexual disorder.</li> </ul>			
UNIT VI	<b>GERIATRIC COUNSELLING:</b> <ul style="list-style-type: none"> <li>• Different stages</li> <li>• Relevance of religion &amp; spirituality.</li> </ul>			
UNIT VII	<b>ETHICAL ISSUES IN GERIATRIC PSYCHOLOGY:</b> <ul style="list-style-type: none"> <li>• Euthanasia</li> <li>• Elder abuse</li> <li>• Homeless elders etc.</li> </ul>			

### HELP READING:

#### SECTION A

#### Text Books:

1. Julian Rappaport and Edward Seidman (Eds), (2000). *Handbook of Community Psychology*, Springer Publications.

#### Reference Books:

1. Ann Cartwright (1964), *Human Relations and Hospital Care*, Routledge & K. Paul.
2. Gershen Rosenblum, American Psychological Association Task Force on Community Mental Health (1971), *Issues in Community Psychology and Preventive Mental Health*, Behavioral Publications.

3. T. Shanmugam “Community Psychology” Utsav Publishing Co.
4. Thomas, E., Kloos B., Hill J., Wandersman A., Elias M.J. & Dalton, J.H. (2012) Community Psychology: Linking Individuals and Communities, 3<sup>rd</sup> Edition. Wadsworth Publishing.

## **FOR SECTION B**

### **Text Books:**

1. Agronin. E & Maletta. *Principles and Practice of Geriatric Psychiatry*, (2<sup>nd</sup> Edition), Wolters Kluwer.
2. Chowdhry Paul D., *Aging and the Aged: A Source Book*, Inter India Pub., New Delhi, 1992

### **Reference Books:**

1. Developmental psychology- a life-span Approach – Elizabeth Hurlock
2. Primary on Geriatric Care- Editor D E Rosenblatt, V S Nadarajan
3. Bellak Leopold: Karasu Toksoz B., *Geriatric Psychiatry: A Handbook for Psychiatrists and Primary Care Physicians*, Grune & Stratton, New York, 1976.
4. Dandekar Kumudini – *Elderly in India*, Sage Publishing, New Delhi, 1996.
5. Desai K.G. *Aging in India*, Tata Institute of Social Sciences, Bombay, 1982
6. Nair T.K., *Community care of the Elderly: A Study of Family and Community based Services in Madras*, Ramana K.V. Visakhapatnam.

COURSE	SECOND YEAR	T	P	C/Pr / A
PAPER-6	<b>PSYCHOTHERAPY &amp; EDUCATIONAL PSYCHOLOGY (100 HOURS) (100 MARKS)</b>			
	SECTION A (50 HOURS)(50 MARKS)			
	<b>PSYCHOTHERAPY</b>			
UNIT I	<b>INTRODUCTION:</b> <ol style="list-style-type: none"> <li>Definition &amp; objectives of psychotherapy</li> <li>Types of psychotherapy: supportive, reductive, &amp; reconstructive &amp; insight oriented.</li> <li>Basic principles of psychotherapy.</li> <li>Indication &amp; contra Indication of psychotherapy.</li> <li>Ethical issues in psychotherapy.</li> </ol>			
UNIT II	<b>DEFERENT PHASES OF PSYCHOTHERAPY:</b> <ol style="list-style-type: none"> <li>Initial, middle &amp; terminal</li> <li>Factors influencing therapeutic relationship</li> <li>Relationship building techniques.</li> <li>Role of psychological assessment in psychotherapy.</li> <li>Characteristics of the effective therapist.</li> </ol>			
UNIT III	<b>APPROACHES TO PSYCHOTHERAPY:</b> <ol style="list-style-type: none"> <li>Psychodynamic approach</li> <li>Cognitive behavioural approach</li> <li>Gestalt approach</li> <li>Humanistic approach</li> <li>Existential approach</li> <li>Eclectic approach</li> </ol>			
UNIT IV	<b>FAMILY THERAPY:</b> <ol style="list-style-type: none"> <li>Types of family therapy &amp; marital therapy</li> <li>Family therapy for psychiatric disorder</li> </ol>			
UNIT V	<b>PSYCHOTHERAPY FOR SPECIFIC CONDITIONS</b> <ol style="list-style-type: none"> <li>Substance abuse disorder</li> <li>Sexual dysfunctions</li> <li>paraphilia's</li> <li>sexual abuse</li> <li>relaxation techniques</li> <li>Brief Psychotherapy</li> <li>Play therapy &amp; psychodrama</li> </ol>			
UNIT VI	<b>GROUP THERAPY:</b> <ol style="list-style-type: none"> <li>Advantages of group therapy</li> <li>Stages in group information</li> <li>Types of group therapy</li> <li>Role of therapist in group therapy and preventing scapegoating &amp; unhealthy influences.</li> </ol> Self-help group.			
UNIT VII	<b>TRANSFERENCE:</b> <ol style="list-style-type: none"> <li>Concept</li> <li>Interpreting transference</li> <li>Counter transference</li> <li>How to guard transference &amp; counter transference</li> </ol>			

	<p>e. Psychotherapeutic formulation  f. Manifestation of resistance  g. Methods of handling resistance.</p>			
	<b>SECTION B (50 HOURS) (50 MARKS)</b>			
	<b>EDUCATIONAL PSYCHOLOGY</b>			
UNIT I	<p><b>LEARNING DISABILITIES:</b></p> <p>a. Introduction: educational psychology, concept &amp; meaning of educational psychology  b. Similarities &amp; dissimilarities between educational psychology/general psychology/ school psychology  c. Nature /scope/aims/ &amp; objectives of educational psychology  d. Application &amp; limitation of educational psychology  e. <b>Recent trends contemporary psychology</b></p>		1	
UNIT II	<p><b>LEARNING DISORDERS</b></p> <p>a. Learning Difficulties &amp; Disorders  b. Nature &amp; Causes of Learning Disorders  Differences between above disorders</p>			C/Pr /A (An y one)
UNIT III	<p><b>TYPES OF LEARNING DISORDERS</b></p> <p>a. Reading  b. Writing  c. Arithmetical skills  d. Motor Skills  e. Speech &amp; Language  f. Information Processing Disorder  Other Disorder</p>		1+1	
UNIT IV	<p><b>PSYCHOLOGY OF GROWTH &amp; DEVELOPMENT</b>  with special reference to:</p> <p>a. physical development,  b. sensory-motor development,  c. cognitive &amp;  d. language development,  e. social, moral,  f. emotional development  g. Academic development:</p> <ul style="list-style-type: none"> <li>• Reading</li> <li>• Writing</li> <li>• Arithmetic</li> </ul>			
UNIT V	<p><b>EDUCATIONAL CHALLENGES AMONG CHILDREN WITH SPECIAL NEEDS</b></p> <p>a. Gifted Children  b. Slow learning  c. Mental Retardation  d. Remedial Teaching  e. Special Education</p>			

## **HELP READING:**

### **FOR SECTION A**

#### **Textbooks**

1. Sharf, R.S. (2000). Theories of psychotherapy and counselling: Concepts and cases (2nd Ed.). Singapore: Brooks/Cole.
2. Trull, T.J., & Phares, E.J. (2001). Clinical psychology: Concepts, methods, and profession (6th Ed.). Belmont, CA: Wadsworth/Thomson Learning
3. Nichols, P.M & Schwartz C.R (2006). *Family Therapy –concepts and methods*, 7<sup>th</sup> edition, Allyn and Bacon, Boston, Pearson education, Inc.

#### **Reference books**

1. Brems, C. (2000). Dealing with challenges in psychotherapy and counselling. Singapore: Brooks/Cole.
2. Brems, C. (2001). Basic skills in psychotherapy and counselling. Singapore: Brooks/Cole.
3. Corey, G. (1996). Theory and practice of counselling and psychotherapy (5th ed.). Pacific Grove, CA: Thomson-Brooks/Cole.
4. Dryden, W. (2007). Dryden's handbook of individual therapy. (5th ed). Sage Publications: New Delhi.
5. Palmer, S. (ed.). (1999). Introduction to counselling and psychotherapy: The essential guide. New Delhi: Sage.
6. Bieling, P.J., MacCabe, R.E., & Antony, M.M. (2006). Cognitive-Behavioural Therapy in Groups NY: Guilford Pub.
7. Miltenberger, R.G. (2012). Behaviour Modification: Principles and Procedures. 5<sup>th</sup> edition. Wadsworth Cengage Learning.
8. Beck, J.S. 2011. Cognitive Behavior Therapy: Basics and Beyond. 2<sup>nd</sup> edition. The Guilford Press, New York.
9. Simos, G. 2002. Cognitive Behavior Therapy: A Guide for the Practicing Clinician, Vol 1. Brunner-Routledge, London.
10. Anthony, J.(2003). Psychotherapies in counselling. Anugraha Publications
11. Simons, J. & Griffiths, R. (2010). CBT for beginners. California Sage
12. Stewart, J. (.2013). Transactional counseling in action. 4<sup>th</sup> edition, Windy Dryden
13. Greenberg, L. (2011) –Emotion focused therapy (Theories of psychotherapy series), Kindle edition.
14. Howie, P., Prasad, S., & Kristel, J. (2013). Using art therapy with diverse populations: Crossing cultures and abilities. London, UK: Jessica Kingsley Publishers.

<https://www.flipkart.com/search?q=art%20therapy%20with%20diverse%20populations&otracker=search&otracker1=search&marketplace=FLIPKART&as-show=off&as=off>

Gussak, D. E., & Rosal, M. L. (2016). *The Wiley handbook of art therapy*. Chichester, UK: John Wiley & Sons Kindle copy [https://www.amazon.com/Handbook-Therapy-Clinical-Psychology-Handbooks/dp/1118306597/ref=sr\\_1\\_3?s=books&ie=UTF8&qid=1551119492&sr=1-3&keywords=gussak](https://www.amazon.com/Handbook-Therapy-Clinical-Psychology-Handbooks/dp/1118306597/ref=sr_1_3?s=books&ie=UTF8&qid=1551119492&sr=1-3&keywords=gussak)

## FOR SECTION B

### **Text Books:**

1. O'Donnell, A.M., Reeve, J., & Smith, J.K. (2009). *Educational psychology*. Hoboken, NJ: John Wiley and Sons.
2. Jena, S. P. K. (2013). *Learning disability: Theory to practice*. SAGE Publications India.
3. Mangal, S. K. (2007). *Advanced Educational Psychology 2nd Edition* Published by Ghosh K.

### **Reference Books:**

1. Fetsco, T. G., & McClure, J. (2005). *Educational psychology: An integrated approach to classroom decisions*. Boston: Allyn & Bacon.
2. Walia, J. S. (1992). *Foundation of Educational Psychology*.
3. Allen K.E and Cowdery, G. E *Working with Children with Special Needs*. Online. Available at [http://www.sagepub.in/upm-data/23472\\_Willis\\_Chapter\\_1.pdf](http://www.sagepub.in/upm-data/23472_Willis_Chapter_1.pdf) (accessed 29 April 2015)
4. Brown, R.I. (2010). *Adult Education and Intellectual and Allied Developmental Disabilities*. In: JH Stone, M Blouin, editors. *International Encyclopedia of Rehabilitation*. Online: Available at <http://cirrie.buffalo.edu/encyclopedia/en/article/21/>. (accessed 9 March 2015)
5. UNESCO. (2009). *Teaching Children with Disabilities in Inclusive Settings*. Bangkok: UNESCO Bangkok. Online. Available at <http://unesdoc.unesco.org/images/0018/001829/182975e.pdf> (accessed 9 March 2015)
6. Smith, C, R (2004).5<sup>th</sup> ed. *Learning Disabilities. The interaction of students and their environments*. Pearson . Allyn and Bacon

COURSE	SECOND YEAR	T	P	C/Pr / A
PAPER-7	<b>INDIAN CONCEPT OF MENTAL HEALTH &amp; HEALING PRACTICES &amp; STRESS MANAGEMENT AND CRISIS INTERVENTION (100 HRS) (100 MARKS)</b>			
	<b>SECTION A (50 HRS) (50 MARKS)</b>			
	<b>INDIAN CONCEPT OF MENTAL HEALTH &amp; HEALING PRACTICES</b>			
UNIT I	Introduction. a. History of ancient psychology b. Evolution of psychology c. Scope & method of psychology d. Concept of consciousness.			
UNIT II	<b>SELF &amp; PERSONALITY</b> a. Upanishad views b. Geeta on self c. Buddha's doctrine of anatma d. The naya (vaishes) (various) e. Samkhya –yoga view, vimansa view, f. personality types –trigunas-(sattva, rajas, tamas)			
UNIT III	<b>COGNITIVE PROCESS</b> a. Memory-imagination-self b. Past experiences-recall & retention memory & feeling. c. Condition for retention, recall & recognition, & forgetfulness.			
UNIT IV	<b>LEARNING:</b> a. Introduction b. Scientists of ancient India c. Ideological perspectives d. Indian philosophy e. Requisites for learning f. History of economic thought g. Kautilya's Arthashastra h. Upanishad i. Thought & learning-Vedas (four kinds) j. Jurisprudence-meaning, importance & concept k. Indian perspective.			
UNIT V	<b>MOTIVATION:</b> a. Geeta on motives b. Distribution between non voluntary & voluntary action c. Behaviour of neonate: three kinds of action –Gautama's Nyayashastra-Rag, Dvesh, & Moha d. Feelings & emotions- e. Geeta on feeling f. Buddhism on feeling-naya- vaishes- hick g. Samkhya yoga h. Geeta patanjali & buddhist view on emotion.			
UNIT VI	<b>MENTAL HEALTH &amp; HEALING:</b> a. Introduction; body mind relationship according to tantras.			

	<ul style="list-style-type: none"> <li>b. Psychopathology &amp; psychotherapy</li> <li>c. Meditation</li> <li>d. Sex behaviour, religious behaviour, psycholinguistic &amp; aesthetic.</li> </ul>			
	<b>SECTION B (50 HRS) (50 MARKS)</b>			
	<b>STRESS MANAGEMENT AND CRISIS INTERVENTION</b>			
UNIT I	<b>STRESS:</b> concept, major sources of stress. <ul style="list-style-type: none"> <li>a. Biological aspects of stress</li> <li>b. Module of stress (GAS) by Hens selye</li> </ul> Relation between stress & illness			
UNIT II	<b>STRESS CONFLICT &amp; CONFLICT RESOLUTION:</b> <ul style="list-style-type: none"> <li>a. Conflict- concept, understanding about typical responses while dealing with stress</li> <li>b. Common styles of conflict</li> <li>c. Knowing about conflict resolution skills</li> </ul>			
UNIT III	<b>STRESS &amp; HANDLING BY SELF MANAGEMENT</b> <ul style="list-style-type: none"> <li>a. Concept of self-care</li> <li>b. How to practice self-care</li> <li>c. Importance of personal goals</li> <li>d. Challenges about how to avoid poor self-care.</li> <li>e. Awareness</li> <li>f. Developing resilience</li> <li>g. Stress &amp; relation between stress &amp; supportive relationship &amp; positive attitude</li> <li>h. Role of food and nutrition, exercise entertainment and the management of stress.</li> </ul>			
UNIT IV	<b>CRISIS</b> <ul style="list-style-type: none"> <li>a. Definition, emergency traumatic stressor</li> <li>b. Crisis intervention/emergency</li> <li>c. Historical perspective of crisis intervention</li> <li>d. Types of crises</li> </ul> Types of emergencies			
UNIT V	<b>TRUMA UNDERSTANDING:</b> <ul style="list-style-type: none"> <li>a. Factors responsible for trauma</li> <li>b. Adjustment &amp; coping with trauma</li> <li>c. Scope &amp; component of crisis event.</li> <li>d. Post-traumatic stress disorder (PTSD)</li> <li>e. Relation of trauma with health &amp; well-being.</li> </ul>			
UNIT VI	<b>PSYCHOLOGICAL BASIS OF TRAUMA &amp; CRISIS:</b> <ul style="list-style-type: none"> <li>a. Cognitive component</li> <li>b. Effective component</li> <li>c. Behavioural component</li> <li>d. Neurological component</li> <li>e. <b>Response related to trauma</b> <ul style="list-style-type: none"> <li>1. Emotional response, cognitive response, behavioural response, physical response.</li> </ul> </li> </ul> Ethical & professional understanding in crisis & trauma.			
UNIT VII	<b>INTERVENTION IN CRISIS:</b> <ul style="list-style-type: none"> <li>a. Crisis intervention: cultural competence, evidence-based intervention</li> <li>b. Focused intervention</li> </ul>			

	c. CBT based coping skills d. CBT based coping planning e. Narrative therapy f. Evaluation & management of following risks- suicide, violence, victimization. g. Eclectic approach & management.			
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**HELP READING:**

**Text Books**

1. Kuppuswamy, B. (1990). *Elements of ancient Indian Psychology*, 3rd ed.: Konark Publishers Pvt. Ltd. New Delhi

**Reference Books**

2. Raghunath Safaya (1975). *Indian Psychology*, Munshiram Manoharlal Publishers Pvt. Ltd. New Delhi
3. Kuppuswamy, B. (1993). *Source Book of Ancient India Psychology*, Konark Publishers Pvt. Ltd. New Delhi

**FOR SECTION B**

**Text Books:**

1. Folkman, S. (2010). *The Oxford handbook of stress, health, and coping*. Oxford University: Oxford.
2. James, R. K. (2012). *Crisis Intervention Strategies*. Belmont, CA: Brooks/Cole.
- Block, Stanley (2010).

**References:**

1. *Mind-Body Workbook for PTSD: A 10-Week Program for Healing After Trauma*. New Harbinger Publications: CA.
2. Briere, John & Scott, Catherine (2006). *Principles of Trauma Therapy: A Guide to Symptoms, Evaluation, and Treatment*. Sage Publications: CA.
3. Hoff, Lee Ann; Hallisey, Bonnie; Hoff, Miracle (2009). *People in Crisis: Clinical and Diversity Perspectives (6th Ed)*. Routledge: NY.

**PAPER-8 –OPTIONAL PAPER-STUDENTS WILL CHOOSE ANY ONE**

**A. CLINICAL PSYCHOLOGY**

**B. COUNSELLING PSYCHOLOGY**

**C. ORGANIZATIONAL BEHAVIOUR.**

**(ANY ONE)**

COURS E	SECOND YEAR	T	P	C/Pr /A
PAPER- 8A	A. <b><u>CLINICAL PSYCHOLOGY (ADVANCED)-(100HRS) (100 MARKS)</u></b>			
UNIT I	<b>ROLE OF CLINICAL PSYCHOLOGIST</b> a. Introduction b. Clinical psychology as a science, as a theoretical subject, as a clinical subject. c. Its purpose for understanding, preventing & relieving psychological based distress & dysfunction.			
UNIT II	<b>ASSESSMENT:</b> a. Scope of assessment in clinical psychology. b. Psychological testing & diagnosis of mental illness. c. Scope of clinical psychology in India.			
UNIT III	<b>COURSES IN CLINICAL PSYCHOLOGY</b> a. Courses in clinical psychology and how to become a clinical psychologist. b. Clinical psychology as a carrier reference. c. The role of clinical psychologist as a researcher/ trainer/ & educationalist.			Pr
UNIT IV	<b>JOB OPPORTUNITY IN CLINICAL PSYCHOLOGY:</b> a. Efficiencies of clinical psychologist b. Scope of clinical psychology a Broad c. The psychology dilemma: in India/ a Broad. d. Clinical psychology –private practice, school & organization.			

## HELP READING:

### Textbooks

1. Hecker, J.E., & Thorpe, G.L. (2005). Introduction to clinical psychology: Science, practice, and ethics (Low Price Edition). Delhi: Pearson Education.
2. Pomerantz, A.M. (2008). Clinical Psychology: Science, practice, and culture. Sage Publications: New Delhi

### Reference Books

1. Hersen, M., Kazdin, A.E., & Bellack, A.S. (eds.). (1991). The clinical psychology handbook (2nd ed.). New York: Pergamon Press.
2. Koocher, G.P., Norcross, J.C., & Hill III, S.S. (eds.). (1998). Psychologists' desk reference. Oxford: Oxford University Press.
3. Osborne, R.E., Lafuze, J., & Perkins, D.C. (2000). Case analysis for abnormal psychology: Learning to look beyond the symptoms. Philadelphia: Psychology Press.

COURSE	SECOND YEAR	T	P	C/Pr /A
PAPER-8B	<b><u>COUNSELLING PSYCHOLOGY-(100 HRS) (100 MARKS)</u></b>			
UNIT I	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• Definition of counselling &amp; guidance</li> <li>• Origin &amp; history</li> <li>• Aims &amp; objectives of counselling</li> <li>• Scope of counselling.</li> </ul>			
UNIT II	<b>APPROACHES OF COUNSELLING</b> <ul style="list-style-type: none"> <li>• Psychoanalytic &amp; Adlerian approach</li> <li>• Behavioural approach</li> <li>• Humanistic approach (client centered)</li> <li>• Existential &amp; Gestalt approach</li> <li>• Rational Emotive approach</li> <li>• Transracial approach.</li> </ul>			Pr
UNIT III	<b>PROCESS OF COUNSELLING</b> <ul style="list-style-type: none"> <li>• Counselling process.</li> <li>• Stapes in basic counselling skills (listening, responding, empathy sizing, paraphrasing silence, &amp; termination).</li> <li>• Stages of counselling.</li> <li>• Counselling process followed by counsellor</li> <li>• Developing &amp; working for client &amp; counsellor relationship.</li> <li>• How to prepare a client for counselling.</li> </ul>			
UNIT IV	<b>FACTORS INFLUENCING COUNSELLING PROCESS</b> <ul style="list-style-type: none"> <li>• Structure</li> <li>• Initiative</li> <li>• Settings</li> <li>• Client's qualities</li> <li>• Counsellor's qualities</li> </ul>			
UNIT V	<b>COUNSELLOR/ COUNSELEE'S CHARECTERSTICS</b> <ul style="list-style-type: none"> <li>• Client qualities</li> <li>• Counsellor qualities</li> <li>• Personality characteristics</li> <li>• Attitude &amp; belief of counsellor</li> <li>• Emotional behaviour &amp; attitudinal dispositional of referred hostile, counselee, &amp; those who come on their own.</li> </ul>			
UNIT VI	<b>COUNSELLING IN MEDICAL SETTINGS</b> <ul style="list-style-type: none"> <li>• Substance abuse counselling</li> <li>• Counselling the terminally ill</li> <li>• HIV/AIDS counselling</li> </ul>			Pr

UNIT VII	<b>ETHICS &amp; COUNSELLING</b> <ul style="list-style-type: none"> <li>• What are ethics?</li> <li>• Ethical principal of counselling</li> <li>• Main ethics: <ul style="list-style-type: none"> <li>a. Counselling relationship</li> <li>b. Confidentiality</li> <li>c. Professional responsibility</li> <li>d. Relationship with other professionals</li> <li>e. Evaluation &amp; interpretation</li> <li>f. Supervision &amp; teaching strategies.</li> <li>g. Research &amp; publication</li> <li>h. Resolving ethical issues.</li> </ul> </li> </ul>			
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**HELP READING:**

**Text Books:**

1. Blocher, DH; (1966) *Developmental Counseling*, New York, The Ronald Press.
2. Narayana Rao, (1991) *Counseling and Guidance*, Tata McGraw Hill Publishing Company.

**References**

1. Carkuff, RR, and B.G. Bernson: (1974) *Beyond counseling and Psychotherapy*, New York, Holt, Rinchart and Winston.
2. Fruster, J.M.: *Psychological Counseling in India*, Mumbai McMillan.
3. Paterson: (1989) *Theories of Counseling and Psychotherapy*, Harper.

COURSE	SECOND YEAR	T	P	C/Pr/A
PAPER-8C	<b><u>ORGANIZATIONAL/INDUSTRIAL PSYCHOLOGY-100 HRS (100 MARKS)</u></b>			
UNIT I	<ul style="list-style-type: none"> <li>• What is an organisation?</li> <li>• What is an organisational psychology?</li> <li>• Organisational Psychology &amp; behaviour</li> </ul>			
UNIT II	<b>KEY FEATURES OF ORGANIZATION</b> <ul style="list-style-type: none"> <li>• Organization as machine</li> <li>• Organization as brains</li> <li>• Organization as cultures</li> <li>• Organization as political system</li> <li>• Organization as prisons.</li> <li>• Cluck &amp; transformation.</li> <li>• Instrument of domination.</li> </ul>			1-Pr
UNIT III	<b>SCOPE OF ORGANIZATION PSYCHOLOGY</b> <ul style="list-style-type: none"> <li>• Work motivation</li> <li>• Job satisfaction in organization</li> <li>• Commitment &amp; justice</li> <li>• Leadership</li> <li>• Group behaviour</li> <li>• Work stress</li> <li>• Organizational culture &amp; behaviour</li> <li>• Productive &amp; counterproductive behaviour</li> <li>• Work-life balance</li> <li>• Organizational behaviour- level of study of organisational behaviour</li> <li>• a. levels of analysis-individual &amp; organization</li> </ul>			Case study
UNIT IV	<b>GOALS OF ORGANIZATIONAL BEHAVIOUR</b> <ul style="list-style-type: none"> <li>• Description</li> <li>• Understanding</li> <li>• Prediction</li> <li>• Control</li> </ul>			Case study
UNIT V	<b>CHARACTERSIC FIELDS OF ORGANIZATIONAL BEHAVIOUR</b> <ol style="list-style-type: none"> <li>a. Betterment of human resources</li> <li>b. Contingency approach</li> <li>c. Multidisciplinary focus</li> <li>d. Organization as open system</li> <li>e. Organizational behaviour &amp; cross-cultural Approach</li> </ol>			
UNIT VI	<b>ORGANIZATION BEHAVIOUR IN THE INDIAN CONTENT</b> <ol style="list-style-type: none"> <li>a. Replication</li> <li>b. Disenchant</li> </ol>			

	<ul style="list-style-type: none"> <li>c. Importance</li> <li>d. Nature of people-individual differences</li> <li>e. People as a whole</li> <li>f. Motivated behaviour</li> <li>g. Value of the person (human dignity)</li> <li>h. Nature of organization-social system, psychological system</li> <li>i. Types of organization</li> </ul>			
UNIT VII	<p><b>ORGANIZATION PARADIGM SHIFT</b></p> <ul style="list-style-type: none"> <li>a. Introduction</li> <li>b. Organizational output</li> <li>c. Holistic organizational behaviour.</li> </ul>			
UNIT VIII	<p><b>MODELS OF ORGANIZATION</b></p> <ul style="list-style-type: none"> <li>a. The autocratic model</li> <li>b. Custodial model</li> <li>c. Supportive model</li> <li>d. Collegial model</li> <li>e. Comparison of the model of organizational behaviour</li> <li>f. Conclusion about models: <ul style="list-style-type: none"> <li>a. Models- importance and subjective evolutionary changes</li> <li>b. Model based on incremental values</li> <li>c. Models-function of prevailing employee</li> <li>d. The contingent use of all models.</li> </ul> </li> </ul>			Pr-1

**HELP READING:**

**Text Books**

1. Jex, S.M. (2002). Organisational psychology: A scientist-practitioner approach. New York:
2. John Wiley. Rollinson, D. & Broadfield, D. (2002). Organisational behaviour and analysis: An integrated approach, 2nd Ed. New York: Prentice-Hall
3. Greenberg, J. & Baron, R.A. (2003). Behaviour in Organisations: Understanding and managing the human side of work, 8th Ed. New Delhi: Prentice Hall of India
4. Robbins, S.P., Judge, T.A., & Sanghi, S. (2009). Organisational Behaviour, 13th Ed. New Delhi: Pearson-Prentice Hall.
5. Sinha, J.B.P. (2008). Culture and organisational behaviour. New Delhi: Sage.
6. Davis, K. D. & Newstrom, J. W. (1989). Human behaviour at work: Organisational Behaviour, 8th Ed. New Delhi: McGraw-Hill.
7. Mullins, L. J. (2005). Management and organisational behaviour, 7th Ed. New Delhi: Prentice Hall

8. Rode, J. C. (2004). Job satisfaction and life satisfaction revisited: A longitudinal test of an integrated model. *Human Relations*, 57, 1205-1229
9. Sinha, J.B.P. (1985). The psychic relevance of work in Indian culture. *Dynamic Psychiatry*, 18, 134-141

### **Reference Books**

1. Smither, R.D. (1988). *The psychology of human and work performance*. New York: Haper & Row. Taylor, F. (1911). *Principles of scientific management*. New York: Harper
2. Brayfield, A. H., & Rothe, H. F. (1951). An index of job satisfaction. *Journal of Applied Psychology*, 35, 307–311.
3. Bruce, W.M., Blackburn, J.W. (1992), *Balancing Job Satisfaction and Performance: A Guide for Human Resource Professionals*, Connecticut, CT: Quorum Books
4. Roe, A. (1956). *The Psychology of Occupations*. New York: John Wiley Sons, Skinner, B. F. (1953). *Science and Human Behaviour*. New York: Free Press.

**SANTOSH COLLEGE OF MANAGEMENT STUDIES**  
**SANTOSH DEEMED TO BE UNIVERSITY CAMPUS**



EFFECTIVE FROM THE SESSION: 2021-22 ONWARDS

**MASTERS OF HOSPITAL ADMINISTRATION**

# **MASTERS OF HOSPITAL ADMINISTRATION**

## **Syllabus**

### **FIRST YEAR**

<b>S.No</b>	<b>Courses Code</b>	<b>Subject</b>
1	MHA101	Human Biology and Medical Terminology
2	MHA102	Hospital Environment
3	MHA103	Health Care Services (Clinical)
4	MHA104	Principles of Management
5	MHA105	Organization Behaviour
6	MHA106	Business Communication
7	MHA107	Health Care Economics
8	MHA108	Quantitative Tools
9	MHA109	Legal aspects in Hospital
10	MHA 110	IT for Hospitals and HIS

# **MASTERS OF HOSPITAL ADMINISTRATION**

## **Syllabus**

### **SECOND YEAR**

<b>S.No</b>	<b>Courses Code</b>	<b>Subject</b>
1	MHA201	Hospital Planning
2	MHA202	Strategic Management
3	MHA203	Total Quality Management
4	MHA204	Human Resource Management
5	MHA205	Materials Management
6	MHA206	Hospital Support Services
7	MHA207	Management Accounting
8	MHA208	Financial Management
9	MHA209	Marketing Management & Industrial relations
10	MHA 210	Operations Management

## **EXAM PAPERS**

### **1st Year**

<b>S.No</b>	<b>Paper</b>	<b>Subject Code</b>
1	Paper 1	MHA 101+MHA102+MHA103
2	Paper 2	MHA104+MHA 105+MHA 106
3	Paper 3	MHA 107+MHA108
4	Paper 4	MHA109+MHA110

### **2nd Year**

<b>S.No</b>	<b>Paper</b>	<b>Subject</b>
1	Paper 1	MHA201+MHA202+MHA203
2	Paper 2	MHA 204+MHA205+MHA206
3	Paper 3	MHA 207+MHA208
4	Paper 4	MHA209+MHA210

## **MHA 101: HUMAN BIOLOGY AND MEDICAL TERMINOLOGY**

### **UNIT I**

Human Anatomy and Physiology: Basic functions and importance of following system in Human body: Digestive System- Respiratory system- Circulatory System-Central Nervous system. Musculoskeletal system-Reproductive System-Excretory System-Endocrine Glands Special Senses. Pathology: Basic concepts of pathogenesis of common diseases, Basic concepts of interpretation of investigations reports. Pharmacology: Commonly used Medicine in a hospital, Narcotic drugs, use and abuse of drugs. Dispensing of medicine, drugs store, drug stock / purchase of medicine, oxygen, I/V Fluid, Chemicals etc.

### **UNIT II**

Medical Terminology-Reasons for using medical terms-Glossary of medical terms: major Diseases and medical specialties.

### **UNIT III**

Roots, Prefixes, Suffixes, Abbreviations and symbols-Common roots: element referring to, usage and definition-Common prefixes and suffixes-Common abbreviations: departments, time, general healthcare, routes of medication and laboratory- Symbols.

### **UNIT IV**

Concept of Health and Disease - Concept of health & disease and well-being, Natural history of disease and role of hospitals to offer various levels of care, Illness-Defining illness: Direct and indirect causes - Classification and description of diseases.Infection Control: Medical asepsis, Nosocomial infection and communicable diseases, Reservoir, carrier and mode of transmission. Prevention aspect of diseases, Dynamics of disease transmission, Changing pattern of diseases, Concept of health indicators

### **UNIT V**

Overview of Hospital Services Intensive care unit – Coronary care Unit – Burns, paraplegic & Malignant disease treatment – Hospital welfare services – Hospital standing services – Indian red cross society – Nursing services. Pharmacy – Medical Stores – Housekeeping – Ward Management – Central sterile supply department. Medical Records – Fatal documents – Medical Registers – Statutory records.

## REFERENCE BOOKS:

- BM Sakharkar, *Principles of Hospital Administration and Planning* – Jaypee brothers Publications.
- Francis CM, Mario C de Souza ; *Hospital Administration* – Jaypee brothers Medical Publishers (P) Ltd., New Delhi, 2000
- Modgli GD: *Medical Records, Organization and Management*, Jaypee brothers Medical Publishers (P) Ltd., New Delhi, 2001
- Sakharkar BM: *Principles of Hospital Administration and planning* , Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, 1999
- McGibony JR: *Principles of Hospital Administration*, GP Putnam's sons ' New York, 1969
- Rowland H.S. Rowland BL: *Hospital Administration Handbook*, Aspen System Corporation: Rockville, 1984
- Grants Method of Anatomy: A Clinical Problem solving approach - John V. Basmajian and Charles E. Slonecker,
- Roger Watson Anatomy and Physiology for Nurses
- William F. Ganong, Review of Medical Physiology, McGraw Hill,
- Stedman's Medical Dictionary
- Park JE, Park K., and Textbook of preventive and social medicine, 20th edition, Banarsidas Bhanot Publishers. 2009
- Hospital Administration - Tabish

## **MHA 102: HOSPITAL ENVIRONMENT**

### **UNIT I**

Introduction – Theoretical frame work - Environment - Internal and External – Environmental Scanning – Economic Environment – Competitive Environment – Natural Environment – Politico Legal Environment – Socio Cultural Environment - International and Technological Environment.

### **UNIT II**

A Conceptual Approach to Understanding the Health Care Systems – Evolution – Institutional Settings - Out Patient services– Medical Services – Surgical Services – Operating department – Pediatric services – Dental services – Psychiatric services – Casualty & Emergency services – Hospital Laboratory services – Anesthesia services – Obstetrics and Gynecology services – Neuro – Surgery service – Neurology services.

### **UNIT III**

Overview of Health Care Sector in India – Primary care – Secondary care – Tertiary care – Rural Medical care – urban medical care – curative care – Preventive care – General & special Hospitals-Understanding the Hospital Management – Role of Medical, Nursing Staff, Paramedical and Supporting Staff - Health Policy - Population Policy - Drug Policy – Medical Education Policy

### **UNIT IV**

Health Care Regulation – WHO, International Health regulations, IMA, MCI, State Medical Council Bodies, Health universities and Teaching Hospitals and other Health care Delivery Systems. National Health Policy & Population policy, National Health Policy & Inter-sectoral Co-ordination, National Population Policy, National Five-year plans. National Health Programme: Background objectives, action plan, targets, operations, achievements and constraints in various National Health Programme.

### **UNIT V**

Epidemiology – Aims – Principles – Descriptive, Analytical and Experimental Epidemiology - Methods – Uses. Natural history of disease, Epidemiology of communicable & non-communicable diseases, disease transmission, Host defense immunizing agents, cold chain, immunization, disease monitoring and surveillance. Screening and surveys, Investigation of an epidemic and role of hospital in its control. Demography & Vital Statistics, Demography – its concept, Vital events of life & its impact on demography, Significance and recording of vital statistics, Census & its impact on health policy

## UNIT VI

Hospital based healthcare & its changing scenario: Health scenario of India: past, present and future. Overview of Hospital, Concept of Modern Hospital & Privatization in Health Sector, Public Sector Hospitals and Level of care / offered facilities, Effects of Globalization in Health care, Concept of Corporate Hospital in developing countries, Infrastructure and lay out of an ideal corporate hospital, Functioning of modern hospitals & changing need of patients, Hospitality in Hospital Care, Invasive and non-invasive diagnostic facilities in modern hospital, Care offered in Specialty and Super specialty Hospitals

### REFERENCE BOOKS:

- Paul's, *Readings in Economics*, Tata McGraw Hill, New Delhi, 1992
- Dwivedr D.N. *Microeconomic Theory*, Vikas Publications New Delhi, 1996
- Seth, M.L. *Macroeconomics* Lakshminarayana Agrawal, Edu, Pub. Agra. 1996
- Shanmugansundaram, Y., *Health Economics*, Oxford Pub. New York, 1997 Mills, A & Lee, K., *Economics of Health OUP, Oxford, 1983*
- Liz Haggard, Sarah Hosking, *Healing the Hospital Environment: Design, Maintenance, and Management of Healthcare Premises*
- Park JE, Park K., *Textbook of preventive and social medicine*, 20<sup>th</sup> edition, Banarsidas Bhanot Publishers. 2009
- S.L GOEL, *Healthcare Management and Administration*, Deep & Deep publications Pvt.Ltd., New Delhi.
- *Textbook of community medicine: V. K. Mahajan*

## **MHA 103: HEALTH CARE SERVICES (CLINICAL)**

### **UNIT I: OUT PATIENT DEPARTMENT**

Introduction, Speciality and Super speciality clinics, Medicine, General Surgery, Orthopedics, OBGY, ENT, Ophthalmology, Pediatrics, DVL, Dental, Cardiology, Nephrology, Gastroenterology etc clinics, Planning and management of OPD

### **UNIT II: IN PATIENT DEPARTMENT**

Introduction, Day care Services, Different Departments, Ward management, Planning and management of IPD.

### **UNIT III: OPERATION THEATRES**

Pre-operative and Postoperative Care, Operation theatres scheduling, designing, planning and Management

### **UNIT IV: INTESIVE CARE UNIT**

Coronary care Unit – Burns, paraplegic & Malignant disease treatment – ICU, ICCU, HDU, NICU, PICU

### **UNIT V: EMERGENCY SERVICES**

Introduction, planning and Management

### **REFERENCE BOOKS:**

- BM Sakharkar, *Principles of Hospital Administration and Planning* – Jaypee brothers Publications.
- Francis CM, Mario C de Souza ; *Hospital Administration* – Jaypee brothers Medical Publishers (P) Ltd., New Delhi, 2000
- Modgli GD: *Medical Records, Organization and Management*, Jaypee brothers Medical Publishers (P) Ltd., New Delhi, 2001
- Sakharkar BM: *Principles of Hospital Administration and planning* , Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, 1999
- McGibony JR: *Principles of Hospital Administration*, GP Putnam's sons ' New York, 1969
- Rowland H.S. Rowland BL: *Hospital Administration Handbook*, Aspen System Corporation: Rockville, 1984
- Hospital Administration - Tabish

## **MHA 104: PRINCIPLES OF MANAGEMENT**

### **UNIT I INTRODUCTION MANAGEMENT**

Introduction, Meaning, scope and process of management, Managerial skills, Levels and roles, Evolution of management theories.

### **UNIT II PLANNING AND DECISION-MAKING**

Meaning, Scope and importance of planning, Strategy making: formulation VS crafting model, Goal setting: vision, mission, objective, strategy, goals and targets, Management by objectives, Decision making; managerial decision making models.

### **UNIT III ORGANIZING**

Division of work and various basis of Organizational structure; Power, authority and responsibility, Delegation and decentralization, Coordination.

### **UNIT IV ACTUATING AND DIRECTING**

Leadership and collaboration, leader Vs manager; Brief discussion on theories of leadership, motivating others; Content theories of motivation, Communication process; barriers to communication.

### **UNIT V CONTROLLING**

Meaning and process of control, Types of control; financial controls, dysfunctional controls, Emerging issues in management, International dimensions.

### **REFERENCE BOOKS:**

- Stoner, James, A.F. and Freeman, R.E., Management, Prentice Hall of India.
- Robbins, S.P.: Management, PHI, New Delhi.
- Koontz, H. and Donnell C., Essentials of Management, McGraw Hill, New Delhi.
- Drucker, Peter F: The Practice of Management. N. Deming, Management: Principles and Guidelines, Wiley India.
- Griffin, Ricky, W.: Management, eight edition, Wiley India
- Principles of Management - L. M. Prasad - S. Chand

## **MHA 105 : ORGANIZATIONAL BEHAVIOUR**

### **Unit I: Foundations of Organizational Behavior**

The nature and functions of an organization; meaning and systematic study of O.B; contribution of behavioral sciences to O.B.; developing contingency model of O.B; OB in a global perspective; Challenges and opportunities in OB.

### **Unit II Individual Dimensions in Organizational Behavior**

Nature of human behavior; Personality; meaning; theories and determinants; Values, attitudes and job satisfaction; Perception process.

### **Unit III Foundations of Learning and Motivation**

learning process; Theories of learning; content theories of motivation (brief discussion); Process theories of motivation; Reinforcement and motivation; An integrative model of motivation; Motivational techniques for Indian managers.

### **Unit IV Group and Interpersonal Dimensions**

Formation, classification, stages and group dynamics; Group decision making; teams and team work; transactional analysis; conflict management.

### **Unit V Organizational Dimensions**

Leadership, Organizational culture; Work stress; Organizational change; Organizational development.

### **REFERENCE BOOKS:**

- Robins, S.P. and Sanghi, S.: Organizational Behavior, ed. xi, Pearson-Education, New Delhi.
- Sakaran, U., Organizational Behavior, TMH, N. Delhi.
- Newstrom J W and K Davis: Organizational Behavior: Human Behavior at Work, ed.v. , NewDelhi: Tata McGraw.
- F. Luthans: Organizational Behavior, ed. vii, PHI, New Delhi.
- L.M. Prasad: Organization Theory and Behavior, HPH, New Delhi.
- Mullins L. J.: Managemesnt and Organizational Behavior, Pearson- Education, N.Delhi.

## **MHA-106: BUSINESS COMMUNICATION**

### **UNIT-I**

Meaning and importance of communication in business: Process, types of communication: formal and informal and their characteristics, essentials of effective business communication, Channels of communication, their effectiveness, limitations, Barriers of communication.

### **UNIT- II**

Time Management and Goal Setting: Identification of Time Wasters, Goal Setting. Listening Skills: Listening to Specific Information, Identifying Main Issues, competitive and Collaborative Team Behavior; Team/ Group Dynamics, Team Assignment.

### **UNIT- III**

Stress Management: Symptoms of Stress, Report Writing: Process, Structure and Layout. Principles of clear writing, often misused words, applications and requests, positive and negative responses to requests, routine messages, memos, organizing meetings, preparation of agenda and minutes, business etiquette, telephone etiquette, e-mail etiquette.

### **UNIT- IV**

Interview: Types of interviews, Job interview, Telephone interview, Conducting the interview.

### **UNIT- V**

Interpersonal Skills: Negotiations, social skills, assertive skills, cross-cultural communications. Leadership Skills: Concepts of leadership, leadership styles, insights from great leaders.

### **REFERENCE BOOKS:**

- Lesikar, Petit & Lesikar's: Basic Business, Tata McGraw Hill,
- Poe & Fruchling: Basic Communication, AITBS,
- Taylor: English Conversion Practice, Tata McGraw Hill,
- Diwan & Aggarwal: Business Communication, Excel Books,
- Baugh, Frayer & Thomas: How to write first class Business Correspondence, Viva Books,
- B.L. Courtland and J.V. Thill: Business Communication Today, Pearson Education,
- H.A. Murphy, W. Hilderbrand and P.J. Thomas: Effective Business Communication, Tata McGraw Hill Companies.
- Asha Kaul -Effective communication methods
- Tabish- Hospital Administration

# **MHA 107 HEALTH CARE ECONOMICS & FINANCING**

## **UNIT 1: INTRODUCTION OF ECONOMICS**

Nature of Economic Analysis – nature Economic – functioning of Economic systems – Circular flow and interdependence of Economic activity- Basic Economic concepts - scarcity – Opportunity cost – Discounting principle – Concept of margin – Utility – Demand – Supply and Elasticity – Relavence of Economics to health and medical care.

## **UNIT 2: DEMAND ANALYSIS**

Utility analysis – Nature of Demand and determinants – law of demand – Elasticity of Demand- Supply Curves – Cost Concepts and Cost Analysis.

## **UNIT III: HEALTH DETERMINANTS**

Unique Nature of Health – Health as a Consumer and investment Good – Valuation of Health – Externalities in Health care –Economic Evaluation in Healthcare.

## **UNIT IV: MARKET ANALYSIS**

Market Configuration – Price determination under different marker conditions – nature and Characteristics of Health care markets - Demand for and supply of Health care services- Market failures and Government intervention and control.

## **UNIT V: HEALTH CARE FINANCES AND TRENDS**

Health care indicators – Health policies - Health care expenditure – Financing of Health care, Allocations under 5-year plans- National rural Health Machine (NRHM) – Human Development indices.

Trends in Healthcare – Changing demography – Medical Technology and Escalating Health costs – Public - Private Partnership -effects of Globalization.

## **REFERENCE BOOKS:**

- Peterson, Craig H., Lewis, Chris and Sudhir Jain, Managerial Economics, Pearson Education, 2006.
- Mark Hirshey, Economics for Managers, 2007, Thomson Learning.
- Samuelson, Paul , Economics, 18th edition, 2005, Tata-McGraw Hill.
- Gupta, G., Managerial Economics, 2004, Tata-McGraw Hill.
- Rangarajan and Dholkia, Macroeconomics, Tata-McGraw Hill.

# MHA 108: QUANTITATIVE TOOLS FOR MANAGAEMENT

## **UNIT I DESCRIPTIVE STATISTICS**

Scope, functions and limitations of statistics, Measures of Central tendency – Mean, Median, Mode, Percentiles, Quartiles, Measures of Dispersion – Range, Inter-quartile range, Mean deviation, Mean Absolute deviation, Standard deviation, Variance, Coefficient of Variation. Measures of shape and relative location; Skewness and Kurtosis.

## **UNIT II TIME SERIES & INDEX NUMBER**

***Time series analysis:*** Concept, Additive and Multiplicative models, Components of time series,

Trend analysis: Least Square method - Linear and Non- Linear equations, Applications in business decision-making.

***Index Numbers:-*** Meaning , Types of index numbers, uses of index numbers, Construction of Price, Quantity and Volume indices:- Fixed base and Chain base methods.

## **UNIT III CORRELATION & REGRESSION ANALYSIS**

***Correlation Analysis:*** Rank Method & Karl Pearson's Coefficient of Correlation and Properties of Correlation.

***Regression Analysis:*** Fitting of a Regression Line and Interpretation of Results, Properties of Regression Coefficients and Relationship between Regression and Correlation and implantation in Industries.

## **UNIT IV PROBABILITY THEORY & DISTRIBUTION**

***Probability:*** Theory of Probability, Addition and Multiplication Law, Baye's Theorm

***Probability Theoretical Distributions:*** Concept and application of Binomial; Poisson and Normal distributions.

## **Unit V Sampling Theory & Testing of Hypothesis**

***Sampling theory:*** Sample enumeration and census enumeration, sampling techniques.

***Hypothesis Testing:*** Null and Alternative Hypotheses; Type I and Type II errors; Testing of Hypothesis: Large Sample Tests, Small Sample test, (t, F, Z Test and Chi Square Test)

## **REFERENCE BOOKS:**

- K.V.Sivayya and K.Satya Rao Business Mathematics.
- Nagar, Das – Basic Statistics, Oxford University press
- Levin, Krehbiel and Berenson, Business: A first course, pearson Education Asia.
- Shenoy, Sarma and Srivatsava, Quantitative Techniques for Management, New Age (International) Pvt.Ltd.
- N.D.Kothari, Quantitative Techniques, in Management, Tata McGraw Hill, 2001.
- Statistics for management – R. I. Levin and D. Rubin – Prentice Hall

- Basic Statistics – Goon, Gupta and Dasgupta – World Press
- Business Statistics – S. P. Gupta - S. Chand Chandrasekaran & Umapparvathi-Statistics for Managers, 1st edition, PHI Learning
- G C Beri – Business Statistics, 3rd ed, TATA McGrawHill
- Davis , Pecar – Business Statistics using Excel, Oxford
- Ken Black – Business Statistics, 5th ed., Wiley India
- Levin and Rubin – statistics for Management, 7th ed., Pearson
- Lind, Marchal, Wathen – Staistical techniques in business and economics, 13th ed, McGrawHill
- Newbold, Carlson, Thorne – Statistics for Business and Economics, 6th ed., Pearson
- S. C.Gupta – Fundamentals of Statistics, Himalaya Publishing
- Walpole – Probability and Statistics for Scientists and Engineers, 8th ed., Pearson

## MHA 109 : BUSINESS LAWS

### UNIT I

**Indian Contract Act 1872:** Offer, Acceptance and Consideration; Essentials of a Valid Contract; Void Agreements; Discharge of Contract; Remedies for breach of Contract; Quasi Contract; Indemnity & Guaranty; Bailment and Pledge; Agency.

### UNIT II

**Sale of Goods Act 1930:** Formation of contract of sale; Condition and warranty; Transfer of title and Passing of property; Rights of an unpaid seller.

**Negotiable Instrument Act 1881:** Nature, Types, Negotiation, Assignment and crossing; Holder in due course; Crossing, Dishonor and discharge;

### UNIT III

**Company Law 2013:** Nature, Types and Formation of Companies; Memorandum of Association, Articles of Association; Prospectus, Shares, Allotment of Shares and share Capital; Authorities.

### UNIT IV

**The Consumer Protection Act:** Objectives, definition, consumer protection council and state consumer protection council.

**Partnership Act:** Definition, Essentials of partnership, Formation of partnership Kind of partners, Authorities, Right and liabilities of partners, registration of partnership, dissolution of partnership, Limited liability partnership.

### UNIT V

**The Information Technology Act:** Definition, Digital Signature, Electronic Governance, Attribution, Acknowledgement and dispatch of Electronic Records, Regulation of certifying, Authorities, Digital Signature Certificate, Offences and Penalties. And all other business related cyber laws.

**The Right to Information Act:** Right to Know, Salient features of the Act, Obligation of Public Authority, Public Information Officer, Duties of PIO, Exemption from Disclosure of Information, Partial Disclosure of Information, Powers of Information Commissions, Appellate Authorities, Penalties, Jurisdiction of Courts

### REFERENCE BOOKS:

- Boatright, J.R.: Ethics and the Conduct of Business, ed. vi, 2006, Pearson Education.
- Fernando, A.C.: Corporate Governance- Principles, Policies and Practices, ed. i, 2006, Pearson Education.
- Gulshan, S.K.: Mercantile Law, ed. iii, 2007, Excel Books.
- Kuchhal, M.C.: Business Law, ed. iv, 2005, Vikas Publishing.
- Velasquez, M.G.: Business Ethics- Concepts and Cases, ed. vi, 2007, Pearson Education

# **MHA 110: INFORMATION TECHNOLOGY FOR HOSPITALS & HIS (HOSPITAL INFORMATION SYSTEM)**

## **UNIT I**

An Introduction of Computer Systems: Types of Software's, Types of O.S. , Concept of MS-DOS : Internal & External Commands. Path, prompt, rmdir, time,ver, vol,echo, chkdisk, diskcopy, label, scandisk, replace, format, f disk. Windows - Windows explorer, print manager.

## **UNIT II**

Data Communication & Networks: Introduction of Communication, Communication Medias, Communication Modes, Switching techniques, Networks: Goals of Networks, Types of Networks, Client/Server Computing, Network Topologies, MODEM, Gateways, Multiplexer, Bridges, Routers. Ethernet. Spreadsheet Software: Introduction of spreadsheet software, creating, Range, formulas, Functions, databases functions in spreadsheet, Graphs on Spreadsheet, data validation, Application of MS-Excel in Business .

## **UNIT III**

Ms-PowerPoint: Power point Basics, create presentations, insert and modify text, working with graphics and media, final presentation, delivery presentation.

## **UNIT IV**

Ms-word: Introduction ms word, creating and editing document, formatting document, working with tables, advanced formatting, mail merge

## **UNIT V**

Excel: Introduction to ms-excel and understanding Basic working with it, Working with formula/function, conditional formatting, data sorting and filtering, pivot table/chart, VBA macros, security feature.

## **UNIT VI**

Hospital Information Systems, introduction - meaning – concepts, its relevance to hospital design – confidentiality, security- privacy of HIS- Business Process Reengineering - IT as a tool for Competitive Advantage, Health records, Approaches to the development of HIS, HIS Design

## **REFERENCE BOOKS:**

- Summer ,M. : Computers Concepts and Uses , Englewood Cliffs, New Jersey , PHI
- V. Rajaraman : Fundamental of Computers
- Peter Norton : Introduction to MS-DOS

- O.Brian, J.A. : MIS , TMH
- Computer Networks : Tannenbaum
- An introduction to computers
- Peter Norton - Tata McGraw Hill
- Computers today S. K. Basandra – Galgolia Books
- Introduction to Computers – C. Xavier – New Age publishers

# **MHA 201: HOSPITAL PLANNING MANAGEMENT**

## **UNIT I**

Introduction to Hospital: Definition, Objectives, Classification, Functions. Planning & Building a New Hospital: Role of Hospital in Health Care, Hospital Planning & Design, guiding principle in Hospital facilities & services, Functional Plans for Hospital construction, Design items, Functional program & design stage, Planning the Hospital building.

## **UNIT II**

Planning & Designing Medical Services: Out Patient service, Emergency service, Clinical laboratories, Radiology services, Radiation Therapy Department, Surgical Department, Nursing Department, Operation Theatre, CSSD Nursing services.

## **UNIT III**

Planning & Designing Engineering Services: Engineering Department, Maintenance management, Clinical [Bio-medical] Engineering, Electrical System, Air Condition System, Water supply & sanitary system, Centralized Medical Gas System, Telecommunication System, Environmental Control, Safety & Security System, Disposal of Hospital Wastes.

## **UNIT-IV**

Organization of the hospital a. Management structure b. Governing body c. Hospital committees and hospital functionaries Duties and responsibilities of various levels of management

## **UNIT V**

Hospital standards, Acts and licenses, Quality Management NABH JCI, Occupational Health & safety standards

## **REFERENCE BOOKS:**

- Principles of Hospital Administration & Planning – by B. M.Sakharkar, Jaypee Publications, 1998.
- Hospital Facilities, Planning & Management – by G. D. Kunders, TataMcGraw Hill, 2004.
- Hospital Administration & Management – by S. L. Goel& R. KumarDeep & Deep Publications
- Applied Clinical Engineering – by Barry N. Feinberg, Prentice Hall,1984.
- Clinical Engineering Principle & Practices – By John G. Webster &Albert M. Cook, Prentice Hall.

## **MHA 202: STRATEGIC MANAGEMENT**

### **UNIT I**

Strategic Management – Evolution – Nature and importance of Strategic Management – Relationship between Strategic Management and Operational Management. Corporate planning: Difference between operational and strategic planning-Characteristics of strategic steps involved in a strategic plan -Business Policies for hospitals – originated policy – appealed policy externally imposed policy –Method of formulating a new or revised policy, Policy Administrations – Functional Policies – Relationship of business policies to company goals, plans and strategies. Types of policies used in Corporation.

### **UNIT II**

Corporate strategy – Distinction between strategy and strategic plan – Defensive strategy – Offensive strategy – Classifications strategies – Competitive Analysis – Industry Analysis – Self Analysis of organizations- Strategic use of marketing variables – Business Portfolio Analysis - Merger – Horizontal merger – Vertical merger – conglomerate merger – Product extension – Market extension – Pure conglomerate extension – Acquisition – Joint Venture.

### **UNIT III**

Concept of Product Diversification with reference to hospitals – Classification of diversification– Single product diversification – Horizontal diversification – Conglomerate diversification – Market penetration – Market development – Product development – Diversification in selected Indian Industries – Case Study of some Indian industries - Corporate image – Corporate image versus brand image – Dimensions of corporate image – Survey method to determine the corporate image - Social Audit – Social Performance – Business ethics – Evolution – Concepts – Social Marketing – Social Auditing – Basic procedures – Benefits of Social audit.

### **UNIT IV**

Organizational environment in hospitals– stable environment – changing environment – Turbulent environment – Matching the system to the environment – Matching system – organic system Differentiation – Integration - Organizational Life Cycle – Evolution – Revolution Creativity – Direction, Coordination – Collaboration - Management environment – Social – Cultural – Economic Political – Educational – Ethic environment.

## **UNIT V**

Impact of technology – An organizational structure – Impact of cultural values on managerial effectiveness – people and structure – Managers and employees structure - Social responsibilities of business with reference to hospital industry – Areas of involvement. The Government's role in Healthcare Industry - Strategies for International operations – Globalization of Business – Strategic Control process

### **REFERENCE BOOKS:**

- Charles W.L. Hill & Gareth R. Jones – 'Strategic Management Theory, An Integrated approach' – Houghton Mifflin Company, Princeton New Jersey, All India Publisher and Distributors, Chennai, 1998.
- Thomas L. Wheelen, J. David Hunger – 'Strategic Management' Addison Wesley Longman Singapore Pvt., Ltd., 6th Edition, 2000.
- Igor Ansoff Corporate Strategy. (Tokyo McGraw Hill Book Co)
- Aaker A. David, Developing Business Strategies, John Wiley & Sons, New York, 1984
- Steiner and Minor: Business Policy – Concept and cases. (North Holland and Publications)
- Keith Davis and Robert Blomstrom: Business and Society, Environment & Responsibility (New York, McGraw Hill Book Co)
- William F. Gluk: Strategy Formation and Management Actions
- P.K. Ghosh: Business Policy – Strategic Planning & Management
- AzharKazmi: Business Policy
- Lloyd L. Byars: Strategic Management: Planning & Implementation
- Porter Michel, Competitive Advantages

# **MHA 203: TOTAL QUALITY MANAGEMENT**

## **UNIT I: EVOLUTION OF QUALITY MANAGEMENT**

Evolution of quality control, Quality characteristics – Variables and attributes – Non confirming and non-confirming unit – Defect – Standard or specification – Quality of design – Quality of conformance – Quality of performance – Total Quality Control -Concept of quality – Quality control – Quality assurance

## **UNIT II**

Quality management in Hospital Department – Front office, OPD, Casualty, Laboratory, OT, ICU, CCU, MRD, Dietary, Laundry, Housekeeping, CSSD, IP and Nursing, Emergency & Trauma Care – Canteen – Hospital Stores. Patient safety management – Hospital acquired infection control – equipment maintenance- Assessing quality – Patient satisfaction survey.

## **UNIT III**

Medical audit, Clinical audit- Nursing audit – Accreditation and ISO. TQM -team work – Employee involvement – Key result areas – Leadership.TQM tools – Quality function Deployment (QFD) – Concurrent Engineering – FMEA – Demings P-C- D- A- Cycle – JIT – Kaizan – Zero defect programme. Statistical tools in TQM – Flow diagram – 5Stechniques- Pareto Analysis – Cause and effect diagram – Control charts. Bench marking – Business Process Reengineering – Six sigma.

## **UNIT IV**

ISO 9000&14000 standards – TQM -Accreditation – NABL – JCAHQ – Quality manual – Quality – Quality Assurance in Hospitals Sop"s – Patient Orientation for Total Patient Satisfaction- Environment Management Systems

## **UNIT V**

Service Quality –productivity – Quality costs in service organizations. Quality management philosophies. Planning for quality – Creating quality culture – patient centered quality – Training for quality- Accreditation survey processes-Achieve a state of continuous readiness for Accreditation

### **REFERNCE BOOKS:**

- S.K. Joshi – Quality Management in Hospitals Jaypee Brothers.
- James R. Evans & William M. Lindsay: The Management and Control of Quality ; JaicoPublishing House, Bombay.
- Kunders, G D (2002) – Designing for Total Quality in Healthcare, Prism BooksPvt Ltd, Bangalore.
- Total Quality Management of hospital nutrition services. M Rosita Schiller, Ph.D., Karen Miller-Kovach, Mary Angela Miller.
- Total Quality Management, Dr. K.C. Arora, S.K. Kataria& Sons, New Delhi
- Creating Quality, William J. Kolarik, McGraw-Hill International Editions.

## **MBA 204: HUMAN RESOURCE MANAGEMENT**

### **UNIT I: INTRODUCTION TO HUMAN RESOURCE MANAGEMENT**

Evolution of HRM, Relevance of HRM, Challenges faced by HRM, Human Resource Functions, Systems Model of HRM Functions, The Indian Scenario of HRM.

### **UNIT II: MANPOWER MANAGEMENT**

Human Resource Planning, Steps in HRP, Succession planning, recruitment and selection, training and career development, training administration, training needs analysis, job analysis - job description and job specifications.

### **UNIT III: COMPENSATION, BENEFITS AND PERFORMANCE MANAGEMENT**

Principles of wage determination; salary structure, grades, range, overtime payments; job evaluation, purpose, methods and procedure; wage policies and regulations in India, performance management.

### **UNIT IV: INDUSTRIAL RELATIONS**

Industrial relations machinery; preventive and settlement machinery; discipline in industry; grievance and the procedure for the Redressal of grievance; Roles, rights and responsibilities of trade union; collective bargaining; worker's participation in management.

### **UNIT V: EMPLOYEE WELFARE SERVICES & SECURITY**

Quality of work life; health and safety, employee assistance programmers; voluntary welfare schemes for education; recreation, housing, medical services; an outline of social security measure; P.F., Gratuity, E.S.I schemes etc.

### **REFERENCE BOOKS:**

- Monoppa & Saiyadain, Personnel Management, Tata McGraw Hill, New Delhi.
- Patnayak, Biswajeet, Human Resource Management, ed. iii, 2006, P.H., New Delhi.
- T.V. Rao and Raju Rao, (ed) 360 degree Feedback and Performance Management System, Vol. I, ed. ii, 2003, Excel Books.
- Gar Dessler, Human Resource Management, ed. x, 2006, Pearson Education New Delhi.
- Strauss & Sayles, Personnel Problems of Management, Prentice Hall of India.
- Pramod Verma, Management of Industrial Relations, Vora Prakashan, Ahmedabad.
- Sinha, PRN, Sinha IB and Shekhar SP, Industrial Relations, Trade Unions and Labour Legislation, Pearson Education, New Delhi 2004

## **MHA 205: MATERIALS MANAGEMENT**

### **UNIT I**

Principles of Purchasing Management - Tendering procedures – procurement procedure  
Vendor development and rating – Methods of payment – Letter of credit – Foreign currency  
payments.- Import documentation - Principles of Logistic Management: Definition of Logistics  
Management

– Functions of Logistics Management

### **UNIT II**

Inventory control: Definition -objectives of Inventory Control – Types of Inventory cost –  
Types of Inventory Control – Pareto's law -ABC /VED / SDE Analysis – Lead Time – Buffer  
stock – Reorder level – Economic Order Quantity (EOQ) – Types of Inventory Control systems.

### **UNIT III**

Store Management: Stores function- location and layout – Standardization, Codification and  
Classification of materials – Material accounting and physical distribution – Store  
documentation

– Condemnation and disposal of scrap, surplus and obsolete materials – Types of stores in a  
Hospital.

### **UNIT IV**

Equipment Planning and Procurement: Steps in equipment selection – Utilization index –  
Factors leading to poor utilization of equipment- planning and procurement of spares /  
accessories / consumables.

### **UNIT V**

Recent trends in Materials Management: Types of Materials used and stored in a Hospital –  
Computerization of Materials function – MIS Reports – Concept and frame work of  
supplychain management -concept of Just in time and Central purchasing.

## **REFERENCE BOOKS**

- Stores management-Second edition - Mr. K S MenonPublished by Macmillan India Ltd
- An Introduction to Documentary Credits - Mr. Rupnarayan BosePublished by Macmillan India Ltd
- Supply Chain Management –Mr. B S Sahay - Published by MacmillanIndia Ltd
- Materials Management – Gopalakrishnan&Sunderasan
- Industrial Engineering – O.P.Khanna

## **MHA 206: HOSPITAL SUPPORT SERVICES**

### **UNIT I: INTRODUCTION**

Introduction to organization of health services in India – Central, States, Defence, Railways and other PSUs- Voluntary agencies- Comprehensive health projects with Rural Development- International organizations related to health services.

### **UNIT II: MANAGING ENGINEERING & UTILITY SERVICES**

Organizing and Managing Facility Support Services – Laundry – Housekeeping - Pest control - Managing the Estate (Hospital Security) - Recent trends in Disaster Management - Hospital Engineering Services (Plumbing, Electricity, Civil, A/C, Lifts) - strategies of hospital equipments- planning and Selection- purchase procedure- installation and commissioning- hospital equipment repair and maintenance quality control.

### **UNIT III: PLANNING & ORGANIZING OF SUPPORT SERVICES**

Imaging – CSSD – Laboratory - Blood Bank – Diet - Medical Records – Mortuary – Pharmacy - Admission & Discharge Procedure - Billing Procedure - Bio Medical Equipments Planning- Ambulance Services

### **UNIT IV: HOSPITAL HAZARDS**

General safety of the patients, fire safety, hospital hygiene, hospital acquired infection, Biomedical waste- handling rule, segregation, collection, transportation, disposal, modern technology, for disposal radioactive waste handling. Review of reports on Healthcare- Bhole Committee- Moodliar Committee- Jain Committee- Kartar Singh Committee- Srivastava Committee

### **UNIT V: EVALUATION OF HOSPITAL & HEALTH SERVICES**

Accreditation - Setting of Objectives - Health Indicators - Applying Economic Concepts to Service Evaluation - Assessing Patient Satisfaction - Techniques of Hospital Services Evaluation

- Indicators of Hospital Efficiency & Effectiveness - Evaluation of Quality of Hospital Services  
- Management of Hazard & Safety in a Hospital Setup - Nursing Services in a Hospital -  
Current

Issues in Hospital Management - Telemedicine - Bio-Medical Waste Management - Organ  
Transplantation - Rehabilitation Services - Health Insurance & Managing Health Care -  
Medical Audit – Hazard and Safety in a hospital Setup.

#### **UNIT VI: MANAGING SERVICES IN CRISIS**

Epidemiological Triad, Levels of Disease Prevention- Disaster Management/ Disaster Plan-  
Fire fighting- Dealing with crisis situations- Natural disasters –floods, earthquakes etc.- Mob  
violence against medical establishments- Bomb threat- Terrorist strike- Political agitation-  
Mass casualties

#### **REFERENCE BOOKS:**

- Arnold D. Kalcizony& Stephen M. Shortell, Health Care Management.
- Carolyn SemplePiggot& Carolyn S.Piggot, Business Planning for Health Care Management.
- David E.Cope, Organization Development and Action Research in Hospitals.
- Perspectives in health care – Nancy North – Macmillan Press, U.K

## **MHA 207: ACCOUNTING FOR MANAGERS**

### **UNIT I: MEANING AND SCOPE OF ACCOUNTING**

Overview of Accounting, Users of Accounting, Accounting Concepts Conventions, Book keeping and Accounting, Principles of Accounting, Basic Accounting terminologies, Accounting Equation , Overview to Deprecation (straight line and diminishing method)

### **UNIT II: ACCOUNTING STANDARDS AND IFRS**

International Accounting Principles and Standards; Matching of Indian Accounting Standards with International Accounting Standards, Human Resource Accounting.

### **UNIT III: MECHANICS OF ACCOUNTING**

Double entry system of Accounting, Journalizing of transactions; Ledger posting and Trial Balance, Preparation of final accounts, Profit & Loss Account, Profit & Loss Appropriation account and Balance Sheet, Excel Application to make Balance sheet, Case studies and Workshops.

### **UNIT IV: ANALYSIS OF FINANCIAL STATEMENT:**

Ratio Analysis- solvency ratios, Profitability ratios, activity ratios, liquidity ratios, Market capitalization ratios; Common Size Statement; Comparative Balance Sheet and Trend Analysis of manufacturing, Service & banking organizations, Case Study and Workshops in analyzing Balance sheet.

### **UNIT V: FUNDS FLOW STATEMENT**

Meaning, Concept of Gross and Net Working Capital, Preparation of Schedule of Changes in Working Capital, Preparation of Funds Flow Statement and its analysis; Cash Flow Statement: Various cash and non-cash transactions, flow of cash, difference between cash flow and fund flow, preparation of Cash Flow Statement and its analysis.

### **REFERENCE BOOKS:**

- Maheshwari S.N & Maheshwari S K – A text book of Accounting for Management (Vikas, 10th Edition)

- Essentials of Financial Accounting (based on IFRS), Bhattacharya (PHI,3rd Ed)
- Ramachandran Kakani- Financial Accounting for Management( TMH ,3rd Edition).
- PC Tulsian- Financial Accounting (Pearson, 2016)
- Dhamija - Financial Accounting for managers: (Prentice Hall, 2nd Edition).
- Narayanswami - Financial Accounting: A Managerial Perspective (PHI,5th Ed)
- Dhaneshk Khatri- Financial Accounting (TMH,2015)
- Ambrish Gupta - Financial Accounting: A Managerial Perspective (Prentice Hall, 4th Edition)
- Ramchandran & Kakani - Financial Accounting for Management (TMH, 2nd Edition).
- Mukherjee - Financial Accounting for Management (TMH, 2nd Edition).

## **MHA 208: FINANCIAL MANAEGMENT**

### **UNIT I: INTRODUCTION**

Introduction, Meaning, scope and development of financial management; finance function; Indian financial System, Risk and Return, Regulatory framework related to financial management; Time value of money and its relevance.

### **UNIT II: FINANCING DECISIONS**

Cost of Capital and Capital Structure, Cost of debt and preferred stock; cost of equity, retained earnings and overall cost of capital; financial and optimum capital structure; theories of capital structure; M.M hypothesis on capital structure. Financial and operating leverage.

### **UNIT III : INVESTMENT DECISIONS**

Management Long-term Capital, Methods of project appraisal; payback period method; average rate of return method; accounting rate of return method; net present value method; internal rate of return method; capital rationing.

### **UNIT IV: WORKING CAPITAL MANAGEMENT**

Working Capital Management, overall considerations in WCM; Determination of W.C. requirements; management of cash; Management of receivables; Management of inventories, CCC theory.

### **UNIT V: DIVIDEND DECISIONS**

Issues in Financial Management, Overview of dividend policy; dividend policy and share valuation; practical considerations and legal requirements on dividend; lease financing in India, contemporary issues in financial management.

### **REFERENCE BOOKS:**

- Chandra Prasanna, Financial Management: Theory and Practice, 2005, Tata McGraw, New Delhi.
- Khan YM and Jain PK, Financial Management – Text and Problems, 2007, Tata McGraw Hill Publishing Company Ltd, New Delhi.
- Van Horn James C, Financial Management and Policy, 2000, Prentice Hall of India, New Delhi.
- Pandey IM – Financial Management

## MHA 209 : MARKETING MANAEGMENT

### UNIT I

**Introduction:** Concept, nature, scope and importance of marketing; Marketing concept and its evolution; Marketing mix; Strategic marketing planning – an overview.

**Market Analysis and Selection :** Marketing environment – macro and micro components and their impact on marketing decisions; Market segmentation and positioning; Buyer behavior; consumer versus organizational buyers; Consumer decision making process.

### UNIT-II

**Product Decisions:** Concept of a product; Classification of products; Major product decisions; Product line and product mix; Branding; Packaging and labeling; Product life cycle – strategic implications; New product development and consumer adoption process.

**Pricing Decisions:** Factors affecting price determination; Pricing policies and strategies; Discounts and rebates.

### UNIT-III

**Distribution Channels and Physical Distribution Decisions:** Nature, functions, and types of distribution channels; Distribution channel intermediaries; Channel management decisions; Retailing and wholesaling.

**Promotion Decisions:** Communication Process; Promotion mix – advertising, personal selling, sales promotion, publicity and public relations; Determining advertising budget; Copy designing and testing; Media selection; Advertising effectiveness; Sales promotion – tools and techniques.

### UNIT-IV

**Marketing Research:** Meaning and scope of marketing research; Marketing research process.

**Marketing Organisation and Control:** Organising and controlling marketing operations.

### UNIT-V

**Issues and Developments in Marketing:** Social, ethical and legal aspects of marketing; Marketing of services; International marketing; Green marketing; Cyber marketing; Relationship marketing and other developments of marketing.

### REFERENCE BOOKS:

- **Kotlar, Philip**, Marketing Management, Prentice Hall, New Delhi.
- **Stanton, Etzel**, Walker, Fundamentals of Marketing, Tata-McGraw Hill, New Delhi.
- **Saxena, Rajan**, Marketing Management, Tata-McGraw Hill, New Delhi.
- **McCarthy, E.J.**, Basic Marketing: A managerial approach, Irwin, New York.

## **MHA 210: PRODUCTION AND OPERATIONS MANAGEMENT**

### **UNIT I**

Nature and scope of production & operations management , production functions , Responsibilities of the Production Manager . Types of Manufacturing systems , Plant location and plant layout .

### **UNIT II**

Production planning and control , Procedure , objectives and importance of production planning and production control , scheduling .

### **UNIT III**

Materials & stores management , Inventory control , relevant costs , economic lot size , inventory analysis , JIT, standardization & specialization, Automation .

### **UNIT IV**

Work study , Method study , work measurement , flow charts , industrial safety and health considerations , maintenance of production facilities .

### **UNIT V**

Quality control and inspection , sampling inspection , quality control charts , concept of TQM & ISO9000.

### **REFERENCE BOOKS:**

- Goel B.S. : Production & Operation Management
- Mayers : Production Management
- Buffa : Operations Management
- Moore FG & Hendrick : Production & Operation Management
- Chunawalla : Production Management

**DEPARTMENT OF ANESTHESIA  
SANTOSH MEDICAL COLLEGE HOSPITAL  
SANTOSH DEEMED TO BE UNIVERSITY**

**B.Sc. OPERATION THEATRE & ANESTHESIA TECHNOLOGY**

**FIRST YEAR SYLLABUS**

<b>S.NO</b>	<b>NAME OF THE SUBJECTS</b>	<b>TOTAL HOURS ALLOTTED</b>
1.	ANATOMY	60 HOURS PER YEAR
2.	PHYSIOLOGY	60 HOURS PER YEAR
3.	BIOCHEMISTRY	45 HOURS PER YEAR
4.	PATHOLOGY	45 HOURS PER YEAR
5.	ENGLISH	30 HOURS PER YEAR
6.	BASICS OF COMPUTER SCIENCE	30 HOURS PER YEAR
7.	CLINICALS/THEATRES IN THE MORNINGS	12 HOURS PER WEEK

**\*\*\* CLINICALS/THEATRES**

1. I V fluids and Transfusion related matters
2. Dressing, sutures, bandages and plasters
3. Recovery room and nursing care
4. Preoperative and Postoperative Management of Patients
5. Patient handling and Transportation to and from the operation theatre
6. Universal precautions for HIV Positives, HBsAg Positive
7. Introduction to Operating room
  - Ethics, Discipline, Lay out, Equipment - Lights, OT table, suction, scrub station
8. Electrical Devices – Electro cautery, Laser, Harmonic etc.
9. Power Surgical Instruments – Drills Saw, Reamer
10. Common General Surgical Operations and Dressings

## **Paper -I: Basic Science**

### **BASIC ANATOMY**

#### **THEORY**

##### **Introduction to Anatomy**

##### **Basic Anatomical terminologies**

**Osteology-** Upper limb – clavicle, scapula, humerus, radius, ulna  
Lower limb - femur, hipbone, sacrum, tibia, fibula  
Vertebral column

**Thorax** – Intercostal space, pleura, bony thoracic cage, ribs  
sternum & thoracic vertebrae, Muscles of Thorax,  
Diaphragm, Lungs

**Airway – Larynx**, Trachea, bronchial tree

**Heart** – Surface anatomy of heart, chambers of the heart, valves of the heart, major blood vessels of heart, pericardium, coronary arteries.

**Excretory system** – Kidneys, ureters, bladder, urethra

**Liver**

**Central Nervous system**

#### **PRACTICALS**

##### **Mannequins to be provided for Teaching**

**Osteology** – Bones identification (right and left side) and prominent features of clavicle, scapula, radius, ulna, humerus, femur, hip bone, sacrum, tibia, fibula.  
Surface Anatomy,

Radiology, X-ray Chest PA view, X-ray of limbs and X-ray abdomen:- -Names Views and identification

Specimens/Models, OSPE charts.

# **PHYSIOLOGY**

## **THEORY**

### **1) The Cell:**

- (I) Cell Structure and functions of the various organelles.
- (ii) Endocytosis and exocytosis
- (iii) Neuro muscular junction

### **2) The Blood:**

- (i) Composition of Blood, functions of the blood and plasma proteins:-
- (ii) Function of Hemoglobin
- (iii) Erythrocyte Sedimentation Rate.
- (iv) Detailed description about WBC-Total count (TC), Differential count (DC) and functions.
- (v) Platelets – formation and normal level and functions
- (vi) Blood groups and Rh factor

### **3) Cardiovascular System:**

- (i) Physiology of the heart
- (ii) Heart sounds
- (iii) Cardiac cycle, Cardiac output.
- (iv) Auscultatory areas.
- (v) Arterial pressures, blood pressure
- (vi) Hypertension
- (vii) Electro cardiogram (ECG)
- (viii) Cardio Pulmonary Resuscitation

### **4. Respiratory system:**

- (i) Respiratory movements.
- (ii) Definitions and Normal values of Lung volumes and Lung capacities.
- (iii). Oxygen saturation of Blood, Pulse Oximeter
- (iv) Surfactants

### **5. Excretory system:**

- (i) Normal Urinary output
- (ii) Micturition
- (iii) Renal function tests

## **6. Reproductive system:**

- (i) Reproductive organs
- (ii) Brief account of menstrual cycle.

## **7. Central Nervous system:**

- (i) Functions of CSF
- (ii) Functions of Cortex
- (iii) Sleep cycle
- (iv) Reticular activating system

## **8. Endocrine system:**

Functions of the pituitary, thyroid, parathyroid, adrenal and pancreatic Hormones.

## **9. Digestive system**

- (i) Physiological Anatomy of the GIT.
- (ii) Food Digestion in the mouth, stomach, intestine
- (iii) Absorption of foods and gastric emptying
- (iv) Role of bile in the digestion.
- (v) Vomiting mechanism

## **PRACTICAL**

- 1) The Compound Microscope
- 2) Determination of Pulse rate – Details on Pulse
- 3) Determination of Blood Groups.
- 4) Measurement of human blood pressure.
- 5) Examination of Respiratory system to count respiratory rate and measure inspiration and Expiration

## **BIO-CHEMISTRY**

### **Cellular**

### **Metabolism**

- (I)** Enzymes
- (II)** Co-enzymes
- (III)** Glucose Metabolism
- (IV)** Urea Cycles

## (V) Protein & lipid

Classifications and functions.

### **Vitamins & Minerals:**

Fat soluble vitamins (A, D, E, K) – Water soluble vitamins – B Complex vitamins-principalelements (Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chlorine and Sulphur)- Trace elements – Basal metabolic rate(BMR) – respiratory quotient(RQ) Specific dynamic action(SDA) – Balanced diet – Nutritional deficiency like Marasmus – and Kwashiorkor

### **Acids and bases:**

Definition, pH, Henderson – Hasselbalch equation, Buffers, Indicators, Normality, Molarity, Molality, Blood Gas Analysis

### **BIOCHEMISTRY SYLLABUS FOR PRACTICALS**

1. Benedict's test
2. Heat coagulation tests

### **PATHOLOGY**

1. Cellular adaptation, Cell injury & cell death. Introduction to pathology.

Overview: Cellular response to stress and noxious stimuli. Cellular adaptations of growth and differentiation. Overview of cell injury and cell death. Causes of cell injury. Mechanisms of cell injury. Reversible and irreversible cell injury. Examples of cell injury and necrosis

2. Inflammation.

General features of  
inflammation Acute  
inflammation

Chemical mediators of  
inflammation Chronic  
inflammation

3. Immunity disorders.

General features of the immune system  
Disorders of the immune system  
Hyper sensitivity reaction – I, II, III, IV

4. Infectious diseases.

General principles of microbial pathogenesis

Viral infections – HBV, HCV, HIV, CMV

Bacterial infections- Staphylococci, /streptococci, E-Coli, Salmonella, Tuberculosis.

Fungal infections

Parasitic infections

TORCH infection

5. Neoplasia

Definition

Nomenclature

Biology of tumor growth benign and malignant neoplasms

Carcinogenic agents and their cellular interactions Clinical features of tumors

6. Environmental and nutritional disorders. Occupational Hazards

Radiation injury

Marasmus

Kwashiorkor

PRACTICAL

SYLLABUS:

-

Specimens,

Models,

OSPE,

Stations,

CHARTS

## **ENGLISH**

Role of communication  
Defining Communication  
Classification of communication  
Purpose of communication  
Major difficulties in communication  
Barriers to communication  
Characteristics of successful communication – The seven Cs  
Communication at the work place  
Human needs and communication “Mind mapping”  
Information communication

### **Comprehension passage:**

Reading purposefully  
Understanding what is read  
Drawing Conclusion  
Finding and analysis

### **Explaining: -**

How to explain clearly  
Defining and giving reasons  
Explaining differences  
Explaining procedures  
Giving directions

### **Writing business letters: -**

How to construct correctly  
Formal language  
Address  
Salutation  
Body  
Conclusion

### **Report writing:**

Reporting an accident  
Reporting what happened at a session  
Reporting what happened at a meeting

## **BASICS OF COMPUTER SCIENCE**

### **COURSE CONTENT:**

Introduction to computer – I/O devices – memories – RAM and ROM – Different kinds of ROM – kilobytes, MB, GB their conversions – large computer – Medium, Micro, Mini computers – Different computer languages – Number system – Binary and decimal conversions – Different operating system – MS DOS – Basic commands – MD, CD, DIR, TYPE and COPY CON commands – Networking – LAN, WAN, MAN (only basic ideas)

Typing text in MS word – Manipulating text – Formatting the text – using different font sizes, bold, italics – Bullets and numbering – Pictures, file insertion – Aligning the text and justify – choosing paper size – adjusting margins – Header and footer, inserting page No's in a document – Printing a file with options – Using spell check and grammar – Find and replace – Mail merge – inserting tables in a document.

Creating table in MS-Excel – Cell editing – Using formulas and functions – Manipulating data with excel – Using sort function to sort numbers and alphabets– Drawing graphs and charts using data in excel – Auto formatting – Inserting data from other worksheets.

Preparing new slides using MS-POWERPOINT – Inserting slides – slide transition and animation – Using templates – Different text and font sizes – slides with sounds – Inserting clip arts, pictures, tables and graphs – Presentation using wizards.

Introduction to Internet – Using search engine – Google search – Exploring the next using Internet Explorer and Navigator – Uploading and Download of files and images – E-mail ID creation – Sending messages – Attaching files in E-mail – Introduction to “C” language – Different variables, declaration, usage – writing small programs using functions and sub – functions.

## **PRACTICAL**

Typing a text and aligning the text with different formats using MS-Word Inserting a table with proper alignment and using MS-Word

Create mail merge document using MS-word to prepare greetings for 10 friends Preparing a slide show with transition, animation and sound effect using MS-PowerPoint

Customizing the slide show and inserting pictures and tables in the slides using MS-PowerPoint

Creating a worksheet using MS-Excel with data and use of functions Using MS-Excel prepare a worksheet with text, date time and data Preparing a chart and pie diagrams using MS-Excel

Using Internet for searching, uploading files, downloading files creating e-mail ID Using C language writing programs using functions

## **B.Sc. Operation Theatre & Anaesthesia Technology Course**

### **Ilyear syllabus**

S.NO.	NAME OF THE SUBJECTS	TOTAL HOURS ALLOTTED
1.	PHARMACOLOGY	60 HOURS PER YEAR
2.	MICROBIOLOGY	60 HOURS PER YEAR
3.	MEDICINE & MEDICAL ETHICS	60 HOURS PER YEAR
4.	PRINCIPLES OF ANAESTHESIA- I	90 HOURS PER YEAR
5.	CLINICALS/THEATRES IN THE MORNINGS	12 HOURS PER WEEK

## **SYLLABUS FOR CLINICALS/THEATRES**

1. Sterilization assembly and packing
2. Principles of Sterile Techniques – Surgical scrub, gowning and gloving
3. Surgical instrumentation, handling instruments

### **Paper-1: Pharmacology and Microbiology**

#### **Pharmacology**

##### **ANTISIALAGOGUES**

Atropine, Glycopyrrolate

##### **SEDATIVES I ANXIOLYTICS**

Diazepam, Midazolam, Phenergan, Lorazepam, Chlorpromazine, Trichlofos

##### **NARCOTICS**

Morphine, Pethidine, Fentanyl, Pentazocine

##### **ANTIEMETICS**

Metoclopramide, Ondansetron, Dexamethasone

##### **ANTACIDS**

Na citrate, Gelusil, Mucaine gel.

##### **H2 BLOCKERS**

Cimetidine, Ranitidine, Famotidine

##### **INDUCTION AGENT**

Thiopentone, Diazepam, Midazolam, Ketamine, Propofol, Etomidate.

##### **MUSCLE RELAXANTS**

Depolarizing - Suxamethonium,  
Non depolarizing -Pancuronium, Vecuronium, Atracurium, rocuronium

##### **INTRODUCTION TO GENERAL ANAESTHESIA**

##### **INHALATIONAL GASES**

Gases - O<sub>2</sub>, N<sub>2</sub>O, Air

Agents - Ether-, Halothane, Isoflurane, Sevoflurane, Desflurane

##### **REVERSAL AGENTS**

Neostigmine, Glycopyrrolate, Atropine,  
Nalorphine, Naloxone, Flumazenil (Diazepam)

## ANTISEPTICS AND DISINFECTANTS

## STERILISATION AND CLEANING OF SURGICAL EQUIPMENTS

## LOCAL ANAESTHETICS

Xylocaine, Preparation, Local – Bupivacaine - Topical,  
Prilocaine-jelly, Emla - Ointment, Etidocaine. Ropivacaine

## EMERGENCY DRUGS

- Adrenaline: Mode of administration, dilution, dosage,
- Effects, Isoprenaline
- Atropine, bicarbonate, calcium, ephedrine, xylocard,
- Inotropes: dopamine, dobutamine, amiodaron
- Aminophylline, hydrocortisone, antihistaminic, potassium.
- Cardiovascular drugs
- Antihypertensives
- Antiarrhythmics
- Beta - Blockers
- Ca - Channel blockers.
- Vasodilators - nitroglycerin & sodium nitroprusside
  - Respiratory system - Bronchodilators, respiratory stimulants Broncho lytic agents
- Renal system - Diuretics, furosemide, mannitol
- Obstetrics - oxytocin, methergine
- Miscellaneous - Antibiotics NSAIDS Anticoagulants and Insulin

## **SYLLABUS FOR PRACTICALS: -**

Specimens, drugs, OSPE charts

## **Microbiology**

- Sterilization & decontamination- I
  - o Dry
  - o Filtration
  - o General Principles Asepsis
- Wound Infection & Urinary Tract Infections
- Blood stream Infections
- Respiratory tract Infection
- S.Typhi, Salmonella Paratyphi 'A', Salmonella Typhimurium

- Catheter, IV associated Infections
- Hospital acquired infections & prevention of hospital acquired infections
- Hepatitis C, HBV, HIV
- \* Hyper sensitivity reaction – Type I, II, III, IV

Biomedical Waste Management

### **SYLLABUS FOR PRACTICALS**

Biomedical waste management, color code  
OSPE charts

### **Paper-2: Medicine and Medical Ethics**

#### **MEDICINE**

1. Disorder of hemopoiesis - Anemias - iron deficiency anemia,
  2. Infectious diseases - Sepsis and septic stock, fever of unknown origin, infective endocarditis, infective of skin, muscle, soft tissue, infection control in hospital, diseases caused by bacteria, viruses, myobacterium, viruses, fungi and protozoa and helminths, common secondary infection in HIV.
3. Diseases of CVS - congenital RHD - Rheumatic fever, CAD, Peripheral vascular diseases.
4. Respiratory system - asthma pneumonia
5. Kidney & Urinary tract - acute renal failure, Glomerulonephritis, Hemodialysis, Transplant, Urinary tract infection
6. Liver and biliary tract disease - Viral hepatitis, alcoholism
7. Endocrinology and metabolism - Diabetes mellitus, Hyper - and hypothyroidism
8. Pain Medicine

#### **MEDICAL ETHICS**

1. Medical ethics - Definition - Goal - Scope
2. Code of conduct - Introduction -
3. 3. Basic principles of medical ethics – Confidentiality
4. Malpractice and negligence - Rational and irrational drug therapy
5. Autonomy and informed consent - Right of patients
6. Care of the terminally ill- Euthanasia
8. Organ transplantation

9. Medico legal aspects of medical records – Medicolegal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects

## **SYLLABUS FOR PRACTICALS**

Specimens  
OSPE charts

Paper:3 - **PRINCIPLES OF ANAESTHESIA - I**

### **1. MEDICAL GAS SUPPLY**

- Compressed gas cylinders
- Color coding
- Cylinder valves; pin index.
- Gas piping system
- Recommendations for piping system
- Alarms & safety devices.

### **2. ANAESTHESIA MACHINE**

- Hanger and yoke system
- Cylinder pressure gauge
- Pressure regulator
- Flow meter assembly
- Vaporizers - types, hazards, maintenance, filling and draining, etc.

### **3. BREATHING SYSTEM**

- General considerations: humidity & heat
- Common components - connectors, adaptors, reservoir bags.
- Capnography ETC o<sub>2</sub>
- Pulse oximetry
- Methods of humidification.
  - Classification of breathing system Mapleson system - a b c d e f  
Jackson Rees system, Bain circuit
- Non rebreathing valves - AMBU valves
- The circle system Components Soda lime, indicators

### **4. FACE MASKS & AIRWAY LARYNGOSCOPES**

- Types, sizes
- Endotracheal tubes - Types, sizes.
- Cuff system

- Fixing, removing and inflating cuff, checking tube position complications.
- \* Bougie
- \* LMA

## **5. ANAESTHESIA VENTILATOR AND WORKING PRINCIPLES.**

### **6. MONITORING**

- ECG
- SpO<sub>2</sub>
- Temperature
- IBP
- CVP
- PA Pressure
- LA Pressure

Bio Medical engineering of Trouble sorting Management, care of cleaning

## **7. BASIC ANAESTHETIC TECHNIQUES**

### **INTRODUCTION TO ANAESTHESIA**

General

Anesthesia

Regional

Anesthesia

Local Anesthesia

Intravenous Anesthesia

Minimum standard of anesthesia

Who should give anesthesia?

### **PRE-OP PREPARATION:**

Pre anesthetic assessment~ History – , past history - disease / Surgery / and personal history - Smoking / alcohol General physical assessment, systemic examination – CVS, RS, CNS

## **INVESTIGATIONS**

Hematological and their significance

Urine- Routine

Chest X-ray

Echocardiography

Angiography

Liver function test

Renal function test

Others

Case acceptance: ASA grading - I, II, III, IV, V

## **PRE - ANAESTHETIC ORDERS:**

Patient - Informed consent

- NPO guidelines
- Premedication - advantages, drugs used
- Special instructions - if any

Machine - Checking the machine

02, N20, suction apparatus

Laryngoscopes, ET tubes,  
airways

- Things for IV accessibility
- Other monitoring systems

Drugs - Emergency drugs

Anesthetic drugs

## **INTRAOPERATIVE MANAGEMENT**

- Confirm the identification of the patient
- Monitoring - minimum
- Noninvasive & Invasive monitoring
- Induction - drugs used
- Endotracheal intubation
  
- Maintenance of anesthesia
- Positioning of the patient
- Blood / fluid & electrolyte balance

- Reversal from anesthesia - drugs used
- Transferring the patient
- Recovery room – set up and things needed

## **POST OPERATIVE COMPLICATIONS & MANAGEMENT**

**Recovery and Delayed recovery  
Hypoxia and Oxygen Therapy PONV**

### **8. Basic Life Support**

Cardio Pulmonary  
Resuscitation

## **SYLLABUS FOR PRACTICALS**

Instruments  
Gas cylinders

## **B.Sc. Anesthesia Technology Course**

### **IIIrd year syllabus**

S.NO	NAME OF THE SUBJECTS	TOTAL HOURS ALLOTTED
1.	STERILISATION PROCEDURES	120 HOURS PER YEAR
2	PRINCIPLES OF ANAESTHESIA – II	150 HOURS PER YEAR
3.	CLINICALS/THEATRES IN THE MORNINGS	12 HOURS PER WEEK

### **SYLLABUS FOR CLINICAL/THEATRE**

1. Routine Maintenance of Equipment and Instruments
2. Laying out of Instrument, trolleys
3. Emphasis on Surgical Positions, Instruments required and the role of Theatre Assistant in various surgeries
4. Preparation of patient, aseptic techniques and draping
5. Special Instrument like Laparoscope, Endoscope, Monitors, C-arm
6. Trouble shooting in OT
7. Specimen labelling and handling
8. Exposure to Critical Care Unit for Surgical patients

### **Main Syllabus**

1. Sterilization Procedures
2. Regional anesthetic techniques
3. Anesthesia for specialty Surgeries.

### **Paper -1: Sterilization Procedures**

1. Waste disposal collection of used items from user area, reception protective clothing and disinfections sage guards, Bio-Medical wastes, Color cooling and management

2. use of disinfections sorting and classification of equipment for cleaning purposes, sharps, blunt lighted etc. contaminated high risk baby care - delicate instruments or hot care instruments,
3. Cleaning process - use of detergents. Mechanical cleaning apparatus, cleaning instruments,  
Cleaning jars, receivers bowl etc. trays, basins and similar hand ware utensils.  
Cleaning of catheters and tubings, cleaning glass ware, cleaning syringes and needles.
4. Materials used for wrapping and packing assembling pack contents. Types of packs prepared. Inclusion of trays and galliparts in packs. Method of wrapping and making use of indications to show that a pack of container has been through a sterilization process date stamping.
5. General observations principles of sterilization. Moist heat V. Nervous System. Dry heat Sterilization. EO gas sterilization. H2O2 gas plasma cap sterilization.

### **SYLLABUS FOR PRACTICALS**

OSPE charts, Instruments

#### **Paper-II: Principles of Anesthesia-II**

#### **Regional anesthetic techniques.**

- a. Local anesthetic technique
- b. Nerve blocks
- c. Spinal Anesthesia
- d. Epidural Anesthesia

## **Anesthesia for specialty Surgeries**

### **NEURO ANAESTHESIA**

- Glasgow coma scale
- Premedication
- Special investigation - CT, Angiography and MRI
- Checklist
- Induction of a patient
- Reinforced Endotracheal tubes
- Positioning in neuro surgery
- I.C.P.
- Air embolism
- Reversal of the patient
- Transferring to I.C.U. / Ward

### **OBSTETRIC ANAESTHESIA**

- Differences between a pregnant and a normal lady
- Risks for anesthesia.
- Precautions to be taken
- Check list
- Regional vs general anesthesia
- Induction / maintenance and recovery.
- Resuscitation of the new born, APGAR score
- Reversal and extubation
- Emergencies - manual removal of placenta
- A.P.H.
- P.P.H.
- Ruptures uterus
  - Ectopic Pregnancy

### **PAEDIATRIC ANAESTHESIA**

- Theatre setting
- Check list
- \* Fluid Calculation and administration
- Premedication - modes
- Induction
- Intubation - Securing the EIT
- Reversal & extubation – Problems
- Transferring / ICU management
- Pain management

### **ENT Anesthesia**

- Anesthesia for adenotonsillectomy
- Anesthesia for mastoidectomy

- Bronchoscopy and esophagoscopy

## **CARDIAC ANESTHESIA :**

- NYHA classification
- Arrhythmias
- Angina
- Dyspnea
- Special investigations
- Ecocardiography
- Premedication
- Setting up of monitoring system
- Monitoring - invasive and non - invasive
- Getting ready for the case
- Induction of cardiac patient, precautions to be taken
- Cardiopulmonary bypass
- Weaning of CPB
- Transferring the patient to ICU.
- Care to be taken
- I.C.U management.
  - Chest tube management

## **ANAESTHESIA OUTSIDE THE O.R.**

- Situations
- Radiology
- E.C.T.
- Short comings.

## **DAY CARE ANAESTHESIA**

- Special features
- Set up
- Advantages
- Disadvantages
- Complications
- Future

## **GERIATRIC ANAESTHESIA**

- Physiological changes
- Diseases of aging
- Nervous system
- Geriatric pharmacodynamics / pharmacokinetics
- Postoperative nervous system dysfunction.

## **ANAESTHESIA FOR TRAUMA & SHOCK**

- Resuscitation
- Pre-op investigation & assessment
- Circulatory management
- Management of anesthesia
- Rapid sequence induction
- Other problems

## **THORACIC ANAESTHESIA**

- Pulmonary function tests
- Bed side Vitalograph
- Preoperative preparation
- Premedication
- Check list
- Induction. Intubation
- Double lumen tubes
- monitoring
- Pain management
- Extubation
- ICU management

## **Postoperative problems**

Nausea & Vomiting

Sore throat

Laryngeal edema, Bronchospasm

Neurological complications.  
 Awareness  
 Vascular complications.  
 Trauma to teeth  
 Headache  
 Backache  
 Ocular complications  
 Auditory complications

**MAJOR CATASTROPHES**

- o Mortality
- o Causes of death o
- Cerebral damage o
- Prevention.

**SYLLABUS FOR PRACTICALS**

Instruments, OSPE charts

**B.Sc.DEGREE IN OPERATION THEATRE AND ANAESTHESIA TECHNOLOGY**  
**EXAMINATION PATTERN – I YEAR**

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**B.Sc. in Operation Theatre and Anaesthesia Technology**

S.NO.	SUBJECTS	THEORY		PRACTICAL		VIVA		INTERNAL ASSESSMENT	
		MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1.	BASIC SCIENCES *	100	50	100	50	50	25	50	20
2.	BASICS OF COMPUTER SCIENCE AND ENGLISH **	100	50	100	50	50	25	50	25

\*- Marks in Basic sciences to be allotted as Anatomy- 30% - Physiology -30% - Biochemistry - 20% & Pathology - 20%

\*\* - Basics of Computer science and English will be internal paper - Institution will send the marks to the University.

**B.Sc. DEGREE IN OPERATION THEATRE AND ANAESTHESIA TECHNOLOGY**  
**EXAMINATION PATTERN - II YEAR**

S.NO.	SUBJECTS	THEORY		PRACTICAL		VIVA		INTERNAL ASSESSMENT	
		MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1.	PHARMACOLOGY & MICROBIOLOGY	100	50	100	50	50	25	50	20
2.	MEDICINE & MEDICAL ETHICS	100	50	100	50	50	25	50	25
3.	PRINCIPLES OF ANAESTHESIA - I	100	50	100	50	50	25	50	25

**B.Sc.DEGREE IN OPERATION THEATRE AND ANAESTHESIA TECHNOLOGY**

## EXAMINATION PATTERN - III YEAR

B.Sc. Degree in Operation Theatre and Anesthesia Technology

S.NO.	SUBJECTS	THEORY		PRACTICAL		VIVA		INTERNAL ASSESSMENT	
		MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
1.	STERILISATION PROCEDURES	100	50	100	50	50	25	50	20
2.	PRINCIPLES OF ANAESTHESIA - II	100	50	100	50	50	25	50	25

### POSTINGS DURING ONE YEAR INTERNSHIP

1. Sterilisation room - 3 months.
2. Post -Operative room/ Recovery room – 3 months (Including Postings in Medical/Surgical Record room)
3. Surgical ICU - 3 months
4. Operation Theatre including
  - General surgery OT – 1 month
  - Obstetrics & Gynaecology OT – 1 month
  - Paediatrics OT – 15 days
  - Others – 15 days.

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# Master of Optometry

## Master of Optometry

### Eligibility for admission:

Bachelor of Optometry or equivalent from a recognised university with minimum 5.5 CGPA

### Duration of the course

The M Optom post graduate degree program is of two years duration.

Duration of the course: 2 years or 4 semesters. (4<sup>th</sup> Semester is internship for 6 months)

### Total hours –2310 (including clinical and research)

### Medium of instruction:

English shall be the medium of instruction for all the subjects of study and for examination of the course.

### Attendance:

A candidate has to secure minimum-

1. 75% attendance in theoretical
2. 80% in Skills training (practical) for qualifying to appear for the final examination.

### Assessment:

Assessments should be completed by the academic staff, based on the compilation of the student's theoretical & clinical performance throughout the training programme. To achieve this, all assessment forms and feedback should be included and evaluated.

### Credit details:

1 hour lecture per week	1 credit
2 hours of tutorials per week	1 credit
2 hours of clinics per week	1 credit

### Curriculum Outline

#### First Semester-

Sl. No.	Course Titles	Hours/week			IA*	UE**	Total marks (IA+ UE)	Total Credits
		L	P/ C/ R	Total contact hours				
<b>MOP101</b>	Epidemiology & Community eyecare	30		30	50	50	<b>100</b>	<b>2</b>
<b>MOP102</b>	Research Methodology & Biostatistics	45		45	50	50	<b>100</b>	<b>3</b>
<b>MOP103</b>	Ocular Diseases and Diagnostics I	75		75	50	50	<b>100</b>	<b>5</b>
<b>MOP104</b>	Research Project		12		50	50	<b>100</b>	<b>6</b>
<b>MOP105</b>	Clinic 1 (General)		16		50	50	<b>100</b>	<b>8</b>
<b>TOTAL</b>		<b>10</b>	<b>28</b>	<b>150</b>	<b>250</b>	<b>250</b>	<b>500</b>	<b>24</b>
<b>Total clinical+ Research hours: 420 hours</b>								
<b>Total Hours for First semester: 420 + 150 = 570 hours</b>								

## Second Semester

Sl. No.	Course Titles	Hours/week			IA*	UE**	Total marks (IA+UE)	Total Credits
		L	P/C	Total contact hours				
MOP201	Ocular Diseases and Diagnostics II	45		45	50	50	100	3
MOP202	Advanced Contact lens I	30		30	50	50	100	2
MOP203	Pediatric Optometry & Binocular vision	45		45	50	50	100	3
MOP204	Low Vision and Geriatric optometry	30		30	50	50	100	2
MOP205	Research Project		12		50	50	100	6
MOP206	Clinics (General )		6		50	50	100	3
MOP207	Clinics specialty		10		50	50	100	5
<b>TOTAL</b>			<b>28</b>	<b>150</b>	<b>350</b>	<b>350</b>	<b>700</b>	<b>24</b>
<b>Total Clinical+ Research hours: 420 hours</b>								
<b>Total Hours for First semester: 420 + 150 = 570 hours</b>								

## Third Semester

Sl. No.	Course Titles	Hours/week			IA*	UE**	Total marks (IA+UE)	Total Credits
		L	P/C	Total contact hours				
MOP301	Advanced contact lens II	30		30	50	50	100	2
MOP302	Low vision care and rehabilitation	30		30	50	50	100	2
MOP303	Vision Therapy	30		30	50	50	100	2
MOP304	Research Project		12		50	50	100	6
MOP305	Clinics (general)		6		50	50	100	3
MOP306	Clinics (specialty)		12		50	50	100	6
<b>TOTAL</b>			<b>30</b>	<b>90</b>	<b>300</b>	<b>300</b>	<b>600</b>	<b>21</b>
<b>Total clinical+ Research hours: 450 hours</b>								
<b>Total Hours for First semester: 450 + 90= 540 hours</b>								

## Fourth Semester

Sl. No.	Course Titles	Hours/week			IA*	UE**	Total marks (IA+UE)	Total Credits
		L	P/C	Total contact hours				
MOP401	Clinics (General)		8		50	50	100	4
MOP402	Clinics (Specialty)		20		50	50	100	10
MOP403	Research Project (Dissertation)		14		50	50	100	7
<b>TOTAL</b>			<b>42</b>		<b>150</b>	<b>150</b>	<b>300</b>	<b>21</b>
<b>Total clinical+ Research hours: 630 hours</b>								

## **EPIDEMIOLOGY AND COMMUNITY EYE CARE**

**INSTRUCTOR INCHARGE:** Public Health professional / Optometrist with higher degree and experience in teaching the course on epidemiology

**COURSE OBJECTIVES:** This course deals with the basics of ocular epidemiology and presents details on various eye diseases. It also introduces the students to the concepts of preventive measures and to inculcate the theoretical knowledge and clinical exposure of community optometry.

### **COURSE OUTCOMES:**

1. Thorough understanding of epidemiological concepts.
2. Thorough understanding of conducting of screening for specific eye conditions, and resultant implications through theoretical and practical exposure.

**TEXT BOOKS:** Epidemiology of eye diseases: Johnson and Gordon

### **COURSE PLAN (Total : 30 hours)**

1. Prevalence, incidence and distribution of visual impairment
2. Methodology
  - 2.1 Basics of Epidemiology study methods
  - 2.2 Types of study designs
  - 2.3 Screening for visual disorders
3. Childhood blindness
4. Refractive errors and presbyopia
5. Age related cataract
6. Low Vision
7. Diabetic retinopathy
8. Glaucoma
9. Age related Macular Degeneration
10. Vitamin A deficiency
11. Corneal and external diseases
12. Prevention strategies
13. Concept of Health and Disease
14. Principles of Epidemiology and Epidemiological Methods
15. Screening for Eye Disease – Refractive errors, Low Vision, Cataract, Diabetic retinopathy, Glaucoma, Amblyopia, Squint.
16. Blindness
17. Health Information and Basic Medical Statistics
18. Communication for Health Education
19. Health Planning and Management
20. Health care of community
21. How to plan and implement Vision2020

## RESEARCH METHODOLOGY

**INSTRUCTOR IN CHARGE:** M.Optom/PhD

**COURSE OBJECTIVES:** This course is designed to provide the students the basic knowledge in Bio-statistics. At the conclusion of the course, the students will have the knowledge of data collection, statistical application and finally, presentation of the statistical data.

### **COURSE OUTCOMES:**

1. Ability to write research proposal/grant application
2. Ability to do statistical analysis
3. Ability to write research articles (Medical writing)
4. Ability to critically evaluate the research material

### **TEXT /REFERENCE BOOKS:**

1. Methods in Biostatistics by B.K Mahajan
2. Probability and Statistics by Murray
3. Epidemiology of Eye Diseases, by Gordon and Drawin
4. Research Methodology by SM Israni

### **COURSE PLAN: (Total: 45 hours)**

1. Need for Research in optometry
2. Introduction to research methods , Conducting a literature review , Research design ,Sampling methods , Data collection and data collection tools , Data analysis : Quantitative and Qualitatively ,Public health research , Issues in Research .Writing skills for students
3. Introduction and method of collecting and presenting of statistical data
4. Calculation and interpretation of various measures like mean, median, standard deviations, Skewness and Kurtosis
5. Probability distribution
6. Correlation and regression
7. Significance tests and confidence intervals
8. Parametric tests –
  - 8.1 Test for single proportion
  - 8.2 Test for Equality of proportions
  - 8.3 Test for single mean
  - 8.4 Test for equality of means
9. ANOVA:-
  - 9.1 One way
  - 9.2 Two way
10. Non parametric tests –
  - 10.1 Chi-square tests
  - 10.2 Fisher's exact test
  - 10.3 McNemar test
  - 10.4 Mann-whitney U-test
  - 10.5 Median test
  - 10.6 Sign test
  - 10.7 Wilcoxon test

## **OCULAR DISEASES AND DIAGNOSTICS - I**

**INSTRUCTOR IN CHARGE:** Ophthalmologist/M. Optom

**COURSE OBJECTIVES:** Evidence based approach to Diagnosis, Clinical decision Making, Management and co management of anterior segment ocular diseases. Developing more reading ability of scientific journals for more evidence based management with recent understanding of diseases.

### **COURSE COMPETENCIES:**

1. Ability to perform clinical decision making for Ocular abnormalities
2. Ability to perform and interpret corneal diagnostics including
  - 2.1 Topography/Pentacam/Orbscan
  - 2.2 Specular microscopy
  - 2.3 Pachymetry
  - 2.4 Abberometry
  - 2.5 AS OCT UBM
3. Ability to perform pre and post Lasik evaluation
4. Ability to interpret glaucoma diagnostic reports
  - 4.1 OCT
  - 4.2 HRT
  - 4.3 GDx
  - 4.4 Gonioscopy
  - 4.5 ONH evaluation
5. Ability to perform anterior segment photography
6. Ability to manage and co-manage therapeutics for anterior segment
7. Referral criteria

### **TEXT/ REFERENCE BOOKS:**

1. Clinical Ophthalmology: Jack J Kanski
2. Diagnostics and imaging techniques in Ophthalmology: Amar Agarwal

### **COURSE PLAN: Total : 80 Hours**

1. Refresher of anterior segment ocular diseases, diagnosis and therapeutics
2. Refresher of glaucoma diagnosis and therapeutics
3. Surgical treatment of anterior segment diseases
4. Anterior segment Diagnostics
  - 4.1 Specular Microscopy
  - 4.2 Topography
  - 4.3 Corneal Hysteresis
  - 4.4 Orbscan, Pentacam
  - 4.5 Pachymetry
  - 4.6 Abberometry
  - 4.7 AS OCT
  - 4.8 HRT

- 4.9 GDx
- 4.10 ONH evaluation
- 4.11 Gonioscopy
- 4.12 Fluoresceinangiography
- 4.13 Refractive surgery
- 4.14 Cataract evaluation

### **RESEARCH PROJECT – Total: 180 hours**

Students will prepare the protocol during this semester after doing extensive literature search. Each student will be reporting to guide/supervisor who helps the student to go about in systematically. Research proposal need to be presented in front of the experts before going ahead with data collection. In institute which has Institute research board and ethics committee student can be encouraged to present the proposal in it.

### **CLINICS: GENERAL: Total - 240 hours**

**OBJECTIVES:** The objective of clinics in this semester is to be able to examine the eye and understand the all eye procedures with clinical management.

An approximate of guided 240 hours needs to be completed in this semester. The students will be by rotation go to community clinics, Campus clinics, and associated hospital and optical / optometric clinics.

The logbook has to be maintained and case sheets of each subject in the semester with complete management and follow up are mandatory for submission at the end of the semester

The log book needs to be signed by the supervisor during every visit. No case record will be considered without the supervisor's signature.

## *Second Semester*

### **OCULAR DISEASES AND DIAGNOSTICS – II**

**INSTRUCTOR IN CHARGE:** Ophthalmologist/M.Optom

**COURSE OBJECTIVES:** Evidence based approach to Diagnosis, Clinical decision Making, Management and co management of posterior segment diseases. Developing more reading ability of scientific journals for more evidence based management with recent understanding of diseases.

#### **COURSE COMPETENCIES:**

1. Ability to perform electro diagnostic procedures and interpret electro diagnostic reports
  - 1.1 ERG
  - 1.2 EOG
  - 1.3 VEP
2. Ability to perform stereoscopic fundus photography
3. Ability to use Ocular photography as tool for evidence based clinical decision making and progression analysis
4. Ability to perform posterior segment photography

5. Ability to manage and co-manage diseases and disorders of posterior segment

**TEXT/ REFERENCE BOOKS:**

1. Clinical Ophthalmology: Jack J Kanski
2. Diagnostics and imaging techniques in Ophthalmology: Amar Agarwal

**COURSE PLAN:** (Total: 45 Hours)

1. Refresher of posterior segment ocular diseases, diagnosis and therapeutics
2. Surgical treatment of posterior segment diseases
  - 2.1 Posterior segment Diagnostics
  - 2.2 ERG
  - 2.3 EOG
  - 2.4 VEP
  - 2.5 OCT
  - 2.6 Fundus photography
  - 2.7 Neuro optometric diseases and disorders

**ADVANCED CONTACT LENSES – I**

**INSTRUCTOR IN CHARGE: M.OPTOM/PhD/FIACLE**

**COURSE OBJECTIVES:** Upon completion of the course, the student should be able to understand the corneal oxygen requirements and recommend the best suitable contact lens for a particular condition. Management of ocular complications with contact lenses. Understand contact lens fitting for compromised corneas and keratoconus. The student should also be able to understand the fitting philosophy of orthokeratology and myopia control.

**COURSE COMPETENCIES:**

1. Ability to understand corneal physiology and oxygen needs
2. Ability to diagnose and manage complications due to contact lenses
3. Ability to fit specialized contact lenses
  - 3.1 Keratoconus
  - 3.2 Rose'Klenses
  - 3.3 Mini scleral lenses

**TEXT/ REFERENCE BOOKS:**

1. IACLE modules
2. Contact lenses – Stone and Philips

**COURSE PLAN:** (Total: 30 hours)

1. Anatomy and Physiology of the Cornea and related Structures
2. Contact Lens Materials
3. Microbiology, Lens Care and Maintenance
4. Tears and contact lenses
5. Optics and Lens Design
6. Clinical Instrumentation in contact lens practice
7. Rigid Gas Permeable corneal lens fitting

8. Soft contact lens fitting
9. Toric Contact lens fitting
10. Lens care regimen
11. Contact lens standards
12. Lens checking : Soft and Rigid
13. Contact lens complications
14. Special types of Contact lenses – diagnosis, surgery, protective, therapeutic, sports, partially sighted

## **PEDIATRIC OPTOMETRY AND BINOCULAR VISION**

**INSTRUCTOR IN CHARGE:** M.Optom/FCOVD

**COURSE OBJECTIVES:** Upon completion of the course, the student should be able to understand the, basic concept behind visual perception, binocular vision anomalies and management and co- management of strabismic, non-strabismic binocular vision disorders and amblyopia.

### **COURSE COMPETENCIES:**

1. Ability to diagnose and manage and co-manage binocular vision anomalies
2. Ability to co-manage visual perceptual anomalies
3. Ability to manage diplopia, suppression and ARC
4. Ability to manage amblyopia

### **TEXT/ REFERENCE BOOKS:**

1. Clinical management of binocular vision Mitchell Scheiman and Bruce Wick
2. Applied concepts in vision therapy: Leonard Press
3. Pediatric optometry: Jerome K Rosner

### **COURSE PLAN:** (Total: 45 hours)

1. Refractive Development:
  - 1.1 Early Refractive Development
  - 1.2 Visually Guided control of Refractive State: Animal Studies
  - 1.3 Infant Accommodation and Convergence
2. Oculomotor Function:
  - 2.1 Conjugate Eye Movements of Infants
  - 2.2 Development of the Vestibuloocular and Optokinetic reflexes
3. Spatial and Chromatic Vision:
  - 3.1 Front-end Limitations to Infant Spatial vision: Examination of two analyses
  - 3.2 Development of the Human Visual Field
  - 3.3 Development of Scotopic Retinal Sensitivity
  - 3.4 Infant Color vision
  - 3.5 Orientation and Motion selective Mechanisms in Infants
  - 3.6 Intrinsic Noise and Infant performance
4. Binocular Vision:
  - 4.1 Development of interocular vision in Infants
  - 4.2 Stereopsis in Infants and its developmental relation to visual acuity

- 4.3 Sensorimotor Adaptation and Development of the Horopter
- 4.4 Two stages in the development of Binocular Vision and Eye Alignment
- 5. Retinal and cortical Development
- 6. Abnormal Visual Development
- 7. What next in Infant Research
- 8. Clinical Applications:
  - 8.1 Assessment of Child Vision and Refractive Error
  - 8.2 Refractive Routines in the Examination of Children
  - 8.3 Cycloplegic Refraction
  - 8.4 Color Vision Assessment in Children
  - 8.5 Dispensing for the Child patient
  - 8.6 Pediatric Contact Lens Practice
  - 8.7 Dyslexia and Optometry Management
  - 8.8 Electrodiagnostic Needs of Multiple Handicapped Children
  - 8.9 Management Guidelines – Ametropia, Contant Strabismus
  - 8.10 Management Guidelines – Amblyopia
  - 8.11 Accommodation and Vergence anomalies
  - 8.12 Nystagmus
  - 8.13 Common genetic problems in Paediatric optometry
  - 8.14 Pediatric Ocular Diseases
  - 8.15 Ocular Trauma in Children
  - 8.16 Myopia control
  - 8.17 Clinical uses of prism

## **LOW VISION CARE AND GERIATRIC OPTOMETRY**

**INSTRUCTOR INCHARGE:** M.Optom/PhD

**COURSE OBJECTIVES:** Upon completion of the course, the student should be able to understand the best suitable low vision and functional assistive device for a particular condition and rehabilitation. This course gives both in-depth theoretical knowledge and clinical exposure in low vision care. The outcomes of this course are: Thorough understanding of the causes of the low vision, its functional and psychosocial consequences. Help visually impaired individuals to utilize their residual visual skills optimally and rehabilitate.

### **COURSE COMPETENCIES:**

1. Ability to diagnose and manage patients with vision impairment
2. Ability to perform specialized diagnostics for patients with low vision with multiple disabilities
  - 2.1 Rudimentary vision
  - 2.2 Berkeley visual field test
  - 2.3 Hand disc perimetry
3. Ability to train for eccentric viewing and steady eye techniques
4. Ability to rehabilitate patients with VI with vocational counselling and activities of daily living

**TEXT/ REFERENCE BOOKS:** The lighthouse handbook on vision impairment and Vision rehabilitation: Barbara Silverstone, Mary Ann Lang, Bruce Rosenthal, Faye.

## **COURSE PLAN (Total: 30 hours)**

1. Visual Disorders – Medical Perspective
  - 1.1 The Epidemiology of Vision Impairment
  - 1.2 Vision Impairment in the pediatric population
  - 1.3 Ocular Diseases :
    - 1.3.1 Age – Related Cataract,
    - 1.3.2 Glaucoma
    - 1.3.3 ARMD
    - 1.3.4 Diabetic retinopathy
    - 1.3.5 Corneal Disorders
    - 1.3.6 Ocular Trauma
    - 1.3.7 Sensory Neuro-ophthalmology and Vision Impairment
    - 1.3.8 Refractive Disorders
2. Visual Disorders – The Functional Perspective
  - 2.1 Low Vision and Psychophysics
  - 2.2 Visual Functioning in Pediatric Populations with Low Vision
  - 2.3 Perceptual correlates of Optical Disorders
  - 2.4 Functional aspects of Neural Visual Disorders of the eye and Brain
  - 2.5 Visual Disorders and Performance of specific Tasks requiring vision
3. Visual Disorders – The Psychosocial Perspective
  - 3.1 Developmental perspectives – Youth
  - 3.2 Vision Impairment and Cognition
  - 3.3 Spatial orientation and Mobility of people with vision impairments
  - 3.4 Social skills Issues in vision impairment
  - 3.5 Communication and language: Issues and concerns
  - 3.6 Developmental perspectives on Aging and vision loss
  - 3.7 Vision and cognitive Functioning in old age
4. Interactions of Vision Impairment with other Disabilities and sensory Impairments.
  - 4.1 Children with Multiple Impairments
  - 4.2 Dual Vision and Hearing Impairment
  - 4.3 Diabetes Mellitus and Vision Impairment
  - 4.4 Vision Problems associated with Multiple Sclerosis
  - 4.5 Vision Impairment related to Acquired Brain Injury
  - 4.6 Vision and Dementia
  - 4.7 Low Vision and HIV infection
5. The Environment and Vision Impairment: Towards Universal Design
  - 5.1 Indian Disabilities act
  - 5.2 Children’s Environments
  - 5.3 Environments of Older people
  - 5.4 Outdoor environments
  - 5.5 Lighting to enhance visual capabilities
  - 5.6 Signage and way finding

- 5.7 Accessible Environments through Technology
- 6. Vision Rehabilitation:
  - 6.1 In Western Countries
  - 6.2 In Asia
  - 6.3 Personnel preparation in Vision Rehabilitation
- 7. Psychological and social factors in visual Adaptation and Rehabilitation
  - 7.1 The Role of psychosocial Factors in adaptation to vision Impairment and Habilitation outcomes for Children and Youth
  - 7.2 The Role of psychosocial Factors in adaptation to vision Impairment and Habilitation outcomes for Adults and Older adults
  - 7.3 Social support and adjustment to vision Impairment across the life span
  - 7.4 The person – Environment perspective of vision impairment
  - 7.5 Associated Depression, Disability and rehabilitation
  - 7.6 Methodological strategies and issues in social research on vision Impairment and rehabilitation

### **RESEARCH PROJECT:**

Data Collection and submit the progress of the research at the end of the semester.

### **CLINIC: GENERAL OBJECTIVES:**

The objective of clinics in this semester is to be able to examine the eye and understand the all eye procedures with clinical management.

An approximate of guided 240 hours needs to be completed in this semester. The students will be by rotation go to community clinics, Campus clinics, and associated hospital and optical / optometric clinics.

The logbook has to be maintained and case sheets of each subject in the semester with complete management and follow up are mandatory for submission at the end of the semester

The log book needs to be signed by the supervisor during every visit. No case record will be considered without the supervisor's signature

### **CLINIC: SPECIALITY**

**OBJECTIVES:** The objective of clinics in this semester is to be able to gets hand-on experience related to diagnosis, interpretation of the reports/findings and management.

An approximate of guided 240 hours needs to be completed in this semester. The students will be by rotation go to community clinics, Campus clinics, and associated hospital and optical / optometric clinics.

The focus will be on the specialized subjects studies in this semester.

The logbook has to be maintained and case sheets of each subject in the semester with complete management and follow up are mandatory for submission at the end of the semester

The log book needs to be signed by the supervisor during every visit. No case record will be considered without the supervisor's signature

## **ADVANCED CONTACT LENSES – II**

**INSTRUCTOR IN CHARGE:**M.OPTOM/PhD/FIACLE

**COURSE OBJECTIVES:** Upon completion of the course, the student should be able to understand the corneal oxygen requirements and recommend the best suitable contact lens for a particular condition. Management of ocular complications with contact lenses. Understand contact lens fitting for compromised corneas and keratoconus. The student should also be able to understand the fitting philosophy of orthokeratology and myopia control.

### **COURSE COMPETENCIES:**

1. Ability to fit specialized contact lenses
  - 1.1 Keratoconus
  - 1.2 Rose'Klenses
  - 1.3 Mini scleral lenses
  - 1.4 Hybrid lenses
  - 1.5 Orthokeratology
  - 1.6 Scleral lenses: Dry eyes, SJS, Post PK, Post C3R, Post LASIK ectasia
2. Ability to fit custom made ocular prosthesis
3. Ability to fit pediatric contact lenses

### **TEXT/ REFERENCE BOOKS:**

1. IACLE MODULES
2. CONTACT LENSES – STONE AND PHILIPS

### **COURSE PLAN: (Total: 30 hours)**

1. Extended and Continuous wear Lenses
2. Scleral Contact lenses
3. Bifocal and Multifocal contact lenses
4. Orthokeratology
5. Keratoconus
6. Post keratoplasty contact lens fitting
7. Post refractive surgery contact lens fitting
8. Pediatric contact lens fitting
9. Cosmetic and prosthetic contact lens fitting
10. Contact lens for abnormal ocular conditions
11. Contact lens and Myopia control
12. Legal issues and contact lenses
13. Contact lens manufacturing
14. Modifications procedures

## LOW VISION CARE AND REHABILITATION

**INSTRUCTOR IN CHARGE:** M.Optom/PhD

**COURSE OBJECTIVES:** Upon completion of the course, the student should be able to understand the best suitable low vision and functional assistive device for a particular condition and rehabilitation. This course gives both in-depth theoretical knowledge and clinical exposure in low vision care. The outcomes of this course are: Thorough understanding of the causes of the low vision, its functional and psychosocial consequences. Help visually impaired individuals to utilize their residual visual skills optimally and rehabilitate.

### **COURSE COMPETENCIES:**

1. Ability to diagnose and manage patients with vision impairment
2. Ability to perform specialized diagnostics for patients with low vision with multiple disabilities
3. Ability to train for eccentric viewing and steady eye techniques
4. Ability to rehabilitate patients with VI with vocational counselling and activities of daily living

**TEXT/ REFERENCE BOOKS:** The lighthouse handbook on vision impairment and Vision rehabilitation: Barbara Silverstone, Mary Ann Lang, Bruce Rosenthal, Faye.

### **COURSE PLAN: (Total – 30 hours)**

1. Habilitation of Children and Youth with vision Impairment
2. Rehabilitation of working –age Adults with Vision Impairment
3. Rehabilitation of older Adults with Vision Impairment
4. Functional consequences of vision Impairment
5. Vision evaluation of Infants
6. Educational assessment of visual function in Infants and Children
7. Functional Evaluation of the Adult
8. Functional orientation and Mobility
9. Functional Assessment of Low Vision for Activities of Daily living
10. Psychosocial assessment of adults with vision impairment
11. Assistive Devices and Technology for Low Vision
12. Assistive Devices and Technology for Blind
13. Vision and Reading - Normal Vs Low Vision
14. Clinical Implications of color vision Deficiencies

## VISION THERAPY

**INSTRUCTOR IN CHARGE:**FCOVD/M.Optom

**COURSE OBJECTIVES:** The course is designed to help expand the student's knowledge base in all aspects of behavioural vision care. Advanced competency is expected in the following principles and procedures for each clinical condition.

### **COURSE COMPETENCIES:**

Principles and Procedures – The student should be able to define and explain:

1. The unique qualities, scientific, and clinical principles of each clinical condition.
2. The epidemiological and demographic characteristics of each clinical condition.
3. The characteristic history, signs and symptoms for each clinical condition.
4. How to assess each clinical condition, including specific test protocols and their interpretation.
5. The differential diagnosis for each clinical condition.
6. The specific treatment and management of each clinical condition including:
  - 6.1 Prognostic indicators
  - 6.2 Treatment options
  - 6.3 Duration and frequency of treatment
  - 6.4 Treatment philosophy and goals
  - 6.5 Specific lens treatment and therapy procedures including rationale for treatment
  - 6.6 Ergonomics and visual hygiene
  - 6.7 Outcomes to determine successful completion of treatment
  - 6.8 Frequency of follow-up care and patient instructions
  - 6.9 Referral criteria (medical, neurological, educational, etc.)

**TEXT/ REFERENCE BOOKS:**

1. Clinical management of binocular vision Mitchell Scheiman and Bruce Wick
2. Applied concepts in vision therapy: Leonard Press

**COURSE PLAN: (Total - 30 hours)**

1. Clinical Conditions
  - 1.1 Strabismus and Amblyopia
    - 1.1.1 Amblyopia
      - Anisometropic / Isometropic Refractive Amblyopia
      - Strabismic Amblyopia
      - Hysterical Amblyopia
      - Form Deprivation Amblyopia
      - Differential diagnoses in childhood visual acuity loss
    - 1.1.2 Strabismus
      - Esotropia-
        - Infantile
        - Accommodative
        - Acquired
        - Microtropia
        - Sensory
        - Convergence Excess
        - Divergence Insufficiency
        - Non-accommodative
        - Sensory Adaptations
      - Exotropia
        - Divergence Excess
        - Convergence Insufficiency

- Basic Exotropia
  - Congenital
  - Sensory
  - Vertical Deviations
  - Noncomitant Deviations (AV Syndrome; Duane's Retraction Syndrome; Brown's Syndrome; III, IV, VI nerve palsy, etc.)
  - Differential diagnoses in strabismus
  - Special clinical considerations
    - Anomalous Correspondence
    - Eccentric Fixation
    - Suppression
    - Motor Ranges
    - Stereopsis
    - Horror fusionalis/intractable diplopia
- 1.2 Perception and Information Processing
- 1.2.1 Neurological / Psychological
- Ambient / focal systems.
  - Visual perceptual midline
  - Parvo cellular / Magno cellular function
  - Perceptual Style (central, peripheral)
  - Impact of colored filters
  - Attention
- 1.2.2 Intersensory and Sensorimotor Integration
- Visual-auditory
  - Visual-vestibular
  - Visual-oral
  - Visual-motor
  - Visual-tactual
- 1.2.3 Performance indicators
- Laterality and directionality
  - Visual requirements for academic success
  - Bilaterality
  - Gross and fine motor ability
  - Form perception/visual analysis
  - Spatial awareness
  - Visualization
  - Visual memory
  - Visual sequential memory
  - Form constancy
  - Visual speed and visual span
  - Visual sequencing
- 1.3 Refractive conditions and visual skills
- 1.3.1 Refractive Conditions
- Developmental influence on refraction & emmetropization

- Aniseikonia
  - Myopia
  - Astigmatism
  - Hyperopia
- 1.3.2 Ocular Motor Function
- Eye movements and reading
  - Pursuit dysfunctions
  - Nystagmus
  - Saccadic Dysfunctions
- 1.3.3 Accommodation
- Role in myopia development
  - Role in computer-related asthenopia
- 1.3.4 Fusion in Non-Strabismic Conditions
- Fixation disparity
  - Motor fusion
  - Sensory fusion
- 1.4 Special clinical conditions
- 1.4.1 Acquired brain injury (traumatic brain injury {TBI} and stroke)
- 1.4.2 Developmental disabilities (Down Syndrome, Developmental delay, etc.)
- 1.4.3 Visually induced balance disorders
- 1.4.4 Motor disabilities (Cerebral Palsy, ataxia, etc.)
- 1.4.5 Behavioral disorders
- 1.4.6 Autism spectrum disorders
- 1.4.7 ADD / ADHD
- 1.4.8 Dyslexia and specific reading disabilities
- 1.4.9 Learning Disabilities
- 1.4.10 Computer Vision Syndrome
2. Vision Therapy Concepts to Consider
- 2.1 Peripheral awareness:
- 2.1.1 focal / ambient roles
- 2.1.2 Significant findings which are good or poor prognostic indicators of vision therapy and lens application
- 2.1.3 Development, rehabilitation, prevention, enhancement
- 2.1.4 Behavioral lens application
- 2.1.5 Yoked prism rationale for treatment and application
- 2.1.6 The relationship between the visual and vestibular systems
- 2.1.7 SILO/SOLI
- 2.1.8 Visual stress and its impact on the visual system
- 2.1.9 Role of posture in vision development, comfort and performance
- 2.1.10 Disruptive therapy: Discuss this type of therapy and how it can be used as a clinical therapeutic tool.
- 2.1.11 Relationship of speech-auditory to vision
- 2.1.12 How television, reading, video gaming might restrict movement, computer work, nutrition, etc., impact vision?
- 2.1.13 Perceptual Style, e.g., spatial/temporal, central/peripheral

## **RESEARCH PROJECT:**

Data Collection, Literature search , Presentation of the progress of the project to the guide.

## **CLINIC: GENERAL**

**OBJECTIVES:** The objective of clinics in this semester is to be able to examine the eye and understand the all eye procedures with clinical management.

An approximate of guided 240 hours needs to be completed in this semester. The students will be by rotation go to community clinics, Campus clinics, and associated hospital and optical / optometric clinics.

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The log book needs to be signed by the supervisor during every visit. No case record will be considered without the supervisor's signature

## **CLINIC: SPECIALITY**

**OBJECTIVES:** The objective of clinics in this semester is to be able to gets hand-on experience related to diagnosis, interpretation of the reports/findings and management.

An approximate of guided 240 hours needs to be completed in this semester. The students will be by rotation go to community clinics, Campus clinics, and associated hospital and optical / optometric clinics.

The focus will be on the specialized subjects studies in this semester.

The logbook has to be maintained and case sheets of each subject in the semester with complete management and follow up are mandatory for submission at the end of the semester

The log book needs to be signed by the supervisor during every visit. No case record will be considered without the supervisor's signature

## *Fourth Semester*

## **RESEARCH PROJECT:**

Literature search, Data analysis, Interim Analysis, Thesis write-up, Presentation of the research work in front of the experts, and manuscript write –up for journal (optional)

## **LINIC: GENERAL OPTOMETRY**

## **OCULAR DISEASES AND DIAGNOSTICS - I**

### **COURSE COMPETENCIES:**

1. Ability to perform clinical decision making for Ocular abnormalities
2. Ability to perform and interpret corneal diagnostics including
  - 2.1 Topography/Pentacam/Orbscan
  - 2.2 Specular microscopy
  - 2.3 Pachymetry
  - 2.4 Abberometry

- 2.5 AS OCT UBM
- 3. Ability to perform pre and post Lasik evaluation
- 4. Ability to interpret glaucoma diagnostic reports
  - 4.1 OCT
  - 4.2 HRT
  - 4.3 GDx
  - 4.4 Gonioscopy
  - 4.5 ONH evaluation
- 5. Ability to perform anterior segment photography and ophthalmic imaging
- 6. Ability to manage and co-manage therapeutics for anterior segment

## **OCULAR DISEASES AND DIAGNOSTICS - II**

### **COURSE COMPETENCIES:**

- 1. Ability to perform electro diagnostic procedures and interpret electro diagnostic reports
  - 1.1 ERG
  - 1.2 EOG
  - 1.3 VEP
- 2. Ability to perform stereoscopic fundus photography
- 3. Ability to use Ocular photography as a tool for evidence based clinical decision making and progression analysis
- 4. Ability to perform posterior segment photography
- 5. Ability to manage and co-manage diseases and disorders of posterior segment

## **LOW VISION CARE**

### **COURSE COMPETENCIES:**

- 1. Ability to diagnose and manage patients with vision impairment
- 2. Ability to perform specialized diagnostics
  - 2.1 Rudimentary vision
  - 2.2 Berkeley visual field test
  - 2.3 Hand disc perimetry
- 3. Ability to train for eccentric viewing and steady eye techniques
- 4. Ability to rehabilitate patients with VI with vocational counselling and activities of daily living

## **PEDIATRIC OPTOMETRY AND BINOCULAR VISION:**

### **COURSE COMPETENCIES:**

- 1. Ability to diagnose and manage and co-manage binocular vision anomalies
- 2. Ability to co-manage visual perceptual anomalies
- 3. Ability to manage diplopia, suppression and ARC
- 4. Ability to manage amblyopia

## **ADVANCED CONTACT LENSES – I**

### **COURSE COMPETENCIES:**

1. Ability to understand corneal physiology and oxygen needs
2. Ability to diagnose and manage complications due to contact lenses
3. Ability to fit specialized contact lenses
  - 3.1 Keratoconus
  - 3.2 Rose'Klenses
  - 3.3 Mini scleral lenses

## **ADVANCED CONTACT LENSES – II**

### **COURSE COMPETENCIES:**

1. Ability to fit specialized contact lenses
  - 1.1 Keratoconus
  - 1.2 Rose'Klenses
  - 1.3 Mini scleral lenses
  - 1.4 Hybrid lenses
  - 1.5 Orthokeratology
  - 1.6 Scleral lenses: Dry eyes, SJS, Post PK, Post C3R, Post LASIK ectasia
2. Ability to fit custom made ocular prosthesis
3. Ability to fit pediatric contact lenses

## **VISION THERAPY**

### **COURSE COMPETENCIES:**

1. Principles and Procedures – The student should be able to define and explain:
  - 1.1 The unique qualities, scientific, and clinical principles of each clinical condition.
  - 1.2 The epidemiological and demographic characteristics of each clinical condition.
  - 1.3 The characteristic history, signs and symptoms for each clinical condition.
  - 1.4 How to assess each clinical condition, including specific test protocols and their interpretation.
  - 1.5 The differential diagnosis for each clinical condition.
  - 1.6 The specific treatment and management of each clinical condition including:
    - 1.6.1 Prognostic indicators
    - 1.6.2 Treatment options
    - 1.6.3 Duration and frequency of treatment
    - 1.6.4 Treatment philosophy and goals
    - 1.6.5 Specific lens treatment and therapy procedures including rationale for treatment
    - 1.6.6 Ergonomics and visual hygiene
    - 1.6.7 Outcomes to determine successful completion of treatment
    - 1.6.8 Frequency of follow-up care and patient instructions
    - 1.6.9 Referral criteria (medical, neurological, educational, etc.)

1. PATIENT HISTORY
  - 1.1 Communicates with the patient
    - 1.1.1 Modes and methods of communication are employed which take into account the physical, emotional, intellectual and cultural background of the patient.
    - 1.1.2 A structured, efficient, rational and comfortable exchange of information between the optometrist and the patient takes place.
  - 1.2 Makes general observations of patient
  - 1.3 Obtains the case history
  - 1.4 Obtains and interprets patient information from other professionals
2. PATIENT EXAMINATION
  - 2.1 Formulates
    - 2.1.1 An examination plan based on the patient history is designed to obtain the information necessary for diagnosis and management.
    - 2.1.2 Tests and procedures appropriate to the patient's condition and abilities are selected.
  - 2.2 Implements examination plan
    - 2.2.1 Tests and procedures which will efficiently provide the information required for diagnosis are performed.
    - 2.2.2 The examination plan and procedures are progressively modified on the basis of findings.
  - 2.3 Assesses the ocular adnexae and the eye
    - 2.3.1 The structure and health of the ocular adnexae and their ability to function are assessed.
    - 2.3.2 The structure and health of the anterior segment and its ability to function are assessed.
    - 2.3.3 The structure and health of the ocular media and their ability to function are assessed.
    - 2.3.4 The structure and health of the posterior segment and its ability to function are assessed.
    - 2.3.5 The nature of the disease state is determined.
    - 2.3.6 Microbiological tests are selected and ordered
  - 2.4 Assesses central and peripheral sensory visual function and the integrity of the visual pathways
    - 2.4.1 Vision and visual acuity are measured.
    - 2.4.2 Visual fields are measured.
    - 2.4.3 Colour vision is assessed.
    - 2.4.4 Pupil function is assessed.
  - 2.5 Assesses refractive status
  - 2.6 Assesses oculomotor and binocular function.
    - 2.6.1 Eye alignment and the state of fixation are assessed.
    - 2.6.2 The quality and range of the patient's eye movements are determined.
    - 2.6.3 The status of sensory fusion is determined.
    - 2.6.4 The adaptability of the vergence system is determined.
    - 2.6.5 Placement and adaptability of accommodation are assessed.
  - 2.7 Assesses visual information processing

- 2.7.1 Visual perceptual abilities are assessed.
- 2.7.2 Visual-motor integration is assessed.
- 2.8 Assesses the significance of signs and symptoms found incidental to the ocular examination in relation to the patient's eye and/or general health.
  - 2.8.1 Pertinent non-ocular signs and symptoms found incidentally during the ocular examination are identified and considered.
  - 2.8.2 Ensures that significant non-ocular signs and symptoms are investigated.
- 3. DIAGNOSIS
  - 3.1 Interprets and analyses findings to establish a diagnosis or diagnoses.
    - 3.1.1 Accuracy and validity of test results and information from the case history and other sources are critically appraised.
    - 3.1.2 Test results and other information are analysed, interpreted and integrated to establish the diagnosis or diagnoses.
- 4. PATIENT MANAGEMENT
  - 4.1 Designs a management plan for each patient and implements the plan agreed to with the patient.
    - 4.1.1 The diagnosis is presented and explained to the patient.
    - 4.1.2 Consideration is given to the relative importance or urgency of the presenting problems and examination findings.
    - 4.1.3 Management options to address the patient's needs are explained.
    - 4.1.4 A course of management is chosen with the patient, following counselling and explanation of the likely course of the condition, case management and prognosis.
    - 4.1.5 The informed consent of the patient is obtained for the initiation and continuation of treatment.
    - 4.1.6 Patients requiring ongoing care and review are recalled as their clinical condition indicates, and management is modified as indicated.
  - 4.2 Prescribes spectacles
    - 4.2.1 The suitability of spectacles as a form of correction for the patient is assessed.
    - 4.2.2 The patient's refraction, visual requirements and other findings are applied to determine the spectacle prescription.
  - 4.3 Prescribes contact lenses
    - 4.3.1 The suitability of contact lenses as a form of correction for the patient is assessed.
    - 4.3.2 The patient's refraction, visual requirements and other findings are applied to determine the contact lens prescription.
    - 4.3.3 Therapeutic and cosmetic contact lenses are recommended and prescribed.
    - 4.3.4 Contact lenses are correctly ordered and on receipt, parameters are verified before the lenses are supplied to the patient.
    - 4.3.5 Contact lenses are checked on the eye for physical fitting and visual performance.
    - 4.3.6 The patient is instructed in matters relating to ocular health and vision in contact lens wear, contact lens care and maintenance.
    - 4.3.7 Contact lens performance, ocular health and patient adherence to wearing and maintenance regimen is monitored.
  - 4.4 Prescribes low vision devices.

- 4.4.1 A range of low vision devices is demonstrated.
- 4.4.2 Low vision devices suited to the patient's visual requirements and functional needs are prescribed.
- 4.4.3 The patient is instructed in the use of the low vision device.
- 4.4.4 The success of the low vision device is evaluated and monitored and additional or alternative devices are prescribed.
- 4.4.5 The patient is informed of and, if necessary, referred to other rehabilitative services.
- 4.5 Prescribes pharmacological treatment regimens
  - 4.5.1 Selects appropriate pharmacological agents for the treatment of the patient's condition.
    - Microbiological factors are considered in the choice of therapeutic agent(s)
    - Pharmacological factors are considered in the choice of therapeutic agent(s)
    - Systemic factors are considered in the choice of therapeutic agent(s)
    - Ocular factors are considered in the choice of therapeutic agent(s)
    - Available delivery systems are considered in the choice of therapeutic agent(s)
    - Drug substitution factors are considered in the choice of therapeutic agent(s)
  - 4.5.2 Prescribes therapeutic drugs.
  - 4.5.3 Monitors and modifies treatment regimen.
  - 4.5.4 Instructs/counsels patient on the correct use of the prescribed drugs.
  - 4.5.5 Patients are instructed about precautionary procedures and non-therapeutic management.
- 4.6 Dispenses optical prescriptions accurately.
  - 4.6.1 The prescription is interpreted and responsibility for dispensing is accepted.
  - 4.6.2 The patient is assisted in selecting an appliance.
  - 4.6.3 Lenses are ordered and fitted to spectacle frames in accordance with accepted standards.
  - 4.6.4 The appliance is verified against the prescription prior to delivery.
  - 4.6.5 The appliance is adjusted and delivered and the patient is instructed in the proper use and maintenance of the appliance and of any adaptation effects which may be expected.
- 4.7 Manages patients requiring vision therapy.
  - 4.7.1 Treats patients diagnosed with accommodative, vergence, strabismic and amblyopic conditions.
  - 4.7.2 The patient is instructed in the use and maintenance of vision training equipment.
  - 4.7.3 Goals of the vision therapy program and criteria for discharge are set.
  - 4.7.4 Progress of the vision therapy program is monitored.
- 4.8 Treats ocular disease and injury.
  - 4.8.1 Non-pharmacological treatment or intervention procedures are performed.
  - 4.8.2 Pharmacological and/or other regimens are instituted and therapeutic devices are introduced to treat eye conditions.
  - 4.8.3 The patient is instructed in the use, administration, storage and disposal of pharmaceutical agents.

- 4.8.4 The effect of treatment is monitored and changes in management are recommended.
- 4.9 Refers the patient.
  - 4.9.1 The need for referral to other professionals for assessment and/or treatment is recognised and discussed with the patient.
  - 4.9.2 A suitable professional is recommended to the patient.
  - 4.9.3 Timely referral, with supporting documentation, is made to other professionals.
  - 4.9.4 Patients can be jointly managed with other health care practitioners.
- 4.10 Co-operates with ophthalmologist in the provision of pre- and post-operative management of patients.
  - 4.10.1 Provides pre-operative assessment and advice.
  - 4.10.2 Provides post-surgical follow-up assessment and monitoring of signs according to the surgeon's requirements and the procedure undertaken.
  - 4.10.3 Provides emergency management for observed post-surgical complication.
  - 4.10.4 Arranges appropriate referral for further post-operative treatment or assessment of complications.
- 4.11 Provides advice on vision in the workplace.
  - 4.11.1 Visual screenings for occupational or other purposes are provided.
  - 4.11.2 Advice is provided on eye protection, visual standards and visual ergonomics in the workplace.
  - 4.11.3 Individuals are counselled on the suitability of their vision for certain occupations.
  - 4.11.4 Certification of an individual's visual suitability for designated occupations or tasks is provided.
- 5. RECORDING OF CLINICAL DATA
  - 5.1 Ensures that data is organised in a legible, secure, accessible, permanent and unambiguous manner.
    - 5.1.1 All relevant information pertaining to the patient is recorded in a format which is understandable and useable by the optometrist and his/her colleagues.
    - 5.1.2 Patient records are kept in a readily retrievable format and are physically secure.
  - 5.2 Maintains confidentiality of patient records.
    - 5.2.1 Understands the need to ensure that access to records is limited to authorised personnel.
    - 5.2.2 Information from patient records and/or obtained from patients is released only with the consent of the patient.



**SANTOSH**  
Deemed to be University