Syllabus for MD Anatomy, Faculty of Medicine & Health Sciences

CURRICULUM

A. Goal: To prepare the postgraduate student to become an exemplary teacher and a research scientist par excellence. To achieve this goal, the postgraduate student in Anatomy should be given an overall exposure to the subject, teaching methodologies and a sound grounding in research technologies.

B. Learning objectives: To achieve this goal, the following objectives must be fulfilled.

I. Cognitive domain : At the end of three years of postgraduate training the student should be able to

1. Describe the gross anatomy of the human body and correlate the knowledge of structure and function.
2. Describe the microanatomy including cytology of various structures of the human body and compare the knowledge of microstructure with function and interpret it accordingly.
3. Interpret the anatomical basis of symptoms and signs of clinical conditions, diagnostic procedures and treatment modalities.
4. Describe the developmental aspects of human body and interpret the developmental basis of various congenital anomalies.
5. Describe the neuroanatomy in its entirety and interpret the neuroanatomical basis of various clinical conditions.
6. Explain various aspects of genetics and describe genetic basis of disorders and principles of genetics counseling.
7. Explain and interpret radiological anatomy and sectional anatomy of the human body as studied by various imaging techniques.
8. Comprehend surface and living anatomy of the human body.
9. Relate forensic anatomy to the study with medicolegal aspects of bone in particular.
10. Explain the general principles of Anatomy Act and Transplant of Human Organ Act.
11. Explain the process of embalming.
12. Comprehend ethical aspects of biomedical research.
13. Comprehend the basis of disposal of biomedical waste.
14. Comprehend horizontal integration of various subdivisions of anatomy with relevant physiology and biochemistry.

II. Psychomotor domain: At the end of the training, the student should be able to

1 Dissect and demonstrate various parts of adult human body

2.Demonstrate surface landmarks and living anatomy pertaining to mucle power, testing of nerves and palpating vessels.

3. Dissect and demonstrate various parts of fetus

4. Prepare tissue blocks ,perform H&E staining and is able to explain the principles of the following special stains -silver nitrate, periodic acid Schiff, osmic acid, Masson trichome, Verhoeff and Orcein stains .

5. Prepare and deliver lectures on various topics of human anatomy using audio- visual aids.

6. Operate computers so as to prepare documents, tables, charts and projection slides.

7. Identify research topics; carry out research and prepare a dissertation on a topic.

8. Present paper / poster in conferences.

9. Set undergraduate theory question paper, evaluate students and able to compute results including internal assessment marks.

10. Biostatistics - Basic principles and concepts of biostatistics applied to health sciences.

III. Affective domain: At the end of the training, the students should be able to

1. Co-operate with and react and respond in a cordial manner in his /her interaction with peers, superiors and subordinates.
2. Project a cheerful persona to the students.
3. Inspire the students to reach greater heights.
4. Arouse an element of curiosity and wonder in the minds of students.
5. Maintain a log book (Appendix - I).
6. Develop a healthy personality and a liking and respect for the subject.

C. **COURSE DESCRIPTION**

I. Eligibility: As per the guidelines of Medical Council of India and affiliated university.

II. Duration: 3 years

III. Desirable qualities: The student should have an aptitude for teaching and reasonable command over spoken and written English language

IV. Details of Training: **T**he P.G. student would be a resident in the department for 3 years. The time-plan and the proposed division of curriculum will be on the following lines.

FIRST YEAR OF RESIDENCY

a.Orientation programme- Institutional and departmental orientation including duties and responsibilities of a postgraduate student.

b.Time Management - should be conducted within 3-6 month.

c. Stress Management- should be conducted within 3-6 months

d.**Gross anatomy**: Dissection of one whole human body and study of gross anatomy and acquisition of embalming skills.

e.**Microanatomy**: Basic techniques in tissue processing, preparation of blocks, microtome sections and H & E staining and principles of the following special stains -silver nitrate, periodic acid Schiff, osmic acid, Masson's trichome, Verhoeff and Orcein stains.

f. To attend all undergraduate lectures held in the department of Anatomy by all the teachers.

g. Get trained to use computer for teaching and use the internet

h. Scan Anatomy journals and periodicals.

i. **OPTIONAL yet DESIRABLE**: To attend all the orations/ seminars/ workshops held for the subject in the city colleges, attend general orations held in the institution and attend regional /national conferences.

j. **TEACHING**

i.70 hours of small group teaching with at least l/3 of these under supervision by a senior teacher.

ii. **Microteaching sessions** are mandatory before small group teaching for each and every session.

iii. Should be exposed to evaluation technique

iv. Exposure to Medical Education Technology Workshops

v. Presentation in Journal club.

vi. Presentation in Seminars and symposia.

vii. Should complete gross and microanatomy journals/files

l. **RESEARCH**

i. Basic techniques like review of literature for a given topic and collection of data.

ii. Exposure to computer for various applications.

iii. **To present the topic for dissertation and the research design in front of a dissertation committee comprising of all senior and PG teachers in the department.Thereafter to submit the protocol of thesis in front of ethical committee of the institution for final approval at the end of six months after registration.**

II YEAR OF RESIDENCY

a. SPECIAL POSTING

Interaction with other pre, para and clinical specialties so as to prime the mind of the P.G. students in Anatomy to the growing needs of application of anatomical knowledge to other branches of medicine .This will be achieved through **horizontal and vertical integration**.

Posting

i. Horizontal Integration

(Selected topics should be taken as PG lectures by the concerned departments.)

Physiology and Biochemistry

ii. Vertical integration (Lectures to be arranged by the various departments for PG students)

Radiology, Surgery, Orthopaedics, Medicine, Obs &Gynac, Genetic Laboratory, Pathology, Microbiology& Forensic.

(Posting in pathology - to gain knowledge about Frozen-sections, use of cryostat. special immunohistochemical techniques and immunological techniques and morbid and medicolegal anatomy from postmortem.)

b. RESEARCH

Starting the work on thesis by the beginning of second year of residency with the aim to complete the data collection & analysis by the end of second year.

c. TEACHING

i. From middle of IInd year, the P.G. students in Anatomy should be capable of giving lectures for the entire batch of students.

ii. Start teaching Embryology and Genetics in small groups after microteaching Sessions.

iii. Should be conversant with the use of various audiovisual aids

d. Presentation in Journal Club

e. Presentation in Seminars / Symposia at the departmental and institutional level

f. FOETAL DISSECTION: Should have dissected at least one fetus.

III YEAR OF RESIDENCY

a. RESEARCH

Analyze the data of thesis work and present it comprehensively in front of the departmental dissertation committee and complete the thesis work for final printing. **submission of thesis to the university in triplicate at least 6 months before the commencement of university examination.**

b. TEACHING

i Full fledged lectures, lecture-demonstration, small group teaching
ii Presentation of paper in conference (optional but desirable)
iii. Writing articles for publication
iv. Seminars / Symposia
v. Journal Clubs.

c. DISSECTION - Exercise in window-dissection of various regions

2. Additional topics to be covered

a. History of anatomy
b. Embalming techniques
c. Microanatomy
   i. Principles and types of Electron microscopy: TEM, SEM
   ii. Identification of various cell organelles and their EM appearance

c. Embryology -- General and Systemic
i Stem Cell applications ,cloning and molecular biology
ii Genetics : Exposure to various DNA technologies, including cell culture, Karyotyping, Polymerase Chain Reaction (PCR) and Fluorescent-in-Situ-Hybridization (FISH)
d Neuroanatomy: Limbic system and Reticular Systems - Details
e. Clinical Anatomy: Application of anatomical knowledge to explain the anatomical basis of various clinical symptoms and signs, diagnostic procedures and treatment modalities
f. Imaging Modalities

i Radiology: plain and contrast skiagrams
ii. Ultrasonography (USG): - Principles of USG, Orientation of anatomical organs, in various USG plates.
iii Principles of CT and MRI.
iv. PET scan: Principles.

g. Forensic Anatomy: Estimation of age and sex
   i. With reference to bones including ossification
   ii. With reference to radiology pictures
h. Cross-sectional Anatomy and its correlation to C.T. scan images and MRI images
i. Comparative Vertebrate Anatomy: Basic outline
j. Anthropology: Basic principles and anthropometry

D. EVALUATION

I. FORMATIVE: Internal assessment based on

1. Teaching: to be evaluated based on a given proforma (Appendix II)
2. Dissection
3. Log Book
4. Journals-Microanatomy and Gross anatomy
5. Examinations

a. Theory:

i. At the end of first year, two papers on general anatomy, gross anatomy, and microanatomy of the

* Upper half of the body: Head (without neuroanatomy), neck, upper limb, thorax and general anatomy.

** Lower half of the body: Diaphragm (Thoracoabdominal), abodomen, lower limb and general microantomy.

ii. At the end of second year, two papers on

* Embryology and Genetics (Including a. i. **).

**Neuroanatomy and applied anatomy (Including a. i. *)

30% of the paper will be constituted by multiple choice questions of the following types: Single best response, multiple true false, multiple completion and assertion reason.

iii. At the end of third year, preliminary examination as per the university examination

b. Practicals and viva

i. At the end of first year,

* Prepare a tissue block, stain and discuss. 10 microanatomy spots.

** Window dissection and viva on Osteology and soft parts.

ii. At the end of second year

* Viva on embryology models (Including b. i. *)

** Viva on brain (Including a. i. **)

iii. At the end of third year, preliminary examination as per the university examination.

UNIVERSITY EXAM PATTERN

The maximum marks in theory shall be 400, consisting of 4 papers of 100 marks each

PAPER 1
ANATOMY AS APPLIED TO VARIOUS CLINICAL DISCIPLINES INCLUDING RADIOLOGICAL & FORENSIC ANATOMY

PAPER 2
GROSS HUMAN ANATOMY INCLUDING ELEMENTS OF COMPARATIVE ANATOMY

PAPER3
DEVELOPMENTAL & MICRO-ANATOMY INCLUDING ELEMENTARY GENETICS

PAPER4
NEURO- ANATOMY AND RECENT ADVANCES IN ANATOMY

Practical Including Viva Exam has 4 Examiners (2 Internal & 2 External)
The maximum marks in Practical including Viva shall be **400** as follows:

1. Dissection -	90
2. Surface marking	30
3. Spotting (10 histology slides)	10
4. Spotting viva	30
5. Histological Techniques	60
6. Micro-Teaching	60
7. Grand Viva (Hard & Soft parts, Embryology models & radiology)	120

	400

The distribution of marks is such that each of the 4 examiners has equal number of marks and can assess the candidate by his/her own standards, thereafter a total cumulative marks may be obtained in each part of the practical exam

Model Question –Paper

MD-ANATOMY

Paper 1 –ANATOMY AS APPLIED TO VARIOUS CLINICAL DISCIPLINES INCLUDING RADIOLOGICAL AND FORENSIC ANATOMY

Time : 3 hours

(Write your Roll No- on the top immediately on receipt of this questions paper)

Attempt all questions.

Illustrate your answers with suitable diagrams.

1. Describe cervical fascia. Add a note on facial spaces of neck and their applied Importance. (30)
2. Describe the gross anatomy and movements of knee Joint. Add a note on its applied aspect and recent techniques of arthroscopy.(30)

3. Write short notes on: (10*4=40)

(a) Importance of sectional Anatomy

(b) Anatomical basis of angiography

(c) Hepatic segments

(d) Sutures

Model Question –Paper

MD-ANATOMY

Paper 2 –GROSS HUMAN ANATOMY INCLUDING ELEMENTS OF

COMPARATIVE ANATOMY

Time : 3 hours

(Write your Roll No- on the top immediately on receipt of this questions paper.)

Attempt all questions.

Illustrate your answers with suitable diagrams.

1. Describe anatomical features of urinary bladder and Discuss the mechanism and neuronal control of micturition. (30)

2. Describe esophagus . Add a note on its surgical anatomy. (30)

3. Write short notes on: (10*4=40)

(a) Growth plate

(b) vertebral venous plexus

(c) Paranasal sinuses

(d) Trigeminal neuralgia

Model Question –Paper

MD-ANATOMY

Paper 3 –DEVELOPMENT AND MICROANATOMY INCLUDING ELEMENTRY GENETICS

Time : 3 hours

(Write your Roll No- on the top immediately on receipt of this questions paper.)

Attempt all questions.

Illustrate your answers with suitable diagrams.

1. Discuss microscopic anatomy of ovary and add a note on pre and post natal development of ovaries. (30)

2. Discuss the microscopic structureof the parts of gastrointestinal system derived from midgut.add a note on malrotation of gut. (30)

3. Write short notes on: (10*4=40)

(a) compactation in early embryo

(b) molecular regulation of limb development

(c) multifactorial inheritence

(d) clearing agents

Model Question –Paper

MD-ANATOMY

Paper 4 –NEURO-ANATOMY AND RECENT ADVANCES IN ANATOMY

Time: 3 hours

(Write your Roll No- on the top immediately on receipt of this questions paper.)

Attempt all questions.

Illustrate your answers with suitable diagrams.

1. Describe blood supply of brainstem and add a note on its applied anatomy. (30)

2. Discuss functional sensory areas of cerebral cortex. Add a note on its blood supply. (30)

3. Write short notes on: (10*4=40)

(A) insula

(b) anatomical basis of spinal anesthetic procedures

(c) stereoscopic vision

(d) occulomotor nuclear complex

E. LIST OF RECOMMENDED BOOKS

I. Textbooks:

1.Gray's Anatomy 40th edition

2 Cunningham's Manual of Practical Anatomy - Latest editions of volumes I, II, II

3 Regional & Applied Anatomy R.J Last

4 Clinical Anatomy for Medical Students - Richard Snell

5.Synopsis of Surgical Anatomy - McGregor

6. Functional Histology - Wheater, Burkit,

7. Langman's Medical Embryology

8. Embryology by Keith Moore

9. Clinical Neuroanatomy – Snell

10. Genetics by Emery

11. Human Genetics - S.D. Gangane

12 Cross-sectional anatomy by Bo, Meehan and Kruger

13. Principles of General anatomy by A. K. Dutta.

14. DiFiore"s Atlas of Histology

II. Reference Books:

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1 Clinical Anatomy _ NMS Series

2. Anatomy for Surgeons - Henry Hollinshead

3. Surgical Anatomy - Harold Ellis

4. Bailey's Textbook of Microscopic Anatomy

5. Embryology - Boyd & Mossman

6. Clinically oriented anatomy _ Keith Moore

7. Genetics by Thompson and Thompson

8. History of Anatomy - Charles Singer

9. History of Anatomy Indian Medicine - Kutumbiah

III. Journals:

1. Journal of Clinical Anatomy
2. Surgical & Radiological Anatomy
3. Indian Journal of Human Genetics.
4. Developmental Dynamics
5. Journal of Anatomical Society of India
6. Annals of Anatomy

Appendix I (LOG BOOK)

Log book details

Sr.No.	Date	Time	Topic /Activity	Teacher	Remarks and sign of PG teacher

*Topic – Topic of lecture/Demonstration attended
Topic of Lecture/Demonstration taught

*Activity- Dissection – Part
Microanatomy- Practical
Special posting- Department

** Fortnightly submission of the logbook to the concerned PG teacher and signature obtained

Appendix II

Direction- Please tick the statement, which most closely corresponds to your observation.

Name of the teacher : _____

Topic : _____

Date : _____

SrNo	Skill		Teacher Action	Yes	To some extent	No
1	Set Induction	a)	Aroused interest at the beginning			
		b)	Specified objectives of presentation			
2	Planning	a)	Organised material in a logical sequence			
		b)	Used relevant content matter			
3	Presentation	a)	Fluency in language			
		b)	Used non verbal cues, eye contact etc			
4	Interaction	a)	Allowed questions from students			
		b)	Asked Questions			
		c)	Rewarded pupil effort			
		d)	Clarified doubts			
5	Use of A V aids	a)	Used proper A V aids			
		b)	Used the aid effectively			
6	Summarization	a)	Summarized the important points at the end			
		b)	Checked that all the students understood the Points			
		c)	Lesson on the whole was effective			
7	Any suggestions for the speaker to improve the Teaching/Learning exercise					

SHREE GURU GOBIND SINGH TRICENTENARY UNIVERSITY

FACULTY OF MEDICINE & HEALTH SCIENCES

Gurgaon-Farukhnagar Road, Village: Budhera, Distt. Gurgaon (HR)-122505, Ph:-0124-2278233, Fax: 0124-2278232

[DEPARTMENT OF PHYSIOLOGY]

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 isrequired.

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 (patho-physiology) 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 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 (patho-physiology) 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 Arneth 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'sheart.
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 splanchnicnerve.
6. Effect of stimulation of peripheral somatic nerve (sciaticnerve).
7. Study of hypovolemic shock and its reversal.
8. Perfusion of isolated mammalian heart and study the effects of drugs andions.
9. Recording of Isolated Intestinal movement and tone and studying the effect of drugs andions.
10. Study of various stages of menstrual cycle, cervical smear and vaginalsmear.

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 (spriometry, vitalography, and gas analysis).
5. Measurement of BMR.
6. Cardio pulmonary resuscitation (CPR) and Artificialrespiration.

***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 pupillaryreflex
      (b) Visual acuity
      (c) Perimetery – mapping out of visual field and blind spot

(d) Accommodation

(e) Fundoscopy

(f) Colour vision and colorblindness

7. Reaction (visual and auditory) and reflex time.
8. Electroencephalography (EEG) and Polysomnography
9. Autonomic Nervous System (ANS)Testing.
10. Neuro-electro diagnostic 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_2max

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 deepsea
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 spirometery

(iv) Laboratory for measuring pulmonary diffusion capacity and functional residual capacity(FRC)

(v) Whole-body plethysmography

(vi) Laboratory for Blood flow measurements (Impedence plethysmograph/Laser flow meter/ Doppler flow meter)

3. Exercise Physiology Laboratory

The department should generate liaison with ports 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 Ergometery

(iii) Treadmill

(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 everyyear.
- The Post graduate student should attend at least, 2 symposia every year and weekly groupdiscussions.
- 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 roaster 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 transudation
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

Annexure 1

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 * : Anysignificantpositiveornegativeattributesofapostgraduatestudenttobementioned. 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

SHREE GURU GOBIND SINGH TRICENTENARY UNIVERSITY

FACULTY OF MEDICINE & HEALTH SCIENCES
Gurgaon-Farukhnagar Road, Village: Budhera, Distt. Gurgaon
(HR)-122505, Ph:-0124-2278233, Fax: 0124-2278232

Curriculum & time bound programme for Teaching and Training in MD Course in

[BIOCHEMISTRY]

CURRICULUM FOR M.D.(BIOCHEMISTRY)

PROGRAMME OBJECTIVES:

A resident on completion of his/her course in MD Biochemistry should

1. Have a thorough understanding of the concepts and principles of Biochemistry and Cell Biology.
2. Be able to apply the same to explain and interpret the Molecular and Metabolic aspects of health and disease thereby integrating his/her understanding with the concept of Molecular medicine.
3. Be equipped with laboratory skills that enable him/her to perform and interpret basic and advanced techniques and identify and solve the problems that arise during their operation.
4. Have skills of self directed learning to keep himself / herself updated with the knowledge, research and technological advancements.
5. Be thorough in Experimental Design and Research Methodology. He / She should be able to prepare research protocols, conduct experimental studies, analyze and solve experimental problems.
6. Be able to plan, organize and conduct class room lectures, seminars, practical demonstrations, tutorial classes and small group discussions on clinical problems for undergraduate students and post graduates of medical and allied disciplines.
7. Have skills to supervise modern laboratory techniques and procedures in Clinical Biochemistry in the hospital and exercise effective degree of quality control.
8. Be able to suggest, evaluate and interpret Biochemical investigations in a give clinical situation and apply knowledge to clinical problems and active patient care.
9. Have knowledge and skills to plan, conduct and lead an educational and modern research programme at the basic and applied level, guide a thesis at the post graduate level and with some relevant experience, at the Doctoral level.
10. Have the background to pursue her/his interest to academic and pursue further specializations e.g. Post doctoral / DM qualifications in different specialties and super specialty areas of life / health sciences.
11. Have knowledge in the basics of Educational Technology so that he / she improve his own performance as a facilitator of learning and can play a lead role in the

designing curriculum and education innovations for effective teaching and learning of Biochemistry at least at the departmental and institutional level.

POSTGRADUATE TRAINING

METHODOLOGY

Active learning should be the mainstay of the program. The following methods will be used to facilitate learning and training of MD students.

1) **Post graduate lectures, tutorials, seminars:** To update on various aspects of basic and clinical biochemistry, immunology & impact of molecular biology on advances in medicines.

2) **Journal club:**
   To develop a) Skills of analysis, evaluation and presentation of research papers
   b) Familiarity with approaches and methodologies of research and
   c) to update on new development / emerging trends in biochemistry.

   Practical exercises: To equip them with knowledge and skills to learn techniques at the bench level.

3) **Thesis:** Each PG student will carry out research work under the supervision of faculty member of the Department of Biochemistry.

4) **Teaching:** Participation in UG laboratory practical teaching and problem based learning tutorials as a team with faculty and senior residents of the department to develop skills of self directed learning, effective communication, leadership, organizing group discussions, working in group, facilitate students learning as a teacher and to gain in depth learning and problem solving skills.

5) **Specialized training in clinical Biochemistry:** Posting in the clinical biochemistry laboratory and other specialized laboratories of the institution to learn sample collection quality control methods, setting up of a clinical biochemistry laboratory, specialized assays, statistical analysis of data.

6) **Horizontal and vertical integration of the subject with the other preclinical, paraclinical and clinical departments:** It should be encouraged by participation in integrated joint teaching sessions, joint seminars, participation in clinical rounds for discussing cases of interest etc. This may also be achieved by framing appropriate problem based modules for small group discussion in collaboration with different departments.

CURRICULUM

The curriculum will be spread over three years and includes the following components:

1. Organized teaching sessions (Theory and Practical) as per the syllabus (attached). These include following sessions.
    i. Lectures -5 hours per week
    ii. Practicals -25 hours per week
    iii. CPC and clinical meeting -4 hours per week
2. Posting of residents for training in different laboratories of biochemistry and clinical laboratories/specialties.

3. Thesis: Each student has to write up a thesis under the guidance of one or more faculty members as per the institute's rules. The work is carried out over and above routine duties.
4. Course in Basics of Biostatistics and Clinical Research Methodology.

ASSESSMENT

1. Sessional examination: Formal written tests and viva are organized at the end of each session.
2. Periodical examination: Students will be given class tests after a series of lectures.
3. Final M.D. examination:- This is conducted as per the pattern in the institute on the following lines.

Examiners: Two internal and two external examiners

Postgraduate Examination

The postgraduate examination shall be in 3 parts.

1. **Thesis:** Each student will prepare a thesis under the direct supervision of a faculty member of the biochemistry department and submit at least 6 months before the date of commencement of the theory examination.

2. **Theory examination** comprising of four paper (100 marks each) of three hours duration each and covering the course content as detailed below.

3. **Practical and Viva – voce examination** spread over two days

Theory examination

There should be 4 theory papers with the broad subdivision of topics as mentioned below.

PAPER I - Biomolecules, introductory biochemistry Cell biology, Physical chemistry, Biostatistics / Research methodology and Biochemical techniques, Quality control in labs.

PAPER II - Enzymes, Biological oxidation, Intermediary metabolism and regulation, inborn errors of metabolism, Nutrition (Vitamins & Minerals), Endocrinology.

PAPER III - Molecular Biology, Immunology

PAPER IV - Clinical Biochemistry& Recent advances.

DETAILED COURSE CONTENTS

PAPER – I

Biomolecules

Molecular hierarchy in the living system (primordial – macromolecular – supra-molecular structures), chemical bonds and molecular interactions. Properties of water. Concept of an acid, a base, pH, pK, buffer and buffering capacity. Classification, structure and functions of amino acids, Structural organization of proteins, relationship with their functions. Conjugated proteins and metalloproteins. Structure and functions of hemoglobin and myoglobin. Structure of collagen. Biologically active amines and neurotransmitters. Classification, chemistry and functions of carbohydrates and lipids.

Cell Biology

Structure of the cell and different subcellular organelles, structure and functions of cell membrane. Movement of substances across cell membranes, Interaction between cells and environment, Glycoproteins and proteoglycans, Extracellular matrix, Cell-cell interactions, tight junctions, gap junctions, Intracellular traffic and sorting of proteins-endoplasmic reticulum, Golgi complex, vesicle transport, endocytic pathway, protein targeting to cell surface, nucleus, lysosomes, mitochondria, peroxisomes, cytoskeleton and cell motility, cell cycle, muscle contraction, Hemoglobin and myoglobin.

Biostatistics and research methodology

Types of study design, calculation of adequate sample size and its significance, basic concepts of biostatistics as applied to health science – mean., mode, median, S.D. , analysis of variance and correlations – Students ‘t’ test, Paired ‘t’ test, Chi square test, Fisher’s exact test, Non-parametric tests of significance, One-way and two-way analysis of variance, Multivariate analysis, Survival analysis-log rank test, Relative risk calculation – Odd’s ratio, familiarity with commonly used statistical software,.

Biochemical Techniques

Centrifugation-ultracentrifugation, Optical techniques spectrophotometry, reflectance photometry, flame photometry, atomic absorption spectrophotometry, Fluorimetry, phosphorescence, chemiluminescence, turbidimetry and nephelometry.

Electrochemistry – Chemical sensors and biosensors, electrophoresis, chromatography, Immunochemical techniques – immunoassays, Spectroscopic techniques – circular dichroism, electron spin resonance, nuclear magnetic resonance, Mass spectrometry and tandem mass spectrometry, Nanotechnology and microfabrication, Techniques to study in vivo metabolism-NMR,SPECT,PET scans, Radiosotope techniques.

PAPER II

Enzymes
Introduction, classification, Coenzymes, cofactors, isoenzymes general and kinetic properties, principles of enzyme assay, Mechanism of enzyme action, regulation of enzyme activity, allosteric enzymes.

Clinical correlations:
1. Drugs as enzyme inhibitors in antibacterial, anti–viral and antitumor therapy.
2. Diagnostic and therapeutic significance of enzymes and isoenzymes in disease states including cancers

Biological oxidation and thermodynamics
Basic concepts of thermodynamics and its laws as applied to living systems, exergonic endergonic, energy transfer and coupled reactions, ATP, high and low energy compounds, redox potential, classification and Role of oxidoreductases, cytochromes, cytochrome P450 system, Free radicals formation and scavenging. Anti-oxidants – role in diseases.

Respiratory chain and oxidative phosphorylation, its components & complexes, flow of electrons in respiratory chain, ATP synthesis and control, site specific inhibitors, uncouplers, ionophores, biological uncouplers.

Clinical correlations:
1. Cyanide poisoning
2. Hypoxic injury

Metabolism
Overview, including methods of studying metabolism

Metabolism of carbohydrates: Digestion and absorption, glycolysis, TCA cycle – regulation, Glycogen metabolism and its regulation, Cori cycle, gluconeogenesis and control of blood glucose, metabolism of fructose, galactose, metabolism of ethanol. Significance of pentose phosphate pathway and uronic acid pathway.

Clinical correlations:
1. Glycogen storage diseases
2. Essential fructosuria; galactosemia
3. Lactic acidosis
4. G6PD deficiency
5. Alcoholism – Methanol poisoning
6. Diabetes mellitus – detailed biochemical aspects of etiopathology, symptomatology, diagnosis, principles of treatment, complications, monitoring of diabetic control of immediate and long term targets.

Metabolism of lipids: Digestion & absorption, role of bile salts. Storage and mobilization of fats, biosynthesis and oxidation of fatty acids, ketone bodies – formation, utilization. Regulation of ketosis. Metabolism of unsaturated fatty acids and eicosanoids –

prostaglandins, thromboxanes, leukotrienes, Role of aspirin and other NSAIDs. Lipid transport – structure, metabolism and functions of different classes of lipoproteins. Role of liver. Separation of lipoprotein classes. Cholesterol synthesis, transport and excretion. Bile acid formation. Role of cholesterol in the development of atherosclerosis – relationship of hypercholesterolemia and dietary fat intake….

Clinical correlations:
1. Obesity
2. Ketoacidosis
3. Fatty liver
4. Hyperlipidemias
5. Atherosclerosis – molecular and clinical aspects including risk evaluation and principles of therapeutic nutritional and life style changes interventions.

Metabolism of amino acids & proteins: Digestion and absorption, pathways of amino acid degradation – transamination, oxidative deamination. Transport and metabolism of ammonia – urea cycle. Essential, non essential and glucogenic and ketogenic amino acids, Catabolism of C-skeletons, Synthesis of biologically important compounds from amino acids. Clinical correlations: Disorders of ammonia metabolism including biochemical basis of common underlying clinical conditions and interventions; Inborn errors of metabolism associated with various amino acids – biochemical aspects of their diagnosis and interventions.

Metabolism of special tissus – Liver, Adipose tissue, Brain, RBCs, Kidneys, eye lens, heart, muscles, sperms. Bone metabolism – Bone formation, resorption, Biochemical markers.

Integration and hormonal regulation of mammalian metabolism
Interconversion of major foodstuffs, tissue specific metabolism – liver, muscle, erythrocytes, heart, adipose tissue, brain etc.

Clinical correlations:
1. Starvation
2. Uncontrolled diabetes mellitus
3. Metabolic response to stress, injury
4. Hemolysis, erythrocyte membrane stability

Heme Metabolism: formation and catabolism of heme, bile pigments, and salts and correlation with liver function

Clinical correlations:
1. Porphyrias
2. Jaundice
3. Hemolytic disease of the new born
4. Metabolism of Xenobiotics and Cytochrome P450 system

Endocrine biochemistry: Classification and general mechanism of action of hormones.

Biogenesis, secretion, control, transport and mode of action of following – hypothalamic peptides, adenohypophyseal and neurohypophyseal hormones, thyroid parathyroid hormones, calcitonin pancreatic hormones, adenocortical and medullary hormones, gonadal hormones, gastrointestinal hormones, opioid peptides, endorphins.
Biochemical aspects of diagnosis and treatment of endocrinal disorders; Biochemistry of conception, reproduction and contraception.
Endocrine interrelationship and their involvement in metabolic regulation Neuromodulators and their mechanism of action, physiological significance.

Human nutrition: General aspects:
Principal food components, general nutritional requirements, energy requirements, biological value of proteins, specific dynamic action, balanced diet, diet formulation 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, undernutrition, laboratory diagnosis of nutritional disorders, National Nutritional programme

Vitamins- Biochemical role, sources, deficiency, daily requirement of vitamins Biochemical basis of vitamin deficiency states, their consequences, diagnosis and treatment.

Minerals – Ca, P, Mg, Na, K, Cl., Trace elements – Fe, Cu, Se, etc.

Clinical correlations:
Protein-energy malnutrition
Malabsorption syndromes
Iron deficiency anemia, Wilson's disease
Tetany
PUFA and risk factors for IHD
Cholera gastroenterit

PAPER III

Molecular Biology
Purines and Pyrimidines, their functions, Structure and metabolism of nucleotides and nucleic acids, including chromatin remodeling, Structure and organization of chromosomes. DNA replication and transcription, translation, Gene expression in prokaryotes and eukaryotes, Recombinant DNA and other molecular biology techniques, Human genome project, functional genomics, proteomics, Bioinformatics.

Principles of human genetics
Transmission of genetic disease – mutations and their functional consequences, alleles, genotypes and phenotypes, genetic linkage, identification of disease causing gene, chromosomal disorders, monogenic Mendelian disorders, mitochondrial disorders, nucleotide repeat expansion disorders, polygenic disease and complex genetic traits, imprinting disorders, methods of mutation detection, gene therapy.

Stem cells in clinical medicine
Basic concepts regarding nature, harvesting, storage and applications of stem cells; future prospects etc.

Cancer and cancer genetics:
Clonal origin and multistep nature, oncogenes, tumor suppressor genes, familial cancer syndromes, chromosomal instability in solid tumors, viruses in human cancer, epigenetic regulation in cancer, gene expression profiling in cancer, cancer cell biology, cell cycle abnormalities, telomerase, apoptosis, metastasis – molecular basis and therapeutic strategies, tumor angiogenesis – molecular events and antiangiogenic therapy, biological basis of cancer chemotherapy, multidrug resistance, molecularly targeted cancer therapy, cancer immunotherapy.

Immunology:
Overview-innate and acquired immunity, cells and organs of the immune system – T and B cells, macrophages, dendritic cells, NK cells, granulocytes, antigens, epitopes and haptens, immunoglobulins classes, isotypes, allotypes, idiotypes, monoclonal antibodies, organization and expression of immunoglobulin genes, immunoglobulin gene rearrangement, class switching, antigen-antibody interaction-immunochemical techniques, MHC, 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 mediated immunity, T regulatory cells, hypersensitivity, immune response to infections, vaccines-newer approaches, immuno-deficiencies, autoimmunity, transplantation immunology, cancer and immune system, immunodiagnostics and immunotherapy.

Environmental Biochemistry:
Xenobiotic metabolism, pollutants, adulterants and their effect on health.

PAPER IV

1. Fluid and electrolyte balance and Acid-Base balance: regulation and disturbances

2. Haematopoietic 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 anaemias RBC membrane and metabolism.

Hemolytic anaemias-inherited defects in RBC memberane and enzymes-G6PD deficiency, immunologic causes of hemolysis. ABO blood group system-Plasma cell disorders multiple myeloma.

3. **Hemostasis and thrombosis**
Biochemical mechanisms, related laboratory tests, antiplatelet / anticoagulant /fibrinolytic therapy.

4. **Cardiovascular system**
Atherosclerosis – pathogenesis, risk factors, its prevention and treatment. Heart failure, acute coronary syndrome, cardiac biomarkers, cardiomyopathy-etiology.
Hypertension – essential and secondary, genetics, laboratory evaluation, approach to therapy.

5. **Respiratory system:**
Gaseous exchange in lungs – physiological features and disturbances, arterial blood gases. Pathogenesis of asthma, cystic fibrosis, emphysema, α1- antitrypsin inhibitor deficiency.

6. **Kidney:**
Kidney function tests, pathophysiology, biochemistry, laboratory findings and management in acute renal failure, chronic renal disease and failure / uremia, Estimation of GFR, glomerular diseases – pathogenesis and mechanisms of glomerular injury, Nephrotic syndrome, Diabetic nephropathy, Tubular disorders, Renal tubular acidosis proteinurea, nephrolithiasis, renal replacement, therapy,
kidney transplant. Biochemistry of renal stones.

7. **Gastrointestinal system:**
Alimentary tract – gastric physiology patho-physiology of peptic ulcer disease, role of *H. pylori,* gastric function tests, Zollinger Ellison syndrome, nutirient digestion and absorption, evaluation of malabsorption, celiac sprue, inflammatory bowel disease, steatorrhea, lactose intolerance, protein losing enteropathy, investigation of mal-digestion / malabsorption, GIT regularoy peptides, Neuroendocrine tumours.

8. **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 gall stones. Pancreas-acute and chronic pancreatitis, cystic fibrosis, pancreatic function tests.

8. Disorders of Immune system, connective tissue and joints

Immune tolerance, mechanisms of immune mediated damage to host tissues, primary immune deficiency diseases – laboratory evaluation, allergies anaphylaxis: pathophysiology – lipid mediators, autoimmunity – immunopathogenetic mechanisms, SLE-etiology / pathogenesis / laboratory tests for autoantibodies, Rheumatiod arthritis genetics, pathogenesis, lab findings, vasculitic syndromes – pathophysiology, lab findings, sarcoidosis amylodosis, osteoarthritis – pathophysiology, gout, pseudogout, Rheumatic fever – immunological aspects, Scleroderma, synovial fluid analysis..

9. **Bone and mineral metabolism**

Bone structure and metabolism, calcium, phosphate and magnesium, regulation and abnormalities, vitamin D, calcitonin, PTH, PTHrP, osteoporosis- pathophysiology, markers of bone turnover.

10. **Nervous system and neurologic disorders**

Neurotransmitters and their receptors, ion channels and channelopathies, memory and learning – signaling pathways, neurotrophic factors, excitotoxicity and apoptosis, protein aggregation and neurodegeneration, genetic disorders of CNS, pathophysiology of ischaemic stroke, Alzheimer's disease, Parkinson' disease, Huntington' disease, Inherited ataxias, Amyotrophic lateral sclerosis and other motor neuron diseases, 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. Biochemistry of olfaction, taste, vision and touch. Psychiatric disorders – anxiety, depression, schizophrenia –pathophysiology.

11. **Neuropsychiatric drugs**

Biochemical basis of mode of action, biochemial basis of drug addiction and abuse, CSF analysis

12. **Clinical Biochemistry**

Investigative aspects – principles of laboratory analysis and safety, specimen collection and processing, automation, point of care testing, evidence based laboratory medicine, selection and analytical evaluation of methods, clinical evaluation of methods – sensitivity and specificity, ROC curves, establishment and use of reference values, preanalytical variables, clinical laboratory informatics, quality management Clinical relevance of different analytes – amino acids / peptides / proteins, plasma proteins, enzymes, clinical enzymology, tumour markers carbohydrates, lipids / lipoproteins / apolipoproteins, cardiovascular risk factors, electrolytes and bilirubin, porphyrins and their disorders, Therapeutic drug monitoring.

Pituitary, adrenal and thyroid function, tests Reproduction related disorders – infertility, Pregnancy – maternal and fetal health Inborn errors of metabolism, Clinical toxicology.

PATTERN & SCHEDULE OF INTERNAL ASSESSMENT & FINAL EXAMINATION:-

General Principles

A. The assessment should be valid, objective, and reliable.
B. It must cover cognitive, psychomotor and affective domains.
C. Formative, continuing and summative (final) assessment should be conducted in theory as well as practicals/clinicals. In addition, thesis should be assessed separately.

Formative assessment

The formative assessment should be continuous as well as end-of-term. The former should be based on the feedback from the senior residents and the unit faculty concerned. End-of-term assessment should be held at the end of each semester (upto the 5th semester). Formative assessment will not count towards pass/fail at the end of the program, but will provide feedback to the candidate. Scheme of internal assessment examination It is held by means of a written test and practical (and or clinical) with viva examination by all consultants of the department as per distribution of marks as follows. In such five six monthly tests a candidate shall be evaluated for

Theory (Four papers)	4x100=400
Practical and viva	300+100=400
Total	800

MD Examination:

Pattern of question for theory Papers- There shall be four theory papers. One paper out of these shall be on ‘Basic Medical Sciences’ and one paper on ‘Recent Advances’ in the discipline. There shall be 100 marks for each paper to be answered in 3 hours’ time. There shall be ‘1 structured essay type question’ for 20 marks besides 8‘short essay type questions’ for 10 marks each in each paper. Days of practical examination- Practical Examination should be conducted for a batch of upto 8 candidates over a minimum period of two to three days subject to the subject curriculum with due approval of the board of examiners. For a batch of more than 8 the examination may extend accordingly. The theory papers shall be evaluated at the examination center itself

before commencement of the practical/clinical and oral examination in the subject during these practical examination days. Components of examination-It consist of a written examination, a practical examination to assess the clinical/practical competencies and skills, and a viva voce examination.

The examinations shall consist of

A) Theory

B) Practical including clinical

C) oral

A. Theory:

The 4 papers in theory shall be conducted well in advance before the oral clinical/practical examination.

B. Practical:

Clinical/Practical examination is the most important part of the evaluation and is aimed at assessing the clinical/practical skills of the candidate and diagnostic reasoning. Entirely objective evaluation of these skills is neither feasible nor desirable. However, in order to test the various skills, the examiners may evaluate the candidates on a structured format.

C. Micro- teaching

The candidate shall be allotted a topic from the discipline at a short notice of few hours, (preferably on the first day of the examination) to prepare and present before the board of examiners within a time span of 15 minutes (preferably on the second day of the examinations). The teaching skill will be evaluated under various points(as illustrated below) and marks given accordingly.

(i) Choice of article/topic (unless specifically allotted)
(ii) Completeness of presentation
(iii) Clarity of presentation
(iv) Understanding of the subject and ability to convey the same
(v) Whether relevant references have been consulted
(vi) Ability to convey points in favor and against the subject under discussion
(vii) Use of audio-visual aids

(viii) Ability to answer questions
(ix) Time scheduling
(x) Overall performance

D. Viva-Voce1

A.Viva-voce is expected to be conducted at every stage of the practical examination.

The resident will be required to answer oral questions on any aspect of the specialty. Oral. Examination is designed to test the general scientific background of the candidate and his/her own particular contribution embodied by the thesis. A formal "grand viva-voce" may be held at the end of the practical examination. Questions on the thesis/dissertation may be asked at this time as well. The board of examiners will conduct the examination. They will read out the comments & questions and will seek the answers from the candidate. The viva voce should be assessed under the following headings:

1. **Thesis viva voce**
2. **Grand viva voce**

All examiners shall be jointly responsible for all parts of the examination. In presence of the external examiners, the Chairman of the conducting board shall make the necessary arrangements for conducting the oral and practical including clinical examination at the department in the college centre .

The candidate shall bring the logbook and a copy of his/her thesis mandatorily while appearing for the oral, practical and clinical examination. Marks for examinations: The examinations shall be organized on the basis of marking system to evaluate and certify candidate's level of knowledge, skill and competence as per distributions mentioned below. In total the overall assessment for a postgraduate shall be for 800 marks.

PASS/FAIL- In order to pass the examination in each subject a candidate must secure not less than 50% marks in each head of passing which shall include (1) Theory (2) Practical including clinical and viva voce examination (3) internal assessment examination.

SYLLABUS FOR PRACTICALS:

1. All undergraduate practicals and routine emergency and special investigations carried out in central clinical laboratory of the hospital,which are useful for diagnosis and prognosis of the disease.

2. Total Quality Management of Laboratory
   a) Specimen collection, handling & storage of sample.
   b) Methods of standardization & calibration.
   c) Methods of quality control & assessment.

3. Fractionation & Identification of,
   a) Amino acids
   b) Sugar
   c) Proteins
   d) Lipoproteins by
   i. Thin Layer Chromatography
   ii. Paper chromatography (circular, Unidimensional& two dimentional iii) Gel electrophoresis- agarose, starch, & Polyacrylamide Gel Electrophoresis iv) paper electrophoresis & cellulose acetate paper electrophoresis.

4. a) Estimation of total activity of following enzymes .
   i. LDH & seperation of its isoenzymes by Polyacryamide gel electrophoresis, Cellulose acetate electrophoresis & quantitation by densitometry.
   ii. AST(GOT)
   iii. ALT(GPT)
   iv. Alkaline phosphatase
   v. Acid phosphatase
   vi. Amylase
   vii. Creatine kinase its Isoenzymes
   b) Enzyme kinetics and Determination of Km value and effect of pH substrate concentration & temperature on Enzyme activity.
   d) Endocrinology: Estimation of Hormones.

5. Isolation of DNA and PCR technique.

6. Estimation of serum lipid profile .
   i) Serum total cholesterol
   ii) Serum HDL cholesterol
   iii) Serum VLDL & LDL
   iv) Serum Triglycerides

7. Estimation of Fe & Total Iron Binding capacity,& ferritin

8. Estimation of Glycosylated Hb.

9. Body fluid analysis
    - Urine
    - CSF
    - Ascitic fluid
    - Pleural fluid

10. Estimation of Na, K & Lithium by ION SELECTIVE METHODS

11. Electrophoresis (AGAROSE & PAGE)

12. ELISA

13. SDS-PAGE

Dissertation:

The dissertation is compulsory for candidates registered for P.G. degree & should include candidates own work under a supervisor, qualified for the purpose & recognized as a P.G. teacher by the University. The subject of dissertation along with synopsis (about 200 words) signed by P.G. teacher, H.O.D.& Head of the Institution will be submitted to the University within the 6 months of the admission. Ethics Committee of the Institution must approve the topic of dissertation.

Completed dissertation will be submitted to the University preferably in the 4th term not later than 6 months before the date of final examination.

MODEL QUESTION PAPER
MD BIOCHEMISTRY (PAPER- 1)
(Introductory Biochemistry, Biochemical Techniques & Biostatistics)

Time: 3hours **Max. Marks: 100**

NOTE: Attempt all the questions

1.	Describe the principle, operation and biochemical applications of Mass Spectrometry.	**10**
2.	Describe the principle, operative procedure and biochemical applications of chemiluminescence.	**10**
3.	How is Levy Jennings control chart plotted? What is its utility in a clinical biochemistry laboratory?	**10**
4.	Describe randomized control trial.	**10**
5.	Describe collagen disorders.	**10**
6.	Describe protein folding and the disorders associated with protein misfolding.	**10**
7.	Explain Electron transport Chain and its inhibitors.	**10**
8.	Describe lysosomes in health and disease.	**10**
9.	What are the various levels of organization of proteins?	**10**
10.	Describe the principle and applications of HPLC.	**10**

MODEL QUESTION PAPER
PAPER – 2
(Biochemistry of Body Metabolism including Vitamins and Minerals))

Time: 3hours **Max. Marks: 100**

NOTE: Attempt all the questions

1.	Describe the structure and biological role of glutathione.	**10**
2.	Discuss the steps of heme synthesis. Tabulate the different types of porphyrias along with deficient enzyme.	**10**
3.	Describe the synergistic role of Vitamin E and Selenium.	**10**
4.	Describe glycogenolysis and mention Glycogen storage disease.	**10**
5.	Write the functions of lipoproteins and give a brief account of clinical disorders associated with lipoprotein metabolism.	**10**
6.	Describe the vitamins implicated in capturing energy from oxidizable substances.	**10**
7.	Write regulatory mechanisms of circulatory LDL and HDL.	**10**
8.	Describe fructose metabolism and mention its inherited Disorders.	**10**
9.	Inborn metabolic errors pertaining to tyrosine.	**10**
10.	Describe Calcium and Phosphorus metabolism.	**10**

MODEL QUESTION PAPER
(PAPER 3)
(Molecular Biology and Immunology)

Time: 3hours **Max. Marks: 100**

NOTE: Attempt all the questions

1.	Give an account of various stages of translation of mRNA into protein and add a note on inhibitors of this process.	**10**
2.	Describe the therapeutic applications of RNA interference.	**10**
3.	What is PCR? Discuss its applications.	**10**
4.	Discuss the hormones released from adipose tissue.	**10**
5.	Describe biochemical basis of antibody diversity.	**10**
6.	Explain MHC – II Complex.	**10**
7.	Describe DNA repair mechanisms.	**10**
8.	Molecular Cloning Technique.	**10**
9.	cDNA library.	**10**
10.	Telomerase in aging and cancer.	**10**

MODEL QUESTION PAPER
(PAPER 4)
(Recent advances and Clinical Biochemistry)

Time: 3hours **Max. Marks: 100**

NOTE: Attempt all the questions

1.	What is proteomics? Discuss in brief the principle of various techniques used in proteomics. Explain the importance of proteomic in medicine.	**10**
2.	Discuss the emerging role of nanotechnology in medicine and clinical biochemistry.	**10**
3.	Discuss etiology and patho physiology of chronic liver disease.	**10**
4.	Novel anticancer drugs directed against tyrosine kinases.	**10**
5.	Troponins in acute coronary syndromes.	**10**
6.	Procalcitonin as a biomarker.	**10**
7.	Immunoelectrophoresis.	**10**
8.	Acute phase proteins.	**10**
9.	Recent advances in metabolic syndrome.	**10**
10.	Adipokines in health and disease.	**10**

Books Recommended:

1. Biochemistry Ed Lubert Stryer. W.H. Freeman & company,New york.

2. Principles of Biochemistry . Ed. Lehninger , Nelson & Cox . CBS publishers & distributers .

3. Harpers Biochemistry Ed. R.K. Murray, D.K. Granner, P. A. Mayes & V.W.Rodwell. Appleton & Lange ,Stanford, Conneticut.

4. Textbook of Biochemistry with clinical correlations. Ed. Thomas M. Devlin. Wiley Liss Publishers.

5. Genes VI Ed. Benjamin Lewin .Oxford University press.

6. Tietz Textbook of Clinical chemistry, Ed. Burtis & Ashwood W.B. Saunders Company.

7. Principles & techniques of practical Biochemistry Ed. Keith Wilson & John Walker Cambridge University press.

8. Biochemistry Ed. Donald Voet & Judith G. Voet John Wiley & Sons ,

9. Molecular cell Biology, H.Lodish,A. Berk, S.L. Zipursky, P. Matsudaira, D.Baltimore , J.Darnell.

10. Lippincott's Illustrated Reviews: Biochemistry. Denise R. Ferrier. Lippincott William Wilkin publications.

11. Kuby Immunology. Thomas J. Kindt, Barbara A. Osborne, Richard A. Goldsby. W. H. Freeman & Company.

12. Practical Clinical Biochemistry. Harold Varley. CBS Publishers & Distributors

13. Text book of medical biochemistry by Dinesh Puri

14. Immunology by S.K.Gupta

15. Lippincott – Molecular Biology

16. Harrisons Internal Medicine 2 volumes

APPENDIX (LOG BOOK)

(LOG BOOK DETAILS)

S.NO:	DATE	TIME	TOPIC	TEACHER	REMARKS & SIGN. OF PG TEACHER

Topic – topic of lecture/demonstration attended

Topic of /demonstration taught

Activity- microteaching/seminars/journal club

Practical- UG & PG

Clinical Laboratory

Thesis work

Fortnightly submission of the log book to the concerned PG teacher and signature obtained.

APPENDIX -2

Direction – please tick the statement, which most closely corresponds to your observation

Name of teacher:

Topic :

Date :

s.no	skill		Teacher action	yes	To some extent	No
1.	Set induction	a)	Aroused interest in the beginning			
		b)	Specified objectives of presentation			
2	planning	a)	Organized material in a logical sequence			
		b)	Used relevant content matter			
3	presentation	a)	Fluency in language			
		b)	Used non verbal cues, eye contact			
4	Interaction	a)	Allows questions from students			
		b)	Asked questions			
5	Use of AV aids	a)	Used proper AV aids			
		b)	Used aids effectively			
6	summarization	a)	Summarized important points at the end			
		b)	Checked that all the students understood the points			
		c)	Lesson on the whole was effective			
7	Any suggestions for the speaker to improve the teaching/learning exercise					

LEARNING OBJECTIVES OF CURRICULUM OF MD-PATHOLOGY

LEARNING OBJECTIVES OF CURRICULUM OF MD-PATHOLOGY

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).	Must to know
2	Interpret and correlate clinical and laboratory data so that clinical manifestations of diseases can be explained.	Must to know

3	Advise on the appropriate specimens and tests necessary to arrive at a diagnosis in a problematic case.	Must to know
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).	Must to know
5	Should be able to teach Pathology to undergraduates, postgraduates, nurses and paramedical staff including laboratory personnel.	Must to know
6	Plan, execute, analyse and present research work	Must to know
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.	Must to know
8	Capable of safe and effective disposal of laboratory waste.	Must to know
9	Able to supervise and work with subordinates and colleagues in a laboratory	Must to know
B	**Psychomotor Domain**	
	Surgical pathology **Skills**	
1	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.	Must to know
2	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	Must to know

3	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	Must to know
4	Be conversant with automatic tissue processing machine and the principles of its running.	Must to know
5	Process a tissue, make a paraffin block and cut sections of good quality on a rotary microtome.	Must to know
6	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.	Must to know
7	Demonstrate understanding of the principles of: Fixation of tissues Processing of tissues for section cutting Section cutting and maintenance of related equipment Differential (special) stains and their utility	Must to know
8	Cut a frozen section using cryostat, stain and interpret the slide in correlation with the clinical data provided	Must to know
9	Demonstrate the understanding of the utility of various immuno-histochemical stains especially in the diagnosis of tumour subtypes.	Must to know
	Cytopathology **Skills**	

1	Independently prepare and stain good quality smears for cytopathologic examination.	Must to know
2	Be conversant with the techniques for concentration of specimens: i.e. various filters, centrifuge and cytocentrifuge.	Must to know
3	Independently be able o 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.	Must to know
4	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 parasite	Must to know
	Haematology **Skills**	
1	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.	Must to know

	vi. Coagulation profile including PT, APTT, FDP. (vii) BM aspiration and BM biopsy	
2	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.	Must to know
3	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.	Must to know
	Laboratory Medicine **Skill**	
1	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.	Must to know
2	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.A complete examination: physical, chemical and cell content of cerebrospinal Fluid (C.S.F), pleural and peritoneal fluid. iii. Semen analysis. iv. examination of peripheral blood for commonly occurring parasites.	Must to know

3	Independently and correctly perform at least the following quantitative **e**stimations by manual techniques and/or automated techniques. i. Blood urea ii. Blood sugar iii. Serum proteins (total and fractional) iv. Serum biIirubin (total and fractional)	Must to know
4	Demonstrate familiarity with the following quantitative estimations of blood/ serum by Automated Techniques:	Must to know
5	Serum cholesterol, Uric acid, Serum Transaminases (ALT and AST/SGOT and SGPT), etc.	Must to know
6	Prepare standard solutions and reagents relevant to the above tests, including the preparation of normal solution, molar solution and buffers.	Must to know
7	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,	Must to know
8	ELISA Reader, flow cytometer, PCR, chemiluminiscence	Must to know
	Transfusion Medicine **Skills**	
1	Selection and bleeding of donors	Must to know
2	Preparation of blood components i.e. Cryoprecipitates, Platelet concentrate, Fresh Frozen Plasma, Single Donor Plasma, Red Blood Cell concentrates.	Must to know
3	ABO and Rh grouping	Must to know
4	Demonstrate familiarity with Antenatal and Neonatal work up. (i) Direct antiglobulin test (ii) Antibody screening and titre (iii) Selection of blood for exchange transfusion	Must to know
5	Demonstrate familiarity with principle and procedures involved in:	Must to know

	(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)**	
1	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.	Must to know
	Syllabus	
	A. General Pathology:	
1	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	SIS + Seminar+ Tutorial
	B. Systemic Pathology:	
1	The study of normal structure and function of various organ system and the aetiopathogenesis, gross and microscope alterations of structure of these organ systems in disease and functional correlation with clinical features.	SIS + Seminar+ Tutorial
	C. Haematology	
1	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.	Tutorial +Practical

2	Laboratory Medicine (Clinical Biochemistry/Clinical Pathology including Parasitology).	Tutorial +Practical
3	Transfusion Medicine (Blood Banking).	Tutorial +Practical
4	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	Tutorial +Practical
	Surgical Pathology Knowledge	
1	The student should be able to demonstrate an understanding of the histogenetic and patho-physiologic processes associated with various lesions.	SIS + Practical+Case Discussion
2	Should be able to identify problems in the laboratory and offer viable solutions.	SIS + Practical+Case Discussion
	Autopsy Pathology Knowledge	
1	Should be aware of the technique of autopsy.	Practical + Case Discussion
2	Should have sufficient understanding of various disease processes so that a meaningful clinico-pathological correlation can be made.	Practical + Case Discussion
3	Demonstrate ability to perform a complete autopsy independently with some physical assistance, correctly following the prescribed instructions.	Practical + Case Discussion
4	In places where non-medico-legal autopsies are not available each student should be made to observe at least five medico-legal autopsies	Practical + Case Discussion
5	Write correctly and systematically Provisional and Final Anatomic Diagnosis reports.	Practical + Case Discussion
	Cytopathology	

	Knowledge	
1	Should possess the background necessary for the evaluation and reporting of cytopathology specimens	Practical + Slide Discussion+ Seminar
2	Demonstrate familiarity with the following, keeping in mind the indication for the test. i. Chronic of site from which smears may be taken ii. Type of sample iii. Method of obtaining various specimen (Urine sample, gastric smear, colonic lavage etc.) iv. Be conversant with the principles and preparation of solutions of stains	
	Haematology Knowledge	
1	○ 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.	Semianr + SIS Practical + Discussion
	Laboratory Medicine **Knowledge**	
1	• 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	SIS + Practical + Seminar

	• Know the principles, advantages and disadvantages, scope and limitation of **a**utomation in the laboratory. • Know the principles and methodology of quality control in the laboratory.	
1	**Transfusion Medicine (Blood Banking)** **Knowledge** □ 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	Practical + Seminar + Group Discussion
1	**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) Immunoelectrophoresis (ii) Immunofluorescence techniques especially on kidney and skin biopsies	SIS + Seminar Group Discussion

	(iii) Anti-nuclear antibody (ANA) (iv) Anti-neutrophil cytoplasmic antibody (ANCA)	
1	**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).	Seminar + Group Discussion
1	**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).	Seminar + Group Discussion + Tutorial
1	**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	Practical + Discussion
1	**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.	Practical + Seminar
1	**f) Cytogenetics Knowledge**	SIS + Practical

	□ Demonstrate familiarity with methods of Karyotyping and Fluorescent in-situ Hybridisation (FISH).	
1	**g) Tissue Culture Knowledge** Demonstrate familiarity with methods of tissue culture.	SIS + Practical
1	**h) Principles of Medical Statistics** **Knowledge** □ Demonstrate familiarity with importance of statistical methods in assessing data from patient material and experimental studies.	SIS
	TEACHING AND LEARNING METHODS	
	Rotation: **Postings to laboratories/assignments**	
1	Section/Subject — Duration in months Surgical Pathology and Autopsy and Pathology Techniques — 12 Haematology and Laboratory Medicine — 10 Cytopathology — 08 Transfusion Medicine/Blood Bank — 02 Museum techniques and record management — 01 Basic Sciencesincluding Immunopathology, Electron microscopy, Molecular Biology, Research Techniques and cytogenetics etc — 02 **Total — 35**	Must to know
2	• 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.	Must to know

	• 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.	
	ASSESSMENT	
1	**Quarterly assessment during the MD training** **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**	Must to know
2	**Post Graduate Examination** The Post Graduate examination shall be in three parts:-	Must to know

	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	
3	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	Must to know
3	3. **Practicals/Clinical and Oral/viva voce Examination:** The practical/clinical examination should consist of the following and should	Must to know

	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.	
4	**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.	Must to know
5	**III. Transfusion Medicine:** • Perform blood grouping • Perform the necessary exercise like cross matching. • Coomb's test, gel cards interpretation.	Must to know
6	**IV. Histopathology**: • Examine, report and discuss 12-15 cases histopathology and	Must to know

	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.	
7	**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.	Must to know
8	**VII. Basic Sciences:** • 10-15 spots based on basic sciences be included • Identify electron micrographs • Identify electron micrographs • Identify gels, results of PCR, immunological tests including interpretation of Immunofluroscence pictures. • Identify histochemical and immuno-histochemistry stains • Teaching exercise 10 min	Must to know
9	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	Must to know
	General Pathology	
	Cellular Responses to Stress and Toxic Insults: Adaptation, Injury, and Death	

	Introduction to Pathology, Overview: Cellular Responses to Stress and Noxious Stimuli **Adaptations of Cellular Growth and Differentiation** **Hypertrophy** *Mechanisms of Hypertrophy* **Hyperplasia** *Physiologic Hyperplasia,Pathologic Hyperplasia* *Mechanisms of Hyperplasia* **Atrophy** *Mechanisms of Atrophy* **Metaplasia** *Mechanisms of Metaplasia* **Overview of Cell Injury and Cell Death** **Causes of Cell Injury, Morphologic Alterations in Cell Injury** **Reversible Injury, Necrosis** *Patterns of Tissue Necrosis* **Mechanisms of Cell Injury** **Depletion of ATP** **Mitochondrial Damage Infl ux of Calcium and Loss of Calcium Homeostasis Accumulation of Oxygen-Derived Free Radicals (Oxidative Stress), Defects in Membrane Permeability** **Damage to DNA and Proteins** **Clinico-Pathologic Correlations: Selected Examples of Cell Injury and Necrosis** **Ischemic and Hypoxic Injury** *Mechanisms of Ischemic Cell Injury* **Ischemia-Reperfusion Injury** **Chemical (Toxic) Injury** **Apoptosis** **Causes of Apoptosis** *Apoptosis in Physiologic Situations* *Apoptosis in Pathologic Conditions* **Morphologic and Biochemical Changes in Apoptosis** *Biochemical Features of Apoptosis* **Mechanisms of Apoptosis** *The Intrinsic (Mitochondrial) Pathway of Apoptosis* *The Extrinsic (Death Receptor–Initiated) Pathway of Apoptosis* *The Execution Phase of Apoptosis* *Removal of Dead Cells* **Clinico-Pathologic Correlations: Apoptosis in Health and Disease** *Examples of Apoptosis* *Disorders Associated with Dysregulated Apoptosis* **Autophagy** **Intracellular Accumulations**	SIS + Tutorial
	Lipids *Steatosis (Fatty Change)* *Cholesterol and Cholesterol Esters* **Proteins** **Hyaline Change** **Glycogen** **Pigments** *Exogenous Pigments* *Endogenous Pigments*	Practical
	Pathologic Calcifi cation **Dystrophic Calcifi cation** **Metastatic Calcifi cation**	Practical
	Cellular Aging	

	Acute and Chronic Inflammation	
	Overview of Inflammation **Historical Highlights** **Acute Inflammation** **Stimuli for Acute Inflammation** **Reactions of Blood Vessels in Acute Inflammation** *Changes in Vascular Flow and Caliber, Increased Vascular Permeability (Vascular Leakage)* *Responses of Lymphatic Vessels* **Reactions of Leukocytes in Inflammation** *Recruitment of Leukocytes to Sites of Infection and Injury* *Recognition of Microbes and Dead Tissues* *Removal of the Offending Agents Other Functional Responses of* *Activated Leukocytes Release of Leukocyte Products and Leukocyte-Mediated Tissue Injury* *Defects in Leukocyte Function* **Termination of the Acute Inflammatory Response** **Mediators of Inflammation** **Cell-Derived Mediators** *Vasoactive Amines: Histamine and Serotonin* *Arachidonic Acid (AA) Metabolites:* *Prostaglandins, Leukotrienes,and Lipoxins* *Platelet-Activating Factor (PAF)* *Reactive Oxygen Species* *Nitric Oxide, Cytokines and Chemokines* *Lysosomal Constituents of Leukocytes, Neuropeptides* **Plasma Protein–Derived Mediators** *Complement System* *Coagulation and Kinin Systems* **Outcomes of Acute Inflammation** **Morphologic Patterns of Acute Inflammation** **Serous Inflammation** **Fibrinous Inflammation** **Suppurative or Purulent Inflammation;** **Abscess** **Ulcers** **Summary of Acute Inflammation** **Chronic Inflammation** **Causes of Chronic Inflammation** **Morphologic Features** **Role of Macrophages in Chronic Inflammation** **Other Cells in Chronic Inflammation** **Granulomatous Inflammation** **Systemic Effects of Inflammation** **Consequences of Defective or Excessive Inflammation**	SIS + Tutorial
	Tissue Renewal, Regeneration, and Repair	
	Control of Normal Cell Proliferation and Tissue Growth **Tissue Proliferative Activity Stem Cells** *Embryonic Stem Cells* *Reprogramming of Differentiated Cells:* *Induced Pluripotent Stem Cells* *Adult (Somatic) Stem Cells* *Stem Cells in Tissue Homeostasis* **Cell Cycle and the Regulation of Cell Replication** **Growth Factors** **Signaling Mechanisms in Cell Growth** *Receptors and Signal Transduction Pathways* *Transcription Factors* **Mechanisms of Tissue and Organ**	SIS + Tutorial

	Regeneration **Liver Regeneration** **Extracellular Matrix and Cell-Matrix Interactions** **Collagen Elastin, Fibrillin, and Elastic Fibers** **Cell Adhesion Proteins** **Glycosaminoglycans (GAGs) and Proteoglycans** **Healing by Repair, Scar Formation,and Fibrosis** **Mechanisms of Angiogenesis** *Growth Factors and Receptors* *Involved in Angiogenesis,ECM Proteins as Regulators of Angiogenesis* **Cutaneous Wound Healing, Local and Systemic Factors That Influence, Wound Healing** **Pathologic Aspects of Repair** *Fibrosis*	
	Hemodynamic Disorders, Thromboembolic Disease, and Shock	
	Edema, Hyperemia and Congestion **Hemorrhage** **Hemostasis and Thrombosis** **Normal Hemostasis** *Endothelium, Platelets,Coagulation Cascade* **Thrombosis** **Disseminated Intravascular Coagulation (DIC)** **Embolism** **Pulmonary Embolism, Systemic Thromboembolism** **Fat and Marrow Embolism, Air Embolism, Amniotic Fluid Embolism** **Infarction, Shock** **Pathogenesis of Septic Shock, Stages of Shock**	SIS + Tutorial
	Genetic Disorders	
	Disorders, Chromosomal Disorders **Normal Human Genetic Architecture, Genes and Human Diseases** **Mutations** **Mendelian Disorders** **Transmission Patterns of Single-Gene, Disorders** *Autosomal Dominant Disorders, Autosomal Recessive Disorders, X-Linked Disorders* **Biochemical and Molecular Basis of Single-Gene (Mendelian) Disorders** *Enzyme Defects and Their, Consequences* *Defects in Receptors and Transport, Systems* *Alterations in Structure, Function, or Quantity of Nonenzyme Proteins* *Genetically Determined Adverse, Reactions to Drugs* **Disorders Associated with Defects in Structural Proteins** *Marfan Syndrome Ehlers-Danlos Syndromes (EDS)* **Disorders Associated with Defects in Receptor Proteins** *Familial Hypercholesterolemia* **Disorders Associated with Defects in Enzymes** *Lysosomal Storage Diseases Glycogen Storage Diseases(Glycogenoses)* *Alkaptonuria (Ochronosis)* **Disorders Associated with Defects in Proteins That Regulate Cell Growth** **Complex Multigenic Karyotype, Structural Abnormalities of Chromosomes** **Cytogenetic Disorders Involving, Autosomes** *Trisomy 21 (Down Syndrome)Other Trisomies* *Chromosome 22q11.2 Deletion Syndrome* **Cytogenetic Disorders Involving Sex Chromosomes** *Klinefelter Syndrome Turner Syndrome, Hermaphroditism and Pseudohermaphroditism* **Single-Gene Disorders with Nonclassic, Inheritance** **Diseases Caused by Trinucleotide-Repeat Mutations** *Fragile-X Syndrome* **Mutations in Mitochondrial Genes—Leber, Hereditary Optic Neuropathy, Genomic Imprinting**	SIS + Tutorial

	Prader-Willi Syndrome and Angelman Syndrome **Gonadal Mosaicism** **Molecular Diagnosis of Genetic Diseases*** **Indications for Analysis of Germ Line, Genetic Alterations** **Indications for Analysis of Acquired** **Genetic Alterations** **PCR and Detection of DNA Sequence Alterations**	
	Neoplasia	
	Nomenclature **Characteristics of Benign and Malignant Neoplasms** **Differentiation and Anaplasia** **Rates of Growth** **Cancer Stem Cells and Cancer Cell Lineages** **Local Invasion** **Metastasis** *Pathways of Spread* **Epidemiology** **Cancer Incidence** **Geographic and Environmental Factors Age** **Genetic Predisposition to Cancer** **Nonhereditary Predisposing Conditions** **Molecular Basis of Cancer** **Essential Alterations for Malignant Transformation** **Self-Suffi ciency in Growth Signals: Oncogenes** *Proto-oncogenes, Oncogenes, and Oncoproteins* *Alterations in Nonreceptor Tyrosine Kinases* **Insensitivity to Growth Inhibition and Escape from Senescence: Tumor Suppressor Genes** **Evasion of Apoptosis** **Limitless Replicative Potential: Telomerase** **Angiogenesis** **Invasion and Metastasis** *Invasion of Extracellular Matrix* *Vascular Dissemination and Homing of Tumor Cells* *Molecular Genetics of Metastasis* *Development* **Genomic Instability—Enabler of Malignancy** **Stromal Microenvironment and Carcinogenesis** **Metabolic Alterations: The Warburg Effect** **Dysregulation of Cancer-Associated Genes** *Chromosomal Changes* *Gene Amplifi cation* *Epigenetic Changes* *miRNAs and Cancer* **Molecular Basis of Multistep Carcinogenesis** **Carcinogenic Agents and Their Cellular Interactions** *Steps Involved in Chemical Carcinogenesis* *Direct-Acting Agents*	SIS + Tutorial+Practical

	Indirect-Acting Agents *Initiation and Promotion of Chemical Carcinogenesis* **Radiation Carcinogenesis** *Ultraviolet Rays* *Ionizing Radiation* **Microbial Carcinogenesis** *Oncogenic RNA Viruses* *Oncogenic DNA Viruses* *Helicobacter pylori* **Host Defense against Tumors—Tumor Immunity** **Tumor Antigens** **Antitumor Effector Mechanisms** **Clinical Aspects of Neoplasia** *Local and Hormonal Effects* *Cancer Cachexia* *Paraneoplastic Syndromes* **Grading and Staging of Tumors** **Laboratory Diagnosis of Cancer** *Molecular Profi les of Tumors* *Tumor Markers*	
	Infectious Diseases	
	General Principles of Microbial Pathogenesis **Categories of Infectious Agents** *Prions* *Viruses* *Bacteria* *Fungi* *Protozoa* *Helminths* *Ectoparasites* **Special Techniques for Diagnosing Infectious Agents** **New and Emerging Infectious Diseases Agents of Bioterrorism** **Transmission and Dissemination of Microbes** *Routes of Entry of Microbes* *Spread and Dissemination of Microbes* *Release of Microbes from the Body* *Sexually Transmitted Infections* *Healthcare-Associated Infections* *Host Defenses Against Infections* **How Microorganisms Cause Disease** *Mechanisms of Viral Injury* *Mechanisms of Bacterial Injury* *Injurious Effects of Host Immunity* **Immune Evasion by Microbes** **Infections in Immunosuppressed Hosts** **Spectrum of Infl ammatory Responses to Infection** *Suppurative (Purulent) Infl ammation* *Mononuclear and Granulomatous Infl ammation* *Cytopathic-Cytoproliferative Reaction* *Tissue Necrosis* *Chronic Infl ammation and Scarring* **Viral Infections**	SIS + Tutorial +Practical

	Acute (Transient) Infections *Measles* *Mumps* *Poliovirus Infection* *West Nile Virus* *Viral Hemorrhagic Fevers* **Chronic Latent Infections (Herpesvirus Infections)** *Herpes Simplex Virus (HSV)* *Varicella-Zoster Virus (VZV)* *Cytomegalovirus (CMV)* **Chronic Productive Infections** *Hepatitis B Virus* **Transforming Infections** *Epstein-Barr Virus (EBV)* **Bacterial Infections** **Gram-Positive Bacterial Infections** *Staphylococcal Infections* *Streptococcal and Enterococcal Infections* *Diphtheria* *Listeriosis* *Anthrax* *Nocardia* **Gram-Negative Bacterial Infections** *Neisserial Infections* *Whooping Cough* *Pseudomonas Infection* *Plague* *Chancroid (Soft Chancre)* *Granuloma Inguinale* **Mycobacteria** *Tuberculosis* *Mycobacterium aviumintracellulare Complex* *Leprosy* **Spirochetes** *Syphilis, Relapsing Fever,Lyme Disease,* **Anaerobic Bacteria** *Abscesses Caused by Anaerobes, Clostridial Infections* **Obligate Intracellular Bacteria** *Chlamydial Infection, Rickettsial Infections* **Fungal Infections** *Candidiasis, Cryptococcosis, Aspergillosis, Zygomycosis (Mucormycosis)* **Parasitic Infections** **Protozoa** *Malaria, Babesiosis, Leishmaniasis, African Trypanosomiasis, Chagas Disease* **Metazoa** *Strongyloidiasis, Tapeworms (Cestodes): Cysticercosis and Hydatid Disease,Trichinosis Schistosomiasis Lymphatic Filariasis, Onchocerciasis*	
	Environmental and Nutritional Diseases **The Global Burden of Disease Health Effects of Climate Change** **Toxicity of Chemical and Physical Agents Environmental Pollution** **Air Pollution** *Outdoor Air Pollution, Indoor Air Pollution* **Metals as Environmental Pollutants** *Lead, Mercury, Arsenic Cadmium* **Occupational Health Risks:** **Industrial and Agricultural, Exposures, Effects of Tobacco** **Effects of Alcohol, Injury by Therapeutic Drugs and Drugs of Abuse**	SIS + Tutorial

	Injury by Therapeutic Drugs (Adverse Drug Reactions) *Hormonal Replacement Therapy (HRT)* *Oral Contraceptives (OCs) Anabolic Steroids* *Acetaminophen Aspirin (Acetylsalicylic Acid)* **Injury by Nontherapeutic Agents (Drug Abuse)** *Cocaine, Heroin, Amphetamines Marijuana, Other Drugs* **Injury by Physical Agents** **Mechanical Trauma** **Thermal Injury** *Thermal Burns, Hyperthermia* *Hypothermia,* **Electrical Injury** **Injury Produced by Ionizing Radiation** **Nutritional Diseases** **Dietary Insuffi ciency, Protein-Energy Malnutrition (PEM)** **Anorexia Nervosa and Bulimia, Vitamin Deficiencies** *Vitamin A, Vitamin D, Vitamin C (Ascorbic Acid)* **Obesity** *General Consequences of Obesity,Obesity and Cancer* **Diets, Cancer, and Atherosclerosis** *Diet and Cancer, Diet and Atherosclerosis*	
	Diseases of Infancy and Childhood	
	Congenital Anomalies **Defi nitions** **Causes of Anomalies** *Genetic Causes, Environmental Causes, Multifactorial Causes* **Pathogenesis of Congenital Anomalies** **Disorders of Prematurity** **Causes of Prematurity and Fetal Growth Restriction** **Neonatal Respiratory Distress Syndrome, Necrotizing Enterocolitis** **Perinatal Infections** **Transcervical (Ascending) Infections, Transplacental (Hematologic) Infections Sepsis** **Fetal Hydrops** **Immune Hydrops Nonimmune Hydrops** **Inborn Errors of Metabolism and Other Genetic Disorders** **Phenylketonuria (PKU)** **Galactosemia** **Cystic Fibrosis (Mucoviscidosis)** **Sudden Infant Death Syndrome (SIDS)** **Tumors and Tumor-like Lesions of Infancy and Childhood** **Benign Tumors and Tumor-like Lesions** **Malignant Tumors** *Incidence and Types The Neuroblastic Tumors, Wilms Tumor*	SIS + Tutorial
	Immunopathology	
	Diseases of the Immune System	
	The Normal Immune Response **Innate Immunity Adaptive Immunity** **Components of the Immune System:** **Cells, Tissues, and Selected Molecules** *Cells of the Immune System* *Tissues of the Immune System* *MHC Molecules: Peptide Display* *System of Adaptive Immunity* *Cytokines: Messenger Molecules of the Immune System* **Overview of Lymphocyte Activation and Immune Responses** *The Display and Recognition of*	SIS + Tutorial

Antigens
Cell-Mediated Immunity: Activation of T Lymphocytes and Elimination of Intracellular Microbes
Humoral Immunity: Activation of B Lymphocytes and Elimination of Extracellular Microbes
Decline of Immune Responses and Immunological Memory
Hypersensitivity and Autoimmune Disorders
Mechanisms of Hypersensitivity Reactions
Immediate (Type I) Hypersensitivity
Antibody-Mediated (Type II) Hypersensitivity
Immune Complex–Mediated (Type III) Hypersensitivity
T Cell–Mediated (Type IV) Hypersensitivity
Autoimmune Diseases
Immunological Tolerance
Mechanisms of Autoimmunity: General Principles
General Features of Autoimmune Diseases
Systemic Lupus Erythematosus (SLE)
Spectrum of Autoantibodies in SLE
Etiology and Pathogenesis of SLE
Drug-Induced Lupus Erythematosus
Rheumatoid Arthritis
Sjögren Syndrome
Etiology and Pathogenesis
Systemic Sclerosis (Scleroderma)
Etiology and Pathogenesis
Infl ammatory Myopathies
Mixed Connective Tissue Disease
Polyarteritis Nodosa and Other Vasculitides
Rejection of Tissue Transplants
Mechanisms of Recognition and Rejection of Allografts
Rejection of Kidney Grafts
Transplantation of Other Solid Organs
Transplantation of Hematopoietic Cells
Immunodefi ciency Syndromes
Primary Immunodefi ciencies
X-Linked Agammaglobulinemia (Bruton's Agammaglobulinemia)
Common Variable Immunodefi cieny
Isolated IgA Defi ciency
Hyper-IgM Syndrome
DiGeorge Syndrome (Thymic Hypoplasia)
Severe Combined Immunodefi ciency
Immunodefi ciency with Thrombocytopenia and Eczema (Wiskott-Aldrich Syndrome)
Genetic Defi ciencies of the Complement System
Secondary Immunodefi ciencies
Diseases of the Immune System
Acquired Immunodefi ciency Syndrome (AIDS)

	Epidemiology *Etiology: The Properties of HIV* *Pathogenesis of HIV Infection and AIDS* *Natural History of HIV Infection* *Clinical Features of AIDS* **Amyloidosis** *Properties of Amyloid Proteins* *Pathogenesis of Amyloidosis* *Classifi cation of Amyloidosis*	
	Systemic Pathology	
	Blood Vessels	
	The Structure and Function of Blood Vessels, Vessel Development, Growth, and Remodeling **Congenital Anomalies, Vascular Wall Cells and Their Response to Injury** **Hypertensive Vascular Disease** **Vascular Pathology in Hypertension** **Arteriosclerosis** **Atherosclerosis** **Epidemiology** **Pathogenesis of Atherosclerosis** *Endothelial Injury, Smooth Muscle Proliferation, Overview* **Consequences of Atherosclerotic Disease** **Aneurysms and Dissection** **Abdominal Aortic Aneurysm (AAA)** **Thoracic Aortic Aneurysms** **Aortic Dissection** **Vasculitis** **Noninfectious Vasculitis** **Giant-Cell (Temporal) Arteritis** **Takayasu Arteritis** **Polyarteritis Nodosa** **Kawasaki Disease** **Microscopic Polyangiitis** **Churg-Strauss Syndrome** **Wegener Granulomatosis** **Thromboangiitis Obliterans (Buerger Disease)** **Vasculitis Associated with Other Disorders** **Infectious Vasculitis** **Raynaud Phenomenon** **Veins and Lymphatics** **Varicose Veins** **Thrombophlebitis and Phlebothrombosis** **Superior and Inferior Vena Caval Syndromes** **Lymphangitis and Lymphedema** **Tumors** **Benign Tumors and Tumor-Like Conditions** *Hemangioma* *Lymphangiomas* *Glomus Tumor (Glomangioma)* *Vascular Ectasias* *Bacillary Angiomatosis* **Intermediate-Grade (Borderline) Tumors** *Kaposi Sarcoma* *Hemangioendothelioma* **Malignant Tumors** *Angiosarcoma*	SIS + Tutorial + Practical

	Hemangiopericytoma **Pathology of Vascular Interventions** **Angioplasty and Endovascular Stents** **Vascular Replacement**	
	The Heart	
	Cardiac Structure and Specializations **Myocardium** **Valves** **Conduction System** **Blood Supply** **Effects of Aging on the Heart** **Heart Disease: Overview of Pathophysiology** **Heart Failure** **Cardiac Hypertrophy: Pathophysiology and Progression to Failure** **Left-Sided Heart Failure** **Right-Sided Heart Failure** **Congenital Heart Disease** **Left-to-Right Shunts** *Atrial Septal Defect* *Patent Foramen Ovale* *Ventricular Septal Defect* *Patent Ductus Arteriosus* *Atrioventricular Septal Defect* **Right-to-Left Shunts** *Tetralogy of Fallot* *Transposition of the Great Arteries* *Persistent Truncus Arteriosus* *Tricuspid Atresia* *Total Anomalous Pulmonary Venous Connection* **Obstructive Congenital Anomalies** *Coarctation of the Aorta* *Pulmonary Stenosis and Atresia* *Aortic Stenosis and Atresia* **Ischemic Heart Disease** **Angina Pectoris** **Myocardial Infarction** **Chronic Ischemic Heart Disease** **Sudden Cardiac Death** **Hypertensive Heart Disease** **Systemic (Left-Sided) Hypertensive Heart Disease** **Pulmonary (Right-Sided) Hypertensive Heart Disease (Cor Pulmonale)** **Valvular Heart Disease** **Calcifi c Valvular Degeneration** *Calcifi c Aortic Stenosis* *Calcifi c Stenosis of Congenitally Bicuspid Aortic Valve* *Mitral Annular Calcifi cation* **Mitral Valve Prolapse (Myxomatous Degeneration of the Mitral Valve)** **Rheumatic Fever and Rheumatic Heart Disease** **Infective Endocarditis**	SIS + Tutorial+Practical

	Noninfected Vegetations *Nonbacterial Thrombotic Endocarditis* *Endocarditis of Systemic Lupus Erythematosus (Libman-Sacks Disease)* **Carcinoid Heart Disease** **Complications of Artifi cial Valves** **Cardiomyopathies** **Dilated Cardiomyopathy** *Arrhythmogenic Right Ventricular Cardiomyopathy* **Hypertrophic Cardiomyopathy** **Restrictive Cardiomyopathy** **Myocarditis** **Other Causes of Myocardial Disease** **Pericardial Disease** **Pericardial Effusion and Hemopericardium** **Pericarditis** *Acute Pericarditis* *Chronic or Healed Pericarditis* **Heart Disease Associated with Rheumatologic Disorders** **Tumors of the Heart** **Primary Cardiac Tumors** *Myxoma* *Lipoma* *Papillary Fibroelastoma* *Rhabdomyoma Sarcoma* **Cardiac Effects of Noncardiac Neoplasms** **Cardiac Transplantation**	
	The Lung	
	Congenital Anomalies **Atelectasis (Collapse)** **Pulmonary Edema** *Hemodynamic Pulmonary Edema* *Edema Caused by Microvascular Injury* **Acute Lung Injury and Acute Respiratory Distress Syndrome (Diffuse Alveolar Damage)** **Acute Interstitial Pneumonia** **Obstructive versus Restrictive Pulmonary Diseases** **Obstructive Pulmonary Diseases** **Emphysema Chronic Bronchitis Asthma Bronchiectasis** **Chronic Diffuse Interstitial (Restrictive) Diseases** **Fibrosing Diseases** *Idiopathic Pulmonary Fibrosis* *Nonspecifi c Interstitial Pneumonia* *Cryptogenic Organizing Pneumonia* *Pulmonary Involvement in Connective Tissue Diseases* *Pneumoconioses* *Complications of Therapies* **Granulomatous Diseases** *Sarcoidosis* *Hypersensitivity Pneumonitis* **Pulmonary Eosinophilia** **Smoking-Related Interstitial Diseases** *Desquamative Interstitial Pneumonia* *Respiratory Bronchiolitis–Associated Interstitial Lung Disease*	SIS + Tutorial + Practical

	Pulmonary Alveolar Proteinosis **Diseases of Vascular Origin** **Pulmonary Embolism, Hemorrhage, and Infarction** **Pulmonary Hypertension** **Diffuse Pulmonary Hemorrhage Syndromes** *Goodpasture Syndrome* *Idiopathic Pulmonary Hemosiderosis* *Wegener Granulomatosis* **Pulmonary Infections** **Community-Acquired Acute Pneumonias** *Streptococcus pneumoniae* *Haemophilus infl uenzae* *Moraxella catarrhalis* *Staphylococcus aureus* *Klebsiella pneumoniae* *Pseudomonas aeruginosa* *Legionella pneumophila* **Community-Acquired Atypical (Viral and Mycoplasmal) Pneumonias** *Infl uenza Infections* *Human Metapneumovirus* *Severe Acute Respiratory Syndrome* **Hospital-Acquired Pneumonia** **Aspiration Pneumonia** **Lung Abscess** **Chronic Pneumonia** *Histoplasmosis* *Blastomycosis* *Coccidioidomycosis* **Pneumonia in the Immunocompromised Host** **Pulmonary Disease in Human Immunodefi ciency Virus Infection** **Lung Transplantation Tumors** **Carcinomas** **Neuroendocrine Proliferations and Tumors** **Miscellaneous Tumors** **Metastatic Tumors** **Pleura** **Pleural Effusion** *Infl ammatory Pleural Effusions* *Noninfl ammatory Pleural Effusions* **Pneumothorax** **Pleural Tumors** *Solitary Fibrous Tumor* *Malignant Mesothelioma*	
	Head and Neck	
	ORAL CAVITY **Teeth and Supporting Structures** **Caries (Tooth Decay)** **Gingivitis** **Periodontitis** **Infl ammatory/Reactive Tumor-like Lesions** **Fibrous Proliferative Lesions** **Aphthous Ulcers (Canker Sores)** **Glossitis** **Infections** **Herpes Simplex Virus Infections** **Other Viral Infections** **Oral Candidiasis (Thrush)** **Deep Fungal Infections**	SIS + Tutorial + Practical

	Oral Manifestations of Systemic Disease **Hairy Leukoplakia** **Tumors and Precancerous Lesions** **Leukoplakia and Erythroplakia** **Squamous Cell Carcinoma** **Odontogenic Cysts and Tumors** UPPER AIRWAYS **Nose** **Infl ammations** **Necrotizing Lesions of the Nose and Upper Airways** **Nasopharynx** **Infl ammations** **Tumors of the Nose, Sinuses, and Nasopharynx** **Larynx** **Infl ammations** **Reactive Nodules (Vocal Cord Nodules and Polyps)** **Squamous Papilloma and Papillomatosis** **Carcinoma of the Larynx** EARS **Infl ammatory Lesions** **Otosclerosis** **Tumors** NECK **Branchial Cyst (Cervical Lymphoepithelial Cyst)** **Thyroglossal Duct Cyst** **Paraganglioma (Carotid Body Tumor)** SALIVARY GLANDS **Xerostomia** **Infl ammation (Sialadenitis)** **Neoplasms** **Pleomorphic Adenoma** **Warthin Tumor (Papillary Cystadenoma Lymphomatosum)** **Mucoepidermoid Carcinoma** **Other Salivary Gland Tumor**	
	The Gastrointestinal Tract	
	CONGENITAL ABNORMALITIES **Atresia, Fistulae, and Duplications** **Diaphragmatic Hernia, Omphalocele, and Gastroschisis** **Ectopia** **Meckel Diverticulum** **Pyloric Stenosis** **Hirschsprung Disease** ESOPHAGUS **Esophageal Obstruction** **Achalasia** **Esophagitis** **Lacerations** **Chemical and Infectious Esophagitis** **Refl ux Esophagitis** **Eosinophilic Esophagitis**	SIS + Tutorial + Practical

Barrett Esophagus
Esophageal Varices
Esophageal Tumors
Adenocarcinoma
Squamous Cell Carcinoma
Uncommon Esophageal Tumors

STOMACH

Acute Gastritis
Acute Gastric Ulceration
Chronic Gastritis
***Helicobacter Pylori* Gastritis**
Autoimmune Gastritis
Uncommon Forms of Gastritis
Complications of Chronic Gastritis
Peptic Ulcer Disease
Mucosal Atrophy and Intestinal Metaplasia
Dysplasia
Gastritis Cystica
Hypertrophic Gastropathies
Ménétrier Disease
Zollinger-Ellison Syndrome
Gastric Polyps and Tumors
Infl ammatory and Hyperplastic Polyps
Fundic Gland Polyps
Gastric Adenoma
Gastric Adenocarcinoma
Lymphoma
Carcinoid Tumor
Gastrointestinal Stromal Tumor

SMALL INTESTINE AND COLON

Intestinal Obstruction
Hernias
Adhesions
Volvulus
Intussusception
Ischemic Bowel Disease
Angiodysplasia
Malabsorption and Diarrhea
Cystic Fibrosis
Celiac Disease
Tropical Sprue
Autoimmune Enteropathy
Lactase (Disaccharidase) Defi ciency
Abetalipoproteinemia
Infectious Enterocolitis
Cholera
***Campylobacter* Enterocolitis**
Shigellosis
Salmonellosis
Typhoid Fever
Yersinia
Escherichia Coli
Pseudomembranous Colitis
Whipple Disease
Viral Gastroenteritis
Parasitic Enterocolitis
Irritable Bowel Syndrome
Infl ammatory Bowel Disease
Crohn Disease

	Ulcerative Colitis *Indeterminate Colitis* *Colitis-Associated Neoplasia* **Other Causes of Colitis** **Diversion Colitis** **Microscopic Colitis** **Graft-versus-Host Disease** **Sigmoid Diverticulitis** **Polyps** **Infl ammatory Polyps** **Hamartomatous Polyps** *Juvenile Polyps* *Peutz-Jeghers Syndrome* *Cowden Syndrome and Bannayan-Ruvalcaba-Riley Syndrome* *Cronkhite-Canada Syndrome* **Hyperplastic Polyps** **Neoplastic Polyps** **Familial Syndromes** **Familial Adenomatous Polyposis** **Hereditary Non-Polyposis Colorectal Cancer** **Adenocarcinoma** **Tumors of the Anal Canal** **Hemorrhoids** **Acute Appendicitis** **Tumors of the Appendix** PERITONEAL CAVITY **Infl ammatory Disease** **Peritoneal Infection** **Sclerosing Retroperitonitis** **Cysts** **Tumors**	
	Liver and Biliary Tract	
	THE LIVER **General Features of Hepatic Disease** **Patterns of Hepatic Injury** **Hepatic Failure** **Cirrhosis** **Portal Hypertension** **Jaundice and Cholestasis** *Bilirubin and Bile Formation* *Pathophysiology of Jaundice Cholestasis* **Infectious Disorders** **Viral Hepatitis** *Hepatitis A Virus* *Hepatitis B Virus* *Hepatitis C Virus* *Hepatitis D Virus* *Hepatitis E Virus* *Hepatitis G Virus* *Clinicopathologic Syndromes of Viral Hepatitis* **Bacterial, Parasitic, and Helminthic Infections** **Autoimmune Hepatitis** **Drug- and Toxin-Induced Liver Disease** **Alcoholic Liver Disease** **Metabolic Liver Disease** **Nonalcoholic Fatty Liver Disease** **Hemochromatosis** **Wilson Disease** **Antitrypsin Deficiency**	SIS + Tutorial + Practical

	Neonatal Cholestasis **Intrahepatic Biliary Tract Disease** **Secondary Biliary Cirrhosis** **Primary Biliary Cirrhosis (PBC)** **Primary Sclerosing Cholangitis (PSC)** **Anomalies of the Biliary Trees** **(Including Liver Cysts)** **Circulatory Disorders** **Impaired Blood Flow into the Liver** *Hepatic Artery Compromise* *Portal Vein Obstruction and Thrombosis* **Impaired Blood Flow through the Liver** *Passive Congestion and Centrilobular Necrosis* *Peliosis Hepatis* **Hepatic Venous Outfl ow Obstruction** *Hepatic Vein Thrombosis and Inferior Vena Cava Thrombosis* *Sinusoidal Obstruction Syndrome (Veno-Occlusive Disease)* **Hepatic Complications of Organ or Bone Marrow Transplantation** **Graft-Versus-Host Disease and Liver Rejection** **Hepatic Disease Associated with Pregnancy** **Preeclampsia and Eclampsia** **Acute Fatty Liver of Pregnancy** **Intrahepatic Cholestasis of Pregnancy** **Nodules and Tumors** **Nodular Hyperplasias** **Benign Neoplasms** *Hepatic Adenoma* **Malignant Tumors** *Hepatoblastoma* *Hepatocellular Carcinoma (HCC)* *Cholangiocarcinoma (CCA)* **Metastatic Tumors** THE BILIARY TRACT **Congenital Anomalies** **Disorders of the Gallbladder** **Cholelithiasis (Gallstones)** **Cholecystitis** *Acute Cholecystitis* *Chronic Cholecystitis* **Disorders of the Extrahepatic Bile Ducts** **Choledocholithiasis and Ascending Cholangitis** **Biliary Atresia** **Choledochal Cysts** **Tumors** **Carcinoma of the Gallbladder**	
	The Pancreas	
	Congenital Anomalies **Agenesis** **Pancreas Divisum** **Annular Pancreas** **Ectopic Pancreas** **Pancreatitis** **Acute Pancreatitis** **Chronic Pancreatitis** **Non-Neoplastic Cysts** **Congenital Cysts**	SIS + Tutorial

	Pseudocysts **Neoplasms** **Cystic Neoplasms** **Pancreatic Carcinoma** *Precursors to Pancreatic Cancer* *Molecular Carcinogenesis* **Acinar Cell Carcinoma** **Pancreatoblastoma**	
	The Kidney	
	Clinical Manifestations of Renal Diseases **Glomerular Diseases** **Clinical Manifestations** **Histologic Alterations** **Pathogenesis of Glomerular Injury** *Immune Complex Deposition Involving Intrinsic and in Situ Renal Antigens* *Circulating Immune Complex Glomerulonephritis* *Antibodies to Glomerular Cells* *Cell-Mediated Immunity in Glomerulonephritis* *Other Mechanisms of Glomerular Injury* *Activation of Alternative Complement Pathway* *Epithelial Cell Injury* *Mediators of Glomerular Injury* **Mechanisms of Progression in Glomerular Diseases** **Nephritic Syndrome** *Acute Proliferative (Poststreptococcal, Postinfectious) Glomerulonephritis* **Rapidly Progressive (Crescentic) Glomerulonephritis** **Nephrotic Syndrome** *Membranous Nephropathy* *Minimal-Change Disease* *Focal Segmental Glomerulosclerosis* *Membranoproliferative Glomerulonephritis* **Isolated Urinary Abnormalities** *IgA Nephropathy (Berger Disease)* *Alport Syndrome* *Thin Basement Membrane Disease (Benign Familial Hematuria)* **Chronic Glomerulonephritis** **Glomerular Lesions Associated with Systemic Diseases** *Lupus Nephritis* *Henoch-Schönlein Purpura* *Bacterial Endocarditis–Associated Glomerulonephritis* *Diabetic Nephropathy* *Amyloidosis* *Fibrillary Glomerulonephritis and Immunotactoid Glomerulopathy* *Other Systemic Disorders* **Tubular and Interstitial Diseases** **Acute Kidney Injury (Acute Tubular Necrosis)** **Tubulointerstitial Nephritis** *Pyelonephritis and Urinary Tract*	SIS + Tutorial + Practical

	Infection *Acute Pyelonephritis* *Chronic Pyelonephritis and Refl ux* *Nephropathy* *Tubulointerstitial Nephritis Induced by* *Drugs and Toxins* *Other Tubulointerstitial Diseases* **Vascular Diseases** **Benign Nephrosclerosis** **Malignant Hypertension and Accelerated** **Nephrosclerosis** **Renal Artery Stenosis** **Thrombotic Microangiopathies** *Epidemic Hemolytic-Uremic* *Syndrome* *Non-Epidemic Hemolytic-Uremic* *Syndrome* *Thrombotic Thrombocytopenic* *Purpura* **Other Vascular Disorders** *Atherosclerotic Ischemic Renal Disease* *Atheroembolic Renal Disease* *Sickle-Cell Disease Nephropathy* *Diffuse Cortical Necrosis* *Renal Infarcts* **Congenital Anomalies** **Multicystic Renal Dysplasia** **Cystic Diseases of the Kidney** **Autosomal-Dominant (Adult) Polycystic** **Kidney Disease** **Autosomal-Recessive (Childhood)** **Polycystic Kidney Disease** **Cystic Diseases of Renal Medulla** *Medullary Sponge Kidney* *Nephronophthisis and Adult-Onset* *Medullary Cystic Disease* **Acquired (Dialysis-Associated) Cystic Disease Simple Cysts** **Urinary Tract Obstruction (Obstructive Uropathy)** **Urolithiasis (Renal Calculi, Stones)** **Tumors of the Kidney** **Benign Tumors** *Renal Papillary Adenoma* *Angiomyolipoma* *Oncocytoma* **Malignant Tumors** *Renal Cell Carcinoma (Adenocarcinoma of the Kidney)* *Urothelial Carcinomas of the Renal* *Pelvis*	
	The Lower Urinary Tract and Male Genital System	
	THE LOWER URINARY TRACT **Ureters** **Congenital Anomalies** **Inflammation** **Tumors and Tumor-like Lesions** **Obstructive Lesions** **Urinary Bladder** **Congenital Anomalies** **Inflammation** *Acute and Chronic Cystitis* *Special Forms of Cystitis*	SIS + Tutorial + Practical

	Metaplastic Lesions **Neoplasms** *Urothelial Tumors* *Mesenchymal Tumors* *Secondary Tumors* **Obstruction** **Urethra** **Infl ammation** **Tumors and Tumor-like Lesions** THE MALE GENITAL TRACT **Penis** **Congenital Anomalies** *Hypospadias and Epispadias* *Phimosis* **Infl ammation** **Tumors** *Benign Tumors* *Malignant Tumors* **Testis and Epididymis** **Congenital Anomalies** *Cryptorchidism* **Regressive Changes** *Atrophy and Decreased Fertility* **Inflammation** *Nonspecific Epididymitis and Orchitis* *Granulomatous (Autoimmune) Orchitis* *Specifi c Inflammations* **Vascular Disorders** *Torsion* **Spermatic Cord and Paratesticular Tumors** **Testicular Tumors** *Germ Cell Tumors* *Tumors of Sex Cord–Gonadal Stroma* *Gonadoblastoma* *Testicular Lymphoma* **Miscellaneous Lesions of Tunica Vaginalis** **Prostate** **Infl ammation** **Benign Enlargement** *Benign Prostatic Hyperplasia (BPH) or Nodular Hyperplasia* **Tumors** *Adenocarcinoma* *Miscellaneous Tumors and Tumor-like Conditions*	
	The Female Genital Tract	
	Development **Anatomy** **Infections of the Female Genital Tract** *Infections of the Lower Genital Tract* *Infections Involving the Lower and Upper Genital Tract* VULVA **Bartholin Cyst** **Non-Neoplastic Epithelial Disorders** **Lichen Sclerosus**	SIS + Tutorial + Practical

	Squamous Cell Hyperplasia **Benign Exophytic Lesions** **Condyloma Acuminatum** **Squamous Neoplastic Lesions** **Vulvar Intraepithelial Neoplasia and Vulvar Carcinoma** **Glandular Neoplastic Lesions** **Papillary Hidradenoma** **Extramammary Paget Disease** **Malignant Melanoma** VAGINA **Development Anomalies** **Premalignant and Malignant Neoplasms** **Vaginal Intraepithelial Neoplasia and Squamous Cell Carcinoma** **Embryonal Rhabdomyosarcoma** CERVIX **Inflammations** **Acute and Chronic Cervicitis** **Endocervical Polyps** **Premalignant and Malignant Neoplasms** **Cervical Intraepithelial Neoplasia** **Cervical Carcinoma** *Cervical Cancer Screening And Prevention* BODY OF UTERUS AND ENDOMETRIUM **Endometrial Histology in the Menstrual Cycle** **Functional Endometrial Disorders (Dysfunctional Uterine Bleeding)** **Anovulatory Cycle** **Inadequate Luteal Phase** **Endometrial Changes Induced by Oral Contraceptives** **Menopausal and Postmenopausal Changes** **Infl ammation** **Acute Endometritis** **Chronic Endometritis** **Endometriosis and Adenomyosis** **Endometrial Polyps** **Endometrial Hyperplasia** **Malignant Tumors of the Endometrium** **Carcinoma of the Endometrium** **Malignant Mixed Müllerian Tumors** **Tumors of the Endometrium with Stromal Differentiation** **Adenosarcomas** **Stromal Tumors** **Tumors of the Myometrium** **Leiomyomas** **Leiomyosarcomas** FALLOPIAN TUBES **Infl ammations** **Tumors and Cysts** OVARIES	

	Non-Neoplastic and Functional Cysts **Follicle and Luteal Cysts** **Polycystic Ovaries and Stromal Hyperthecosis** **Ovarian Tumors** **Tumors of Surface (Müllerian) Epithelium** *Serous Tumors* *Mucinous Tumors* *Endometrioid Tumors* *Clear Cell Adenocarcinoma* *Cystadenofi broma* *Brenner Tumor* *Clinical Course, Detection, and Prevention of Surface Epithelial Tumors* **Germ Cell Tumors** *Teratomas* *Dysgerminoma* *Endodermal Sinus (Yolk Sac) Tumor* *Choriocarcinoma* *Other Germ Cell Tumors* **Sex Cord–Stromal Tumors** *Granulosa–Theca Cell Tumors* *Fibromas, Thecomas, and Fibrothecomas* *Sertoli–Leydig Cell Tumors (Androblastomas)* *Other Sex Cord–Stromal Tumors* *Metastatic Tumors* GESTATIONAL AND PLACENTAL DISORDERS **Disorders of Early Pregnancy** **Spontaneous Abortion** **Ectopic Pregnancy** **Disorders of Late Pregnancy** **Twin Placentas** **Abnormalities of Placental Implantation** **Placental Infections** **Preeclampsia and Eclampsia** **Gestational Trophoblastic Disease** **Hydatidiform Mole** *Complete Mole* *Partial Mole* **Invasive Mole** **Choriocarcinoma** **Placental Site Trophoblastic Tumor (PSTT)**	
	The Breast	
	THE FEMALE BREAST **Disorders of Development** **Clinical Presentations of Breast Disease** **Infl ammatory Disorders** **Acute Mastitis** **Periductal Mastitis** **Mammary Duct Ectasia** **Fat Necrosis** **Lymphocytic Mastopathy (Sclerosing Lymphocytic Lobulitis)** **Granulomatous Mastitis** **Benign Epithelial Lesions** **Nonproliferative Breast Changes (Fibrocystic Changes)**	SIS + Tutorial + Practical

	Proliferative Breast Disease without Atypia **Proliferative Breast Disease with Atypia** **Clinical Signifi cance of Benign Epithelial Changes** **Carcinoma of the Breast** **Incidence and Epidemiology** **Etiology and Pathogenesis** *Hereditary Breast Cancer* *Sporadic Breast Cancer* *Overview of Carcinogenesis and Tumor Progression* **Classifi cation of Breast Carcinoma** *Carcinoma in Situ* *Invasive (Infi ltrating) Carcinoma* *Invasive Carcinoma, No Special Type (NST; Invasive Ductal Carcinoma)* *Invasive Lobular Carcinoma* *Medullary Carcinoma* *Mucinous (Colloid) Carcinoma* *Tubular Carcinoma* *Invasive Papillary Carcinoma* *Metaplastic Carcinoma* **Prognostic and Predictive Factors** **Stromal Tumors** *Fibroadenoma* *Phyllodes Tumor* *Benign Stromal Lesions* *Malignant Stromal Tumors* **Other Malignant Tumors of the Breast** THE MALE BREAST **Gynecomastia** **Carcinoma**	
	The Endocrine System	
	PITUITARY GLAND **Clinical Manifestations of Pituitary Disease** **Pituitary Adenomas and Hyperpituitarism** **Prolactinomas** **Growth Hormone Cell (Somatotroph) Adenomas** **ACTH Cell (Corticotroph) Adenomas** **Other Anterior Pituitary Adenomas** **Hypopituitarism** **Posterior Pituitary Syndromes** **Hypothalamic Suprasellar Tumors** THYROID GLAND **Hyperthyroidism** **Hypothyroidism** **Cretinism** **Myxedema** **Thyroiditis** **Hashimoto Thyroiditis** **Subacute (Granulomatous) Thyroiditis** **Subacute Lymphocytic (Painless) Thyroiditis** **Graves Disease** **Diffuse and Multinodular Goiters** **Diffuse Nontoxic (Simple) Goiter**	SIS + Tutorial + Practical

Multinodular Goiter
Neoplasms of the Thyroid
Adenomas
Carcinomas
Pathogenesis
Papillary Carcinoma
Follicular Carcinoma
Anaplastic (Undifferentiated) Carcinoma
Medullary Carcinoma
Congenital Anomalies

PARATHYROID GLANDS

Hyperparathyroidism
Primary Hyperparathyroidism
Secondary Hyperparathyroidism
Hypoparathyroidism
Pseudohypoparathyroidism

THE ENDOCRINE PANCREAS

Diabetes Mellitus
Diagnosis
Classifi cation
Glucose Homeostasis
Regulation of Insulin Release
Insulin Action and Insulin Signaling Pathways
Pathogenesis of Type 1 Diabetes Mellitus
Genetic Susceptibility
Environmental Factors
Mechanisms of b*-Cell Destruction*
Pathogenesis of Type 2 Diabetes Mellitus
Insulin Resistance
b*-Cell Dysfunction*
Monogenic Forms of Diabetes
Pathogenesis of the Complications of Diabetes
Morphology of Diabetes and Its Late Complications
Clinical Features of Diabetes
Pancreatic Endocrine Neoplasms
Hyperinsulinism (Insulinoma)
Zollinger-Ellison Syndrome (Gastrinomas)
Other Rare Pancreatic Endocrine Neoplasms

ADRENAL GLANDS

Adrenal Cortex
Adrenocortical Hyperfunction (Hyperadrenalism)
Hypercortisolism (Cushing Syndrome)
Primary Hyperaldosteronism
Adrenogenital Syndromes
Adrenocortical Insuffi ciency
Primary Acute Adrenocortical Insuffi ciency
Waterhouse-Friderichsen Syndrome
Primary Chronic Adrenocortical Insuffi ciency (Addison Disease)
Secondary Adrenocortical Insuffi ciency
Adrenocortical Neoplasms
Other Lesions of the Adrenal
Adrenal Medulla
Pheochromocytoma

MULTIPLE ENDOCRINE NEOPLASIA

	SYNDROMES **Multiple Endocrine Neoplasia, Type 1** **Multiple Endocrine Neoplasia, Type 2** PINEAL GLAND **Pinealomas**	
	The Skin	
	The Skin: More Than a Mechanical Barrier **Defi nitions of Macroscopic Terms** **Defi nitions of Microscopic Terms** **Disorders of Pigmentation and Melanocytes** **Freckle (Ephelis)** **Lentigo** **Melanocytic Nevus (Pigmented Nevus, Mole)** **Dysplastic Nevi** **Melanoma** **Benign Epithelial Tumors** **Seborrheic Keratoses** **Acanthosis Nigricans** **Fibroepithelial Polyp** **Epithelial Cyst (Wen)** **Adnexal (Appendage) Tumors** **Premalignant and Malignant Epidermal Tumors** **Actinic Keratosis** **Squamous Cell Carcinoma** **Basal Cell Carcinoma** **Tumors of the Dermis** **Benign Fibrous Histiocytoma (Dermatofi broma)** **Dermatofi brosarcoma Protuberans** **Tumors of Cellular Migrants to the Skin** **Mycosis Fungoides (Cutaneous T-Cell Lymphoma)** **Mastocytosis** **Disorders of Epidermal Maturation** **Ichthyosis** **Acute Infl ammatory Dermatoses** **Urticaria** **Acute Eczematous Dermatitis** **Erythema Multiforme** **Chronic Infl ammatory Dermatoses** **Psoriasis** **Seborrheic Dermatitis** **Lichen Planus** **Blistering (Bullous) Diseases** **Infl ammatory Blistering Disorders** *Pemphigus* *Bullous Pemphigoid* *Dermatitis Herpetiformis* **Noninfl ammatory Blistering Disorders** *Epidermolysis Bullosa and Porphyria* **Disorders of Epidermal Appendages**	SIS + Tutorial + Practical

	Acne Vulgaris **Rosacea** **Panniculitis** **Erythema Nodosum and Erythema Induratum** **Infection** **Verrucae (Warts)** **Molluscum Contagiosum** **Impetigo** **Superfi cial Fungal Infections**	
	Bones, Joints, and Soft-Tissue Tumors	
	BONES **Bone Modeling, Remodeling, and Peak Bone Mass** **Bone Growth and Development** **Developmental Abnormalities in Bone Cells, Matrix, and Structure** **Malformations and Diseases Caused by Defects in Nuclear Proteins and Transcription Factors** **Diseases Caused by Defects in Hormones and Signal Transduction Mechanisms** **Diseases Associated with Defects in Extracellular Structural Proteins** *Type 1 Collagen Diseases (Osteogenesis Imperfecta)* *Diseases Associated with Mutations of Types 2, 9, 10, and 11 Collagen* **Diseases Associated with Defects in Folding and Degradation of Macromolecules** *Mucopolysaccharidoses* **Diseases Associated with Defects in Metabolic Pathways (Enzymes, Ion Channels, and Transporters)** *Osteopetrosis* **Diseases Associated with Decreased Bone Mass** *Osteoporosis* **Diseases Caused by Osteoclast Dysfunction** *Paget Disease (Osteitis Deformans)* **Diseases Associated with Abnormal Mineral Homeostasis** *Rickets and Osteomalacia* *Hyperparathyroidism* *Renal Osteodystrophy* **Fractures** **Osteonecrosis (Avascular Necrosis)** **Infections—Osteomyelitis** **Pyogenic Osteomyelitis** **Tuberculous Osteomyelitis** **Skeletal Syphilis** **Bone Tumors and Tumor-Like Lesions** **Bone-Forming Tumors** *Osteoma* *Osteoid Osteoma and Osteoblastoma*	SIS + Tutorial + Practical

Osteosarcoma
Cartilage-Forming Tumors
Osteochondroma
Chondromas
Chondroblastoma
Chondromyxoid Fibroma
Chondrosarcoma
Fibrous and Fibro-Osseous Tumors
Fibrous Cortical Defect and Non-Ossifying Fibroma
Fibrous Dysplasia
Fibrosarcoma Variants
Miscellaneous Tumors
Ewing Sarcoma/Primitive Neuroectodermal Tumor
Giant-Cell Tumor
Aneurysmal Bone Cyst
Metastatic Disease

JOINTS

Arthritis
Osteoarthritis
Rheumatoid Arthritis
Juvenile Idiopathic Arthritis
Seronegative Spondyloarthropathies
Ankylosing Spondyloarthritis
Reiter Syndrome
Enteritis-Associated Arthritis
Psoriatic Arthritis
Infectious Arthritis
Bacterial Arthritis
Tuberculous Arthritis
Lyme Arthritis
Viral Arthritis
Crystal-Induced Arthritis
Gout and Gouty Arthritis
Calcium Pyrophosphate Crystal Deposition Disease (Pseudo-Gout)
Tumors and Tumor-Like Lesions
Ganglion and Synovial Cyst
Tenosynovial Giant-Cell Tumor (Localized and Diffuse)

SOFT-TISSUE TUMORS AND TUMOR-LIKE LESIONS

Pathogenesis and General Features
Fatty Tumors
Lipomas
Liposarcoma
Fibrous Tumors and Tumor-Like Lesions
Reactive Pseudosarcomatous Proliferations
Nodular Fasciitis
Myositis Ossifi cans
Fibromatoses
Superfi cial Fibromatosis (Palmar, Plantar, and Penile Fibromatoses)
Deep-Seated Fibromatosis (Desmoid Tumors)
Fibrosarcoma
Fibrohistiocytic Tumors
Benign Fibrous Histiocytoma (Dermatofi broma)

	Malignant Fibrous Histiocytoma **Tumors of Skeletal Muscle** **Rhabdomyosarcoma** **Tumors of Smooth Muscle** **Leiomyomas** **Leiomyosarcoma** **Synovial Sarcoma**	
	Peripheral Nerve and Skeletal Muscle	
	General Reactions of the Motor Unit **Segmental Demyelination** **Axonal Degeneration and Muscle Fiber Atrophy** **Nerve Regeneration and Reinnervation of Muscle** **Reactions of the Muscle Fiber** **Diseases of Peripheral Nerve** **Infl ammatory Neuropathies** *Immune-Mediated Neuropathies* **Infectious Polyneuropathies** *Leprosy (Hansen Disease)* *Diphtheria* *Varicella-Zoster Virus* **Hereditary Neuropathies** *Hereditary Motor and Sensory Neuropathy Type I* *Other Hereditary Motor and Sensory Neuropathies* **Acquired Metabolic and Toxic Neuropathies** *Peripheral Neuropathy in Adult-Onset Diabetes Mellitus* *Metabolic and Nutritional Peripheral Neuropathies* *Neuropathies Associated with Malignancy* *Toxic Neuropathies* **Traumatic Neuropathies** **Tumors of Peripheral Nerve** **Diseases of Skeletal Muscle** **Denervation Atrophy** *Spinal Muscular Atrophy (Infantile Motor Neuron Disease)* **Muscular Dystrophies** *X-Linked Muscular Dystrophy (Duchenne Muscular Dystrophy and Becker Muscular Dystrophy)* *Other Muscular Dystrophies* *Myotonic Dystrophy* **Ion Channel Myopathies (Channelopathies)** **Congenital Myopathies** **Myopathies Associated with Inborn Errors of Metabolism** *Lipid Myopathies* *Mitochondrial Myopathies (Oxidative Phosphorylation Diseases)* **Infl ammatory Myopathies** *Noninfectious Infl ammatory Myopathies* **Toxic Myopathies** *Thyrotoxic Myopathy*	SIS + Tutorial

	Ethanol Myopathy *Drug-Induced Myopathies* **Diseases of the Neuromuscular Junction** *Myasthenia Gravis* *Lambert-Eaton Myasthenic Syndrome* **Tumors of Skeletal Muscle**	
	The Central Nervous System	
	Cellular Responses to Injury **Cerebral Edema, Hydrocephalus, and Raised Intracranial Pressure and Herniation** **Cerebral Edema** **Hydrocephalus** **Raised Intracranial Pressure and Herniation** **Malformations and Developmental Diseases** **Neural Tube Defects** **Forebrain Anomalies** **Posterior Fossa Anomalies** **Syringomyelia and Hydromyelia** **Perinatal Brain Injury** **Trauma** **Skull Fractures** **Parenchymal Injuries** *Concussion* *Direct Parenchymal Injury* *Diffuse Axonal Injury* **Traumatic Vascular Injury** *Epidural Hematoma* *Subdural Hematoma* **Sequelae of Brain Trauma** **Spinal Cord Trauma** **Cerebrovascular Diseases** **Hypoxia, Ischemia, and Infarction** *Hypotension, Hypoperfusion, and Low-Flow States (Global Cerebral Ischemia)* *Infarction from Obstruction of Local Blood Supply (Focal Cerebral Ischemia)* **Hypertensive Cerebrovascular Disease** *Lacunar Infarcts* *Slit Hemorrhages* *Hypertensive Encephalopathy* **Intracranial Hemorrhage** *Intracerebral (Intraparenchymal) Hemorrhage* *Subarachnoid Hemorrhage and Ruptured Saccular Aneurysms* *Vascular Malformations* **Infections** **Acute Meningitis** *Acute Pyogenic (Bacterial) Meningitis* *Acute Aseptic (Viral) Meningitis* **Acute Focal Suppurative Infections** *Brain Abscess* *Subdural Empyema* *Extradural Abscess*	SIS + Tutorial + Practical

	Chronic Bacterial Meningoencephalitis *Tuberculosis* *Neurosyphilis* *Neuroborreliosis (Lyme Disease)* **Viral Meningoencephalitis** *Arthropod-Borne Viral Encephalitis* *Herpes Simplex Virus Type 1* *Herpes Simplex Virus Type 2* *Varicella-Zoster Virus (Herpes Zoster)* *Cytomegalovirus* *Poliomyelitis* *Rabies* *Human Immunodefi ciency Virus* *Progressive Multifocal Leukoencephalopathy* *Subacute Sclerosing Panencephalitis* **Fungal Meningoencephalitis** **Other Infectious Diseases of the Nervous System** **Transmissible Spongiform Encephalopathies (Prion Diseases)** **Demyelinating Diseases** **Multiple Sclerosis** **Neuromyelitis Optica** **Acute Disseminated Encephalomyelitis and Acute Necrotizing Hemorrhagic Encephalomyelitis** **Other Diseases with Demyelination** **Degenerative Diseases** **Degenerative Diseases Affecting the Cerebral Cortex** *Alzheimer Disease* *Frontotemporal Dementias* *Vascular Dementia* **Degenerative Diseases of Basal Ganglia and Brainstem** *Parkinsonism* *Parkinson Disease* *Dementia with Lewy Bodies* *Multiple System Atrophy* *Huntington Disease* **Spinocerebellar Degenerations** *Spinocerebellar Ataxias* **Degenerative Diseases Affecting Motor Neurons** *Amyotrophic Lateral Sclerosis (ALS; Motor Neuron Disease)* *Bulbospinal Atrophy (Kennedy Syndrome)* *Spinal Muscular Atrophy* **Genetic Metabolic Diseases** **Neuronal Storage Diseases** *Neuronal Ceroid Lipofuscinoses* *Tay-Sachs Disease* **Leukodystrophies** *Krabbe Disease* *Metachromatic Leukodystrophy* *Adrenoleukodystrophy* *Pelizaeus-Merzbacher Disease* *Canavan Disease* *Alexander Disease* *Vanishing-White-Matter Leukodystrophy*	

	Mitochondrial Encephalomyopathies *Mitochondrial Encephalomyopathy, Lactic Acidosis, and Strokelike Episodes* *Myoclonic Epilepsy and Ragged Red Fibers* *Leigh Syndrome (Subacute Necrotizing Encephalopathy)* *Kearn-Sayre Syndrome* *Alpers Disease* **Toxic and Acquired Metabolic Diseases** **Vitamin Defi ciencies** *Thiamine (Vitamin B_1) Defi ciency* *Vitamin B_{12} Defi ciency* **Neurologic Sequelae of Metabolic Disturbances** *Hypoglycemia* *Hyperglycemia* *Hepatic Encephalopathy* **Toxic Disorders** *Carbon Monoxide* *Methanol* *Ethanol* *Radiation* *Combined Methotrexate and Radiation-Induced Injury* **Tumors** **Gliomas** *Astrocytoma* *Oligodendroglioma* *Ependymoma and Related Paraventricular Mass Lesions* **Neuronal Tumors** **Poorly Differentiated Neoplasms** *Medulloblastoma* *Atypical Teratoid/Rhabdoid Tumor* **Other Parenchymal Tumors** *Primary CNS Lymphoma* *Germ Cell Tumors* *Pineal Parenchymal Tumors* **Meningiomas** **Metastatic Tumors** **Paraneoplastic Syndromes** **Peripheral Nerve Sheath Tumors** *Schwannoma* *Neurofi broma* *Malignant Peripheral Nerve Sheath Tumor* **Familial Tumor Syndromes** *Neurofi bromatosis Type 1* *Neurofi bromatosis Type 2* *Tuberous Sclerosis Complex* *Von Hippel–Lindau Disease*	
	The Eye	
	Orbit **Functional Anatomy and Proptosis** **Thyroid Ophthalmopathy (Graves Disease)** **Other Orbital Infl ammatory Conditions** **Neoplasms**	SIS + Tutorial + Practical

	Eyelid **Functional Anatomy** **Neoplasms** **Conjunctiva** **Functional Anatomy** **Conjunctival Scarring** **Pinguecula and Pterygium** **Neoplasms** **Sclera** **Cornea** **Functional Anatomy** **Keratitis and Ulcers** **Corneal Degenerations and Dystrophies** *Band Keratopathies* *Keratoconus* *Fuchs Endothelial Dystrophy* *Stromal Dystrophies* **Anterior Segment** **Functional Anatomy** **Cataract** **The Anterior Segment and Glaucoma** **Endophthalmitis and Panophthalmitis** **Uvea** **Uveitis** **Neoplasms** *Uveal Nevi and Melanomas* **Retina and Vitreous** **Functional Anatomy** **Retinal Detachment** **Retinal Vascular Disease** *Hypertension* *Diabetes Mellitus* *Retinopathy of Prematurity (Retrolental Fibroplasia)* *Sickle Retinopathy, Retinal Vasculitis, Radiation Retinopathy* *Retinal Artery and Vein Occlusions* **Age-Related Macular Degeneration** **Other Retinal Degenerations** *Retinitis Pigmentosa* **Retinitis** **Retinal Neoplasms** *Retinoblastoma* *Retinal Lymphoma* **Optic Nerve** **Anterior Ischemic Optic Neuropathy** **Papilledema** **Glaucomatous Optic Nerve Damage** **Other Optic Neuropathies** **Optic Neuritis** **The End-Stage Eye: Phthisis Bulbi**	
	Haematology & Blood Transfusion	
	Diseases of White Blood Cells, Lymph Nodes, Spleen, and Thymus	SIS + Tutorial + Practical
	Development and Maintenance of Hematopoietic Tissues DISORDERS OF WHITE CELLS **Leukopenia** **Neutropenia, Agranulocytosis**	SIS + Tutorial + Practical

	Reactive (Infl ammatory) Proliferations of White Cells and Lymph Nodes **Leukocytosis** **Lymphadenitis** *Acute Nonspecifi c Lymphadenitis* *Chronic Nonspecifi c Lymphadenitis* **Neoplastic Proliferations of White Cells** **Etiologic and Pathogenetic Factors in White Cell Neoplasia: Overview** **Lymphoid Neoplasms** *Defi nitions and Classifi cations* *Precursor B- and T-Cell Neoplasms* *Peripheral B-Cell Neoplasms* *Peripheral T-Cell and NK-Cell Neoplasms* *Hodgkin Lymphoma* **Myeloid Neoplasms** *Acute Myeloid Leukemia* *Myelodysplastic Syndromes* *Myeloproliferative Disorders* **Langerhans Cell Histiocytosis** SPLEEN **Splenomegaly** **Nonspecifi c Acute Splenitis** **Congestive Splenomegaly** **Splenic Infarcts** **Neoplasms** **Congenital Anomalies** **Rupture** THYMUS **Developmental Disorders** **Thymic Hyperplasia** **Thymomas**	
	Red Blood Cell and Bleeding Disorders	
	Anemias **Anemias of Blood Loss** *Acute Blood Loss* *Chronic Blood Loss* **Hemolytic Anemias** *Hereditary Spherocytosis (HS)* *Hemolytic Disease Due to Red Cell Enzyme Defects: Glucose-6-Phosphate Dehydrogenase Defi ciency* *Sickle Cell Disease* *Thalassemia Syndromes* *Paroxysmal Nocturnal Hemoglobinuria* *Immunohemolytic Anemia* *Hemolytic Anemia Resulting from Trauma to Red Cells* **Anemias of Diminished Erythropoiesis** *Megaloblastic Anemias* *Iron Defi ciency Anemia* *Anemia of Chronic Disease* *Aplastic Anemia* *Pure Red Cell Aplasia* *Other Forms of Marrow Failure* **Polycythemia** **Bleeding Disorders: Hemorrhagic**	SIS + Tutorial + Practical

	Diatheses **Bleeding Disorders Caused by Vessel Wall Abnormalities** **Bleeding Related to Reduced Platelet Number: Thrombocytopenia** *Chronic Immune Thrombocytopenic Purpura* *Acute Immune Thrombocytopenic Purpura* *Drug-Induced Thrombocytopenia* *HIV-Associated Thrombocytopenia* *Thrombotic Microangiopathies: Thrombotic Thrombocytopenic Purpura (TTP) and Hemolytic-Uremic Syndrome (HUS)* **Bleeding Disorders Related to Defective Platelet Functions** **Hemorrhagic Diatheses Related to Abnormalities in Clotting Factors** *The Factor VIII-vWF Complex* *Von Willebrand Disease* *Hemophilia A (Factor VIII Defi ciency)* *Hemophilia B (Christmas Disease, Factor IX Defi ciency)* **Disseminated Intravascular Coagulation (DIC)**	
	Cytology	
	Introduction	SIS + Tutorial + Practical
	The techniques of FNA Cytology, i) Basic Techniques, ii) Miscellaneous techniques	SIS + Tutorial + Practical
	Imaging methods for guidance of aspiration cytology	SIS + Tutorial + Practical
	Head & Neck, salivary glands	SIS + Tutorial + Practical
	Lymph nodes	SIS + Tutorial + Practical
	Thyroid	SIS + Tutorial + Practical
	Breast	SIS + Tutorial + Practical
	Lung, chest wall and pleura	SIS + Tutorial + Practical
	Mediastinum	SIS + Tutorial + Practical
	Liver and spleen	SIS + Tutorial + Practical
	Pancreas, biliary tract and intra-abdoinal organs	SIS + Tutorial + Practical
	Kidney, adrenal and retroperitoneum proper	SIS + Tutorial + Practical
	Male and female genital tract **i) Male genital tract, prostate and testis** **ii) Female genital tract**	SIS + Tutorial + Practical

	Skin and subcutis	SIS + Tutorial + Practical
	Soft tissues	SIS + Tutorial + Practical
	Bone	SIS + Tutorial + Practical
	Pediatric tumours	SIS + Tutorial + Practical
	infectious Diseases	SIS + Tutorial + Practical

Annexure 1

Postgraduate Students Appraisal Form
Para Clinical Discipline

Name of the Department/Unit :
Name of the PG Student :
Period of Training : FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory 1 2 3	Satisfactory 4 5 6	More Than Satisfactory 7 8 9	Remarks
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**

Syllabus for MD Microbiology, Faculty of Medicine & Health Sciences

PREAMBLE

The main aim of this course is to train students of Medicine in the field of Medical Microbiology. Theoretical as well as practical training is imparted to the candidates in the subspecialities viz. Bacteriology, Virology, Parasitology, Immunology and Mycology so that they can participate in good patient care and prevention of infectious diseases in the community .They are introduced to basic research methodology so that they can conduct fundamental and applied research. They are also imparted training in teaching methods in the subject which may enable them to take up teaching assignments in Medical Colleges/Institutes.

AIMS & OBJECTIVES

At the end of the course the students should be able to :

1. Establish good clinical microbiological services in a hospital and in the community in the fields of bacteriology, virology, parasitology, immunology and mycology .
2. Plan, execute and evaluate teaching assignments in medical microbiology and
3. Plan, execute, analyse and present the research work in medical microbiology.

Course contents (Syllabus)

Desirable

PAPER-I GENERAL MICROBIOLOGY AND IMMUNOLOGY

PAPER-II BACTERIOLOGY + MYCOLOGY

PAPER-III VIROLOGY AND PARASITOLOGY

PAPER-IV APPLIED MICROBIOLOGY & RECENT ADV ANCES

General Microbiology

1. History of microbiology
2. Microscopy
3. Bio-safety including universal precautions
4. Physical and biological containment124 Syllabus M D / M S / M D S / M H A — AIIMS

5. Sterilization and disinfection
6. Morphology of bacteria and other microorganisms
7. Nomenclature and classification of microorganisms
8. Normal flora of human body
9. Growth & nutrition of bacteria
10. Bacterial metabolism
11. Bacterial toxins
12. Bacteriocins
13. Microbiology of hospital environment
14. Microbiology of air, milk and water
15. Host-parasite relationship
16. Antibacterial substances and drug resistance
17. Bacterial genetics & bacteriophages
18. Molecular genetics relevant for medical microbiology
19. Quality assurance & quality control in microbiology
20. Accreditation of laboratories

Immunology

1. Components of the immune system
2. Innate and acquired immunity
3. Cells involved in immune response
4. Antigens
5. Immunoglobulins
6. Mucosal immunity
7. Complement
8. Antigen & 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 parametersCourse and Curriculum of M D Microbiology 125
20. Immunological techniques
21. Immunopotentiation & immunomodulation

Systematic bacteriology

1. Isolation & 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 & 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, Bruce/la, Gardnerella, Pseudomonas & other non-fermenters, Pasture/ la, Francisella, Bacteroides, Fusobacterium, Leptotrichia and other anaerobic gram negative bacilli etc.
6. Helicobacter, Campylobacter & Spirillium
7. Enterobacteriaceae
8. Mycobacteria
9. Spirochaetes
10. Chlamydiae
11. Mycoplasmatales: Mycoplasma, Ureaplasma, Acholeplasma and other Mycoplasmas.
12. Rickettsiae, Coxiella, Bartonella etc.

Virolology

1. General properties of viruses
2. Classification of viruses
3. Morphology: Virus structure
4. Virus replication
5. Isolation & identification of viruses
6. Pathogenesis of viral infections
7. Genetics of viruses

8. DNA viruses of medical importance including Poxviridae, Herpesviridae, Adenoviridiae, Hepadna, virus, Papova and Parvo viruses etc.
9. RNA viruses of medical importance including Enteroviruses, Togaviridae, Flaviviruses, Orthomyxoviruses, Paramyxoviruses, Reoviridiae, Rhabdoviridae, Arenaviridae, Bunyaviridae, Retroviridae, Filoviruses, Human immunodeficiency virus, Arboviruses, Coronaviridae, Calci viruses etc.
10. Slow viruses including prions
11. Unclassified viruses
12. Hepatl.
13. Viriods
14. Vaccines & anti-viral drugs

Parasitology

1. General characters & 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, Dipyllidium, 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.)
5. Entomology: common arthropods & other vectors viz. mosquito, sandfly, ticks, mite, cyclops, louse, myasis.
6. Antiparasitic agents.

Mycology

1. General characteristics & classification of fungi
2. Morphology & reproduction of fungi
3. Isolation & 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, Pseudoallescheria, Fusarium, Piedra, other dematiaceous hyphomycetes and other hyalohyphomycetes etc.
7. Dimorphic fungi including Histoplasma, Blastomyces, Coccidioides, Paracoccidioides, Sporothrix, Penicillium marneffei etc.
8. Dermatophytes
9. Fungi causing mycetoma, keratomycosis & otomycosis.
10. Pythium insidiosum
11. Prototheca
12. Pneumocystis carinii inf~ction
13. Rhinosporidium seeberi & Loboa loboi
14. Actinomycetes &.Nocardia.
15. Common laboratory contaminant fungi
16. Mycetismus & mycotoxicosis
17. Antifungal agents & invitro antifungal susceptibility tests.Course and Curriculum of M D Microbiology 127

Applied Microbiology

1. Epidemiology of infectious diseases
2. Hospital acquired infections
3. Management of hospital waste
4. Investigation of an infectious outbreak
5. 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 & nose, septicaemia, endocarditis, haemorrhagic fever etc.
6. Opportunistic infections.
7. Sexually transmitted diseases
8. Vaccinology: principle, methods of preparation, administration of vaccines information technology (Computers) in microbiology
9. Gene cloning
10. Molecular techniques as applicable to microbiology
11. Automation in Microbiology
12. Statistical analysis of microbiological data and research methodology
13. Animal & human ethics involved in microbiological work

Psychomotor Skills for Postgraduates Students in M.D. (Microbiology) Bacteriology - Must acquire

1. Collection/transport of specimens for microbiological investigations
2. Preparation, examination & interpretation of direct smears from clinical specimens
3. Plating of clinical specimens on media for isolation, purification, identification and quantitation purposes.
4. Preparation of stains viz. Gram, Albert's, capsules, spores, 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, Serum, sugars, Kligler iron agar, 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 9ven, distillation plant, filters like Sietz and membrane filters
9. Care and operation of microscopes
10. Washing and sterilisation of glassware (plugging and packing)
11. Care and maintenance of common laboratory equipments like water bath, centrifuge, refrigerators, incubators etc.
12. Aseptic practices in laboratory and safety precautions128 Syllabus M D / M S / M D S / M H A — AIIMS
13. Sterility tests
14. Identification of bacteria of medica.1 importance upto species level (except anaerobes which could be upto generic level).
15. Techniques of anaerobiosis
16. Tests for Motility:hanging drop, Cragie's tube, dark ground microscopy for spirochaetes
17. In-vitro toxigenicity tests- Elek test, Naegler's reaction
18. Special tests-Bile solubility, chick cell agglutination, sheep cell haemolysis, niacin and catalase tests for Mycobacterium, satellitism, CAMP test, catalase, slide & tube agglutination tests.

19. Preparation of antibiotic discs; performance of antimicrobial susceptibility testing, eg. KirbyBauer, Stoke's method, Estimation of Minimal Inhibitory/Bactericidal concentrations by tube/plate dilution methods.
20. Tests for Beta-lactamase production.
21. Inoculation of infective material by different routes in animals
22. Bleeding techniques of animals including sheep
23. Performance of autopsy on animals & disposal of animals
24. **Animal pathogenicity/toxigenicity testsfor C.diphtheriae, C.tetani, S.pneumoniae, S.typhimurium, K.pneumoniae etc.**
25. **Care and breeding of laboratory animals viz. mice, rats, guinea pigs, rabbits etc.**
26. **Testing of disinfectants -Phenol coefficient and "in use" tests**
27. **Quantitative analysis of urine by pour plate method and semi quantitative analysis by standard loop tests for finding significant bacteriuria**
28. **Disposal of contaminanted materials like cultures**
29. **Disposal of infectious waste**
30. **Bacteriological tests for water, air and milk**
31. **Maintenance & preservation of bacterial cultures**

Bacteriology - Desirable to acquire

1. **Conjugation experiments for drug resistance**
2. **Serum antibiotic assays e.g. gentamicin**
3. **Phage typing for Staphylococci, S.typhi, etc.**
4. **Bacteriocin typing viz. Proteocin, etc.**
5. **Enterotoxigeniciiy tests like rabbit ileal loop, intragastric inoculation of infant mouse, Sereny's test.**
6. **Serologic grouping of Streptococci**
7. **Mouse foot pad test for M leprae**
8. **Antimicrobial susceptibility tests for Mycobacteria**
9. **Molecular typing methods**
10. **Special staining techniques for Mycoplasma, Treponemes, Gardenerella.Course and Curriculum of M D Microbiology 129**

Immunology - Must acquire

1. **Collection of blood by venepuncture, separation of serum and preservation of serum for short and long periods**

2. **Preparation of antigens from bacteria or tissues like Widal, Weil Felix, VDRL, SLO and group polysaccharide of Streptococcus etc. and their standardisation.**
3. Raising of antisera in laboratory animals
4. Performance of serological tests viz. Widal, Brucella tube agglutination, indirect hemagglutination, VDRL, ASO, Rose Waaler test, IFA.
5. Immunodiffusion in gel (Ouchterlony), counter-immunoelectrophoresis.
6. Enzyme linked immunosorbent assay
7. Latex agglutination tests
8. Preparation & preservation of complement & complement titration

Immunology - Desirable to acquire

1. Radial immunodiffusion for estimation of serum Immunoglobulins
2. Immunoelectrophoresis
3. Crossed immunoelectrophoresis
4. Neutrophil phagocytosis
5. Immunoblotting
6. Performance of serological tests viz. Weil Felix, cold agglutination, Paul Bunnel test
7. Leukocyte migration test
8. T - cell resetting
9. Separation of lymphocytes by centrifugation, gravity sedimentation etc.

Mycology - Must acquire

1. Collection and transport of specimens
2. Processing of samples for microscopy and culture.
3. Direct examination of specimens by KOH, Gram's, Acid fast, Giemsa, Lactophenol cotton blue & special fungal stains
4. Examination of histopathology slides for fungal infections
5. Isolation and identification of medically important fungi & common laboratory contaminants
6. Special techniques like Wood's lamp examination, hair baiting, hair perforation, paraffin baiting and slide culture
7. Maintenance of stock cultures
8. Animal pathogenicity tests viz. intravenous, intracerebral and intra peritoneal inoculation of mice for fungal pathogenicity study.

Mycology-desirable to acquire

1. Antigen preparation -viz. from Candida, Aspergillus, Histoplasma, Sporothrix
2. Antibody detection in candidiasis, aspergillosis, histoplasmosis, blastomycosis, ryptococcosis, zygomycosis, coccidioidomycosis
3. Antigen detection in cryptococcosis, aspergillosis, candidiasis
4. Skin test using aspergillin, candidin, histoplasmin, sporotrichin
5. Isolation and identification of actinomycetes.
6. Calcofluor staining & examination under fluorescent microscope

Parasitology - Must acquire

1. Collection and transport of specimens for diagnosis of parasitic diseases
2. Examination of faeces for parasite ova and cysts etc. by direct and concentration methods (salt floatation and formol-ether methods)
3. Egg counting techniques for helminths micrometry and mounting of slides
4. Examination of blood for protozoa and helminths by wet mount, thick and thin stained smears
5. Examination of blood for microfilariae ii.1cluding concentration techniques
6. Examination of other specimens eg. Urine, CSF, Bone marrow etc. for parasites
7. Histopathology sections -examination and identification of parasites
8. Preparation & performance of stains -Leishman, Giemsa, Lugol's iodine.
9. Micrometry
10. Identification of medically important adult worms
11. Preparation of media -NIH, NNN etc.
12. Copro-culture for larvae of hook worms
13. Identification of common arthropods and other vectors viz. mosquito, sandfly, ticks, mites, Cyclops
14. Preservation of parasites-mounting, fixing, staining etc.

Parasitology - Desirable to acquire

1. Maintenance of parasites in laboratory either in vivo in animals or by in-vitro cultures
2. Permanent staining techniques like iron hematoxylin
3. QBC for alaria & filaria .
4. In-vitro culture of parasites like Entamoeba, Leishmania, p falciparum, Acanthamoeba etc.

5. Antigen preparation -viz. Entamoeba, filaria, Toxoplasma, hydatid for serological tests for IRA, ELISA and skin tests like Casoni ' s

Virology - Must acquire

1. Preparation of glassware for tissue cultures (washing, sterilisation).
2. Preparation of buffers like PBS, Hank's
3. Preparation of clinical specimens for isolation of viruses
4. Collection & transport of specimens
5. Recognition of CPE producing viruses
6. Serological tests -ELISA for HIV & HBsAg, Haemagglutination Inhibition test for Influenza, MeaslesCourse and Curriculum of M D Microbiology 131
7. Chick Embryo techniques-inoculation and harvesting
8. Handling of mice, rats and guinea pigs for collection of blood, pathogenicity tests, etc.
9. Special staining procedure for viruses

Virology - desirable to acquire

1. Electron microscopy of virus -TEM, SEM
2. Preservation of viruses
3. Preparation of viral antigens.
4. Molecular techniques in virology
5. Preparation of monkey kidney cells (primary) and maintenance of continuous cell lines by subculture.

Preservation in -70°C and liquid nitrogen

6. Performance of haemadsorption for Parainfluenza, Haemagglutination of Influenza, Immunofluorescence, Neutralisation for Enteroviruses and Respiratory viruses. Identification tests on tissue cultures and supernatants etc.
7. Serological tests: haemadsorbtion for Parainfluenza

4. Teaching Schedule

1. Seminar	Once a week
2. PG Practicals	Once a week
3. Journal club	Once a week
4. PG discussion	Once a week
5. Thesis/Case Discussion	Once a week

5. Posting

Section/Subject

- Bacteriology:
- Mycology:
- Immunology:
- Parasitology:
- Mycobacteriology:
- Serology:
- Virology:

6. Thesis

- Every candidate shall carry out work on an assigned research project under the guidance of a recognized Postgraduate Teacher, the project plan of thesis shall be submitted with in the first six months of admission to MD course.
- (i) The student will Identify a relevant research question; (ii) conduct a critical review of iterature; (iii) formulate a hypothesis; (iv) determine the most suitable study design; (v) state the objectives of the study; (vi) prepare a study protocol; (vii) undertake a study according to the protocol; (viii) analyze and interpret research data, and draw conclusions; (ix) write a research paper.
- The Thesis shall be submitted at least six months before the final examination

7. Assessment

All the PG residents are assessed daily for their academic activities and also periodically.

7.1. General Principles

The assessment is valid, objective, and reliable.

It covers cognitive, psychomotor and affective domains.

Formative, continuing and summative (final) assessment is also conducted in theory as well as practicals/clinicals. In addition, thesis is also assessed separately.

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7.2. Formative Assessment

The formative assessment is continuous as well as end-of-term. The former is be based on the feedback from the senior residents and the consultants concerned. End-of-term assessment is held at the end of each semester (upto the 5th semester). Formative assessment will not count towards pass/fail at the end of the program, but will provide feedback to the candidate.

7.3. Internal Assessment

The performance of the Postgraduate student during the training period should be monitored throughout the course and duly recorded in the log books as evidence of the ability and daily work of the student. Marks should be allotted out of 100 as followed.

Sr. No.	Items	Marks
1.	Personal Attributes	20
2.	Practical Work	20
3.	Academic activities	20
4.	End of term theory examination	20
5.	End of term practical examination	20

1. Personal attributes:

Behavior and Emotional Stability: Dependable, disciplined, dedicated, stable in emergency situations shows positive approach.

Motivation and Initiative: Takes on responsibility, innovative, enterprising, does not shirk duties or leave any work pending.

Honesty and Integrity: Truthful, admits mistakes, does not cook up information, has ethical conduct, exhibits good moral values, loyal to the institution.

Interpersonal Skills and Leadership Quality: Gets on well with colleagues and paramedical staff, is respectful to seniors, has good communication skills.

2. Practical Work:

- **Availability:** Punctual, available continuously on duty, responds promptly on assignments and takes proper permission for leave.
- **Diligence:** Dedicated, hardworking, does not shirk duties, leaves no work pending, does not sit idle, competent in practical work.

- **Academic ability:** Intelligent, shows sound knowledge and skills, participates adequately in academic activities, and performs well in oral presentation and departmental tests.
- **Performance:** Proficient in presentations and discussion during academic sessions in the department.

3. Academic Activity: Performance during presentation at Journal club/ Seminar/ Case discussion/ Stat meeting and other academic sessions. Proficiency in skills as mentioned in job responsibilities.

4. End of term theory examinations conducted at end of 1st, 2nd year and after 2 years 9 months. Curriculum M.D. Microbiology

5. End of term practical/oral examinations after 2 years 9 months.

Marks for personal attributes and work done should be given annually by all the consultants under whom the resident was posted during the year. Average of the three years should be put as the final marks out of 20.

Marks for academic activity should be given by the all consultants who have attended the session presented by the residents.

The Internal assessment should be presented to the Board of examiners for due consideration at the time of Final Examinations.

7.4. Summative Assessment

- Ratio of marks in theory and practicals will be equal.
- The pass percentage will be 50%.
- Candidate will have to pass theory and practical examinations separately.

A. Theory Examination (Total=400)

Paper	Marks
Paper-I General Microbiology and Immunology	100
Paper-II Bacteriology + Mycology	100
Paper-III Virology And Parasitology	100
Paper-IV Applied Microbiology & Recent Advances	100

B. Practical & Viva-Voce Examination (Total=400)

Ex.1	Bacteriology	
	a)Clinical exercise	80 marks
	b)Identification of pure culture	40 marks
Ex.2	Mycology	50 marks

Ex.3	Spots	40 marks
Ex.4	Serology	30 marks
Ex.5	Virology	30 marks
Ex.6	Animal Inoculation	20 marks
Ex.7	Parasitology	10 marks
Viva-voce		100 Marks

Microbiology

8. Job Responsibilities

During 1st year the resident will work under direct supervision of the consultants /Sr. Resident / 2nd yr & 3rd yr residents and will be responsible for handling and processing of the specimens in their respective sections.

During 2nd yr, they will be responsible for reporting in their respective sections under the supervision.

During 3rd yr, they should be able to handle all the emergencies in the evening and night.

All the junior residents should be able to take practical demonstrations of undergraduates.

9. Suggested Reading

9.1 Core Books

Title Author

- Text Book of Microbiology (vol I & II) Mackie & MacCarteney
- Diagnostic Microbiology Bailey & Scot
- Text Book of Microbiology Ananthanaryan
- Text Book of Microbiology
- Text Book of Parasitology
- CP Baveja
- KD Chattereji
- Review of Medical Microbiology Jawetz

9.2 Reference Books

Title Author

- Microbiology and Microbial Infection
- (Vol I- VI)

- Topley & Wilson
- Colour Atlas & Text Book of Diagnostic
- Microbiology
- Koneman
- Immunology Ivan Roitt
- Text Book of Mycology Emmons
- Medical Virology Fenner

9.3. Journals

- Indian Journal of Medical Microbiology
- Indian Journal of Medical Research
- Clinical Microbiological Reviews
- Journal of Hospital Infection
- Lancet
- North American Clinics of Infectious Diseases
- Review of Infectious Diseases
- Tuberculosis
- Indian Journal of Tuberculosis
- Journal of Tropical Medicine

10. Model Test Papers Curriculum M.D. Microbiology

MODEL QUESTION PAPER
MD (Microbiology)
Paper-I
General Microbiology & Immunology

Max. Marks:100

Time: 3 hrs

- **Attempt ALL questions**
- **Answer each question & its parts in SEQUENTIAL ORDER**
- **ALL questions carry equal marks**
- **Illustrate your answer with SUITABLE DIAGRAMS**

i. Discuss genetic basis of drug resistance in bacteria.

ii. Enlist important primary immunodeficiency diseases. Describe DiGeorge's syndrome.

iii. What are histocompatibility antigens? Discuss HLA typing.

iv. What is microarray? Describe its principle and applications in microbiology.

v. Explain hybridoma technology and give its applications in microbiology.

vi. What is redox potential? Describe giving suitable examples.

vii. Enumerate various tests used for determining the efficacy of disinfectants. Discuss briefly the phenol-coefficient test.

viii. Enumerate various tests used for determining the efficacy of disinfectants. Discuss briefly the phenol-coefficient test.

ix. Differentiate between classical and alternate pathways of complement activation. Discuss the role of complement in various serological tests.

x. Categorize pathogens according to hazard and categories of containment. Discuss various types of microbiological biosafety cabinets.

MODEL QUESTION PAPER

MD (Microbiology)

Paper-II

Bacteriology and Mycology

Max. Marks:100

Time: 3 hrs

- **Attempt ALL questions**
- **Answer each question & its parts in SEQUENTIAL ORDER**
- **ALL questions carry equal marks**
- **Illustrate your answer with SUITABLE DIAGRAMS**

i. Discuss the laboratory diagnosis of antibiotic associated diarrhea.

ii. Discuss etiology, pathogenesis and laboratory diagnosis of Weil's disease.

iii. What are PBP's ? Discuss their role in drug resistance.

iv. Discuss briefly GISA.

v. Explain the mechanism of action and methods of detection of enter toxin

vi. Discuss etiology, pathogenesis and laboratory diagnosis of Cat Scratch Disease.

vii. Enumerate various dematiaceous fungi and discuss their pathogenicity.

viii. What are mycotoxins ? Discuss mycotoxicosis.

ix. Classify antifungal agents. Discuss the methods of anti-fungal susceptibility testing.

x. Define conidiogenesis and explain with suitable diagrams.

MODEL QUESTION PAPER
MD (Microbiology)
Paper-III
Virology & Parasitology

Max. Marks:100

Time: 3 hrs

- **Attempt ALL questions**
- **Answer each question & its parts in SEQUENTIAL ORDER**
- **ALL questions carry equal marks**
- **Illustrate your answer with SUITABLE DIAGRAMS**

i. Name various nonpathogenic ameobae. Discuss the life cycle, pathogenicity and laboratory diagnosis of any one of them.

ii. Discuss rapid diagnostic tests in parasitology along with their clinical applications.

iii. Enlist and discuss laboratory diagnosis of opportunistic parasitic infections in immunocompromised patients.

iv. Discuss the etiology, pathogenesis and diagnosis of Tropical Pulmonary Eosinophilia.

v. Classify oncogenic viruses and explain the various mechanisms of viral oncogenesis.

vi. What are Interferons ? Explain their mechanism and clinical applications.

vii. Discuss etiology, pathogenesis and laboratory diagnosis of viral hemorrhagic fever.

viii. Define Prions. Classify Prion diseases and discuss their pathogenesis and diagnosis.

ix. Enumerate various congenital viral infections and discuss their laboratory diagnosis.

x. Write briefly on transfusion transmitted hepatitis. Curriculum M.D.

MODEL QUESTION PAPER
MD (Microbiology)
Paper-IV
Applied Microbiology and Recent Advances in Microbiology

Max. Marks:100

Time: 3 hrs

- **Attempt ALL questions**
- **Answer each question & its parts in SEQUENTIAL ORDER**
- **ALL questions carry equal marks**
- **Illustrate your answer with SUITABLE DIAGRAMS**

i. What are the edible vaccines? Discuss the current status and future of edible vaccines.
ii. What is flowcytometery? Give its principle and uses in clinical microbiology.
iii. Define transgenic mice and discuss its role in study of microbial pathogenicity.
iv. What is the role of microbiologist in Hospital Infection Control Committee?
v. What is quality control ? Describe various methods adopted for internal quality control in microbiology.
vi. Discuss the emerging and reemerging bacterial infections.
vii. What are biofilms. Describe their significance in clinical microbiology.
viii. Discuss PEP in case of needle stick injury.
ix. Define and categorize biomedical waste. Discuss its management.
x. Discuss various methods used for bacteriological examination of water.

Syllabus for MD Pharmacology, Faculty of Medicine & Health Sciences

PHARMACOLOGY — M D

A. OBJECTIVES

At the end of the 3 years training in pharmacology, the PG Student should be able to

1. Acquire knowledge of general pharmacological principles, systemic pharmacology, rational use of drugs and up to date with the recent advances.
2. Plan and conduct lecture, practical demonstration, and tutorial classes for students of medical, dental, Physiotherapy & Nursing students.
3. Carry out screening of drugs for pharmacological and toxicological profile.
4. Critically review and comment on research papers.
5. Monitor adverse drug reactions, therapeutic drug monitoring, and able to provide drug information
6. Acquisition of skills related to teaching, research methodology and Knowledge of elementary statistics.
7. Preparation of protocols to conduct experimental studies in animals, human drug trials and to develop skills for translational research.

B. CURRICULUM OF M.D. PHARMACOLOGY

1. Theory

1.1 Clinical and Basic Sciences as applied to Pharmacology

- Central Nervous System
- Autonomic Nervous System
- Cardiovascular System
- Hematopoietic System
- Kidney/Renal System
- Endocrinology
- Respiratory System
- Gastrointestinal System
- Microbial resistance
- Regulation of cell growth and differentiation

1.2 General Pharmacology

- Important landmarks in the growth and development of Pharmacology,
- important contributions of renowned Indian and foreign Pharmacologists
- Principles and modes of drug administration, source, nature and preparations of drugs
- Qualitative and Quantitative Pharmacokinetics
- Pharmacodynamics
- Drugs interactions, Adverse drug reactions
- Methods of new drug development
- Factors modifying drug response
- Pharmacogenetics and pharmacogenomics
- Structure-activity relationship of important group of drugs
- Preclinical evaluation of new drugs and toxicity studies

1.3 Systemic Pharmacology

- Autonomic nervous system
- Central nervous system
- Cardiovascular system
- Hematopoietic system

- Respiratory system
- Autacoids
- Gastrointestinal system
- Renal pharmacology
- Endocrine pharmacology
- Chemotherapy
- Miscellaneous: Vitamins, heavy metals, vaccines & sera, antiseptics etc.

1.4 Clinical Pharmacology & Therapeutics

Rational basis of therapeutics (P-drug concept, Essential drugs)
Rational drugs
Human and Population Pharmacokinetics
Clinical drug evaluation
Clinical trial designing
Clinical trial ethics
Medico-legal aspects of clinical trials
Pharmacovigilance
Drugs and Cosmetics Act
Data archiving and management
Drug audit (Pharmacoepidemiology, Pharmacoeconomics)
Evidence Based Medicine
Statutory and legal requirements for conduct of clinical trials (including drug schedules)

1.5 Quantitative and Experimental Pharmacology

- Study design
- Biostatistics
- Bioassay
- Drug-receptor interactions and response including pDx and pAx values.
- Step up and step down methods for LD
- CPCSEA
- Alternatives to animal experiments (cell culture, cell lines)
- Screening for Pharmacological activity with special reference to the following activities:
    - Analgesic-Antipyretic
    - Anticonvulsant
    - Sedative-hypnotics
    - Anti-psychotic
    - Anti-depressant
    - Anti-parkinsonian
    - Anti-diabetic
    - Autonomic
    - Anti-anginal
    - Anti-arrhythmic
    - Anti-Hypertensive
    - Diuretic
    - Hypoglycaemic
    - Anti-inflammatory
    - Anti-secretory
    - Anti-allergic

- Local anesthetic
- Smooth muscle
- Anti-fertility
- Anti-cancer

2. Practical

2.1 Experimental Pharmacology:

- Handling of animals, collection of blood and urine samples.
- Assembly of organ bath and setting of thermostat.
- Animal experiments to be done **subject to Ethical Approval by the Institutional Animal Ethics committee (IAEC)**
- Hands on training in the use of Computer simulations of actual animal experimentation
- Isolated tissue preparations:
  - ✓ To prepare log dose response curve of a suitable drug on:
    - Guinea pig ileum.
    - Guinea pig tracheal chain
    - Guinea pig vas deferens
    - Frog rectus abdominis
    - Rabbit atrium
    - Rat colon
    - Rat uterus
    - Rat gastric fundus
    - Rat anococcygeus muscle
  - ✓ To perform three point/ four-point bioassay of a suitable drug on:
    - Guinea pig ileum
    - Guinea pig vas deferens
    - Rat colon
    - Rat uterus
    - Rat gastric fundus
    - Frog rectus abdominis
- To prepare cumulative log dose response curve of a suitable drug on rabbit aorta.
- To study the stimulatory and depressant effects of drugs on rabbit/ rat gut.
- To study the effect of coronary vasodilator drug on perfused rabbit heart (Langendroff's technique).
- Determination of ED50 of histamine on guinea pig ileum.
- Determination of ED50 of acetylcholine on frog rectus abdominis muscle.
- Determination of pD2 values of histamine on guinea pig ileum.
- Determination of pD2 value of acetylcholine on frog rectus abdominis muscle.
- Determination of pA2 value of acetylcholine on guinea pig ileum.
- To study the effect of unknown drugs using rabbit eye.
- To study the stimulatory and depressant effects of drugs on Blood Pressure of rat.
- Screening Tests on animals to study the following activities:
  - Motor in-coordination
  - Anxiolytic effect
  - Despair behavior
  - Anticonvulsant effect
  - Diuretic activity
  - Spontaneous motor activity

- Analgesic effect
- Conditioned Avoidance Response
- Antipsychotic effect
- Anti-inflammatory effect

2.2 Clinical/human experiments: To study the effect of following activities in healthy human volunteers (all human experiments to be done only after the approval from the Institutional Ethics Review Board- IERB)

- To demonstrate the use of any model as an experimental tool on human subjects without administration of any drug/beverage for evaluation of analgesic activity, psychomotor function, cardiac parameters (HR, BP)
  - Physical stress
  - Mental stress
- To determine lung volumes
- To perform:
  - EEG
  - Nystagmography
  - Spirometry
  - ECG
  - Treadmill test/Bicycle ergometry/Master Step test
  - Psychomotor tests

2.3 Chemical analysis:

To do chemical estimation of various drugs including sulphonamides and salicylates, chemical identification of alkaloids, glycosides and basic chemical parameters like blood sugar levels, blood urea levels, lipid profile etc. Principles of common chemical techniques such as colorimeter, spectrophotometer, flame photometer and HPLC etc.

2.4 Computer Aided Learning (CAL) Program:

Proficiency in using CAL programs for demonstration of effects of drugs on animals.

2.5 Statistics:

Use of calculators, computers and electronic spread sheets for understanding of:

- Elements of data collection and presentation of data
- Measures of central tendency and dispersion
- Non parametric tests
- Parametric tests (including ANOVA)

C. TEACHING PROGRAM

Acquisition of practical competencies being the keystone of postgraduate medical education & postgraduate training is skill oriented. Learning in postgraduate program is essentially self directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

1. Teaching sessions

The postgraduate students (mandatory for 1st year PG) should attend all undergraduate classes taken by their teachers and colleagues and should also be involved in supervised undergraduate teaching. In addition, there should be daily sessions of formal teaching. Each MD student has to present seminars, Journal clubs, Abstract club, Drug Reviews and perform practicals. He/she should be allotted time for thesis related work.

2. Teaching Schedule

Following is the suggested departmental teaching schedule:

S.No.	PG teaching programme	Frequency
1.	Thesis work*	Depending on the work load
2.	Journal club / Drug review	Once a week
3.	Abstract club / Case discussion	Once a week
4.	Seminar	Once a week
5.	Practical(Experimental/Chemical/Human)	Once a week
6.	Statistical exercise	Once a fortnight
7.	Pharmacokinetic exercise	Once a fortnight
8.	Theory test	Once a year
9.	Grand viva & Practical test	Once a year

**Thesis protocol is to be submitted within 6 months of joining the PG course & the completed thesis to be submitted at least 6 months before the final MD university examination.*

Note:

- All PGs are supposed to attend the sessions.
- All the teaching sessions shall be assessed by the faculty members at the end of each session and marks should be given out of 10 (for participant) & 100 (for presenter) and kept in the office for the purpose of **calculation of internal assessment**
- Attendance of the PG residents at various sessions (including central sessions) should be at least 75%

D. SKILLS:

The candidates should be conversant with the following techniques:

- Weighing technique (chemicals & animals)
- Handling of equipment
- Handling of small animals including various anaesthetic techniques.
- Recording of blood pressure (In vivo and Computer Assisted Learning program)
- Administration of drugs/chemicals to animals (parenteral and enteral routes)
- Screening of drugs using appropriate models
- Isolated tissue preparations for log dose response curve and bioassay
- Use of Cartesian and log graph paper
- Use of various methods to evaluate drug effects in humans
- Elementary principles of common chemical techniques such as colorimeter, spectrophotometer, flame photometer, HPLC etc.
- Use of appropriate statistical techniques to analyze the results on computer system.

E. THESIS

- Every candidate shall carry out work on an assigned research project under the guidance of a recognized Postgraduate Teacher (not less than associate professor); the project shall be written and submitted in the form of a Thesis.
- Every candidate shall **submit thesis plan to the University (Thesis Protocol) within 6 months of joining the PG course.**

- The **completed thesis to be submitted at least 6 months before the final MD university examination** and will be analyzed by suitable experts in that field. The acceptance of the thesis by the institute will be a prerequisite for the candidate to be allowed to appear in the final examination
- The student will: (i) identify a relevant research question; (ii) conduct a critical review of literature; (iii) formulate a hypothesis; (iv) determine the most suitable study design; (v) state the objectives of the study; (vi) prepare a study protocol; (vii) undertake a study according to the protocol; (viii) analyze and interpret research data, and draw conclusions; (ix) write a research paper

F. ASSESSMENT:

All the PG residents should be assessed daily also periodically for their academic activities by all teachers.

1. General Principles for assessment-

- The assessment should be valid, objective, and reliable.
- It should cover cognitive, psychomotor and affective domains.
- Formative, continuing and summative (final) assessment should also be conducted in theory as well as practical. In addition, thesis should also be assessed separately

2. Formative Assessment-

The formative assessment should be continuous as well as end-of-term. The former is to be based on the feedback from the departmental faculty. End-of-term assessment should be held at the end of each year. Formative assessment will not count towards pass/fail at the end of the program, but will provide feedback to the candidate.

3. Internal Assessment-

The performance of the Postgraduate student during the training period should be monitored throughout the course and duly recorded in the log books as evidence of the ability and daily work of the student. Marks should be allotted out of 100 as follows.

Sr. No.	Items	Marks
1.	Personal Attributes	20
2.	Practical Work	20
3.	Academic activities	20
4.	End of term theory examination	20
5.	End of term practical examination	20

1. Personal attributes:

- Behavior and Emotional Stability: Dependable, disciplined, dedicated, stable in emergency situation shows positive approach.
- Motivation and Initiative: Takes on responsibility, innovative enterprising, does not shirk duties or leave any work pending.
- Honesty and Integrity: Truthful, admits mistakes, does not cook up information, has ethical conduct, exhibits good moral values, loyal to the institution.
- Interpersonal Skills and Leadership Quality: Gets on well with colleagues and paramedical staff, is respectful to seniors, has good communication skills.

2. Practical Work:

- Availability: Punctual, available continuously on duty, responds promptly on assignments and take proper permission for leave.

- Diligence: Dedicated, hardworking, does not shirk duties, leaves no work pending, does not sit idle, competent in practical work.
- Academic ability: Intelligent, shows sound knowledge and skills, participates adequately in academic activities, and performs well in oral presentation and departmental tests.
- Performance: Proficient in presentations and discussion during academic sessions in the department.

3. Academic Activity:
Performance during presentation at Journal club/Seminar/Abstract club/ Case discussion/Stat meeting/ Practical classes and other academic sessions. Proficiency in skills as mentioned in job responsibilities.
4. End of term theory examination: Written test conducted at end of 1st, 2nd year and 2 year & 9 months
5. End of term practical/oral examination: Practical exam and viva examination at end of 1st, 2nd year and 2 years and 9 months.

- Marks for personal attributes and work done should be given annually by all the faculty members under whom the resident was posted during the year. **Average of the three years should be put as the final marks out of 20.**
- Marks for academic activity should be given by the all faculty members who have attended the session presented by the PG student.
- The Internal assessment should be presented to the Board of examiners for due consideration at the time of Final Examination

6. Summative Assessment

- Ratio of marks in theory and practicals will be equal
- The pass percentage will be 50%
- Candidate will have to pass theory and practical examination, separately.

7. Final University Examination:

A. Theory Examination (4 days)	**(Total =400)**
Title	**Marks**
Paper 1: General pharmacological principles and allied sciences	100
Paper 2: Systemic Pharmacology, Chemotherapy and Therapeutics	100
Paper 3: Experimental & Clinical Pharmacology	100
Paper 4: Recent Advances in Pharmacology	100

B. Practical Examination and Viva voce (2 days)		**(Total =400)**
Sr. No	**Exercise**	**Marks**
1	Spotting	40
2	Long animal Experiment (e.g. bioassay etc.)- exercise on isolated organ*	60
3	Experimental pharmacology exercise on intact animal*	40
4	Screening methods (human models)/ clinical pharmacology exercise#	40
5	One chemical pharmacology exercise	40
6	Thesis Presentation	40
7	Evaluation of teaching abilities (Microteaching)	40
8.	Viva voce	100

* ***All Animal experiments to be done subject to Ethical Approval by the Institutional Animal Ethics committee (IAEC)***
 # All human experiments to be done only after the approval from the Institutional Ethics Review Board (IERB).

Theory papers:

Paper- 1. General Pharmacological Principles and Applied Sciences

General Pharmacology concepts-

Pharmacokinetics & pharmacodynamic principles, adverse drug reactions, Pharmacovigilance, Pharmacoeconomics & Pharmacogenetics

Toxicology

Basics of principles of diagnosis and treatment of human poisoning. Clinical features of common poisoning. Antidotes in the management of poisoning. Principles of clinical toxicology. Applied analytical toxicology and toxicovigilance.

Practical skills: Training at poison information centre. Determination of plasma cholinesterase levels in organophosphorus poisoned patients. Spot test for aluminium phosphide poisoning. Estimation of lead in drinking water and patient's urine.

Molecular Biology in Pharmacology

Gene expression, Pharmacogenomics, Proteomics, techniques involved in studying receptor dynamics. PCR, No4rthern blot, Southern blot and Western blot. Protein purification. Mono, poly clonal antibodies. Molecular biology in receptor identification. Antisense oligonucleotides, molecular targets of drug action.

Discoveries in Pharmacology

Nobel laureates in Pharmacology and their revolutionary discoveries

Paper- 2. Systemic Pharmacology, Chemotherapy and Therapeutics

_ Autonomic & peripheral nervous system
_ Central nervous system
_ Autacoids
_ Drugs affecting kidney function and Cardiovascular system
_ Drugs affecting gastrointestinal and respiratory system
_ Chemotherapy of parasite infections
_ Chemotherapy of microbial diseases
_ Antineoplastic agents
_ Immunomodulators
_ Drugs acting on blood and blood forming organs
_ Endocrine Pharmacology including drugs affecting uterine motility
_ Miscellaneous- drugs acting on skin & mucous membranes, vitamins, anti-oxidants, herbal drugs & chelating agents

Paper-3. Experimental & Clinical Pharmacology

Experimental methodologies involved in the discovery of drugs (in vivo, in vitro, ex vivo). Animal handling and animal care. Methods of anaesthetising animals and methods of euthanasia. Restraining and blood collecting methods. Drug screening methods involved in the evaluation of anti-ulcer, antidepressant, antianginal, antihypertensive, antiarrhythmic, antidiabetic, anticataract, anti-platelet, anticancer, antiinflammatory, antidiarrhoeal, antiepileptic, analgesic, antithyroid, antipyretic, antiglaucoma, antihyperlipidemic antiasthmatics drugs and cough suppressants. Drug screening methods used in screening antifungal, antihelminthic, antibacterial, antiviral agents, drugs for heart failure, posterior pitutary, adrenal steroid (gluco & mineralo corticoids), testicular, parathyroid, ovarian, thyroid hormones, Methods involved in testing teratogenicity, carcinogenicity and organ toxicities in animals.

Practical Skills: Effect of antiinflammatory agents on caraagennan induced rat paw edema. Evaluation of analgesic activity of morphine using tail flick latency test. Evaluation of cardiotonic drugs on isolated rabbit heart (Langendroff isolated heart preparation). Demonstration of Dale's vasomotor reversal and nicotinic effect of acetylcholine on dog blood pressure. Effect of autonomic drugs on rabbit intestine.

Demonstration of bronchodilation on guinea pig tracheal chain. Effect of sedatives on rodents (rotarod test). Four point assay of histamine and acetylcholine on guinea pig ileum. Four point assay of 5HT on rat uterus. Estimation of PA2 value of atropine. Identification of unknown by evaluating its action on dog haemodynamic parameters. Assay of acetylcholine using rat fundus. Estimation of pressor agents on rat blood pressure.

Instrumentation in Drug analysis

Qualitative testing, titrimetric analysis. Beer and Lambert's law. Basis and working principle of colorimeter, ultraviolet, atomic absorption spectrometers, Fluorescence spectroscopy, NMR and Mass Spectroscopy. Basics of Chromatography. Partition, adsorption and ionexchange chromatography. Column chromatography, thin layer chromatography, paper chromatography, immunoabsorbant chromatography, high performance thin layer chromatography, high performance liquid chromatography and gas Chromatography. Radio immunoassay. Processing of biological materials for drug analysis. Calculations in drug analysis. Good laboratory practice. Validation of analytical procedure.
Practial skills: Spectrophoto & flurimetric estimations of drugs in biological fluids.

Pharmacokinetics

Basics of pharmacokinetics, calculation of pharmacokinetic estimates (C-max, Tmax, T1/2, AUC(0-n), AUC(0-∞), Vd, Ke, Ka etc.) Compartment models used in pharmacokinetics (oral and intravenous). Compartment fitting (one comp & two comp). Pharmcodynamic /pharmacokinetic (PK/PD) correlation.
Practical skills: Calculation of Pharmacokinetic estimates from given concentration vs time data

Drug Regulations

Drugs and Cosmetics Act, Drug Price Control order, Application for Investigational New Drug (IND), Application for New Drug Discovery (NDD) according to Indian Control Authority & USFDA guidelines. Conducting bio-equivalence studies. Ethical considerations in utilizing human subjects for drug discovery process. Helsinki's declaration. ICH-GCP Guidelines. Ethical guidelines in utilising animals for experimental
purposes.
Practical skills: Draft an IND and NDD application for the approval of a numbered compound.

Clinical Trials

Types of clinical trials, clinical trial for a new investigational drug in India. Methods involved in the assessment of drugs in human volunteers and bio-equivalence studies. Key points in drafting protocol for a large scale multicentric drug trial in India. Pharmacovigilance, Pharmacoeconomic & Pharmacogenomics
Practical skills: Draft a protocol to conduct phase II clinical trial for a newly discovered non-steroidal anti-inflammatory drug.

Therapeutic Drug Monitoring (TDM)

Basic principles of TDM. Therapeutic index. Trough level monitoring and dosage adjustments.
Practical skills: Calculation of the next dosage of drug to the patient whose plasma drug level has been estimated
Therapeutic audit: Drug utilisation studies, essential drug concept, rational prescribing
Drug delivery systems: sustained release, enteric coated formulations and liposome etc.

Biostatistics

Calculation of basic statistical parameters (mean, median, mode, standard deviation, standard error etc.). Null hypothesis, parametric and non parametric tests (Student 't test, Wilcoxon, ANOVA etc.).Metaanalysis.
Practical skills: Calculation for statistical significance in the given data for Student paired and unpaired t test. Applying ANOVA to the given set of concentration vs time data of two drug formulations to comment about their bio-equivalence.

Paper- 4. Recent Advances in Pharmacology

Recent advances in Pharmacotherapeutics including**-** Autonomic & peripheral nervous system, Central nervous system, Autacoids, Drugs affecting kidney function and Cardiovascular system, Drugs affecting gastrointestinal and respiratory system, Chemotherapy of parasite infections, Chemotherapy of microbial diseases, Antineoplastic agents, Immunomodulators, Drugs acting on blood and blood forming organs, Endocrine Pharmacology including drugs affecting uterine motility, Miscellaneous- drugs acting on skin & mucous membranes, vitamins, anti-oxidants, herbal drugs & chelating agents

Drug development process

Methods involved in the development of new drugs. Preclinical toxicological studies. Calculation of LD50 & ED50. Acute, subacute and chronic toxicity studies. Irwin profile test, Pre-clinilcal pharmacokinetic and dynamic studies. Lipinski's rule for drug like molecule, High throughput screening (invitro and invivo) for pre-clinical pharmacokinetic and pharmacodynamic studies.

Newer therapies & newer targets for drug development.

Pharmacovigilance, Pharmacoeconomics, Pharmacogenetics and Drug Information

G. JOB RESPONSIBILITIES OF THE PG STUDENT

- To maintain a log book on daily basis
- To maintain daily record of post graduate activities including:
    - Seminars/ abstract club/ Journal club/ case studies/ drug reviews
    - Practical exercises
    - Statistics exercises
    - Pharmacokinetic exercises
    - PG teaching schedule
    - To maintain the laboratory equipment allotted to them
    - To prepare and organize undergraduate and postgraduate practicals
    - 50 hours/annum in ADR monitoring & pharmacovigilance activities
- **Course Details: Duration of the course -36 months**
- **First year:**
    1. Introduction to pharmacology and its branches.
    2. Selection of Thesis topic & submission of thesis protocol to the university for approval within 6 month of joining the PG course.
    3. Pharmacovigilance duties
    4. Teaching duties- to deliver UG lectures of Bachelor of Physiotherapy (BPT) & Nursing courses
    5. The postgraduate students in 1st year PG to attend all the undergraduate classes taken by their teachers and colleagues
    6. Animal house duties
    7. PG academic programme- presentation of seminars, journal club & abstract club
- **Second year:**
    1. Teaching duties- UG lectures of Bachelor of Dental Surgery (BDS), Nursing & MBBS
    2. Prescription scrutiny, clinical case presentation.
    3. Thesis work completion & submission of thesis to the University
    4. Pharmacovigilance duties.
    5. PG academic programme- presentation of seminars, journal club & abstract club

- **Third year:**

  1. Thesis completion & submission for approval at least 6 months before the final MD university examination
  2. Teaching duties- UG lectures of Bachelor of Dental Surgery (BDS), Nursing & MBBS
  3. Pharmacovigilance duties
  4. PG academic programme- presentation of seminars, journal club & abstract club

H. **SUGGESTED BOOKS & JOURNALS-**

S.No	Author	Title of Books	Publisher	Edition/ Year
1.	Laurence Brunton, Bruce Chabner, Bjorn Knollman	Goodman & Gilman's the pharmacological basis of therapeutics	McGraw-Hill Professional	12 ed., 2012;
2.	Kamlesh Kohli, Madhur Gupta & Sheela Tejwani	Contemporary perspectives on Clinical Pharmacotherapeutics	Elsevier India.	1st Ed. 2006
3.	Katzung G bertram, Susan Masters, Anthony J Trevor	Basic & clinical pharmacology	McGraw-Hill/Appleton & Lange	12 Ed., 2012
4.	DIPIRO	Pharmacotherapy: A Pathophysiologic Approach,	McGraw-Hill/Appleton & Lange	8th Ed.,
5.	VV Pillay	Modern Medical Toxicology	Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.	Ed.: 4/e, 2013
6.	S.K Gupta	Textbook of Pharmacovigilance	Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.	1st Ed; 2011
7.	Malcolm Rowland, Thomas N. Tozer	Clinical pharmacokinetics: concepts and applications	Williams & Wilkins	1995
8.	Malcolm. Rowland, Thomas N. Tozer	Clinical Pharmacokinetics and Pharmacodynamics: Concepts And Applications	Wolters Kluwer Health/Lippincott William & Wilkins	2011
9.	William J. Spruill, William E. Wade	Concepts in Clinical Pharmacokinetics	ASHP	2010
10.	James E. De Muth	Basic Statistics and Pharmaceutical Statistical Applications	Marcel & Dekker	1999
11.	Practical Manual of Experimental and Clinical Pharmacology	Medhi Bikash	Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.	1st Ed;

12.	Humphrey P. Rang, Maureen M. Dale, James M. Ritter -	Rang & Dale's Pharmacology: with STUDENT CONSULT Online Access	Elsevier churchill Livingstone	7th Ed.; 2011
13.	Curtis L. Meinert	Clinical Trials Dictionary: Terminology and Usage Recommendations	John Wiley & Sons	2nd Ed.; 2012
14.	Lawrence M. Friedman, Curt D. Furberg, David L. DeMets	Fundamentals of Clinical Trials	Springer	2010 Ed.
15.	Kanu Chatterjee, Eric J Topol	Cardiac Drugs	Jaypee Brothers Medical Publishers (P) Ltd., New Delhi	1st Ed.; 2013
16.	Hans G. Vogel	Drug discovery and evaluation: pharmacologica l assays	Springer-New York.	2002
17.	G.Jagadeesh, Sreekant Murthy, Y.K Gupta & Amitabh Prakash	Biomedical Research	Wolters Kluwer health-Lippincott Williams wilkinson	2010, 1st Ed.
18.	MN Ghosh	Fundamentals of experimental pharmacology	Hilton and Company	2005; 3rd Ed.
19.	Charles R. Craig	Modern Pharmacology With Clinical Applications,	Lippincott	Sixth Edition
20.	Sargel L.	Applied biopharmaceutics and pharmacokinetics	Prentice-Hall, International, London.	(1999) (IV Edition)
21.	Loralie J. Langman, Amitava Dasgupta	Pharmacogenomics in Clinical Therapeutics	Wiley Publishers	2012
22.	S.K.Kulkarni	Hand book of Experimental Pharmacology	Vallabh Prakashan, Delhi.	1987
23.	Richard A. Guarino	New Drug Approval Process	Informa Healthcare USA,	2009, revised Fifth Edition
24.	Peter N. Bennett, Morris J. Brown, Pankaj Sharma	Clinical Pharmacology	Elsevier Health Sciences UK	2012

Suggested Journals:

S.N	Title of the Journal	Publisher
1.	Drugs	Adis International (Springer Science + Business Media)
2.	Pharmacological Reviews	American Society for Pharmacology & Experimental Therapeutics (ASPET) subscriptions@aspet.org
3.	British Journal of Clinical Pharmacology	British Pharmacological Society by Wiley-Blackwell.
4.	British Medical Journal	BMJ Group, a wholly owned subsidiary of the British Medical Association
5.	Pharmacotherapy	Pharmacotherapy Publications, Inc., USA
6.	New England Journal of Medicine	Massachusetts Medical Society
7.	Trends in Pharmacological Sciences	Elsevier Ltd.
8.	Annual Review of Pharmacology	Email: service@annualreviews.org
9.	Indian journal of experimental biology (IJEB)	Niscair publications, India
10.	Annals of Pharmacotherapy	Harvey whitney books company, USA
11.	Clinical Pharmacokinetics	Springer Science
12.	PharmacoEconomics	Adis International (Springer Science + Business Media)
13.	Journal of Pharmacovigilance	OMICS Publishing Group, USA
14.	European Journal of Clinical Pharmacology	Springer

Practical Exercises using Animal Experiments during the PG course is Subject to Ethical Approval by the Institutional Animal Ethics committee (IAEC)

I. **MODEL TEST PAPERS-**

MODEL QUESTION PAPER

MD (Pharmacology)

Paper- I

General pharmacological principles and allied sciences

Max. Marks:100 *Time: 3 hrs*

- ***Attempt ALL questions***
- ***Answer each question & its parts in SEQUENTIAL ORDER***
- ***ALL questions carry equal marks***
- ***Illustrate your answer with SUITABLE DIAGRAMS***

I. Discuss briefly the status of hormone replacement therapy in post menopausal women.
II. Describe the clinical significance of apoptosis. Discuss the mechanism of action of drugs modifying apoptosis.
III. Discuss the management of nosocomial infections.
IV. Describe the composition of blood substitutes and explain their therapeutic uses.
V. Outline the present status of purinergic receptors.
VI. Describe the pharmacotherapy of obesity.
VII. Define antimicrobial resistance and discuss methods for its prevention.
VIII. Elaborate the modern approaches to receptor characterization and classification.
IX. Discuss the current approaches in the management of osteoporosis.
X. Discuss briefly the pathophysiological basis of the management of essential hypertension with the help of suitable illustrations.

Paper-II

Systemic Pharmacology, Chemotherapy and Therapeutics

Max. Marks:100 *Time: 3 hrs*

- ***Attempt ALL questions***
- ***Answer each question & its parts in SEQUENTIAL ORDER***
- ***ALL questions carry equal marks***
- ***Illustrate your answer with SUITABLE DIAGRAMS***

I. Give an account of the drugs modifying the Renin-angiotensin system. Discuss the clinical implications with special reference to cardiovascular system.
II. Explain the cell-cycle. Discuss the clinical implications of the drugs acting on different phases of cell-cycle.
III. Define selective estrogen receptor modulators. Discuss their therapeutic implications.
IV. Discuss the current therapeutic status of metronidazole in different diseases.
V. Enumerate newer antiepileptic drugs. Discuss their current therapeutic status in seizure and non-seizure disorders.
VI. Classify antidepressant drugs. Give an account of adverse effects of typical and atypical antidepressants.
VII. Discuss the principles of safe and effective antibacterial drug therapy.
VIII. Define half life of a drug following first order kinetics. Discuss its derivation and clinical importance.
IX. Define therapeutic index and discuss its importance in therapeutics.
X. Define pA2 value. Describe the method of its calculation giving suitable examples.

MODEL QUESTION PAPER

MD (Pharmacology)

Paper-III

Experimental & Clinical Pharmacology

Max. Marks:100 Time: 3 hrs

- *Attempt ALL questions*
- *Answer each question & its parts in SEQUENTIAL ORDER*
- *ALL questions carry equal marks*
- *Illustrate your answer with SUITABLE DIAGRAMS*

I. Define placebo. Give an outline of ethical considerations for its use in clinical trials.
II. Explain the role of genetic engineering in new drug development.
III. Define LD50 and ED50. Discuss the methods for their calculation.
IV. What is the significance of sample size in biomedical research? Give the methods to calculate sample size using an appropriate hypothetical example.
V. Define the term 'transgenic animals'. Elaborate on their use in drug research.
VI. Enumerate the drug schedules. Give a detailed account of Schedule Y.
VII. Discuss the significance of randomization in clinical trials. Elaborate on the practicable methods of randomization.
VIII. Outline the evaluation of diuretic activity of a new compound in animal models.
IX. Discuss the phases of clinical trials. Give an outline of Phase V clinical trial plan.
X. Outline the evaluation of a lead compound for its hypolipidemic activity in animal models.

MD (Pharmacology)

Paper-IV

Recent Advances in Pharmacology

Max. Marks:100 Time: 3 hrs

- *Attempt ALL questions*
- *Answer each question & its parts in SEQUENTIAL ORDER*
- *ALL questions carry equal marks*
- *Illustrate your answer with SUITABLE DIAGRAMS*

I. Discuss the recent advances in CRIE (Chemotherapy and Radiation Induced Emesis)
II. Define monoclonal antibodies. Describe the rationale for their use in therapeutics.
III. Give an outline of the pathophysiology of bronchial asthma. Discuss the recent advances in its management.
IV. Compare the cyclo-oxygenase enzymes. Discuss the current status of COX-2 inhibitors in therapy.
V. Give an account of pharmacotherapy of cutaneous leishmaniasis.
VI. Describe the ethical considerations for the use of animals in biomedical research. Discuss the alternatives to animal species in research.
VII. Discuss the recent advances in the management of type 2 diabetes mellitus.
VIII. Give a diagrammatic representation of the synthesis of eicosanoids. Describe the newer therapeutic applications of prostaglandins.
IX. Outline the pathophysiology of osteoporosis. Discuss the diagnostic and therapeutic advances in the management of osteoporosis.
X. Describe the management of Premenstrual Dysphoric Disorder

Syllabus for MD Community Medicine, Faculty of Medicine & Health Sciences

The infrastructure and facilities to be as per MCI guidelines

1. Goals

The goal of postgraduate medical education shall be to produce specialists of Community Medicine who shall have the following competencies:

Recognize the health needs of the community and carry out professional obligations ethically and in keeping with objectives of the national health policy.

Have necessary abilities for the practice of Community Medicine

Be aware of the contemporary advances and developments in the discipline of Community Medicine.

Have a spirit of scientific enquiry and is oriented to the principles of research methodology and epidemiology.

Have the basic skills in training of the medical and paramedical professionals.

2.General Objectives:

The general objective of the training programme in Community Medicine will be enable a candidate to be a:

Public Health Specialist to

1. Define and manage the health problems of the community, which he/she serves. He/she should be able to organize epidemiological studies to identify health problems.

2. Plan, implement and evaluate various health programs in his/her area, especially National Health, Family Welfare and Disease Control/Eradication Programmes.

3.Select, train, supervise and manage various categories of health personnel working with him/her.

4. Organize health care services, routine and for special groups and during periods of special needs such as disasters/calamities and epidemics.

5. Should update himself/herself on latest advances/developments in the field of Public Health.

Teacher/Trainer to

1. Plan and conduct educational session/programme. He/she will be able to draw up lesion plan with details of educational objectives, content, process and essential inputs.

2. Assist in development of curriculum, teaching and learning objectives and methods of evaluation.

3.Assist in manpower planning and development. He/she should be able to participate in programmes for the selection, training and supervision of various coders of health personnel.

Research to

1. Plan and execute a research study including clinical trials. Use/organize Biostatistical analysis using computers and software and prepare reports/papers.

2. Critically evaluate research activities.

3. Make recommendations on policy and procures.

Special Objectives

At the end of MD program in Community Medicine the student will

1. Know the structure and functioning of health system at the National and International levels and its historical perspectives.

2. Know the principles of Nutrition, Maternal Health and Family Welfare and put the same into practice.

3. Apply the principles of Epidemiology and Biostatistics to health practice including the design and implementation of health related research studies and clinical preventive medicine trials.

4. Know the principle of Communicable and Non communicable disease control and assist in the implementation of National Health Programmes at the programe level.

5.Identify the sociocultural dimension in Health and disease and apply this knowledge in the design and implementation of an integrated Health and Development program.

6. Apply the principles of environmental and occupational health in the design of health programs aimed at improving health status.

7. Access specific health situations in population,plan, organize, implement and evaluate programs aimed at improving health situations.

8. Identify the health needs of the special groups within populations especially the aged, the disabled and to respond to the needs.

9. Know the principles of learning and apply this knowledge in facilitating the learning process in groups of people involved in health.

10. Relate his/her knowledge of curative medicine to the improvement of health status of a given population.

11. Identify the role of the Government, Private and Voluntary sector in health and understand the principles of innovations in health practices and research.

3. Syllabus

3.1 Theory

Basic Sciences

Genetics: Genes, chromosomes & inheritance, inheritance of dominant, recessive and sex linked genes, genetics and disease conditions, concept of genetic engineering, gene therapy, genetic counseling.

Physiology: Effects of exposure to cold, heat, humidity, noise, vibration, radiation, air pollution, high attitude, depth. Physiology of pregnancy & lactation, respiration, ventilation, dust measurement, space requirement, aerospace medicine.

Biochemistry: Constituents of body fluids, sewage & water, food and milk; principles of dietary constituents; requirements of nutrients and trace elements.

Para-clinical

Pathology

Urine, blood, serology, basic histo-pathology/cytology techniques

Microbiology:

General : Sterilization & disinfections, collection & transportation of samples, concepts of immunology and vaccination

Bacteriology: Classification, essentials of culture technique, staining procedures

Virology: Classification, essentials of virology, virological diagnostic techniques

Parasitology: Classification of protozoa, helminthes identification and lab diagnosis including skin tests

Mycology: Classification of mycoses and general characteristics, lab diagnosis and identification

Rickettesia, spirochetes: Classification & diagnostic techniques

Clinical

The student will have adequate exposure to the clinical aspects of health conditions spanning over other clinical disciplines namely Medicine and allied specialities, Pediatrics, Dermatology and Venereology, Ophthalmology, Radiology, ENT, Psychiatry, Obstetrics and Gynecology and Surgery. For this purpose, the training will be integrated with these departments.

Hospital Administration

Students will be posted to learn organization and administration of hospital services and understand system used for collection, recording and reporting of hospital statistics, inventory control of medical stores, hospital laundry, hospital dietary, CSSD, ensuring quality of health care, clientele satisfaction, hospital infection control, medical audit.

Community Medicine

Concept of Health & Disease

History of medicine, evolution of public health, alternative systems of medicine

Definition and concepts of public health

Definition of health, holistic concepts of health including concept of spiritual health, appreciation of health as a relative concept, determinants of health Curriculum M.D. Community Medicine

Characteristics of agent, host and environmental factors in health and disease and the multifactorial etiology of disease

Understanding the natural history of disease and application of interventions at various levels of prevention

Health indicators

Health profile of India

Concept of rehabilitation, its types and techniques

Social and Behavioural Sciences

Clinico- social, cultural and demographic evolution of the individual, family and community

Humanities and Community Medicine

Social organizations with special reference to family

Religion, its evolution as a special instance of the evolution of social institutions

Major tenets of the common religions in India & their influence on health & disease

Assessment of barriers to good health and health seeking behavior

Methodology in social research (Attitude surveys, Questionnaires, Interviews)

Health economics

Social security in India

Culture and its impact on health

Customs, taboos and mores

Medical social worker

Doctor patient relationship

Social problems e.g. child abuse, juvenile delinquency, drug addiction, alcoholism, marital maladjustment, domestic violence, suicide and attempted suicide, problems of the old, caste system

Psychology and its concepts

The Psycho analytic theory

Human personality, its foundations, development and organization

Development of child and its impact on its personality

Psychological tests-personality tests, intelligence tests

Group dynamics

Hospital psychology

Epidemiology & Research Methodology

Evolution of epidemiology

Epidemiology : definition, concepts and its role in health & disease

Measurement of disease frequency

Use of basic epidemiological tools to make a community diagnosis of health situation, in order to formulate appropriate intervention measures

Cause and effect relationship: concept of association, causation, chance and biases

Descriptive epidemiology

Formulation of hypothesis

Analytical epidemiology

Experimental epidemiology (randomized and non-randomized controlled trials)

Testing of hypothesis

Errors in testing of hypothesis

Survival analysis

Meta analysis

Measurement of risk and risk reduction

Use of constructs/scales and their validity in research

Concepts and techniques of qualitative research

Investigation of an epidemic of communicable diseases and to understand principles of control measures

Definition of the terms used in describing disease transmission and control

Modes of transmission and general principles of prevention and control of communicable, non-communicable diseases and other health conditions of public health importance

Epidemiological intelligence and forecasting

Principal sources of epidemiological data

Definition, calculation and interpretation of morbidity and mortality rates

Geographical information system (GIS) and remote sensing

Hospital epidemiology

Concept of disease eradication/ elimination, review of smallpox eradication strategy

Rapid assessment techniques

Application of computers in epidemiology

Screening for diseases

Screening : definition, types, uses and principles

Screening test : selection criteria, validity, evaluation, predictive accuracy

Screening programmes and their evaluation

Biostatistics

Health Statistics

- Introduction
- Role of statistics in Public Health
- Collection of data
- Sampling in Public Health
- Statistical classification of health data
- Handling and processing of statistical information
- Analysis of demographic data
- Measurement of morbidity, mortality and fertility
- Standardization of rates and standard indices
- Life tables
- Statistical techniques of evaluation in Public Health

Descriptive Statistics

- Introduction to biostatistics- aim and scope
- Collection of data- basic ideas
- Presentation of data- tabulation, diagram and graphs
- Measures of central tendency and dispersion

- Normal distribution
- Elementary idea of skewness
- Concepts of correlation and regression

➢ **Statistical inferences**

- Elementary idea of probability
- Sampling techniques
- Test of Significance-Chi Square, t-test, z-test, ANOVA
- Basic idea of testing of hypothesis Curriculum M.D. Community Medicine
- Advanced statistical techniques, multivariate regression analysis, statistical models. Use of Epi info, SPSS/ other computer software

➢ **Special topics in Biostatistics**

- Clinical trials-Aim and scope, general principles, use of controls, placebos and dommios, final presentation of results-discussion of some well known clinical trials
- Prophylactic trials-Assessment by time trends and geographical comparison, controlled prophylactic trials, discussion of some well known clinical trails
- Retrospective and prospective studies and follow up studies, discussion of important studies
- Field studies, prevalence surveys, guiding principles for data collection
- Controls in field studies & hospital studies

➢ **Demography and Vital Statistics**

- Concepts of demography, demographic cycle, vital statistics
- Definition, calculation and interpretation of various demographic indices
- Declining sex ratio and its social implication
- Population explosion, population dynamics of India
- Population control
- National population policy
- Sources of vital statistics like census, SRS, NFHS, NSSO etc.

➢ **Epidemiology of communicable and non-communicable diseases**

➢ Communicable and non-communicable diseases of public health importance

➢ Communicable diseases

- Intestinal infections : Poliomyelitis, viral hepatitis, diarrhea, cholera, helminthiasis, typhoid fever etc.
- Respiratory infections: Acute respiratory infections, measles, mumps, rubella, influenza, diptheria, whooping cough, tuberculosis etc.
- Vector- borne infections: Malaria, filariasis, kala-azar, dengue, yellow fever etc.

    - Surface infections: Sexually transmitted diseases, HIV & AIDS, tetanus, leprosy, scabies, pediculosis etc.
    - Zoonosis: Rabies, japanese encephalitis, plague, kyasanur forest disease, leptospirosis, brucellosis, anthrax, other viral / bacterial / parasitic / rickettsial zoonoses etc.
- **Non-communicable and lifestyle diseases**
- Coronary artery disease, hypertension, stroke, obesity, diabetes, rheumatic heart disease, blindness, cancers, accidents etc.

Above diseases to be studied in detail under the following subheads:

- Extent of problem, epidemiology and natural history of disease
- Public health importance of particular disease in local area
- Influence of social, cultural and ecological factors on the epidmiology of particular disease
- Diagnosing disease by clinical methods, using essential laboratory techniques at primary care level
- Treatment of a case, as per National Programme guidelines and also follow up of case
- National Health Programme for particular disease
- Understand the principles of control of an epidemic Curriculum M.D. Community Medicine
- Training of health workers in disease surveillance, control, treatment and health education
- Management information system in a particular disease
- New/ emerging diseases and health related problems
- Applied Nutrition
- Nutrients, common sources and their requirement according to age, sex, activity and physiological conditions
- Balanced diet, Prudent diet
- Techniques of nutritional assessment of individual, family and the community
- Plan and recommend a suitable diet for the individuals and families as per local availability of foods and economic status etc.
- Common nutritional disorders, specific nutrient deficiency disorders, disorders related to toxins in food ; their control and management
- Food fortification, additives and adulteration, food hygiene
- Social and cultural factors in nutrition and health
- Food and economics

- Important National nutritional programmes
- National Nutrition Policy
- Nutritional surveillance, education and rehabilitation
- Role of diet in specific diseases like coronary heart disease, diabetes, obesity etc.
- Food and legislation
- Future trends in nutrition
- **Reproductive and Child Health**
- Current status of reproductive and child health
- Screening of high risk groups and common health problems
- Local customs and practices during pregnancy, lactation, child rearing, child feeding practices including complementary feeding
- Breast feeding and its importance
- Indicators of RCH
- Causes of perinatal/infant/maternal mortality and measures for reduction of the same
- Essential obstetric care, emergency obstetric care
- Essential newborn care
- Reproductive child health (RCH) components, including child survival and safe motherhood, universal immunization programme, integrated child development services scheme (ICDS), integrated management of neonatal and childhood illness (IMNCI) and other existing programmes
- Organization, implementation and evaluation of reproductive and child health program components
- Various family planning methods, their advantages and shortcomings
- Medical termination of pregnancy and Act (MTP Act)
- Adolescent health
- Handicapped child
- Gender issues and women empowerment
- Organizations, technical and operational aspects of the National Family Welfare Programme
- **School Health**
- Objectives and components of school health programme
- Activities of the programme Curriculum M.D. Community Medicine
- Periodic medical examination of the children and the teachers
- Immunization of the children in the school
- Health promotion and education
- Mid-day meal programme

- Healthful school environment
- **Health Care of Elderly**
- Size of elderly population, their common health problems and justification of their special care
- Screening procedures for early detection of various diseases and disabilities of elderly
- Comprehensive heath care aspects of elderly
- National policy for care of elderly
- Urban Health
- Common health problems (Medical, social, environmental, economical, psychological) of urban slum dwellers
- Organization of health services for and in urban slums
- National policy on urban health
- Health issues of migrant populations
- **Environment and Health**
- Water : concepts of safe and wholesome water, sanitary sources of water, water borne diseases, water purification processes
- Physical and chemical standards of drinking water quality and tests for assessing bacteriological quality of water
- National rural water supply and sanitation programme
- Concepts of water conservation and rainwater harvesting
- Health hazards of air, water, noise, radiation pollution and their prevention & control including indoor air pollution
- Rural and Urban sanitation
- Concepts of solid waste / human excreta / sewage disposal
- Awareness of standards of housing and the effect of housing on health
- Aerospace medicine
- Health hazards related to climate, altitude, and depth
- Human health in a changing world

➢ **Medical Entomology**

- Role of vectors in the causation of diseases
- Identifying features of vectors and their control measures
- Life cycles of vectors and advantages and limitations of various vector control measures
- Mode of action, application cycle of commonly used insecticides and rodenticides
- Integrated vector control
- Entomological survey techniques

- **Biomedical Waste & its disposal**

- Classification / categories, sources, health hazards and treatment of biomedical waste as per current regulations
- Application of principles of biomedical waste management in different settings of health care delivery system
- Disaster Management

Principles of disaster preparedness and application of these in disaster management

- Occupational Health Curriculum M.D. Community Medicine

- Relate the history of symptoms with specific occupations including agriculture related occupation
- Asbestos and other fibers, coal workers lung diseases, silicosis, health significance of metal exposures, diseases associated with exposure to chemical substances, multiple chemical sensitivities, pulmonary responses to gases and particles, pesticides, illness due to thermal extremes, ionizing radiations, non-ionizing radiations, effects of physical environment- noise, vibration, work related musculo-skeletal disorders
- Employees State Insurance (ESI) scheme
- Concepts of ergonomics
- Diagnostic criteria of various occupation related diseases
- Industrial hygiene
- Surveillance, monitoring and screening in occupational health
- Occupational problems of special working groups
- Occupational safety and health standards
- Legislations related to occupational health

- **Information, Education, Communication & Health Promotion**

- Understand the concepts of health promotion and education, IEC, behavioral change communication
- Principles & methods of health promotion and education
- Barriers to effective communication and methods to overcome them.
- Process of learning and its principles
- Various methods of health education with their advantages and limitations
- Aids for imparting health education
- Organizing health promotion and education activities at individual, family and community settings
- Evaluation of health promotion and education programme

- Pedagogical methods: introduction, elements and techniques

➢ **Mental Health**

- Importance of mental health care in primary care settings
- Common psychiatric/ neurotic/ other mental health disorders, mental retardation
- Comprehensive mental health care at primary care settings
- Psychotherapy, its place in mental health
- Psychology and field research

➢ **Human Genetics**

- Genes and development
- Blood groups- Medico-Legal applications
- Genetic and chromosomal disorders in man
- Genetic counseling
- Genetics and public health
- Genetic engineering and related health issues including genetically modified foods
- Gene therapy
- Human genome project

➢ **Health care delivery system in India**

- Concepts of primary health care and comprehensive health care.
- Health profile of India
- Evolution of health care delivery system in India
- Health care delivery in India and infrastructure at primary, secondary and tertiary care level
- Job responsibilities of different categories of workers in health system
- Voluntary health agencies working in India
- Pattern of health care services in certain south Asian and western countries
- Health insurance

Health planning , management and administration

- Concepts of planning, management, public health administration
- Components of planning a health activity
- Classification and understanding of various qualitative and quantitative health management techniques
- Over view of administration at village, block, district, state and center level in India
- Organizational concept
- Organizational behavior

- Time, material and personnel management
- Integrated disease surveillance project (IDSP)
- Health related Millennium Development Goals
- Operational research
- National Health Policy and National Rural Health Mission
- Concepts of health economics in health planning and management
- Concepts, scope and methods of Health Audit
- Role of Planning Commission and five year plans in development of health sector in India
- Various health committees of Govt. of India and their important recommendations
- Public health administration of the future
- Research in administration, operational & action oriented research
- New concepts in public health administration
- Principles of hospital administration
- Medical audit, quality assurance, quality improvement and client satisfaction
- Alternative approaches to planning
- Importance of hospital records, their retrieval, International classification of diseases, medical certification of death

➢ **Public Health Legislation**

- Birth and death registration act, PFA act, MTP act, CPA, Child labour act,
- PNDT act, Transplantation of human organ act in India etc.
- Other public health legislations

➢ **International Health**

- Role of various multilateral, bilateral international health organizations like WHO, UNICEF, UNDP, World Bank etc.
- Organization structure of these organizations
- International Health Regulations (IHR)

3.2 Practical

All MD students will be required to acquire following demonstrable / verifiable skills:

- All candidates will be required to complete PG thesis as prescribed by the university. Curriculum M.D. Community Medicine

➢ The following diaries / books will be maintained by each PG endorsed by the guide / HOD:-

- Log book of daily activities including statement of skill acquired on each day
- Day book containing detailed reports of visits to establishments of health interest other than own department
- Scrap book containing lay media reports regarding current health issues & critical appraisal thereof (min 30 reports)
- Folder containing formats / brochures / other material like family health cards, in connection with extramural visits
- Family health file containing records of min 15 families
- Folder containing clinico-social case records of 15 long / short case.
- The following skills will be specifically acquired during the entire tenure:
- Skills related to Public Health
- Familiarization with organization & functioning of following establishments:
- Water supply system
- Sewage system
- Slaughter house
- Catering establishment
- Food processing plant
- Milk plant
- Solid waste disposal system
- State public health laboratory
- Familiarization with techniques and ability to interpret data in relation to the following :
- Surveillance of drinking water quality
- Analysis of sewage
- Analysis of milk
- Assessment of pesticide & other toxins in the environment
- Familarization with food adulteration act
- Familiarization with Health Legislation in India
- Skills as Community Physician
- Ability to identify local health needs of community.
- Ability to demonstrate leadership qualities & function as effective team leader.
- Ability to make community diagnosis including application of Rapid assessment techniques.
- Ability to organize health camps.
- Ability to organize health surveys & ongoing comprehensive health delivery programme.

- Ability for effective liaison with PRIs & local opinion leaders, mustering of local resources, advocacy & mobilization of administration & political will for health care programmes.
- Skills as Family Physician
- Diagnosis & management of common illness.
- Diagnosis & management of chronic diseases & disabilities including rehabilitation.
- Nutritional assessment & nutritional therapy.
- Family planning practices.
- Diagnosis & management of Pediatric, Geriatric, Gynecological illness with special emphasis on RCH & integrated management of childhood illness.
- Perform all immunization procedures.
- Ability to organize & conduct MCH services including antenatal clinic, intranatal & postnatal care, care of newborn, growth monitoring & care of toddler.
- Conduct / attend 20 normal deliveries & 5 abnormal deliveries.
- Skills of Occupational Health
- Familiarisation with measurement of relative humidity, temperature, thermal comforts & ventilation, noise levels, air pollution, lead exposure estimation, light level estimation.
- Familiarisation with organization & functioning of ESI system.
- Conduct of pre-placement & periodic medical examination.
- Identification of specific health hazards in occupational environment.
- Skills of Communicable Disease Control
- Investigation of an outbreak.
- Investigation of episode of food poisoning.
- Diagnosis & management of zoonotic diseases.
- Familiarisation with organization & functioning ofo Rabies clinic
- STD clinic
- Leprosy clinic
- TB Centre
- National vector borne diseases control programme
- IPPI & AFP surveillance
- Case management of diarrhoea & preparation of ORS.
- Case management of ARI
- Functioning of isolation / quarantine unit
- Family Planning skills
- Ability to propagate planned parenthood & small family norm as per national guidelines (GOI) by Counselling, motivation & IEC.

- Administer appropriate method of contraception by cafeteria approach.
- Assess gaps / unmet needs in family planning services in community under care.
- ➢ Ability to perform / assist Tubectomy by using conventional / laproscopic method (min 5)
- ➢ Ability to perform / assist vasectomy by using latest techniques (min 3).
- ➢ Ability to insert IUCDs (min 10).
- ➢ Ability to perform / assist in MTPs (min 5)
- ➢ Ability to perform / assist in menstrual regulation techniques (min 5).
- ➢ Skills of Hospital Administration
- ➢ Familiarisation with working of large multispeciality hospital with special reference to following departments:-
- Layout of OPDs
- CSSD
- Laundry
- Catering
- Biomedical waste management
- Other departments / labs / OTs
- ➢ Familiarisation with functioning of Medical Record Department
- ➢ Inventory control
- ➢ HR management
- ➢ Familiarisation with functioning of infection control committee
- ➢ Disinfection procedures with special reference to OTs & isolation wards.
- ➢ Skills of Research Methodology including application of Statistical Methods
- ➢ Planning & execution of 1 short hospital based epidemiological (analytical) study other than thesis work.
- ➢ Planning & execution of 1 short field based / KAP study.
- ➢ Critical appraisal of 10 published research papers / projects duly evaluated.
- ➢ Ability to apply biostatistical procedure including sampling & tests of significance.
- ➢ Ability to perform epidemiological, biostat & public health exercises duly evaluated (min 10 each).
- ➢ Communication Skills
- ➢ Ability to utilize all known modes of IEC in order to :
- To generate desired level of awareness in the community on common health issues
- To render health education to specified groups / individuals on specific health issues.
- Mobilise community participation regarding health programmes in hand.

- Mobilise political & administrative will & demolish communication barrier regarding on going health programme .
- Prepare IEC material using local resources.
- Skills related to Health Care Delivery to Community
- Familiarization with functioning & infrastructure of SC, SHC, PHC, CHC.
- Familiarization with Urban Health Care delivery system models.
- Planning & evaluation of health programme (min 2).
- Organization of health services for camps, fairs, prisons, orphanages, urban slums, migratory population & other special circumstances.
- Planning & organization of health aspects of disaster management.
- Planning & organization of school health
- Documentation & record keeping for delivery of comprehensive family health care (RHC & UHC).
- Familiarization with MIS in primary health care.
- Skills related to Applied Microbiology, Pathology & Radiology

Microbiology

- Familiarisation with organization & functioning of Microbiology lab, diagnostic equipements & bio safety procedures.
- Ability to perform staining procedures (10 each), JSB stain, Niesser stain, Gram's stain, Z-N staining, Leishman stain, other staining procedures.
- Ability to make thin & thick blood smear.
- Ability to identify helminthic ova / larvae.
- Familiarisation with procedures for-
- VDRL & other tests for STDs
- Weil-Felix test
- Widal test & other tests for enteric fever
- Examination of throat swab
- ELISA & other tests for HIV
- Other common tests for viral infection
- Blood culture & other culture procedures
- Collection, preservation & transportation of samples for microbiological examination.
- Bacteriological examination of water.

Pathology

- Familiarization with organization & functioning of Pathology lab including diagnostic equipments.

Ability to perform the following tests-

- Routine Haemogram
- Routine urine examination
- Routine stool examination
- Familiarisation with Histopathological procedures
- Familiarisation with cytological procedures including FNAC & pap smear.

Biochemistry

Organization & functioning of Biochemistry lab & familiarization with diagnostic equipments.

Radiology

- Familiarization with protection against radiation exposure.
- Interpretation of skiagrams related to common diseases of chest and occupational exposures.

Computer Skills

- Knowledge & skill to use of Microsoft Word
- Microsoft Excel
- Microsoft Powerpoint
- SPSS
- Epi info
- Public Health Administration Skills
- Familiarisation with the administrative set up & functioning of the health system in India (National, State & District levels).
- Familiarisation with methods of financial management, practice & procedure.
- Familiarisation with techniques of human resource management.
- Familiarisation with creating, implementation & monitoring of routine MIS of the health system.
- Ability to identify need for change & to make strategic & structural changes in clinic, community services, health system & health policies.
- Ability to play advocacy role in the District Planning Committees & Panchayat Samiti & Zila Parishad.
- Familiarisation with the administrative, executive & legislative setup of nation & state.
- Organization & Conduct of health camps.
- Evaluation of National Health Programmes

- Familiarisation with legislation pertaining to health.
- Familiarisation with administrative setup, functions, powers & operations of :

- Municipal Corporation
- Pollution Control Board
- Registrar Births & Deaths
- IMA
- NGOs
- Other bodies of significance to health

4. Teaching Program

4.1. General Principles

Acquisition of practical competencies being the keystone of postgraduate medical education, postgraduate training will be skills oriented. Learning in postgraduate program is essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

4.2. Teaching Sessions

Following is the list of teaching sessions:

Seminars

Journal clubs

Family presentations

Long case presentations

Short case presentations

Epidemiological exercise

Biostatistics exercise

Mobile clinics

Thesis work discussion

Extra mural posting discussions

Field visits

Participation in National Health Programmes

5. Postings

The postgraduate students are to be posted in Urban Health Centre/ Rural Health Centre / other departments in the hospital:

UHC : Minimum 1 month per year

RHTC : Minimum 2 months per year

6. Thesis

- Every candidate shall carry out work on an assigned research project under the guidance of recognized postgraduate teacher. The project shall be written and submitted in the form of a thesis.
- Within 6 months the topic to be selected, protocol to be presented at the department level. Local Ethical Committee approval to be obtained at the end of 6 months. The title and synopsis to be communicated to the university.
  First 6 months:
  Topic Identification.
  Protocols Presentation.
  Submission of title
  Synopsis to university.
- Thesis submission to the university 6 months before the Final University Examinations.
- The student should (i) identify a relevant research question (ii) conduct a critical review of literature (iii) formulate a hypothesis (iv) determine the most suitable study design (v) state the objectives of the study (vi) prepare a study protocol (viii) undertake a study according to the protocol (viii) analyze and interpret research data and draw conclusions (ix) write a research paper.

7. Assessment

All the PG residents are to be assessed daily for their academic activities and also periodically.

7.1. General Principles

The assessment is valid, objective, and reliable.

It covers cognitive, psychomotor and affective domains.

Formative, continuing and summative (final) assessment is also conducted in theory as well as practicals/clinicals. In addition, thesis is also assessed separately.

7.2 Formative Assessment

The formative assessment is continuous as well as end-of-term. The former is based on the feedback from the senior residents and the consultants concerned. End-of term assessment is held at the end of each semester (upto the 5th semester). Formative assessment will not count towards pass/fail at the end of the program, but will provide feedback to the candidate.

7.3 Internal Assessment

The performance of the Postgraduate student during the training period should be monitored throughout the course and duly recorded in the log books as evidence of the ability and daily work of the student. Marks should be allotted out of 100 as followed.

Sr. No.	Items	Marks
1.	Personal Attributes	20
2.	Practical Work	20
3.	Academic activities	20
4.	End of term theory examination	20
5.	End of term practical examination	20

1. Personal attributes:

Behavior and Emotional Stability: Dependable, disciplined, dedicated, stable in emergency situations shows positive approach.

Motivation and Initiative: Takes on responsibility, innovative, enterprising, does not shirk duties or leave any work pending.

Honesty and Integrity: Truthful, admits mistakes, does not cook up information, has ethical conduct, exhibits good moral values, loyal to the institution.

Interpersonal Skills and Leadership Quality: Gets on well with colleagues and paramedical staff, is respectful to seniors, has good communication skills.

2. Practical Work

Availability: Punctual, available continuously on duty, responds promptly on assignments and takes proper permission for leave.

Diligence: Dedicated, hardworking, does not shirk duties, leaves no work pending, does not sit idle, competent in practical work.

Academic ability: Intelligent, shows sound knowledge and skills, participates adequately in academic activities, and performs well in oral presentation and departmental tests.

Performance: Proficient in presentations and discussion during academic sessions in the department.

3. Academic Activity

Performance during presentation at Journal club/ Seminar/ Case discussion/ Stat meeting and other academic sessions. Proficiency in skills as mentioned in job responsibilities.

4. End of term theory examinations conducted at end of 1st, 2nd year and after 2 years 9 months.

5. End of term practical/oral examinations after 2 years 9 months.

Marks for personal attributes and work done should be given annually by all the consultants under whom the resident was posted during the year. Average of the three years should be put as the final marks out of 20.

Marks for academic activity should be given by the all consultants who have attended the session presented by the residents.

The Internal assessment should be presented to the Board of examiners for due consideration at the time of Final Examinations.

A. Theory Examination (Total = 400)

Paper	Title	Marks
Paper I	Basic sciences as applied to Community Medicine	100
Paper II	Public Health Administration & Management Sciences	100
Paper III	Community Medicine & Family Practice	100
Paper IV	Recent Advances in Community Medicine	100

B. Practical & Viva voce Examination (Total = 400)

Long Case / Family Study /Medico-social case	80
Short Case (s) x 2	80
Statistical Exercise	30
Epidemiological exercise	30
Public health exercise	20
Structured spot exercise (spotting)	20
Microbiological exercise	15
Pedagogic Exercise	15
Journals/other work records	10
Oral	100

8. Suggested Books

Core books

Maxcy-Rosenau-last Public Health & Preventive Medicine : Wallace RB

Text book of Community Medicine : Sunder Lal, Adarsh & Pankaj

Park's Text book of Preventive & Social Medicine

Epidemiology in Medical Practice : Barker DJP

Biostatistics : A foundation for Analysis in the Health Sciences: Daniel WW

National Health Programmes of India: Kishore J

Multiple Choice Questions in Preventive & Social Medicine : GPI Singh & Sarit Sharma

Reference Books

Oxford Text book of Public Health: Detels R, McEwen J, Beaglehold R

Control of Communicable Diseases in Man: Benenson AS

Manson's Tropical Diseses:Cook G, Zumla A

Hunter's Diseases of Occupations: Baxter PJ, Admas PH Curriculum M.D. Community Medicine

Hunters Tropical Medicine and emerging infectious diseases: Strickland GT

An introduction to sociology: Bhusan and Sachdeva
Clinical Epidemiology- the Essentials : Fletcher
Epidemiology and Management for Health Care for all: Sathe PV, Sathe AP
Training modules of various national & international institutes and national health programmes

Journals

Indian journal of community medicine

Indian journal of preventive and social medicine

American journal of epidemiology

British journal of epidemiology

Lancet

Human biology

Health and populations- perspectives and issues

NTI Bulletin

Journal of communicable diseases (NICD)

WHO Bulletin

WHO technical reports series

Emerging infectious diseases

CD alerts (NICD)

Nutrition news (National institute of nutrition)

The journal of family welfare

International family planning perspectives

Indian Journal of Public Health

Social Medicine

IAPSM Punjab Bulletin

MODEL QUESTION PAPER
MD (Community Medicine)
Paper-I
Basic Sciences as applied to Community Medicine

Max. Marks:100
Time: 3 hrs

i. Attempt ALL questions

ii. Answer each question & its parts in SEQUENTIAL ORDER

iii. ALL questions carry equal marks

iv. Illustrate your answer with SUITABLE DIAGRAMS

i. What is Kaplan Meier Survival Curve? Discuss its applications in medical sciences.

ii. How will you plan the universalisation of ICDS scheme while maintaining the quality of services ?

iii. Describe lot quality assurance sampling giving suitable examples.

iv. Discuss the social pathology of maternal mortality in India.

v. Outline various ethical considerations in randomised controlled trials.

vi. Outline various ethical considerations in randomised controlled trials.

vii. Give an account of evaluation techniques in Pedagogy.

viii. Discuss in detail various criteria for measurement of poverty.

ix. Enumerate the salient features and uses of International Classification of diseases-10th Revision.

x. What is nutritional surveillance? Describe briefly various methods used for nutritional surveillance.

MODEL QUESTION PAPER
MD (Community Medicine)
Paper-II
Public Health Administration & Management Sciences

Max. Marks:100
Time: 3 hrs

i. Attempt ALL questions
ii. Answer each question & its parts in SEQUENTIAL ORDER
iii. ALL questions carry equal marks
iv. Illustrate your answer with SUITABLE DIAGRAMS

i. Discuss the role of social marketing in health sector.
ii. Enumerate health hazards related to infectious waste management. Describe briefly ways to minimize these health hazards.
iii. What is biological warfare? Write a note on disaster preparedness in case of biological warfare.
iv. Describe briefly the concept of essential drugs. Enumerate the criteria for selection of essential drugs.
v. Enumerate the salient features of Pre-Conception and Pre-natal Diagnostic Techniques (Prohibition of Sex Selection) Act 1994.
vi. Discuss the Impact of International Health Regulations on World Trade Organization.
vii. What is Medical Audit ? Discuss in detail various stages of audit cycle.
viii. Explain the effects of lead pollution on environment. Elaborate ways to reduce lead pollution.
ix. Give an account of new dimensions of health informatics.
x. Describe briefly various inventory control techniques giving suitable examples.

MODEL QUESTION PAPER
MD (Community Medicine)
Paper-III
Community Medicine & Family Practice

Max. Marks:100
Time: 3 hrs

i. Attempt ALL questions
ii. Answer each question & its parts in SEQUENTIAL ORDER
iii. ALL questions carry equal marks
iv. Illustrate your answer with SUITABLE DIAGRAMS

i. Critically evaluate the available infrastructure of RCH programme.
ii. Critically evaluate the Current Scenario of RCH programme.
iii. Describe in detail surveillance of Acute Flaccid Paralysis.
iv. Discuss the role of emergency contraception in the era of globalization.
v. Submit a plan for resource mobilization for geriatric population at the level of community health centre.
vi. W rite a note on Disability Adjusted Life Years.
vii. Discuss validity of a Screening Test giving suitable examples.
viii. Describe briefly 10/90 Gap in relation to inequitable distribution of resources in health care.
ix. Give an account of current status of malaria vaccines.
x. What do you understand by Replacement Level Fertility in the context of population stabilization?

MODEL QUESTION PAPER
MD (Community Medicine)
Paper-IV
Recent Advances in Community Medicine

Max. Marks:100
Time: 3 hrs

i. Attempt ALL questions
ii. Answer each question & its parts in SEQUENTIAL ORDER
iii. ALL questions carry equal marks
iv. Illustrate your answer with SUITABLE DIAGRAMS

i. Discuss the role of remote sensing in vector borne diseases.
ii. What is meta analysis? Describe steps for conducting meta analysis.
iii. Write a note on No Scalpel Vasectomy.
iv. Discuss briefly various operational research techniques used in health care.
v. Give an account of recent developments in RNTCP.
vi. Submit a plan for preventing an imminent outbreak of bird flu.
vii. Outline the objectives & salient features of National AIDS Control Programme phase- III.
viii. Discuss the impact of tourism on the health of community.
ix. Discuss briefly the role of computer software in epidemiology.
x. What is focus group discussion? Discuss its role in qualitative research.

Syllabus for MD Forensic Medicine, Faculty of Medicine & Health Sciences

The infrastructure and faculty will be as per MCI guidelines.

1. Goals:

The goal of the teaching of postgraduate students in Forensic Medicine is to produce a competent specialist who:

1. Is able to provide basic and specialized services in relation with medico-legal responsibilities in the practice of medicine and process of crime investigation.
2. Must be capable of setting inquiries on right track in criminal matters and connected to medico-legal problems.
3. Has acquired competency to be teacher, trainer, researcher and leader in the field.
4. Has acquired knowledge of law in relation to practice of medicine, medical negligence and investigation of crime against human beings. Respect for the codes of medical ethics consistent with national health policy and law of the land as a citizen of India is of course mandatory for them.

2. Objectives:

At the end of the course, the candidate shall be able to:

1. Conduct a competent medico-legal autopsy, collect appropriate evidence pertaining to cause/mode/manner of death and identification of deceased and assailant. They must also be able to understand and interpret other important medico-legal aspects of death due to natural and unnatural conditions and poisonings.
2. Must be able to visit the scene of crime and shall detect, describe, interpret the observations and conclude the procedure in a technically competent manner.
3. Have fundamental knowledge of all branches of medical disciplines related to their medico-legal applications. They must also be able to refer and understand relevant application of few other branches of science like botany, zoology, chemistry, and physics. It is also expected that they must be reasonably aware of using computer.
4. Be aware of laws in relation to medico-legal work, medical practice and be acquainted with related relevant amendments and also related judgments passed by constitutional courts.
5. Understand the important procedures and applicability of the general principals of analytical toxicology, ballistics, and immunology, occupational and environmental hazards.
6. Serve as a future teacher, trainer, researcher and leader in the field of medicolegal faculty. They must also be able to offer technically competent consultancy services to the health, home and law departments in connection with medicolegal work, crime investigation process and courts.

M.D. FORENSIC MEDICINE AND TOXICOLOGY

SYLLABUS

THEORY

Basic medical sciences namely Anatomy, Physiology, Pharmacology, Pathology and Microbiology as applied to Forensic Medicine.

- Surface Land marks & regional Anatomy of medico legal significance.
- Comparative anatomical study of Male & Female skeleton.
- Anatomy of neck with special reference to violent Asphyxial deaths.
- Anatomy of reproductive organs
- Gross anatomy of heart and coronaries.
- Outline of embryonic / foetal development.
- Microscopic anatomy (histology of different organs & tissues, such as brain, heart, lungs, liver, kidneys, spleen, thyroid, adrenals, bone, skin)
- Body water & fluid balance.
- Blood grouping & RH incompatibility.
- Physiology of menses & pregnancy.
- Physiology of thermo-regulation.
- Patho-physiology of shock.
- Blood sugar regulation & diabetic coma, hypoglycaemic coma.
- Outline of the functions of circulation, respiration, and haemopoitic, and nervous, digestive, endocrine, excretory, reproductive and musculo-skeletal system. Pathophysiology of sexual functions and histopathology.
- General pathology: Pathology of cell / tissues – Degenerative changes & secondary changes(atrophy, hypotrophy, aplasia, Hyperplasia, ischemia, necrosis, infarction, cloudy swelling, amyloidosis and embolism, asphyxia deaths, electricity, gun-shot wounds, poisoning, thrombo-embolism, fat embolism, aspirations, wound healing, histological determination of time of death.
- Body's local and systemic response to trauma.
- Healing and fibrosis (Pathology of scar)
- Common general and systemic diseases and caused by physical/chemical agents.
- Disorders of infancy and old age changes relevant to forensic medicine.
- Pathology gross and microscopic in myocardial infarction, congenital heart diseases, tuberculosis, cirrhosis, malnutrition, starvation.
- Histology with important Staining Procedures
- Microbiology and serology of venereal diseases infections.
- Microbiology of Cadavers.

- Relevant General Pharmacology, Pharmacology of Important Antidotes & Drugs.
- Addiction, Anti-sera, Hormones & Anaesthetic Drugs.

Forensic Medicine including other clinical subjects as applied to it.

1. Identification of the living and dead, determination of race and religion, sex, age, external peculiarities such as moles, birth marks, occupational marks, nthropometry, finger prints, and foot prints handwriting etc. and their medico legal aspects.
2. Evaluation of evidence from the skeleton. Problems of reconstruction, superimposition technique.
    - Medico legal aspects of allergy and anaphylaxis.
    - Evidence from trace elements like hair and biological stains of blood, semen, weat, saliva, milk, sputum etc.
    - Laboratory investigations as required in medico legal situations like unconsciousness, sudden death from unknown causes, therapeutic misadventures, industrial exposures and the like.
    - Outlines of analytical and Histopathological techniques as applied to forensic medicine.
    - Injuries and Thermal death from cold coma, heat coma, electricity coma, lightning and radiation.
    - Death from starvation.
    - Mechanical injuries & their medico legal aspects in relation to nature of injuries, accidental, suicidal, homicidal distinction between injuries caused during life and after death. Medico legal examination of injured person. Regional and Transportation injuries.
    - Examination of weapon in relation to inflicted injuries.
    - Firearm and Thermal injuries.
    - Causes of death from wounds.
    - Forensic radiology in identification, pathology, dentistry, child abuse, trauma, medico legal implications of radiological procedures.

FORENSIC PSYCHIATRY:

Various Acts in relation to Forensic psychiatry,

- Classification of mental disorders and abnormal human behaviours. Medico legal aspects of INSANITY and abnormal human behaviour as regards to civil & criminal responsibilities and rules regarding admission, treatment and discharge of mentally ill person in the Menta Hospitals, Feigned insanity, Juvenile delinquency in the juvenile court. Restraint of mentally ill person.
- Biology of behaviour, emotion, stress, attitudes, normal & abnormal personalities.

- Psychological assessment & testing personality and its disorders, abnormal psychology, health psychology, assessment strategies in medical education.
- Study of suicide, production of personality and circumstances. Post mortem analysis of suicide notes and circumstances
- Counselling in normal sexual behavior and sex related disorders.
- Medico legal aspects of emergency & resuscitation intensive care, medical negligence death.
- Trauma, Work Stress & Disease.
- Torture medicine: Medico legal aspects & duties of physician in cases of torture.

Type of personalities.

- Mass disasters.
- Bombs and other explosives. Biological and chemical warfare and barotrauma.
- Impotence, Sterility, Artificial insemination, sterilization. Test tube babies & their medico legal aspects.
- HIV and AIDS.
- Virginity, Pregnancy, Delivery in relation to suit of nullity of marriage, divorce, and legitimacy affiliation cases etc.
- Abortion – Criminal & Justifiable, Laws in relation to criminal abortion. Duties of medical persons when called to treat a case of criminal abortion. MTP Act 1971.
- Sexual Offences – Rape, Incest, unnatural sexual offences such as sodomy,
- Tribadism, Bestiality & Buccal Coitus, Sexual perversions.
- Infanticide.

Forensic Toxicology & Medical Jurisprudence

- General & Forensic Toxicology including Classification, Mechanism of Action, Clinical Features, Diagnosis , Management , Autopsy appearances & Medico-legal Importance of Poisons.
- Addiction, de-addictions and drug abuse.
- Important Toxicological Analytical Techniques.
- Forensic Science: Recent Advances & Modern Trends.
- Introduction & working of various Wings of Forensic Science Laboratory..
- Immunology, Examination of Biological Trace material Evidence. Ballistics,
- Identification. Crime Laboratory, Forensic Photography.
- Definition of Medical Jurisprudence.
- Introductory remarks, Criminal Courts & their powers, inquests and legal procedures, procedure in court, medical evidence, various medical

certificates, medico legal reports, dying declaration & dying deposition, witness, conducts and duties of the doctor in the witness box, professional secrecy.

- Regulation of medical profession, various governing bodies, their constitution & functions. Laws in relation to medical man.
- Rights, duties & privileges of a registered medical practitioner.
- Informed consent in medical practice. Infamous conduct. Medical malpraxis.
- Physician duties under various public health & medical Acts.
- Problems of privileges and confidentiality etc. Physician in the Witness Box.
- Liabilities of Hospitals, nursing home and public dispensaries to patients.
- Medical practice in relation to Insurance.
- Relevant parts of Indian Penal Code of criminal procedure, Indian Evidence Act, Suppression on Immoral Trafficking Act. Workman's Compensation Act and other Laws related to medical practice.
- Law & Procedures related to Organ Transplantation.
- Legal & Ethical aspects of Family planning procedures.
- Therapeutic trial & human experimentation etc.
- Medico legal aspects of Organ & Tissue transplantation.
- Euthanasia.
- Supreme Court and High Court Landmark judgments related to Forensic Medicine and Medical Jurisprudence.
- Relevant Laws, Legal Procedures & Psych General Medical Jurisprudence including MCI, MMC, Ethics & Bio Med Research, Consent, Negligence, Relevant Sections , Courts & their powers , Evidence & Recording of Evidence ,
- Relevant Sections of IPC, Cr Pc, IEA, Acts Like CPA , MTP , PCPNDT , NDPS, OT, NHRC
- Medical certification of cause of death and relevant vital statistics..
- Day-to-day MLC problems in hospitals.
- Recent Laws applicable to medical man.
- Value of medical opinion in the court of law.

Forensic Pathology including Forensic immunology & recent advances.

- Medico legal autopsy of dead body, decomposed and mutilated body or its fragments / skeleton, bones, exhumation & rules regarding it.
- Death, manner of death, modes of death, cause of death, sudden death, signs of death and changes following death. Estimation of post mortem interval, Forensic Entomology, Post mortem chemistry of body fluid like blood, CSF and vitreous humour, presumption of death and presumption of

survivorship. Violent asphyxia deaths: Hanging, Strangulation, Suffocation and Drowning.

- Death from sudden violent, suspicious, unknown and unnatural cause, disease following trauma.
- Basic concepts of immunology and serology.
- Principles of various immune-serological tests, precipitin test, pregnancy test, sperm antibody test.
- Role of immunological techniques in crime investigation and exclusion of parentage.
- Incompatibility and adverse reaction of drugs commonly used in therapy etc.
- Anaphylaxis and hypersensitivity reactions.
- Different types of teaching aids, methods of teaching & question paper formation of different types (MCQs, Structures, Traditional, Short, and Essay Types).
- DNA & Finger Print System, Lie Detector & Polygraph, Norco-analysis.
- National Health policies.
- Life saving maneuvers and pre-hospital first aid.
- Routine and advanced Imaging Techniques and equipments.
- Medico-legal record keeping.
- Basics of medical education technology and research methodology.
- Computer and its use and its applicability in the specialty.
- Medical auditing.

Note: The project syllabus is minimal and may require further improvement time to time as per requirements of MCI and the advances in the specialty of forensic medicine & toxicology.

PRACTICAL

1. Medico-legal autopsies.
2. Age estimation
3. Medico-legal Injury report preparation.
4. Medico-legal examination of an Alcoholic and other drugs;
5. Medico-legal examination in cases of Sexual offences
6. Medico-legal examination of Poisoning cases
7. Psychiatric assessment of patient.
8. Medico-legal examination of bones, weapons, clothing, wet specimens, poisons.
9. Detection of common poisons in Toxicology Laboratory.
10. Medico-legal examination of Photographs.
11. Medico-legal examination of X-rays.
12. Laboratory examination of Biological trace material evidence.

13. Court evidence / attendance.
14. Awareness of various intensive care setups & Operation Theatre setups.
15. Awareness of medico legal & crime Laboratory instruments & Equipments.
16. Attending CME/Workshops/Conference; involvement in UG Teaching.

Teaching Program

General Principles

Acquisition of practical competencies being the keystone medical education, postgraduate is skills oriented. Learning in postgraduate program is essentially self-directed and primarily emanating from academic and experimental work. The formal sessions are merely meant to supplement this core effort.

Teaching sessions

In addition to undergraduate teaching by postgraduate students, there are daily sessions of formal teaching. Each MD student has to present Seminars, Journal clubs, perform medicolegal autopsies, prepare medico legal reports. They are also allotted time for doing work related to thesis. Candidates must actively participate in Postmortem Examination, Clinical Medico legal cases, Laboratory work, Clinico-pathological Conferences, Seminars, Journal Clubs, Group Discussions, Visit to Scene of crime, Court Evidence & Research work. The facilities offered by other Clinical & Basic Science Departments are made available to them. The postgraduate Student shall be required to actively participate in the Teaching / Training programmes of undergraduates, nursing students, interns. The candidates are also expected to be aware of basics of medical education teaching technology principles and use of audiovisual aids in the same. The postgraduate Student should maintain a Log Book of the work assigned to him. This log book will be assessed by the postgraduate Guide of the Student and will be jointly evaluated by the Guide & Head of the Department.

Teaching Schedule

The suggested departmental teaching schedule is as follows:
Monday: Thesis work reporting to guide and to the department
Tuesday: Journal club
Wednesday: Autopsy report presentation
Thursday: Presentation of clinical forensic medicine cases
Friday: Seminar
Saturday: Statistics
End of each month: Theory test
6 monthly: Grand viva

Note:
All sessions are to be attended by the faculty members. All PGs are supposed to attend the sessions.
All the teaching sessions are assessed by the consultants at the end of session and marks are given out of 10 (for participant) & 100 (for presenter) and kept in the office for internal assessment. Attendance of the residents at various sessions has to be at least 75%.

Posting:
The postgraduate student shall rotate through the following department and acquire the relevant knowledge as follows:

a. **Anatomy**: Dissection techniques, Gross & Histological appearances of Vital Organs & Endocrines. Forensic Osteology, Anthropometry, Embalming & Relevant Embryology.

b. **Physiology & Biochemistry**: Functional aspects of Vital Organs & endocrines, Physiology & Biochemistry of Blood, Semen, Saliva, Sweat, CSV, P.M. Biochemistry of Body Fluids.

c. **Pathology & Microbiology**: Injury, Inflammation, Repair, Thrombus-Embolism, Shock, Gross & Microscopic Appearances of Vital Organs and histopathology in cases of sudden death e.g. Myocardial infarctions and other related diseases e. g, which can cause sudeen death by complications e.g. tuberculosis, renal failure etc.& Endocrines Imp. Staining techniques, Museum Procedures, Infection, Immunology, HIV, Anaphylaxis, Insulin, Penicillin, Observation-Collection-Preservation & Forwarding Of Pathological & Microbial Evidence.

d. **Medicine + Paediatrics + Psychiatry + Pharmac** + Medical Record Section: Awareness of Diagnosis, Evaluation of ECG in cases of Myocardial Infarctions Medicolegal Aspects & Management of Critical Care, Poisoning & Psychiatry cases, Visit to MICU Set Up, important Paediatric procedures + NICU Set Up, Pharmacology & Detection Of Drugs of Dependence, Casualty: First Aid, Examination, Diagnosis & Medical + Medico Legal Management of Clinical Medico-legal cases, Dying Declaration and Dying deposition, Gastric Lavage, Parental Injections, Emergency Tray, Casualty Administration in Mass Disasters.

e. **Surgery + Orthopaedics +Dentistry + Radiology + Anaesthesiology:** Awareness regarding Examination, Diagnosis & Medical + Medico Legal Management of cases Of Imp. Regional Injuries (Poly trauma & Burns), Injury certification & Disability Evaluation, X-ray findings in Bony Trauma Age determination cases Intracranial hemorrhages with the help of MRI and CT ScansVisit to Surgical ICU

& Operation Theatre, Awareness of imp Anaesthetic, Procedures and complications, Important OT Instruments & Equipments.

f. **Obstetrics & Gynaecology**: Abortion, Sterilization Techniques, Introduction to Major Obs. & Gyn. Procedures, Prenatal Diagnostic Techniques. Study of fetuses and placenta. Forensic Science Laboratory: Introduction to various sections of the FSL Setup & Instrumentation, Introduction to & relevant awareness of imp Qualitative & Quantitative.

Detection & Analytical Techniques. Introduction to & relevant awareness of Identification, Biology, Chemistry, Toxicology & Ballistics Divisions.

Note:-The Casualty Posting should be split in to two periods. The initial posting during First Year is introductory type. The Second Casualty posting is during Second year. This posting is major one & it is expected that students must be exposed to maximum quantity & variety of cases. Their ability to manage the casualty in major casualties can be observed during this period.

Thesis

Every candidate shall carry out work on an assigned research project under the guidance of a recognized Postgraduate Teacher. the project Plan of thesis shall be submitted within 6 months after admission.

The students will identify a relevant research question; (ii) conduct a critical review of literature; (iii) formulate a hypothesis; (iv) determine the most suitable study design; (v) state the objectives of the study; (vi) prepare a study protocol; (vii) undertake a study according to the protocol; (viii) analyze and interpret research data, and draw conclusions; (ix) write a research paper. The Thesis shall be submitted atleast 6 month before the commencements of University.

Assessment.

All the PG residents are assessed daily for their academic activities and also periodically.

General principles

The assessment is valid, objective, and reliable It covers cognitive, psychomotor and affective domains. Formative, continuing and summative (final) assessment is also conducted in theory as well as practicals/clinical. In addition, thesis is also assessed separately

Formative

The formative assessment is continuous as well as end-of-term. The former is based on the feedback from the senior residents and the consultants concerned. End-of-term assessment is held at the end of each semester (up to the 5th semester). Formative assessment will not count towards pass/fail at the end of the program, but will provide feedback to the candidate.

Internal Assessment

Items Marks

1. Personal attributes* 20 marks
2. Clinical skills and performance 20 marks
3. Academics activities (Journal club, 20 marks seminars, drug review)
4. End of term theory examination (1st year, 20 marks, 2nd year, 2 years and 9 months)
5. End of term practical examination / Oral 20 marks

The record of internal assessment will be presented to the board of examiners for consideration at the time of final examination.

*Personal attributes

***Availability*:** Punctual, available continuously on duty, responds promptly to calls and takes proper permission for leave.

Sincerity and motivation: Dependable, honest, admits mistakes, does not falsify information, exhibits good moral values, loyal to institution, has initiative, takes on responsibilities, goes beyond routine work, exhibits keen desire to learn.

Diligence and performance: Dedicated, hardworking, does not shirk duties, leaves no work pending, does not sit idle, competent in clinical case work up and management (Where applicable), skilled in procedures, proficient in record keeping and file work.

Academic ability: Intelligent, shows sound knowledge and skills, participates adequately in academic activities, and performs well in oral presentation and departmental tests *Inter-personal skills*: Has compassionate attitude towards patients, gets on well with colleagues and paramedical staff, respectful to seniors.

Job Responsibilities

The junior residents should:

1. Maintain log book on daily basis
2. Maintain daily record of post graduate activities including:
   i. Practical exercises
   ii. Statistics exercises
   iii. PG teaching schedule
3. Prepare for undergraduate and postgraduate practical
4. Provide the basic medico-legal services in relation to practice of medicine.
5. Must be able to conduct, interpret and report common medico-legal autopsies.

6. Identify diagnose and manage common acute and chronic poisonings.
7. Be able to examine , interpret , report and if required give expert opinion in various clinical medico-legal matters like age estimation, alcoholics, sexual offences, injuries, abortion, sex determination, paternity, disability evaluation etc.
8. Teach the practical undergraduate medical students the subject of forensic medicine and also to actively participate in the training and re-orientation programmes of interns.

Suggested books

Core books-Name of book & author

1. Modi's Text book of medical Jurisprudence & Toxicology.
2. The essentials of forensic medicine & toxicology. K.S.N. Reddy.
3. The textbook of Forensic Medicine. J.B. Mukharjee, Vol. 1 & 2.
4. Principles of Forensic Medicine. A. Nandy.
5. A Textbook of Forensic Medicine & Toxicology, Principles & Practice. Krishan Vij
6. Textbook of Forensic Medicine & Toxicology V.V. Pillay.
7. Modern Medical Toxicology. V.V. Pillay
8. Forensic Pathology. Bernard Knight
9. Handbook of Forensic Pathology. Vincent J.M. Di Maio & Suzzanna E. Dana.

Reference Books

1. Bernard Knight et.all: Cox's Medical Jurisprudence & Toxicology.
2. Russel S. Fisher & Charles S. Petty: Forensic Pathology.
3. Keith Simpson's Forensic Medicine.
4. Jurgen Ludwig, Current methods of autopsy practice.
5. Camps F.E. Gradwohls- Legal Medicine, Bristol Wright.
6. Simpson's: A Doctors guide to Court.
7. Polson C.J.: The essentials of Forensic Medicine.
8. Adelson L.: The pathology of Homicide.
9. Atlas of Legal Medicine: Tomio Watanabe.
10. Spitz W.U., & Fisher R.S. , Medici Legal Investigation of Death.
11. A. Keith Mant, Taylor's principles & practice of Medical Jurisprudence. Churchil Lvng.
12. Justice Hidayatullah & V.R.Manohar , Ratanlal & Dhirajlal : The Indian Penal Code.
13. Justice Hidayatullah & S.P.Sathe : Ratanalal & Dhirajlal ; The Code of Crm. Procdr.
14. Justice Hidayatullah & V.R. Manohar , Ratanlal & Dhirajlal :The Law of Evidence.
15. H.S. Mehata: Medical Law & Ethics in India.
16. Code of Medical Ethics, Medical Council of India , approved by Central Govt. U/S 33(m) of IMC Act 1956 (Oct. 1970).
17. Krogman W.M. : The Human Skeleton in Legal Medicine.

18. F.E. Camps, J.M. Cameren , David Lanham : Practical Forensic Medicine.
19. Dr.B.V. Subrahmanyam , Textbook of Forensic Medicine & Toxicology.
20. The Medical Profession & Law, Dr.R.D.Lele.(IMA , Mumbai Publication).

Journals

1. Journal of Forensic Sciences.
2. Journal of Legal Medicine (Of American College Medicine.).
3. Journal of Forensic Science Society.
4. Medico-legal Journal.
5. American Journal of Of Law & Medicine.
6. American Journal of Forensic Medicine.
7. Forensic Science International.
8. Journal of Clinical Forensic Medicine.
9. Medicine Science & Law.
10. Science & Justice.
11. Journal of Indian Academy of Forensic Medicine. Journal of Punjab Academy of Forensic Medicine and Toxicology
12. Journal of Forensic Medicine & Toxicology, (Medico-legal Society.)
13. Medico-legal Update, An International Journal.
14. Journal of Clinical Forensic Medicine.
15. Journal of Forensic and Legal Medicine

MODEL QUESTION PAPER
MD (Forensic Medicine)
Paper-I
Basic Medical Sciences

Max. Marks:100
Time: 3 hrs

- ***Attempt ALL questions***
- ***Answer each question & its parts in SEQUENTIAL ORDER***
- ***ALL questions carry equal marks***
- ***Illustrate your answer with SUITABLE DIAGRAMS***

i. Describe blood supply of the heart. What are the histopathological changes in MI?
ii. Describe anatomy of skull from medico-legal point of view.
iii. Describe the physiology of muscle contraction & rigor mortis.
iv. How can you identify the sex of a person microscopically?
v. Enumerate the medico-legal importance of examination of blood.
vi. Describe the age changes in pubic symphysis and its medico-legal significance.
vii. Discuss the patho-physiology of hypovolemic shock.
viii. Describe the Circle of Willis and its medico-legal importance.
ix. Describe the process of healing of wound and determination of age of the wound.
x. Describe the dissection of neck and its blood vessels in context to asphyxia Deaths.

MODEL QUESTION PAPER
MD (Forensic Medicine)
Paper-II
Forensic Medicine including other clinical subjects as applied to it

Max. Marks:100

Time: 3 hrs

- ***Attempt ALL questions***
- ***Answer each question & its parts in SEQUENTIAL ORDER***
- ***ALL questions carry equal marks***
- ***Illustrate your answer with SUITABLE DIAGRAMS***

i. Describe the examination procedure and findings in a 16 year old victim of rape.
ii. Explain therapeutic misadventure with examples.
iii. Discuss the role of radiological examination in clinical forensic medicine.
iv. Discuss the medico-legal aspects of artificial insemination.
v. Describe elementary ballistic principles and their medico-legal significance.
vi. What are the medico-legal aspects of insanity?
vii. Discuss medico-legal aspects of treatment including iatrogenic disease and industrial hazards.
viii. Enumerate the medico-legal importance of Ultrasound and CT scan.
ix. Discuss the medico-legal aspect of AIDS.
x. What is the role of clinical forensic medicine in prevention of torture?

MODEL QUESTION PAPER
MD (Forensic Medicine)
Paper-III
Forensic Toxicology & Medical Jurisprudence

Max. Marks:100
Time: 3 hrs

- ***Attempt ALL questions***
- ***Answer each question & its parts in SEQUENTIAL ORDER***
- ***ALL questions carry equal marks***
- ***Illustrate your answer with SUITABLE DIAGRAMS***

i. Describe in detail the set up of Modern poison control centre.
ii. Classify insecticides/Organophosphorus compounds.
iii. What is Therapeutic misadventure? Explain with examples.
iv. What is professional negligence? Give some examples.
v. What are medico-legal issues pertaining to Plumbism?
vi. Discuss the ethical considerations for Human experimentation.
vii. Enumerate the salient features of NDPS Act.
viii. Describe the signs and symptoms, fatal dose, treatment, and postmortem changes in case of Alphos poisoning.
ix. Describe the differential diagnosis of dilated and constricted pupils from forensic viewpoint.
x. Describe Professional Misconduct. Give some examples.

MODEL QUESTION PAPER

MD (Forensic medicine)

PAPER-IV

Forensic Pathology including Forensic immunology & Recent advances

Max. Marks:100
Time: 3 hrs

- ***Attempt ALL questions***
- ***Answer each question & its parts in SEQUENTIAL ORDER***
- ***ALL questions carry equal marks***
- ***Illustrate your answer with SUITABLE DIAGRAMS***

i. Enumerate the Tissues/materials preserved for DNA analysis.
ii. Discuss to substantiate that applied aspects of Forensic Pathology & Odontology have much to help the system of Penology, law & order and to assure justice.
iii. Discuss the medico-legal aspects of Human organ transplantation.
iv. Discuss the scope of Entomology in determination of time since death. Quote recent famous cases where this technique proved of significant value.
v. Discuss the ethical issues related to Cloning.
vi. Discuss ML applications of DNA fingerprinting. Also discuss the probative value of this evidence.
vii. Discuss the ethical issues pertaining to Renting of Womb.
viii. What are the liabilities of a doctor in case of mismatched blood transfusion?
ix. Discuss the medico-legal issues related to Euthanasia. What is the legal status of Euthanasia in India?
x. Enumerate the salient features of ART Act.

UNIVERSITY EXAMINATION PATTERN

There will be Theory and Practical examination consisting of 400 marks each. Totalling 800 marks.

Theory will consists of 4 paper of 100 marks each.

Paper I – Basic Medical Science - 100 Marks

Paper II – Forensic Medicine including other clinical subjects related - 100 Marks

Paper III – Forensic Toxicology & Medical Jurisprudence - 100 Marks

Paper IV- Forensic Pathology including Forensic immunology & Recent advances - 100 Marks

Practical Including - 400 Marks

I . Post Mortems	**-**	**100 Marks**
II. Histology & Histopathology	**-**	**50 Marks**
III . Hematology & serology	**-**	**50 Marks**
IV. ML problem & case discussion	**-**	**100 Marks**
V. Grant Viva	**-**	**100 Marks**

SGT Medical College, Hospital & Research Institute
(A Constituent of SGT University)
Budhera, Gurugram-Badli Road, Gurugram (Haryana) – 122505 Ph. : 0124-2278183, 2278184, 2278185

Department of General Medicine

SGTH/Med./HOD/2019/99

Dated: - 13.12.2019

Minutes of the meeting of Board of studies

Meeting of the Board of Studies of the Department of General Medicine was held on 11/12/2019 in the Department of General Medicine in SGT Medical College, Hospital & Research Institute at 2:00 PM. Following members attended the meeting.

Dr. D.K. Sharma	Professor & Head of Department	Chairman
Dr. S. Prasad	Professor of Medicine	Member
Dr. P.S. Ghalaut	Professor of Medicine	Member

Dr. A.K. Jain (External Expert)
Professor & Consultant Medicine
RML Hospital & JIPMER, Delhi

Dr. Ravish Verma (External Expert)
Professor of Medicine
Rama Medical College &Hospital,
Pilkhuwa, Hapur

Curriculum for the course M.D (Medicine) was placed before the board.
The board passed the curriculum for M.D (Medicine) course after due deliberations.

Dr. D.K. Sharma
Prof. & Head of Department
SGT, University

Dr. A.K. Jain (External Expert)
Professor & Consultant Medicine
RML Hospital & JIPMER, Delhi

Dr. S. Prasad
Professor of Medicine
SGT University

Dr. Ravish Verma (External Expert)
Professor of Medicine
Rama Medical College &Hospital,
Pilkhuwa, Hapur

Dr. P.S. Ghalaut
Professor of Medicine
SGT University

Professor & HOD
Deptt. of General Medicine
SGT Medical College, Hospital & Research Institute
Budhera, Gurugram, Haryana

Dept of Medicine at SGT Medical Collage

The Department of Medicine was established in 2010 and it progressed steadily since then

There is continuous increase in clinical and teaching load of the department. The Annual intake of MBBS students has increased from 50 to 150, Post graduate course (MD) was started in 2018 with 8 student , and is currently in the second year .

Staff members of the Department are also involved in teaching and training of BDS students and Diploma in Dialysis Techniques and other diploma courses of Surgery and Orthopedic departments.

Presently, there are 5 units which are headed by Professors and supported by Associate and Assistant Professor.

[redacted]ademic activities in the form of seminars / Case Presentations / Journal Clubs /Interesting Investigations are [redacted]eld

All postgraduates and all teaching staff members, participate in the seminar.

Postgraduates are given full facilities and responsibilities; in OPD, IPD and casualty, where they work under the direct supervision of consultants & senior residents. The department organizes regular conferences, symposia and seminars of national and state levels. Also, extension and invited lectures are organized on regular basis.

Various Sub- Speciality Clinics functioning in the Department:

1.Nephrology Clinic : Wednesday

2.Neurology Clinic: Thrusday

3 Diabetic Clinic: Tuesday

4. Cardiology Clinic: Tuesday and Thrusday

[redacted]ephrology division is providing dialysis facilities , with a well established dialysis unit providing round the clock dialysis support to critically ill patients.

Gastroenetrological Endoscopic facilities are being provided at the state of the art Gastroenterology Lab of the department.

The Department also manages Medical ICU that has been established and operating very effectively under the department.

The Medicine OPD caters to the maximum number of patients attending the hospital.

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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 and content. 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

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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.

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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, pathophysiological 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

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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 bioterrorism.
2. Aging and Geriatric Medicine including Biology, epidemiology and neuropsychiatric 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 cardiovascular 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.

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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, papulosquamous 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.

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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

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

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☐ 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

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☐ 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

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☐ 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 decisionmaking.

☐ 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

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☐ 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

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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

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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, pathophysiological 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.

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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

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☐ 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

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- 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

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□ clinical syndromes
□ community acquired clinical syndromes
□ Nosocomial infections
□ Bacterial diseases - General consideration, diseases caused by gram - positive bacteria, diseases caused by gram - negative bacteria
o miscellaneous bacterial infections
o Mycobacterial diseases
o Spirochetal diseases
o Rickettsia
o Mycoplasma and Chlamydia
o viral diseases
o DNA viruses
o DNA and RNA respiratory viruses
o 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

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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.

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• 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

1st Month Orientation Basic cognitive skills
- Combined duties
- Supervised procedures

1st 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

2nd 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

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SHREE GURU GOBIND SINGH TRICENTENARY UNIVERSITY

FACULTY OF MEDICINE & HEALTH SCIENCES
Gurgaon-Farukhnagar Road, Village: Budhera, Distt. Gurgaon
(HR)-122505, Ph:-0124-2278233, Fax: 0124-2278232

Curriculum & time bound programme for Teaching and Training in MD Course in

[DERMATOLOGY]

CURICULLUM MD DERMATOLOGY VENEREOLOGY AND LEPROSY (DVL)

M D Dermatology including Venereology (STD) and Leprology is one of the important basic clinical specialties. Considerable advances have taken place in the understanding of dermatological disorders and their treatment. Leprosy is still a public health problem of considerable magnitude in the country. The STDs are showing worldwide increase in incidence with new dimensions added to it. There is a dearth of trained personnel in the specialty. The curriculum of MD Dermatology has been made designed for achieving academic excellence. An attempt has been made to give a comprehensive training to the postgraduates including basic subjects and recent advances.

OBJECTIVES

At the end of this training a candidate should be able to

1. Diagnose and manage independently common skin diseases, sexually transmitted diseases and leprosy.
2. Manage independently and efficiently all medical emergencies related with skin, leprosy and venereal disease.
3. Adopt preventive measures at individual and community levels against communicable skin, venereal diseases and leprosy.
4. Teach requisite knowledge and laboratory skills to other medical/paramedical team members.
5. Adopt a compassionate attitude toward towards the patients (and their families) under his/ her charge.
6. Critically evaluate and initiate investigation for solving problems relating to skin, venereal diseases and leprosy.

SKILLS TO BE LEARNT

1. History taking for dermatology, Venereology and leprosy
2. Describe cutaneous findings in dermatological terms in a systematic way.

3. Evaluate and manage the common diseases in dermatology and have a broad idea how to approach uncommon diseases.
4. Evaluate and manage STD cases
5. Evaluate and manage HIV positive cases
6. Systemic examination relevant for dermatologic condition
7. Maintain basic skills like pulse, blood pressure chest and cardiac auscultation learnt in MBBS
8. Care of dermatologic emergencies like TEN, Pemphigus, necrotic ENL, angioedema, drug reactions etc.
9. Management of pediatric cases with skin diseases
10. To achieve adequate skills for tests done in side laboratory in day-to-day practice and be familiar with other sophisticated investigations.

POSTINGS

The first year junior residents shall be posted indoor for 8 months exclusively. For the remaining 28 months the students will rotate through outdoor, side laboratory, minor OT, specialty clinics, i.e. leprosy, STD, psoriasis, pigmentation, allergy and dermatosurgery.

Dermatology Ward – 8 months

General Skin OPD – 16 months

Minor OT – 4 months

Side Laboratory – 4 months

Afternoon weekly specialty clinics

STD Clinic – 28 months

Psoriasis clinic – 28 months

Pigmentation clinic – 28 months

Leprosy clinic – 28 months

Allergy clinic – 28 months

Dermatosurgery clinics – 28 months

The postings will be spread over the entire period. During postings 2nd and 3rd year residents or senior residents will give cover to first year residents and have active involvement in the diagnosis, investigations and treatment of the admitted patients.

Weekly Teaching Programme

Teaching wards rounds : 1

Clinical case presentations : 1

Seminars : 1

Journal club/Dermatopathology/Thesis discussion : 1

COURSE CONTENT-ANNEXURE II

Research activity

The candidate will be required to undertake independent research work or associate himself/herself with on-going departmental research work.

Internal assessment

This will be carried out every three monthly be means of written test and practical with viva examination every six months. It would include Dermatopathology and dermatosurgery.

Thesis

Each student is expected to write thesis under the guidance of one or more faculty members as per the institute rules. The work is carried out over and above routine duties. The thesis topic and its progress will be discussed in departmental faculty meeting. The protocol to be submitted within 6 months of joining and thesis submission within 2 ½ years of joining the 3 year course.

Evaluation

1. Weekly by senior resident a consultant for regularity, patient care, records and library search.
2. End of ward posting by consultant/senior resident
3. Quarterly- with theory, clinical and viva by all consultants of the department. Ten percent total weightage will be given to internal assessment in the final.
4. Final MD examination with 2 external examiners

Examination pattern

The examination shall be held in the months of May and December or on such dates as may be decided by the Dean of the Institute and it shall be open to all candidates who have completed the prescribed course of study and submitted their thesis work. The examinations shall consist of

1. Theory papers 4 (each of 3 hours duration) and 100 marks each.
2. Title of the paper
    a. Paper I : Basic sciences, anatomy, physiology, biochemistry, pathology etc. in relation to the specialty .
    b. Paper II : Principles of dermatology diagnosis and therapeutics
    c. Paper III : Venereology and Leprology, Principals of diagnosis and therapeutics
    d. Paper VI: Dermatology in internal medicine, including applied clinical aspects, therapeutics, pathology, immunopathology, bacteriology and recent advances.

All papers would have following format Essay – One long question of 30 marks and 6-7 short notes on covering the prescribed course (10- 12 marks each)

All questions have to be attempted with no choice

Board of examiners

Practical and clinical examination

External examiners – 2 – Dermatologists as per the institute guidelines

Internal examiners – 2 – Dermatologist as per the institute guidelines

1. Practical and/or clinical examination will be held on 1-2 days
2. Semi-Long case 4 Dermatology – 2 Venereology – 1 Leprology – 1
3. Spots:10-12 Spot same for each candidate
4. Viva voice examination for General dermatology, Venereology and Leprology
5. Dermatopathology slides four to six

Syllabus

Main subjects to be covered: Dermatology, Venereology, Leprosy, Dermatopathology and Dermatosurgery (including lasers)

Dermatology

1. Fundamental • History taking and examination of dermatological patient • Type of skin lesions • Distribution patterns • Aids in diagnosis of skin diseases etc.
2. Structure and development skin
3. Biochemistry and Physiology of epidermis and its appendages including • Melanin synthesis • Keratinization
4. Pathophysiologic reactions of skin
5. Basic immunology

Skin Diseases

1. Disorders of Keratinization and epidermal proliferation
2. Disorders effecting skin appendages, hair, nail, sebaceous glands, sweat glands and apocrine glands etc.
3. Neoplastic disorders of skin
4. Gendodermatosis
5. Vesiculo bullous diseases, e.g. pemphigus, pemphigoid, erythema multiforme, dermatitis herpetiformis etc.
6. Dermatitis: - exogenous – contact dermatitis, patch testing, endogenous – atopic acquired endogenous nummular
7. Disorders of pigmentation
8. Disorders of collagen and connective tissue
9. Disorders of hair nail sweat glands, sebaceous glands, apocrine glands, mastocytosis etc.
10. Disorders of mucous membranes, stamotological disorders
11. Disorders involving genitalia
12. Disorders due to physical agents, heat, cold, light, radiation etc.
13. Disorders due to chemical agents – reactions to chemicals, occupational dermatosis
14. Pyodermas
15. Fungal infections-superficial and deep
16. Viral infection
17. Parasitic infestations, insect bites etc.

Dermatology in relation to internal medicine

Nutritional diseases – protein and vitamin deficiencies

Metabolic disorders

1. Diabetes mellitus
2. Amino acid metabolism
3. Pophyrin metabolism

4. Lipoidosis
5. Dysproteinemias and agamma glubulinemias etc.
6. Carcinoid syndrome
7. Glycolipid lipoidosis
8. Calcinosis cutis
9. Histiocytosis
10. Hematological systems-reticulosis-leukemia etc.
11. Gastro – intestinal system
12. Endocrinal system
13. Neurocutaneous disorders
14. Psychocutaneous disorders

Allergic disorders

1. Anaphylaxis – urticaria / angioedema
2. Serum sickness
3. Drug Reactions

Venereal disorders

1. Anatomy of male and female genitalia
2. Syphilis and other trreponematoses, immunology, pathology, diagnosis,
3. Treatment, control etc.
4. Gonococcal uretheritis and complications
5. Nongonococcal urethritis and its complications
6. Lymphogranuloma venereum
7. Chancroid
8. Granuloma inguinale (Donovansois)
9. Herpes genitalis, venereal warts and molluscum contagiosum
10. Other disorders involving male and female genitalia
11. STIs and control
12. STI and Reproductive health
13. Epidemiology of STI'S,

AIDS

Transmission, prevention, clinical manifestations, prophylaxis of opportunistic infections, Anti-retroviral therapy, treatment in HIV+ve STD cases.

Leprosy

1. Epidemiology
2. Pathogenesis
3. Pathology
4. Diagnosis – clinical features, classifications, laboratory aids
5. Reactions in leprosy
6. Treatment of leprosy and reactions
7. Leprosy control and rehabilitation etc.

Dermatosurgery

The course would consist of lesions in basic techniques of dermatosurgery or various diseases and laser.

For Vitiligo • Punch grafting • Split skin grafting • Dermabrasion and suction blister grafting • Tattooing

For Acne • Dermabrasion, Scar revision • Chemical peeling

For Melasma • Chemical face peels with glycolic ad trichloroacetic acid

For Nevi and Keloid etc. • Cryosurgery • Excision • Electrosurgery • Use of CO2 laser Teaching methods

For Dermatosurgery Teaching methods would include at least 10 theory lectures in the form of seminars and journal club. Practical demonstration of techniques by a faculty member of a representative case of each disease would be part of their Minor OT posting, dermatosurgery clinic (3 months). They would also be required to assist during the procedures.

Examination Theory – The subject is included in paper IV of the theory examination and at least one short note would be from the dematosurgical procedures. Practical – They would be subjected to questions on various dermatosurgical procedures and instruments related to these procedures during their viva voce examination.

Date:

(Dr MPS Sawhney)
Prof & HOD

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Gurgaon-Farukhnagar Road, Village: Budhera, Distt. Gurgaon
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Curriculum & time bound programme for Teaching and Training in MD Course in

[RESPIRATORY MEDICINE]

Syllabus for MD

1.. Goals

2. Objectives

3. Syllabus

4. Teaching Program

5. Posting

6. Thesis

7. Assessment

8. Job Responsibilities

9. Suggested Books

10. Model Test Papers

Curriculum

MD Chest Diseases & Tuberculosis

The infrastructure and faculty will be as per MCI guidelines.

1. Goals

The goal of Post-graduation (MD) course in Medicine (Chest) is to produce a competent chest physician who:

- Recognizes the health needs of patients having chest complaints and carries out professional obligations in keeping with principles of National Health Policy and professional ethics.
- Has acquired the competencies pertaining to chest medicine that are required to be practiced in the community and at all levels of health care system.
- Has acquired skills in effectively communicating with the patient, family and the community.
- Is aware of the contemporary advances and developments in medical sciences as related to pulmonary medicine.
- Is oriented to principles of research methodology.
- Has acquired skills in educating medical and paramedical professionals.

2. Objectives

At the end of the MD course in Medicine (Chest), the student should be able to:

- Recognize the key importance of pulmonary medicine in the context of the health priority of the country.
- Practice the specialty of Pulmonary Medicine in keeping with the principles of professional ethics.
- Identify social, economic, environmental, biological and emotional determinants of patient and institute diagnostic, therapeutic, rehabilitative, preventive and promotive measures to provide holistic care to him.
- Take detailed history, perform full physical examination and make clinical

diagnosis.

- Perform relevant investigative and therapeutic procedures for the patient.
- Interpret important imaging and laboratory results.
- Diagnose illness based on the analysis of history, physical examination and investigative workup.
- Plan and deliver comprehensive treatment for illness using principles of rational drug therapy.
- Plan rehabilitation of patients suffering from chronic illness.
- Manage respiratory emergencies efficiently.
- Demonstrate skills in documentation of case details, and of morbidity and mortality data relevant to the assigned situation.
- 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 skills 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 pediatrics.

3. Syllabus

General Guidelines. During the training period effort will always made that adequate time is spent in discussing pulmonary problems of public health importance in the country.

3.1. Theory

- Approach to Important Clinical Problems
- Respiratory. Cough/chronic cough, noisy breathing, wheezy child, respiratory distress, hemoptysis.
- Critical Care Medicine. All patients on ventilator with special reference to

acute severe COPD and bronchial asthma

- Nutrition. TB suspect / COPD /asthmatic
- Infections. Upper & lower respiratory infection, tuberculosis, pneumonia, fungal infections, bronchi stasis, recurrent infections, nosocomial infections.
- Oncology. Lung cancer, benign and malignatn with pleural metastasis with primary pleural malignancy
- Miscellaneous. Connective tissue disorder, drug induced pulmonary diseases, HIV related pulmonary disease and tuberculosis.

3.2. Practical

- Skills
  - **History and examination.** History taking including psychosocial history, physical examination, general physical examination, health function-aries and social support groups;
  - **Bedside procedures**
    - Monitoring skills: Temperature recording, capillary blood sampling, arterial blood sampling.
    - Therapeutic skills: Hydrotherapy, nasogastric feeding, endotracheal intubation, cardiopulmonary resuscitation, administration of oxygen, venepuncture and establishment of vascular access, administration of fluids, blood, blood components, parenteral nutrition, intraosseous fluid administration, intrathecal administration of drugs, common dressings, abscess drainage and basic principles of rehabilitation.

  Investigative skills: Lumbar puncture, pleural, peritoneal, pericardial and subdural tap, pleural biopsy, lung biopsy, fine needle aspiration cytology, tru cut biopsy from lung, broncho scopic alveolar lavage, pulmonary function test, sleep study, collection of urine for culture, urethral catheterization.

- Bedside investigations. Hemoglobin, TLC, ESR, peripheral smear staining and examination, urine: routine and microscopic examination, PFT, bronchoscopy, sputum microscopy examination, gram stain, ZN stain, gastric aspirate.

- **Interpretation of X-rays of chest, CT chest, ECG, ABG findings.**
- ***Understanding of common EEG patterns, x-ray findings, CT scans, ultrasonographi abnormalities.***
- **Basic Sciences**

  Embryogenesis of different organ systems especially heart, genitourinary system, gastro-intestinal tract, applied anatomy of different organs, functions of kidney, liver, lungs, heart and endocrinal glands. Physiology of micturition and defecation, placental physiology, fetal and neonatal circulation, regulation of temperature (especially newborn), blood pressure, acid base balance, fluid electrolyte balance, calcium metabolism, vitamins and their functions, hematopoiesis, hemostasis, bilirubin meta-bolism. Growth and development at different ages, puberty and its regulation, nutrition, normal requirements of various nutrients. Basic immunology, bio-statistics, clinical epidemio-logy, ethical and medicolegal issues, teaching methodology and managerial skills, pharmaco-kinetics of commonly used drugs, microbial agents and their epidemiology.

- **Community and Social Pulmonary Medicine**

  Prevention and cure of tuberculosis under RNTCP, impementation of DOTS. Prevention of HIV (VCTC) as it increases prevalence of tuberculosis, investigation of adverse events following anti tubercular therpay, general principles of prevention and control of tuberculosis and nosocominal infection (pneumonia), prevention of drop let infection.

4. Teaching Program

4.1. General Principles

Acquisition of practical competencies being the keystone of postgraduate medical education, postgraduate training is skills oriented.

Learning in postgraduate program is essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

4.2. Teaching Sessions

- Clinical case discussions:
  - PG bedside
  - Teaching rounds
  - Mock Examination
- Seminars/Journal club
- Statistical meetings
- Mortality meetings
- Perinatal meetings
- Inter departmental Meetings
- Others – Guest lectures/vertical seminars/Central Stat meets.

4.3. Teaching Schedule

In addition to bedside teaching rounds in the department, there will be daily hourly sessions of formal teaching. The suggested teaching schedule is as follows:

1. Bed side case discussion — Once a week
2. Journal club/Seminar alternate week — Once a week
3. Grand round — Once a week
4. Emergency case discussion — Once a week
5. Weekly stat and mortality meet (detailed discussion of all the deaths occurring in previous week) — Once a week

6.	Central session (held in hospital auditorium regarding various topics like CPC, guest lectures, student seminars, grand round, sessions on basic sciences, biostatistics, research methodology, teaching methodology, health economics, medical ethics and legal issues) or teaching rounds at bedside.	Once a week

Note:

- All sessions are attended by the faculty members. All PGs are supposed to attend the sessions except the ones posted in PCCU and emergency.
- All the teaching sessions are assessed by the consultants at the end of session and marks are considered for internal assessment.
- Attendance of the Residents at various sessions has to be atleast 75%.

5. Postings

The postgraduate student will rotate through all the clinical units in the department. In addition, following special rotations are also undertaken:

Chest Ward (including outpatient dept)	:	2-3 months
Intensive Care	:	3-4 months
Emergency	:	2- 3 months
NIV unit	:	2-3 months

No posting at one area will be for more than 2 months at a stretch.

Weekly Teaching Programs

Sr. No.	Days	Topic	Timing	Teacher
1.	Monday	Seminar	2:00 to 4:00 pm	All Faculty
2.	Tuesday	Case Presentation	2:00 to 4:00 pm	Do
3.	Wednesday	Chest X-Ray	2:00 to 4:00 pm	Do
4.	Thursday	Case Presentation	2:00 to 4:00 pm	Do
5.	Friday	Journals club	2:00 to 4:00 pm	Do
6.	Saturday	K Toman	2:00 to 4:00 pm	Do

A. Ward Round, Ward Teaching & Procedure every day.

B. Emergency Duty around the clock in wards & RICU.

During first year the resident will work under direct supervision of the 2/3 year resident/senior resident and consultant on call. S/he will be responsible for taking detailed history, examination of patients as per the file record and send appropriate investigations as advised by seniors. Initially all procedures are to be observed and then done under supervision of seniors and during 2/3 year can do procedures independently. In 2nd year, resident is posted in special clinics also and making of discharge cards including referrals. In 3 rd year, resident is also encouraged to make independent decisions in management of cases. S/he is also involved in teaching of undergraduate students.

6. Thesis

- Every candidate shall carry out work on an assigned research project under the guidance of a recognized Postgraduate Teacher, the project shall be written and submitted in the form of a Thesis.
- Every candidate shall submit thesis plan to the University within nine months from the date of admission.

  Thesis shall be submitted to the University six months before the commencement of theory examination i.e. for examination May/June session, 30th November of the preceding year of examination and for November/December session 31st May of the year of examination.
- The student will identify a relevant research question; (ii) conduct a critical review of literature; (iii) formulate a hypothesis; (iv) determine the most suitable study design; (v)state the objectives of the study; (vi) prepare a study protocol; (vii) undertake a study according to the protocol; (viii) analyze and interpret research data, and draw conclusions; (ix) write a research paper.

7. Assessment

All the PG residents will be assessed daily for their academic activities and also periodically.

7.1.General Principles

- The assessment is valid, objective, and reliable.
- It covers cognitive, psychomotor and affective domains.
- Formative, continuing and summative (final) assessment is also conducted in theory as well as practicals / clinicals. In addition, thesis is also assessed separately.

7.2.Formative Assessment

The formative assessment is continuous as well as end-of-term. The former is be based on the feedback from the senior residents and the consultants concerned. End-of-term assessment is held at the end of each semester (upto the 5th semester). Formative assessment will not count towards pass/fail at the end of the program, but will provide feedback to the candidate.

7.3. Internal Assessment

The performance of the Postgraduate student during the training period should be monitored throughout the course and duly recorded in the log books as evidence of the ability and daily work of the student. Marks should be allotted out of 100 as followed.

Sr. No.	Items	Marks
1	Personal Attributes	20
2.	Clinical Work	20
3.	Academic activities	20
4.	End of term theory examination	20
5.	End of term practical examination	20

1. **Personal attributes:**

- **Behavior and Emotional Stability:** Dependable, disciplined, dedicated, stable in emergency situations, shows positive approach.
- **Motivation and Initiative:** Takes on responsibility, innovative, enterprising, does not shirk duties or leave any work pending.
- **Honesty and Integrity:** Truthful, admits mistakes, does not cook up information, has ethical conduct, exhibits good moral values, loyal to the institution.
- **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.

2. **Clinical Work:**

- **Availability:** Punctual, available continuously on duty, responds promptly on calls and takes proper permission for leave.
- **Diligence:** Dedicated, hardworking, does not shirk duties, leaves no work pending,doesnotsitidle,competentinclinicalcaseworkupandmanagement.
- **Academic ability:** Intelligent, shows sound knowledge and skills, participates adequately in academic activities, and performs well in oral presentation and departmental tests.
- **Clinical Performance:** Proficient in clinical presentations and case discussion during rounds and OPD work up. Preparing Documents of the case history/examination and progress notes in the file (daily notes, round discussion, investigations and management) Skill of performing bed side procedures and handling emergencies.

3. **Academic Activity:** Performance during presentation at Journal club/ Seminar/ Case discussion/Stat meeting and other academic sessions. Proficiency in skills as mentioned in job responsibilities.

4. **End of term theory examination** conducted at end of 1st, 2nd year and after 2 years 9months

5. **End of term practical/oral examinations** after 2 years 9months.
   Marks for **personal attributes** and **clinical work** should be given annually by all the consultants under whom the resident was posted during the year. Average of the three years should be put as the final marks out of20.

   Marks for **academic activity** should be given by the all consultants who have attended the session presented by the resident.

   The Internal assessment should be presented to the Board of examiners for due consideration at the time of Final Examinations.

5.1. Summative Assessment

- Ratio of marks in theory and practicals will be equal.
- The pass percentage will be50%.
- Candidate will have to pass theory and practical examinations separately.

A. Theory Examination (Total =400)

Paper	Title	Marks
Paper1	Basic sciences as related to pulmonary medicine	100
		100
Paper2	Principles and Practice of Pulmonary Medicine	100
Paper3	Preventive & Social aspects of Pulmonary Medicine and tuberculosis	
Paper4	Recent Advances in Pulmonary Medicine	100

B. Practical & Viva voce Examination(Total=400)

Long Case (s)
Short Case (s) 300
Viva Voce -100

8. Job Responsibilities

- **OPD**: History and work up of all cases and presentation to the consultants
  - This includes all the special clinics also
  - Documentation. OPD card and register completion and maintenance
- **Indoors:**
  - PCCU/NIV unit Emergency : Sending investigations and filling investigation forms
  - Ward : History and work up of all cases
  - Starting initial management – Oxygen, IV antibiotics, fluids
  - Transport of sick patients
  - Preparation of weekly, monthly & annual stat
  - Sending AFP reports.
  - Performing procedures:
  - Maintaining I/Vline
  - Plural tap, peritoneal tap, pericardial tap, central line insertion,

pleural biopsy, BAL, bronschoscopy, PFT, sleep study

- ➢ Examination of all patients and documentation the the files.
- ➢ Completion offices
- ➢ Preparation of typed discharge summary

9. Suggested Reading

- ❖ Fishmen's Pulmonary Diseases and Disorders
- ❖ Croftan's Pulmonary Diseases

9.1 Journals

- ❖ Indian J Tuberculosis
- ❖ Chest
- ❖ Chest Cliics
- ❖ Critical Care Clinics
- ❖ JAPI
- ❖ Lung India

Curriculum Planning of Pulmonary Medicine& Tuberculosis

Sr. No	Topics	Learning objectives (At the end of the session, the student should know)	Teaching Guidelines	Methodology	Time
1.	Anatomy & Physiology of Respiratory System	learns to describe about • various anatomical parts of Respiratory System • functioning of various physiological units and their respiratory system	• Physiology of respiratory system knowing the gaseous exchange mechanics • Congenital malformations and embryology.	Seminar	1 Hour

2	Symptoms & Signs of Respiratory System	Discuss signs, symptoms & causes of • Shortness of breath • Cough • Haemoptysis • Pain chest • Wheeze • Sneeze	• Explain the symptoms & signs in correlation to various diseases. • Air pollution • Genetic disorders • family history	Seminar	1 Hour
3.	Pulmonary Tuberculosis	Discuss in detail • Epidemiology • Transmission • Aetio pathogenesis • Risk factors • Type of tuberculosis • Diagnosis • Management • Prevention • Natural course of disease	To cover about disease in detail • T.B. & HIV • T.B. & Diabetes • Post T.B. Sequele	Seminar	6 Hours
4.	RNTCP & DOTS	1. To learn& Discuss evolution of National Tuberculosis programme (NTP) 2. Can Explain in detail about RNTCP • Structure & diagnosis • Various regimens of treatment • DOTS,MDR, XDR,TDR • Designated	• Problem of T.B. in India & world • Side effects of ATT • Contraindications of various anti tuberculosis drugs • Pit-falls in RNTCP	Seminar	2 Hours

		Microscope Centre (DMC) • Surveillance • Recording & reporting system			
5.	Pleural Effusion and Empyema	Can discuss in detail about • Epidemiology • Causes • Signs, symptoms • Diagnosis • Pleural aspirations • Management & thoracocentesis .	• To differentiate between pleural effusion from pleural thickening • Differential diagnosis • Analysis of pleural fluid	Seminar	1 Hour
6.	COPD Chronic patient Emphysema	Can discuss in detail about • Epidemiology & Risk Factors • Diagnosis • Treatment • GOLD Classification • Exacerbations • Management • Prevention	To cover • Differential diagnosis • Use of Inhalers • Use of SPIROMETRY	Seminar	1 Hour
7.	Bronchial asthma	Can Discuss bronchial asthma about • Epidemiology & Causes • GINA staging • Diagnosis	• To cover differential diagnosis, complications & prevention. • To discuss on proper inhalation	Seminar	1 Hour

		• Treatment • Exacerbations	technique & appropriate counseling of asthmatics.		
8.	Bronchiectasis	Can discuss about Bronchiectasis • Epidemiology • Classification • Diagnosis & Management	1. To know role of chest physiotherapy in bronchiectasis. 2. differentiate b/w various D/d's of non CF bronchiectasis.	Seminar	1 Hour
9.	PneumothoraxHydropneumot-horax	Can discuss in detail about • Epidemiology • Causes • Signs, symptoms & Diagnosis • Management	• To know about mechanics of respirations involved in different respiratory failure • Appropriate clinical evaluation to differentiate pneumothorax from Hydropneumothorax.	Seminar	1 Hour
10.	Pneumonia ARDS	Can critically discuss Pneumonias regarding • Causes • Type/ classification • Risk Factors • Causative organisms • Signs ,symptoms & diagnosis • Management	• To know gas exchange mechanics in various respiratory failure. • Clinical Evaluation of hypoxia & cyanosis	Seminar	1 Hour
11.	Pulmonary	Can discuss Lung	• Role of Early cancer	Seminar	1 Hour

	Tumors	tumours • Classification • Risk factors • Diagnosis • Treatment	screaming & Immune histochemistry. • Role of Adjuvant chemo- radiation therapy		
12.	Respiratory Failure and Ventilatory Strategies	Can explain respiratory failure • Types & Causes • Management	• Know O2-CO2 Carriage & dissociation curve • kRole of Ventilation – Perfusion mechanics	Seminar	1 Hour
13.	Diagnostic Tools in Respiratory Diseases	Discuss diagnostic tools • Pulse Oxymetery • ABG • Spirometry & Diffusion Studies • 6 Min. Walk Test • Respirometery • Radiography • CT Scan • CPET Test	• To understand and correlate various pulmonary function tests & clinical scenarios.	Seminar	2 Hours

Model Test Papers

MODEL QUESTION PAPER

MD (Chest and Tuberculosis) Paper-I

Basic Sciences as related to Pulmonary Medicine

Max.Marks:100 ***Time: 3hrs***

Attempt ALL questions

- **Answer each question & its parts in SEQUENTIALORDER**
- **ALL questions carry equal marks**
- **Illustrate your answer with SUITABLEDIAGRAMS**

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i. Etiopathogensis, diagnosis and management of sarcoidosis.

ii. Etiology, diagnosis and staging of pleuralmesothelioma.

iii. Risk factors and management of obstructive sleep apnea

iv. Write a note on allergicbronchopulmonary as per gillosis

v. Patho-physiology and management of acute exacerbation of COPD.

vi. Describe the differential diagnosis along with anatomical planes the differential diagnosis of meditational masses.

vii. Etiopathogensis, diagnosis and management of bronchogenic carcinoma.

viii. Describe the various congenital anomalies of the lung and mediastinum which have a clinical implication.

ix. Etiopathogensis, diagnosis and management of interstitial lung diseases.

x. Describe HIV and tuberculosis co-infection

MODEL QUESTION PAPER

MD (Chest and Tuberculosis) Paper-II

Principles and practice of Pulmonary Medicine

Max.Marks:100 **Time: 3hrs**

- **Attempt all questions**
- **Answer each question & its parts in SEQUENTIALORDER**
- **ALL questions carry equal marks**
- **Illustrate your answer with SUITABLEDIAGRAMS**

I Describe the diagnosis & management of community acquired pneumonia.

II Describe etiology, staging, diagnosis and management of non small cell lung cancer.

III Give the Diagnosis and management of stable COPD.

IV Immunopathogenesis of tuberculargranuloma.

V Secondary infections in AIDS. Write a note on penumocystis jerocivi pneumonia.

VI Describe the pathogenesis and management of pulmonary edema

VII Describes ilicotuberculoisis

VIII Give the indications and evaluation of a patient undergoing lung transplantation, enumerate the various complications associated with it.

IX Describe acute hypoxemic respiratory failure

X Give the management of patient with nosocomialpneumonias

MODEL QUESTION PAPER

MD (Chest and Tuberculosis)

Paper-III

Preventive & social aspects of Pulmonary Medicine and tuberculosis

Max.Marks:100 **Time: 3hrs**

- **Attempt All questions**
- **Answer each question & its parts in SEQUENTIALORDER**
- **ALL questions carry equal marks**
- **Illustrate your answer with SUITABLEDIAGRAMS**

I Write a note on anaerobic lung infections.

II Screening and tumour markers in bronchogenic carcinoma

III Describe the management of MDR tuberculosis

IV Write a note on revised national tuberculosis control programme

V Management of acute severe asthma.

VI Describe the rehabilitation plan for a patient of COPD

VII Give the treatment strategies for patient of pneumothorax

VIII Give the treatment plan for a patient with asthma who is pregnant

IX Describe the various pulmonary function test and its clinical co-relation

X Describetheclinicalfeaturesandmanagementofhypersensitivitypneumonia

MODEL QUESTION PAPER

MD (Chest and Tuberculosis) Paper-III
Recent advances in Pulmonary Medicine

Max.Marks:100 **Time: 3hrs**

- **Attempt All questions**
- **Answer each question & its parts in SEQUENTIALORDER**
- **ALL questions carry equal marks**
- **Illustrate your answer with SUITABLEDIAGRAMS**

I Diagnosis & management of idiopathic pulmonary fibrosis.

II Diagnosis & management of bronchiectasis.

III Role of immunotherapy in bronchialasthma.

IV Describe the clinical features and management of pulmonary vembolism

V Describe the etiology and management of haemoptysis

VI Describe the recent advances in the management of COPD

VII Describe the current treatment strategies for a patient of empyma

VIII Discuss the newer strategies for management of ARDS

IX Describe the newer techniques used in bronchoscopy

X Describe patho-physiology, clinical features of pulmonary vacuities

SGT UNIVERSITY
SHREE GURU GOBIND SINGH TRICENTENARY UNIVERSITY
GURGAON, DELHI-NCR
(Established by the Haryana Act No.8 of 2013)

Postgraduate Training in Psychiatry
M.D. PSYCHIATRY

Syllabus and Curriculum

CONTENTS

PREAMBLE

- Postgraduate training in Psychiatry will be imparted to doctors who have been awarded MBBS degree by a recognized Indian university, and have obtained permanent registration in a State Medical Council or the Medical Council of India.
- Postgraduate training in Psychiatry will also be imparted to doctors who hold a degree equivalent to MBBS, awarded by a foreign university and recognized by the Medical Council of India, and have obtained permanent registration in the appropriate registering authority of their native country.
- Postgraduate training in Psychiatry is designed to enable the acquisition of knowledge, skills and attitudes required for the competent and ethical practice of evidence-based psychiatry in a variety of service settings.
- The training program will include exposure to basic and allied sciences, general psychiatry, various psychiatric sub-specialities, and neurology.
- The curriculum incorporates training in contemporary educational technology and research methodology.
- The curriculum will facilitate the attainment of a wide range of competences required for the practitioner to function effectively as medical expert, communicator, collaborator, manager, health advocate, scholar and professional.
- The candidate is required to complete three years of postgraduate training and pass the qualifying examination, to become eligible for the conferment of Doctor of Medicine (MD) degree in Psychiatry.

OBJECTIV ES OF THE COURSE

The overall objective of postgraduate training in psychiatry is to create a professional with competencies ranging from the clinical management of complex mental disorders to managing a population-based integrated mental health care plan.

At the end of the course, the candidate should have developed/acquired:

1. A firm grounding in the understanding and application of a bio psychosocial model with reference to mental health and mental disorders
2. Scientific knowledge in a variety of disciplines related to mental health and mental disorders
3. The clinical skills required to manage a range of psychiatric disorders in the areas of assessment, diagnosis, medical and psychosocial management
4. Humanistic attributes towards patient care including compassion and empathy
5. An ethical approach to psychiatric service and research
6. The ability to deal with the medico-legal aspects of psychiatric illness
7. The basic skills with regard to planning, implementing, and reporting research
8. The qualities to be an effective leader of a multidisciplinary mental health team and an effective teacher
9. The skills required to function as a mental health consultant to physicians in primary care and physicians in other specialties
10. The administrative and leadership abilities to contribute to various components of the national mental health program

The program will focus on problem-based learning, safe, scientific and evidence-based clinical practice, and development of skills applicable to diverse clinic, community and career settings.

COMPETENCIES TO BE ACQUIRED DURING THE COURSE

The candidate, at the end of the post graduate training course is expected to have competencies in the following areas:

Clinical competence

1. Assess and diagnose psychiatric disorders - History taking, mental state examination, physical examination, formulating a diagnosis, differential diagnosis, assessment of medical co-morbidity, investigations as appropriate.
2. Formulate and implement a comprehensive treatment plan that includes pharmacological and psychosocial management, rehabilitation, aftercare and engagement of care givers.
3. Be able to manage psychiatric emergencies.
4. Demonstrate empathy; Communicate effectively and tactfully with patients and care-givers
5. Learn the use of Evidence-Based Medicine (EBM) which refers to the process of making medical decisions that are consistent with current evidence from relevant scientific research and envisages a therapeutic alliance between research-evidence, clinicians and patients.

Practice competence

1. An understanding of the general and ethical considerations as pertaining to medical and psychiatric practice, including issues of confidentiality, patient autonomy, preventing boundary violations, respecting and ensuring human rights of patients.
2. Knowledge of medico-legal issues relating to admission, discharge, record maintenance, standards of care.
3. Proper documentation in patient records.
4. Arranging care for patients, collaborating with mental health professionals and other health professionals.
5. Knowledge and practical experience of using community networks for improving awareness about mental health and mental disorders, support networks such as self-help groups, government assistance programs etc.
6. Mental health care planning through participation in public mental health care initiatives including primary care, district mental health program, and school mental health programs etc.
7. An understanding of administrative aspects of service delivery in clinic settings as well as community-based settings.

Research and teaching competence

1. Basic knowledge of research methods.
2. The ability to think critically and evaluate evidence. The trainee must develop the ability to discern whether the evidence from research can be trusted.
3. Ability to develop research ideas, carry out a review, plan a protocol, carry out a research study or clinical audit, carry out statistical analysis, write a report, present and publish original work or reviews.
4. Exposure and opportunities to train in areas of recent advances such as neuroimaging, molecular genetics, neuropsychological assessments, newer psychotherapeutic interventions and other specialized areas.
5. Acquisition of teaching experience through involvement in undergraduate teaching as well as teaching of other health personnel.

COURSE CONTENT

Paper 1: Basic sciences related to Psychiatry
Paper 2: General Psychiatry
Paper 3: Psychiatric specialities
Paper 4: Psychosomatic Medicine and Consultation-Liaison Psychiatry; Neuropsychiatry and Behavioural Neurology

Note: Postgraduate residents are expected to be acquainted with recent advances and current Indian and international research in various spheres of Psychiatry.

Paper 1: Basic sciences related to Psychiatry

- Concepts of mind and mental health
- Human development throughout the life cycle
- Functional and behavioural neuroanatomy
  - Developmental and topographical neuroanatomy
  - Brain cytoarchitecture
  - Central, peripheral and autonomic nervous system and relevance in psychiatry
  - Applied neuroanatomy with reference to psychiatric disorders
- Neurochemistry
  - Basic understanding of neurotransmission, including receptor structure and function
  - Neurotransmitter pathways
  - Role of neurotransmitters in human emotion, motivation, thought, memory and behaviour
  - Neurotransmitters in psychiatric disorders (eg. Dopamine and psychiatric disorders, neuro-chemical basis of addictive disorders)
- Neurophysiology & electrophysiology
  - Basic cell structure and physiology
  - Physiology of thought, cognition, mood and motor functions
  - Neural connectivity, networks and circuitries
  - Synaptic-level and subcellular phenomena involved in learning and memory
  - Physiology of appetitive behaviours (e.g. hunger, sex)
  - Normal sleep and disorders of sleep
  - Methods of physiological investigations in psychiatric disorders (e.g. Electroencephalography, Evoked Potentials, NMS, etc.)
- Neuroimaging
  - Principles and techniques of brain imaging (Computed Tomography, Magnetic Resonance Imaging, Functional Magnetic Resonance Imaging, Positron Emission Tomography, etc.) and application of imaging studies in neuropsychiatry
- Psychoneuroendocrinology
- Psychoneuroimmunology
- Chronobiology
- Neurogenetics
  - Basic principles of genetics
  - Patterns of inheritance
  - Introduction to molecular genetics
  - Genetic epidemiology
  - Genetic studies in psychiatric disorders
  - Endophenotypes in psychiatry
  - Understanding of population genetics
  - Genome-wide association studies
- Principles of clinical pharmacology
- Psychology
  - Background to psychology, including relevance to psychiatric practice
  - Psychological development, including cognitive, language and emotional development

  - Sensory processes
  - Perception
  - Consciousness
  - Learning & conditioning
  - Memory
  - Thought & language
  - Motivation
  - Emotion
  - Stress - Concepts, management and prevention
  - Social psychology
  - Attitudes
  - Intelligence
  - Personality theories and application in practice
  - Psychological assessment & testing - Rationale, conduct and interpretation
  - Abnormal psychology - Explanatory paradigms of psychopathology in common mental disorders
  - Methods of therapy
  - Positive mental health
  - Indian perspectives in understanding psychology
- Contributions of the socio-cultural sciences
  - Sociology, socio-biology and ethology
  - Anthropology and cross-cultural Psychiatry
- Epidemiology, biostatistics, research methodology and evidence-based medicine
- History of Psychiatry and historical cases in Psychiatry
- Medical education technology
- Medical informatics and the role of information technology in medical practice

Paper 2: General Psychiatry

Psychiatric examination and diagnosis

- Communication, interpersonal skills & the patient-doctor relationship
- Signs and symptoms of mental disorders (Psychopathology)
- Psychiatric history
- Mental status examination
- Clinical neuropsychological and neuropsychiatric assessment
- Structured diagnostic interviews, questionnaires and psychiatric rating scales
- Medical assessment & laboratory testing in Psychiatry
- Classification in Psychiatry

Core disorders and syndromes

- Substance-related disorders
- Schizophrenia
- Other psychotic disorders
- Mood disorders
- Anxiety disorders
- Somatoform disorders
- Chronic fatigue syndrome and neurasthenia
- Factitious disorders
- Dissociative disorders
- Human sexuality, sexual dysfunctions and paraphilias
- Gender identity disorders
- Eating disorders

- Normal sleep and sleep disorders
- Impulse-control disorders
- Adjustment disorders
- Personality disorders
- Suicide and deliberate self-harm
- Aggression / violent behaviour
- Relational problems
- Culture-bound syndromes

Note: The study of various psychiatric disorders has to be covered based on the following domains: Epidemiology (Indian and global research data), aetiology (biological, genetic and psychosocial factors), clinical features, diagnosis, course, outcome, prognosis, and treatment methods.

Additional issues that may be a focus of clinical attention

- Malingering
- Adult antisocial behaviour, criminality and violence
- Borderline intellectual functioning and academic problems
- Occupational problems
- Acculturation problems
- Phase of life problems
- Noncompliance with treatment
- Age-related cognitive decline

Special and miscellaneous areas of interest

- Ethical issues in clinical psychiatry
- Premenstrual dysphoric disorder
- Genetic counselling in psychiatric practice
- End-of-life care and palliative medicine
- Death, dying, and bereavement
- Problems related to physical/sexual abuse or neglect
- Mental health issues in survivors of torture
- Mental health of military personnel
- Mental health issues in disasters
- Terrorism and mental health
- Assessment of disability
- Spirituality, religion and mental health
- Mental health of physicians and medical students
- Telepsychiatry

Treatment methods

- Clinical psychopharmacology: Pharmacokinetics, pharmacodynamics, approved indications, dosage regimens, practice guidelines and treatment algorithms, precautions & adverse effects, drug interactions, continuation treatment, maintenance treatment & prophylaxis
- Specific treatment algorithms for poor response & treatment resistance; Drug augmentation and combination strategies
- Psychopharmacology in special patient groups/populations: Pregnancy & lactation, medical comorbidity

- Psychotherapies: Cognitive therapy, behaviour therapy, interpersonal therapy, dialectical behaviour therapy, family therapy, couples therapy, group therapy and other psychotherapeutic techniques
- Rehabilitation
- Reproductive hormonal therapy
- Electroconvulsive therapy and other brain stimulation methods
- Neurosurgical treatments in psychiatric practice
- Other pharmacological and biological therapies
- Complementary and alternative medicine in Psychiatry (Yoga, music therapy, etc.)

Paper 3: Psychiatric specialities

Child Psychiatry

- Normal development during childhood and adolescence
- Psychiatric examination and psychological testing of children and adolescents
- Mental retardation (Intellectual disability / Intellectual developmental disorder)
- Learning disorders
- Motor skills disorder: Developmental coordination disorder
- Communication disorders
- Pervasive developmental disorders
- Attention-deficit disorders
- Disruptive behaviour disorders
- Feeding and eating disorders of infancy or early childhood
- Tic disorders
- Elimination disorders
- Mood disorders and suicide in children and adolescents
- Anxiety disorders of infancy, childhood, and adolescence
- Early-onset schizophrenia
- Adolescent substance abuse
- Reactive attachment disorder, stereotypic movement disorder
- Borderline intellectual functioning, academic problems, antisocial behavior in childhood or adolescence, identity problem
- Ethical and legal issues, adoption and foster care, child maltreatment and abuse, impact of terrorism on children
- Adult outcomes of childhood psychiatric disorders
- Psychiatric treatment of children and adolescents (Psychopharmacology and psychological treatments)

Note: The study of various psychiatric disorders of childhood and adolescence has to be covered based on the following domains: Epidemiology (Indian and global research data), aetiology (biological, genetic and psychosocial factors), clinical features, diagnosis, course, outcome, prognosis, and treatment methods.

Geriatric Psychiatry

- Normal ageing
- Epidemiology of psychiatric disorders in the elderly (Indian and global data)
- Clinical features and diagnosis of psychiatric disorders in the elderly
- Assessment of cognitive functions

- Psychopharmacology and psychotherapy in the elderly
- Holistic care of chronic and terminal illness
- Abuse and neglect of the elderly

Community Psychiatry

- Public health approach to mental health
- Mental health literacy, stigma, anti-stigma campaigns
- Mental health advocacy
- World mental health surveys; Burden of mental and behavioural disorders
- World mental health atlas, with special reference to India
- Pathways to psychiatric care
- Treatment gap; mental health gap action programme (WHO)
- National mental health programme, Government of India
- District mental health programme, Government of India
- Screening for common mental disorders in the community
- Primary prevention of mental disorders

Forensic Psychiatry

- Clinical-legal issues in Psychiatry
- Ethics in Psychiatry
- Correctional Psychiatry

Paper 4: Psychosomatic Medicine and Consultation-Liaison Psychiatry; Neuropsychiatry and Behavioural Neurology

Psychosomatic medicine and consultation-liaison psychiatry: Fundamental aspects and overview

- Historical aspects; Mind-body dualism - Concept and limitations
- Brain-body medicine; Brain-body information transfer systems and mechanisms of mind-body interactions
- Classification of psychological factors affecting physical / other medical conditions
- Classification of mental disorders due to other medical conditions
- Stress theory; Neurotransmitter responses to stress; Endocrine & immune responses to stress
- Life events
- Specific versus non-specific stress factors
- Adjustment to illness and handicap
- Health psychology: Behavioural factors influencing health; symptoms and illness behaviour; health care behaviour; treatment behaviour
- Epidemiology and presentation of psychiatric disorders in medical settings
- Overview of comorbidity of psychiatric disorders with medical conditions
- Concept & scope of consultation-liaison psychiatry
- Common consultation-liaison problems
- Medically unexplained symptoms
- General principles of treatment of psychosomatic disorders; Principles of management of psychiatric disorders in the medically ill; Psychopharmacology in the medically ill
- Stress management and relaxation therapy
- Organization of psychiatric services in medical settings

Neurocognitive disorders

- Delirium
- Dementia
- Amnestic disorders

Mental disorders due to other medical conditions

- Mood disorder
- Psychotic disorder
- Anxiety disorder
- Sleep disorder
- Sexual dysfunction
- Catatonia
- Personality change

Substance / medication-induced mental disorders

Neuropsychiatry and behavioural neurology; other specific physical conditions associated with psychiatric manifestations

- Cardinal manifestations of neurologic disease
- Approach to the patient with neurologic disease: Clinical history-taking, neurological and neuropsychiatric examination, diagnosis, and localisation
- Special methods of investigation in neurology (EEG, CT, MRI, PET, fMRI, etc.)
- Neuropsychiatric aspects of cerebrovascular disorders
- Neuropsychiatric aspects of brain tumours
- Neuropsychiatric aspects of epilepsy
- Neuropsychiatric consequences of traumatic brain injury
- Neuropsychiatric aspects of movement disorders
- Neuropsychiatric aspects of multiple sclerosis and other demyelinating disorders
- Neuropsychiatric aspects of HIV infection and AIDS
- Neuropsychiatric aspects of other infectious diseases (non-HIV)
- Neuropsychiatric aspects of prion disease
- Neuropsychiatric aspects of headache
- Neuropsychiatric aspects of neuromuscular disease
- Psychiatric aspects of child neurology
- Neuropsychiatry of neurometabolic and neuroendocrine disorders
- Psychiatric aspects of immune disorders
- Psychiatric aspects of nutritional disorders
- Environmental toxins and mental health

Psychiatric issues in other specific medical/surgical scenarios

- Psychiatric aspects of respiratory disorders
- Psychiatric aspects of gastrointestinal disorders
- Psychiatric aspects of cardiovascular disorders
- Psychiatric aspects of surgery (plastic surgery, limb amputation, organ transplantation etc.)
- Psychiatric aspects of cancer (Psycho-oncology)
- Psychiatric aspects of skin disorders (Psychocutaneous disorders)

- Psychological (emotional and cognitive) factors influencing pain; Cerebral processing of pain; Psychiatric management of pain
- Psychiatric aspects of obesity
- Psychiatric aspects of diabetes
- Psychiatric aspects of musculoskeletal disorders
- Psychiatric issues in Obstetrics and Gynaecology - Infertility, pregnancy, parturition, post-partum period
- Psychiatric aspects of accidents, burns and other physical trauma
- Psychiatric issues in critical care units
- Psychiatric issues in haemodialysis units
- Psychiatric aspects of sensory disorders
- Psychiatric aspects of genetic counselling

TEACHING - LEARNING METHODS AND FORMATIVE ASSESSM ENT

A standardized master list of academic programs has been prepared for the benefit of the postgraduate students. Each postgraduate resident needs to complete all these programs before the end of the course. Each postgraduate resident will receive a copy of this list at the beginning of the course. The list of postgraduate programs has been designed such that each postgraduate student will have a program once in 7-14 days. This master list is the basis of the *PG program schedule* which is made once a month but updated more frequently. These PG program updates will be disseminated electronically to all postgraduate students and faculty members of the department.

Seminars

Seminars shall be held at regular intervals. The seminars will be prepared and presented by the postgraduate trainee under the direct supervision of a faculty.

Written tests

Written tests will be conducted every month to ensure that the most important components of the course content are covered in a systematic manner during the training period.

Critical appraisal of published research

Research appraisal will be held at regular intervals. Relevant and suitable research articles from standard peer-reviewed journals will be selected and assigned to the postgraduate resident. The postgraduate resident will present detailed appraisals of research articles.

Case conferences

Case conferences will be conducted at regular intervals. Postgraduate residents will deliver exhaustive presentations of common and prototypical cases, in addition to unusual cases. These presentations will include comprehensive reports of psychopathology, differential diagnosis, prognosis and management.

Clinical training as a part of outpatient and inpatient services

Postgraduate residents will be trained in the practical delivery of routine outpatient and inpatient services under the close supervision of the faculty. Through active participation in these clinical services, the postgraduate student will acquire competencies in the domains of communication,

empathy, doctor-patient relationship, detailed psychiatric assessment, differential diagnosis, case formulation, construction of a management plan, and discussion of prognosis and outcome. The postgraduate student will receive hands-on training in the delivery of optimal clinical care, implementation of the treatment plan, and follow-up care. The postgraduate student shall be assigned full-time clinical responsibilities under the supervision of senior residents and consultants.

Psychotherapy training

Each postgraduate resident will receive supervised training and practice in psychotherapy, employing one or more psychotherapeutic techniques/models.

Practical demonstration

Skills pertaining to electroencephalography, clinical neuropsychological assessment and interpretation of neuroimaging will be imparted through practical demonstration.

Electroconvulsive therapy

The postgraduate resident will receive practical training in the administration of modified electroconvulsive therapy, under the supervision of a faculty member.

Training in Emergency Psychiatry

Postgraduate residents will be on call, by rotation, and will play an active role in the delivery of emergency psychiatry services under the supervision of a faculty member.

Community mental health services

The postgraduate student is required to participate in community mental health programs and outreach services organized by the department and the institute.

Undergraduate teaching assignments (Theory / Clinics)

From the second year of residency, postgraduate students will start receiving training in teaching undergraduate medical and nursing students, under the supervision of the faculty.

Integrated interdepartmental and institutional programs

Postgraduate residents will participate in special case conferences held in collaboration with other departments such as General Medicine and Neurology. In addition, postgraduate residents will be required to attend clinico-pathological conferences, clinico-radiological conferences, medical audit meetings, guest lectures and other scientific programs held by the institution.

Extramural activities

Postgraduate students will be encouraged to attend extramural academic/scientific events such as workshops, seminars, conferences, and postgraduate CME programs.

Schedule of postings

Postgraduate residents will receive intra-departmental training in various subspecialties such as Child Psychiatry, Geriatric Psychiatry and Consultation-Liaison Psychiatry on a daily basis, as part of

the routine outpatient and inpatient clinical services. To supplement this training, special additional intramural and extramural postings will be organized during the second year of training, based on the framework given below.

	Intramural – SGT Medical College	Extramural– PGIMS, Rohtak	Extramural - DMHP, Civil Hospital Gurugram	Total number of weeks
Community Psychiatry			2	2
Child and Adolescent Psychiatry		2		2
Addiction Medicine		2		2
Geriatric Psychiatry		2		2
Psychiatric rehabilitation		1		1
Clinical Psychology		2		2
Neuroradiology	2	1		3
Neurology	4			4
General Medicine	2			2
Weeks	8	10	2	**20**
Months	2	2.5	0.5	**5**

Training in research methodology

As per the regulations of the Medical Council of India, every postgraduate student admitted to a degree course should provide evidence of the following to be eligible to appear for the final degree examination:

1. One poster presentation
2. Evidence of having presented one paper at a national / state-level conference
3. Evidence of one research paper which should be published / accepted for publication / sent for publication during the period of his / her postgraduate studies.

The **dissertation** is a compulsory research project that has to be completed by the MD postgraduate student to be eligible to appear for the final university examination. This will be done under the guidance of a faculty member. Dissertation workshops will be conducted by the institute to train the postgraduate students in basic research methods.

Preparation of the dissertation under the supervision of a qualified guide will provide the postgraduate student hands-on training in various domains of research methodology such as *literature search, electronic reference management, study design, ethical issues in research, writing and implementing a research protocol, and the use of statistical tests for analysis of data*. The dissertation will also facilitate the acquisition of skills pertaining to *scientific written communication*.

The protocol of the dissertation should be submitted to the university within six months of joining the course. Due care should be exercised while selecting a topic for the dissertation, especially with reference to feasibility and practicability. The postgraduate student is required to ensure that a need to change the topic will not arise at a later date. The student is required to pay special attention to ethical issues while planning the dissertation. Approval of the dissertation topic should be obtained

from the Postgraduate Training Committee and the Ethical Committee of the institute. The dissertation has to be completed and submitted to the university six months before the final examination. The postgraduate student will be allowed to appear for the final examination, only after the dissertation is approved by the examiners and accepted by the university.

Postgraduate students are required to prepare a paper based on their dissertation for publication. Proof of submission of a paper based on the dissertation work along with the letter of acknowledgement from the concerned journal is mandatory for being issued the hall ticket for the final university examination. This rule will also apply to those postgraduate students who have submitted some other paper for publication earlier during the course. In addition, they are required to present a paper or a poster based on their dissertation at a special meeting of the Scientific and Academic Forum of the institution. Presentation of the dissertation in this form does not preclude their presentation elsewhere later on.

Information technology

Postgraduate students will receive training in the optimal and efficient use of computers and the internet for academic, clinical and research work. A few examples are listed below.

- Conducting an online literature search using various resources, including databases such as PubMed and Proquest, and websites of journals
- Using current information from reliable sources to stay up to date with best clinical practice
- Electronic reference management using reference management software
- Retrieval of information pertaining to drugs [Drug Product Labels, Summary of Product Characteristics (SPC), etc.]
- Use of online drug interaction checkers
- Retrieval of clinical practice guidelines from standard and reliable web portals
- Effective and appropriate use of PowerPoint software
- Electronic sharing and dissemination of academic resources
- Clinical documentation (electronic medical records)

Continuing Evaluation and Feedback

The performance of the postgraduate resident in all the aforementioned teaching-learning activities will be rigorously assessed on a continuous basis by the faculty members. Progress of postgraduate resident in the **academic**, **clinical** and **research** domains will be monitored. Feedback will be given to the trainee at regular intervals.

Log book: The trainee should maintain a work diary and record his / her participation in all training programs conducted by the department. Assessment of the postgraduate student's performance in various teaching-learning activities will be recorded by the faculty in the log book, thus providing a formal documented feedback of the trainee's strengths and weaknesses, with suggestions for improvement. The log book will be reviewed by the Head of the Department at regular intervals. The log book will be made available to the University for Periodic Scrutiny.

Mock examination

A mock examination will be conducted two months before the final qualifying examination. This will serve to prepare the trainee for the final examination.

QUALIFYING EXAMINATION

Objective

- To assess the theoretical and applied knowledge gained by the trainee.
- To assess the ability of the trainee to function as a competent psychiatrist in the areas of identification, evaluation and management of psychiatric disorders.

Eligibility

- *Satisfactory attendance* and participation in all training activities as reflected in the log book.
- Approval of dissertation by the examiners.
- As per MCI regulations, every postgraduate student admitted to a degree course should provide evidence of the following to be eligible to appear for the final degree examination: (1) One poster presentation; (2) Evidence of having presented one paper at a national/state-level conference; (3) Evidence of one research paper which should be published/accepted for publication/sent for publication during the period of his/her postgraduate studies.

Theory / written examination

The theory examination comprises of four written papers as described below:

	Topics	*Duration*	*Marks*
Paper 1	Basic Sciences related to Psychiatry	3 hours	100
Paper 2	General Psychiatry	3 hours	100
Paper 3	Psychiatric specialties	3 hours	100
Paper 4	Psychosomatic Medicine and Consultation-Liaison Psychiatry; Neuropsychiatry and Behavioural Neurology	3 hours	100

Distribution of marks:

PAPER	*Essay typequestions*			*Short answer questions (Short notes)*			TOTAL MARKS
	Number	Marks per question	Sub-total	Number	Marks per question	Sub-total	
Basic Sciences	-	-	-	10	10	100	100
General Psychiatry	2	20	40	6	10	60	100
Psychiatric specialities	2	20	40	6	10	60	100
Psychosomatic Medicine and Consultation-Liaison Psychiatry; Neuropsychiatry and Behavioural Neurology	-	-	-	10	10	100	100

All papers will include questions pertaining to recent advances and current Indian and international research in various spheres of Psychiatry.

Practical / clinical examination and viva voce

- Evaluation of the candidate's clinical skills, and viva-voce will be conducted by a panel of four psychiatrists (recognized as postgraduate teachers by the Medical Council of India), of which at least two shall be external examiners.
- All four examiners will assess the candidate together, for all components of the practical / clinical examination and viva voce.
- The Head of the Department of Psychiatry will serve as Chairman of the Board of Examiners.
- The practical examination will include a long case and a short case in Psychiatry, and one short case in Neurology.
- Viva voce will cover various components of the prescribed course content, and will include assessment of the candidate's knowledge and skills pertaining to electroencephalography, clinical neuropsychological assessment and neuroimaging.
- The postgraduate student will qualify for the award of MD degree in Psychiatry if he/she scores a minimum of 50% marks in the theory papers, and 50% marks in the practical/clinical examination.

Long case presentation - Adult Psychiatry

The trainee will be given 45 minutes for evaluation, including history-taking, mental state examination and relevant physical examination. An additional 15 minutes will be given for the trainee to organize the presentation. The examiners may interview the patient in this time. The examiners may ask the trainee to elicit specific phenomena / clarify specific aspects during the viva.

Marking format:

Component	*Marks*
Adequacy of history-taking	20
Mental state examination	20
Diagnosis / Differential Diagnoses	10
Management	20
Discussion	20
Style of presentation (fluency, clarity of communication, ability to organize information); Interview with patient	10
Total marks	100

Short case - Psychiatry

The trainee will be given 25 minutes for history-taking and clinical examination and an additional 5 minutes for preparing the presentation.

Marking format:

Component	*Marks*
Adequacy of history-taking	10
Mental state examination	10
Diagnosis / Differential Diagnoses	10
Management	10
Discussion	10
Total marks	50

Neurology case

The trainee will be given 25 minutes for history-taking and clinical examination and an additional 5 minutes for preparing the presentation.

Marking format:

Component	*Marks*
Adequacy of history-taking	10
Neurological examination	10
Diagnosis / Differential Diagnoses	10
Management	10
Discussion	10
Total marks	50

Final viva-voce

Marking format:

Component	*Marks*
General questions covering various components of the PG syllabus/course content	40
Questions pertaining to psychological assessment tools	15
Interpretation of CT / MRI brain images	10
Interpretation of EEG recordings	10
Questions pertaining to dissertation	25
Total marks	100

Summary of distribution of marks

Examination	*Marks*
Theory / written examination	
- Theory paper 1	100
- Theory paper 2	100
- Theory paper 3	100
- Theory paper 4	100
Subtotal	**400**
Practical / clinical examination	
- Long case (Psychiatry)	100
- Short case 1 (Psychiatry)	50
- Short case 2 (Neurology)	50
- Viva voce	100
Subtotal	**300**
Grand total	**700**

Eligibility for award of final degree

- Acceptance of dissertation
- Pass (minimum of 50% marks) in theory / written examination
- Pass (minimum of 50% marks) in practical / clinical examination and viva voce

RECOMMENDED BOOKS, JOURNALS & OTHER RESOURCES

Core textbooks & resources (Latest editions)

- Shorter Oxford Textbook of Psychiatry. Philip Cowen, Paul Harrison, Tom Burns. Oxford University Press.
- Introductory Textbook of Psychiatry. Black DW, Andreasen NC. American Psychiatric Publishing.
- Kaplan & Sadock's Comprehensive Textbook of Psychiatry. Benjamin J Sadock, Virginia A Sadock. Lippincott Williams & Wilkins.
- Kaplan & Sadock's Synopsis of Psychiatry. Benjamin J Sadock, Virginia A Sadock. Wolters Kluwer / Lippincott Williams & Wilkins.
- The New Oxford Textbook of Psychiatry. Michael G Gelder, Nancy C Andreasen, Juan J Lopez-Ibor Jr, John R Geddes. Oxford University Press.
- Sims's Symptoms in the mind: An introduction to descriptive psychopathology. Femi Oyebode. Saunders.
- Fish's Clinical Psychopathology: Signs & symptoms in Psychiatry. Patricia Casey, Brendan Kelly. Royal College of Psychiatrists.
- ICD-10 Symptom Glossary for Mental Disorders. World Health Organization.
- Lexicon of psychiatric and mental health terms. World Health Organization.
- Schedules for Clinical Assessment in Neuropsychiatry (SCAN) - Glossary. World Health Organization.
- Campbell's Psychiatric Dictionary. Robert J Campbell. Oxford University Press.
- ICD-10 Classification of Mental & Behavioural Disorders: Clinical descriptions & diagnostic guidelines. World Health Organization.
- Diagnostic & Statistical Manual of Mental Disorders (DSM-5). American Psychiatric Association.
- Bickerstaff's Neurological Examination in Clinical Practice. John A. Spillane. Wiley-Blackwell.
- Lishman's Organic Psychiatry: A Textbook of Neuropsychiatry. Anthony David, Simon Fleminger, Michael Kopelman, Simon Lovestone, John Mellers. Wiley-Blackwell.
- Manter and Gatz's Essentials of Clinical Neuroanatomy and Neurophysiology. Sid Gilman, Sarah Winans Newman. Jaypee Brothers Medical Publishers.
- Clinical Neuroanatomy. Richard S. Snell. Lippincott Williams & Wilkins.
- Atkinson & Hilgard's Introduction to Psychology. Susan Nolen-Hoeksema, Barbara L. Fredrickson, Geoffrey R. Loftus, Willem Wagenaar. Cengage Learning.
- The Maudsley Prescribing Guidelines in Psychiatry. Taylor D, Paton C, Kapur S. John Wiley & Sons.
- Cognitive-behavioural therapy. A guide to empirically-informed assessment and intervention. Stefan G. Hofmann, Mark A. Reinecke. Cambridge University Press.
- Communication skills in clinical practice: Doctor-patient communication. K R Sethuraman. Jaypee Brothers Medical Publishers.
- Basic methods of medical research. A. Indrayan. AITBS Publishers.
- Medical postgraduate dissertations: A step-by-step approach. Ananthakrishnan N. United India Periodicals.
- Community Mental Health in India. B. S. Chavan, Nitin Gupta, Priti Arun, Ajeet Sidana, Sushrut Jadhav. Jaypee Brothers Medical Publishers.
- Forensic psychiatry (Psychiatry and law). Nambi S. Jaypee Brothers Medical Publishers.

Other textbooks and resources (Latest editions)

- Psychiatry. Allan Tasman, Jerald Kay, Jeffrey A. Lieberman, Michael B. First, Mario Maj. Wiley.
- Rutter's Child and Adolescent Psychiatry. Michael Rutter, Dorothy Bishop, Daniel Pine, Steven Scott, Jim S. Stevenson, Eric A. Taylor, Anita Thapar. Wiley-Blackwell.
- Textbook of Geriatric Psychiatry. Dan G. Blazer, David C. Steffens. American Psychiatric Publishing.
- Textbook of Psychosomatic Medicine - Psychiatric Care of the Medically III. James L. Levenson. American Psychiatric Publishing.
- Lowinson and Ruiz's Substance Abuse: A Comprehensive Textbook. Pedro Ruiz, Eric Strain. Wolters Kluwer / Lippincott Williams & Wilkins.
- Clinical Manual of Emergency Psychiatry. Michelle B. Riba, Divy Ravindranath. American Psychiatric Publishing.
- Stahl's Essential Psychopharmacology: Neuroscientific Basis and Practical Applications. Stephen M. Stahl. Cambridge University Press.
- The Prescriber's Guide (Stahl's Essential Psychopharmacology). Stephen M. Stahl. Cambridge University Press.
- The ECT Handbook. Allan I F Scott. The Royal College of Psychiatrists.
- Textbook of Psychotherapeutic Treatments. Glen O. Gabbard. American Psychiatric Publishing.
- Kaufman's Clinical Neurology for Psychiatrists. David Myland Kaufman, Mark J Milstein. Elsevier / Saunders.
- Adams & Victor's Principles of Neurology. Allan H Ropper, Martin A Samuels. McGraw-Hill.
- The Mental Status Examination in Neurology. Richard L Strub, F William Black. F A Davis Company.
- Principles of Neural Science - Eric R. Kandel, James H. Schwartz, Thomas M. Jessell, Steven A. Siegelbaum, A. J. Hudspeth. McGraw-Hill.
- Cognitive Psychology: Mind and Brain. Edward E. Smith, Stephen M. Kosslyn. Pearson.
- Basic Epidemiology. R Bonita, R Beaglehole, T Kjellstrom. World Health Organization.
- Basic & Clinical Biostatistics. Beth Dawson, Robert G. Trapp. McGraw-Hill / Lange Basic Science.
- Genetics Home Reference Handbook - US National Library of Medicine.
- Medical Education: Principles & Practice. N Ananthakrishnan, K R Sethuraman, Santhosh Kumar. Alumni Association of NTTC, JIPMER.
- Mental health - An Indian perspective - 1946 to 2003. S P Agarwal. Elsevier / DGHS.
- Mental Health Act - Government of India.
- Narcotic Drugs and Psychotropic Substances Act - Government of India.
- Persons with Disability Act - Government of India.

Recommended journals

- Indian Journal of Psychiatry
- Indian Journal of Psychological Medicine
- American Journal of Psychiatry
- JAMA Psychiatry
- British Journal of Psychiatry
- Journal of Clinical Psychiatry
- Psychiatric Clinics of North America
- General Hospital Psychiatry

Recommended online/web resources

PubMed	http://www.ncbi.nlm.nih.gov/pubmed/
Proquest	http://search.proquest.com/
Cochrane Reviews	http://www.cochrane.org/cochrane-reviews
Cochrane Library	http://www.thecochranelibrary.com/view/0/index.html
Centre for Reviews and Dissemination	http://www.crd.york.ac.uk/crdweb/
NHS Evidence	http://www.evidence.nhs.uk/
Scottish Intercollegiate Guidelines Network (SIGN) - Evidence-based clinical practice guidelines	http://www.sign.ac.uk/index.html
Epocrates online - Drug information & drug interaction checker	https://online.epocrates.com/
National Institute for Health and Care Excellence (NICE) - Clinical guidelines	http://www.nice.org.uk/
U.S. Food and Drug Administration - Drug Product Labels	http://www.accessdata.fda.gov/scripts/cder/drugsatfda/
Electronic Medicines Compendium (eMC)	http://www.medicines.org.uk/emc/
British Association for Psychopharmacology: Consensus guidelines	http://www.bap.org.uk/
Indian Psychiatric Society	http://www.ips-online.org/
American Psychiatric Association	http://www.psych.org/
American Psychiatric Publishing	http://psychiatryonline.org/
National Institute of Mental Health (NIMH)	http://www.nimh.nih.gov/index.shtml
World Federation for Mental Health	http://www.wfmh.org/
World Health Organization	http://www.who.int/en/
Centre for Evidence-based Medicine at the University of Oxford	http://www.cebm.net/
Centre for Evidence Based Mental Health	http://www.cebmh.com/
Evidence - based practice: Duke University Medical Center Library & Archives	http://guides.mclibrary.duke.edu/ebm
Zotero (Electronic reference management)	http://www.zotero.org/

MODEL QUESTION PAPERS

Paper 1: Basic sciences related to Psychiatry

Time: **3 hours** ● Maximum marks: **100**

Answer all questions

	Marks
Write notes on:	
1. Prefrontal cortex	10
2. Synaptic plasticity & learning	10
3. Hypothalamic-pituitary-adrenal axis & its relevance to Psychiatry	10
4. Functional magnetic resonance imaging & its role in neuropsychiatry	10
5. Types of receptor-drug interactions & relevance to Psychiatry	10
6. Instrumental conditioning	10
7. Assessment of intellectual abilities	10
8. Carl Gustav Jung	10
9. Culture, migration and mental health	10
10. Study designs in medical research	10

Paper 2: General Psychiatry

Time: **3 hours** ● Maximum marks: **100**

Answer all questions

	Marks
1. Outline the neurobiological theories of schizophrenia and elucidate the neurodevelopmental hypothesis.	20
2. Discuss the efficacy and current status of cognitive behavioral therapy for psychiatric disorders.	20
3. Write short notes on:	
a) Structured diagnostic interviews in Psychiatry	10
b) Continuation and maintenance treatment of bipolar affective disorder	10
c) Epidemiology of alcohol dependence	10
d) Obsessive compulsive spectrum disorders	10
e) Alternative DSM-5 model for personality disorders	10
f) Mechanisms of action and therapeutic indications of second-generation antipsychotics	10

MODEL QUEST ION PAPERS (co n t i n u e d)

Paper 3: Psychiatric specialities

Time: **3 hours** ● Maximum marks: **100**

Answer all questions

	Marks
1. Elucidate the clinical features, diagnosis and management of attention-deficit/hyperactivity disorder.	20
2. Elucidate the objectives, progress, problems & manpower development schemes of the National Mental Health Program (NMHP) of India.	20
3. Write short notes on:	
a) Clinical evaluation of dementia	10
b) Principles of psychopharmacological treatment of geriatric mental disorders	10
c) Mental Health Gap Action Programme	10
d) Internet addiction among children & adolescents - Current concepts & clinical approach	10
e) Amendments in MHA (Mental Health Act) -1987 and PWD (Persons with disability) Act - 1995 and their implications on mental health care	10
f) Legal issues regarding mental health & marriage	10

Paper 4: Psychosomatic Medicine and Consultation-Liaison Psychiatry; Neuropsychiatry and Behavioural Neurology

Time: **3 hours** ● Maximum marks: **100**

Answer all questions

	Marks
Write notes on:	
1. Brain-body medicine and brain-body information transfer systems	10
2. Stress theory and neurophysiological responses to stress	10
3. Concept and scope of health psychology	10
4. Aetiology and principles of management of delirium	10
5. Mood disorder due to other medical conditions	10
6. Neuropsychiatric aspects of epilepsy	10
7. Diagnosis and management of psychiatric syndromes in Parkinson's disease	10
8. Role of psychological factors in pain	10
9. Psychiatric aspects of cardiovascular disorders	10
10. Psychocutaneous disorders	10

SGT Medical College, Hospital & Research Institute
(A Constituent of SGT University)
Budhera, Gurugram-Badli Road, Gurugram (Haryana) – 122505 Ph. : 0124-2278183, 2278184, 2278185

Department of Gen. Surgery

SGTU/FMHS/Gen.Surg/58 Dated: 4th Dec. 2019

To

The Dean
Faculty of Medicine and Health Sciences
SGT University
Budhera, Gurgaon (Haryana)

Subject: - " Approval of curriculum for Post Graduate Course in General Surgery"

Respected Sir

1. A meeting of the **Board of Research Study (BRS)** of the Department of Gen. Surgery was held on 02/12/2019.

2. The board of officers was constituted with the following doctors of the Department of Surgery to review the curriculum of Post Graduate Surgery (Photo Copy attached). They were -
   (a) Dr. P.N Agarwal
   (b) Dr. Pawan Tiwari
   (c) Dr. (Col) M.S Ray
   (d) Dr. Kuldeep Raj
   (e) Dr. R. Talukdar

3. The curriculum of PG Surgery has been approved by the aforementioned Board of Officers of the Department of Surgery, and is being sent to External Members (Whose names are given below) for approval. They are:-
   (a) Dr. Rajdeep Singh (Professor Surgery)
   Maulana Azad Medical College, New Delhi
   (b) Dr. Anubhav Vindal (Professor Surgery)
   Maulana Azad Medical College, New Delhi

डा. राजदीप सिंह / Dr. RAJDEEP SING
आचार्य (शल्य चिकित्सा) / Professor of Surgery
मौ. आ. मे. कालेज एवं संबंधित लोक नायक अस्पत
M.A.M. College and Associated Lok Nayak Hosp
रा. रा. रा. दिल्ली सरकार / Govt. of NCT of De
नई दिल्ली / New Delhi-110002

DR. ANUBHAV VINDAL
MS, DNB, MNAMS, MRCS Ed. FAIS, FCLS FACS
Professor of Surgery
Maulana Azad Medical College
& Lok Nayak Hospital
New Delhi - 110002

4. This being forwarded to you for your information and needful.

4/12/19

Dr. P.N Agarwal
Professor & Head
Department of Gen. Surgery

(Sx Clk:- Narender Singh)

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 aetoiology, 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, antisepsis, 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, narcotizing fascitis 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 hyper-glycaemia 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 oesophgeal atresisa 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-esophageal 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 anamolies
- 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
- Phimosis and paraphimosis
- Carcinoma penis
- Diagnosis and principles of treatment of undescendecd 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, lumber 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 hypochrondium 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
- Spleenectomy (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 will be assessed periodically as per details given below.

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

Annexure I

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

P.G. SYLLABUS
M.S. OPHTHALMOLOGY

GOAL

The purpose of PG education is to create competent specialists in Ophthalmology who would provide high quality health care and advance the cause of science through research & training.

PROGRAMME OBJECTIVES

The post graduate training programme is aimed at developing a blend of qualities of a clinical specialist, a teacher and a researcher in the student. This programme is so organized that at the end, the post graduate student possesses the following qualities, knowledge and skills:

a. A 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 independently most day-to-day problems 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 eye 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 aware of Mobile Ophthalmic Unit , 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:

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.

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.

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.

Ophthalmic super-specialties:

Given an opportunity to work on a rotational basis in various special clinics of sub-specialties of Ophthalmology. 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.

Ophthalmic pathological/microbiological/biochemical sciences

- Be able to interpret the diagnosis in correlation with the clinical data and routine materials received in such cases.

Community Ophthalmology

Eye camps may be conducted where the PG students are posted for imparting training 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.

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.

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.

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

Diffuse illumination
Focal illumination
Retroillumination – direct and indirect
Sclerotic scatter
Specular reflection
Staining modalities and interpretation

2. Fundus evaluation

Direct/Indirect ophthamoscopy
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

Staining- fluorescein and Rose Bengal
Schirmer test/tear film break up time
Syringing
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

Retinoscopy- Streak/ Priestley Smith
Use of Jackson's cross-cylinder

Subjective and objective refraction
Prescription of glasses

7. Diagnosis and assessment of Squint

Ocular position and motility examination Synoptophore usage Lees screen usage Diplopia charting
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. <u>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</u>:

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. <u>Minor surgical procedures – Must know and perform independently</u>

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, parabulbar anaesthesia Posterior Sub-Tenon's injections
Artificial eye fitting

V. Surgical procedures

1.Must know and can perform independently

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 Student 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

Standard ECCE (extracapsular cataract extraction; first year) with or without IOL implantation
Small incision ECCE with or without IOL implantation and/or Phacoemulsification with PC IOL implantation
Intracapsular cataract extraction (second year)
Cataract with Phacoemusification (third year)
Secondary AC or PC IOL implantation

Vitrectomy/Scleral buckling

Intra-vitreal 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

Trabeculotomy & Pharmacological modulation

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 Kerato refractive 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 postoperative 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 **secondphase**, 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.

M.S OPHTHALMOLOGY
SYLLABUS

PAPER I: BASIC SCIENCES AS APPLIED TO OPHTHALMOLOGY

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. Genetics in Ophthalmology
6. Ocular Microbiology
    i. General Microbiology, specific microbiology applicable to the eye
    ii. Immunology with particular reference to ocular immunology
7. Ocular Pharmacology

PAPER II: CLINICAL OPHTHALMOLOGY INCULDING OCULAR SURGERY

1. Disorders of the lids
2. Disorders of the Orbit
3. Disorders of the lacrimal system
4. Disorders of the Conjunctiva
5. Disorders of the Cornea
6. Disorders of the Sclera
7. Disorders of the Uveal Tract
8. Disorders of the Lens
9. Glaucoma
10. Disorders of the Retina
11. Neuro-Ophthalmology including Disorders of the Optic Nerve and Visual Pathway
12. Paediatric Ophthalmology including Strabismus and Amblyopia
13. Ocular oncology

PAPER III: OPTICS, REFRACTION AND INVESTIGATIVE OPHTHALMOLOGY

1. Elementary, Physical and Physiological optics.
2. Error of Refraction and Accommodation.
3. Visual Acuity, Contrast Sensitivity and Test for Potential Vision.
4. Low Vision Aids.
5. Optical Instruments And Techniques Including: Optical Instruments and techniques For Anterior Segment Evaluation, Optical Instruments and techniques For Posterior Segment Evaluation, Laser Scanning Imaging techniques, Optical Coherence Tomography, Optical Devices For eye Surgery and Lensmeter.
6. Perimetry and Other Psychophysical Tests in Glaucoma.
7. Electrophysiological Tests in Ophthalmology.
8. Imaging Techniques in Ophthalmology including : Plain X-rays in Ophthalmology, Ultrasonography in Ophthalmology, Ultrasound Biomicroscopy (UBM) in Ophthalmology, Computed Tomography Scanning in Ophthalmology and Magnetic Resonance Imaging in Ophthalmology

PAPER IV: MEDICAL AND COMMUNITY OPHTHALMOLOGY INCULDING RECENT ADVANCES:

1. Ocular involvement in Systemic Diseases
2. Community Ophthalmology
3. Recent Advances in diagnostic and therapeutic modalities for ocular disorders.

SGT Medical College, Hospital & Research Institute

(A Constituent of SGT University)

Budhera, Gurugram-Badli Road, Gurugram (Haryana) – 122505 Ph. : 0124-2278183, 2278184, 2278185

FACULTY OF MEDICINE & HEALTH SCIENCES ★ SGT UNIVERSITY ★ DEAN OFFICE Received on: Date: 04/12/19 Time: 10:40 Am Signature

Minutes of the meeting of Board of studies Department of Anaesthesiology

Meeting of the Board of studies of the Department of Anaesthesiology was held on 03/12/2019 in the department of Anaesthesiology in SGT Medical College Hospital at 2.00 PM .

Following members attended the meeting.

Dr Krishan Lal Garg	**Prof & HOD ,**	**Chairmen**
Dr Mohan Lal Khatri	**Professor ,**	**Member**
Dr Baljit Singh	**Professor,**	**Member**

Dr Suresh Singhal (External Expert)
Senior Professor (Anaesthesia) PGIMS Rohtak
Dr Prashant Kumar (External Expert)
Professor Anaesthesia PGIMS Rohtak

Curriculum for the Course M.D (Anaesthesiology) was placed before the board.

The board passed the corricullum for M.D (Anaesthesiology) course after due deliberations.

Dr Krishan Lal Garg
Professor & HOD

Dr Suresh Singhal (External Expert)
Senior Professor (Anaesthesia)
PGIMS, Rohtak

Dr Prashant Kumar (External Expert)
Professor (Anaesthesia) PGIMS, Rohtak

Dr Mohan Lal Khatri, Professor

Dr. Baljit Singh, Professor

Compiled. Dr. Jyoti Arora

Dean
Faculty of Medicine & Health Sciences
SGT University, Budhera, Gurugram

Learning Objective of MD ANAESTHESIOLOGY curriculum

Vision and Mission

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.

Programme Outcome

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, blocks for acute pain states
  - ❖ Procedures like -Intramuscular injections, arterial and venous cannulations and
  - ❖ Patient Positioning under anaesthesia.

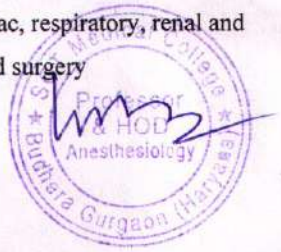
Demonstrate knowledge of Physiology of various systems (respiratory, cardiovascular, hepatobiliary, renal, endocrine, pregnancy, haematological, neuromuscular, regulation of temperature and metabolism, stress response, cerebral blood flow and ICP, central, autonomic and peripheral nervous systems, metabolic 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 co relation
- 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, lumber 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: , 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-anaesthsia 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:
    - o 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-arctation 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 aneasthesia 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 **1st 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

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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 **2nd 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,
    - fibroptics.
    - 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.

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- 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 **3rd 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

- 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.

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.

Operation theatre	Months
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	(Radiology,Radiotherapy)
posting in the other areas.	
ECT, Cardiac Cath)	

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 Bocks (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

Annexure I

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 89	
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 HOD

SYLLABUS FOR
M.S. ORTHOPAEDIC SURGERY

SCHEME OF EXAMINATION

3 Years Course :

Part – I (At the end of First Year)

Theory	Title	Duration In Hours	Maximum Marks
Paper – I	Applied Basic Sciences	3	100

50% Marks in University Theory Examination to quality for a Pass

Part –I I (At the end of third Year)

Theory	Title	Duration In Hours	Maximum Marks
Paper – I	Traumatology	3	100
Paper – II	Orthopaedics	3	100
Paper – III	Recent advances in Traumatology and Orthopedic Surgery & Rehabilitation	3	100

Question paper pattern

2 Essyas	2 X 20	=	40
6 Short Notes	6 X 10	=	60
	Total	**=**	**100**

Clinical & Voce :

Clinical - Total 200 Marks

						Marks	
Long Cases	-	1	-	1 Hour	-	80	
Short Cases	-	3	-	45 Minutes	-	120	
				Total	**-**	**200**	**100**

Orals - 100

Recent Advances in Orthopaetic Surgery & Dermatology	-	10
X-rays, CT Scan, MRI Scan	-	10
Instruments – Basic Instruments & Implants in Sine Joint Replacements	-	10
Surgical Procedure	-	15
Pathological Specimen	-	05
Histopathological Slide	-	05
Demonstration of Clinical Tests	-	05
Prosthetics & Orthotics, Image Identification (10 + 10)	-	20
Log book	-	20
Total	**-**	**100**

Marks Qualifying for Pass

				Marks	
				Max	Min (To pass)
Part I	-	Theory	-	100	50
Part II	-	Theory	-	300	150
		Clinical	-	200	100
		Viva	-	100	-----
		Aggregate of 2 +3	-	300	150
		Total		**600**	

Special Postings

- Paediatric Orthopaedic surgery – 1 month
- Plastic surgery - 15 days
- Rehabilitation - 15 days
- Radio Diagnosis - 15 days

Dissertation in Ortho has to submitted to the University 6 Months before proposed University Examination after getting approval from HOD.

Each student has to submit 4 copies :-

1. One copy to University
2. One copy to Library
3. One copy to Department
4. One copy for the Candidate

It should be approved by External and Internal Examiners

Log Book – Containing – Surgeries done (or) assisted has to be maintained which will be periodically scrutinized by the Department.

SYLLABUS FOR APPLIED BASIC SCIENCES - PART I

Anatomy :

- Cell Biology
- Genetics
- Elementary Embryology
- Bone Structure
- Anatomy of Joints

Physiology :

- Water and Electrolyte Metabolism
- Acid – base regulation
- Renal & Hepatic Functions
- O_2 & CO_2 Tranport Mechanism
- Heat rate, Blood pressure
- Regional Blood Flow
- Lung Functions
- Renal Functions
- Haemorrage, Thrombosis, Clotting Mechanism / Pathway
- Shock emobilism, DIC
- Physiological response to Trauma
- Exercise Physiology
- Fracture Healing
- Physiology of Nerve Conduction & Muscle Functions, NCS, EMG

Bio – Chemistry :

Prtotein, Fat, Carbohydrate & Calcium Metabolism and Chemical Transmission of Nerve impulses

Pathology :

General Pathology related to inflammations, infections, Wound Healing – Stages and Neoplasia – Biopsy Techniques

Pharmacology

Principles of Actions of Drugs and Principles governing the use of commonly administered Anesthetic, Analgesic, Anti – inflammatory drugs, Antibiotic, Antimicotic agents, Anti – TB Drugs used against Retrovirus.

Microbiology

General Principles of Microbiology Immunology

Principles of Dietetic & Nutrition

Elementary Biostatistics & epidemiology

Psycho – Social Problems in Ortho Surgery

Sterilization Procedures, Antiseptics

Microbiology of Common Pathogens causing Orthopaedic Infections

Orthopaedic Surgery – Part – II

Each Candidate will be examined by Theory, Clinical & VIVA 0 – Voce to assess the sound knowledge of Principles & Practice of Orthopaedics.

Candidate should have adequate knowledge, skill & competence in diagnosing and treating a patient appropriately whether it is emergency (or) elective case with good results.

Sound Knowledge of various laboratory investigations and othe diagnostic procedures like Arthroscopy is expected out of each and every candidate.

Should be aware of interpretation of CT, MRI, Bone Scan / Dexa Scan

In Clinical Examination, Candidate is expected to demonstrate Proficiency in Physical examinations, Clinical Diagnosis & Discussing various modalities of treatment after evaluating Clinically, Radiologially with appropriate laboratory Parameters in arriving at the diagnosis.

ORTHOPAEDIC SURGERY PART II

Syllabus : Tramatology :

- Fractures and Dislocations including Mechanism of Violence causing injury – their signs and symptoms, methods of reduction, maintenance of reduction, management surgical & complication early – late.
- Pathology, Stages of Fracture Healing
- Various methods of internal fixations of Extra & intra articular fractures- lating / nailing / fixators.
- Current concepts in internal fixation & arthrodesis
- Arthoscopy – Diagnostic & interventional & Surgeries on Spine
- Sprains – Mechanism of Production, Pathology management
- Peripheral Nerve injuries & Evaluation, rehab and management

- Spinal cord injuries – Mechanism of Injury signs & Symptoms investigations including Electro diagnosis, splinting, bracing and Rehabilitation
- Other Soft Tissue Injuries (Muscle / tendon)
- Compound Fractures – Classifications, Management – Emergency & later definitive treatment / complications, management of complication
- Vascular / Neurological Complications

General Orthopaedics

Deformities :

- Congenital and acquired – Pathomechanics, Clinical Featurs – Treatment – Conservative – Manipulation Bracing, Splinting & Surgical Treatment – Rehabilitation

Osteoarticular Tuberculosis :

- Bacteriology – Pathotnogy – Symptomatology – Investigation, Diagnosis – Management – Conservative & Surgical

Infections :

- Bacteriology – Pathology – Types – Clinical Features & Management in Acute, Subcute & Chronic

Arthritis :

- Study of various types – Infective, Rheumatoid, Degenerative, crystallord Metabolic – Signs & Symptoms – Management

Tumors :

- Benign & Malignant – Osseous & Soft Tissue – Pathogenic – Histopathology – Inves tigations – Management / staging / Role of radio & chemo management of secondaries therapy from other primary sites.

Metabolic disorders :

- Involving Skeletal Systems
  Ca / ph / thyroid / parathyroid

Neuromuscular Disorders :

- Polio, Ep – Muscular Dystrophies, Obstetrical Palsy and other types of brachial plexus injuries – Etiology, Patho Physiology, Clinical types – Splinting Bracing, Physiotherapy, Surgical Interaction

Physical Medicine & Rehabilitation:

- Principles of Physical Therapy including Exercise Therapy, electrotherapy, Splint & Brace Prscription

Prosthetics & Orthotics :

- Principles of Amputation Surgery & Prescription of Appropriate Orthosis & Prosthesis early post OP prosthetic mobilization

Total Rehabilitation :

- Medical Educational, Vocational, Social Rehabilitation

Post – Graduate Students are supposed to attend Ortho OPD, 24 Hours Fracture Clinic, Ortho ward and Operation Theatre regularly and to gain knowledge.

They should have basic knowledge about receiving a poly trauma patient and how to give first aid & how to attend to the wounds & to stabilize the patient.

They should know to do manipulatory reduction of fractures & dislocations to know the methods of application of plaster of Paris, Splints, skin and skelitle traction .

They should know the techniques of giving intra articular steroid injections.

RECOMMENDED LIST OF TEXT BOOKS

1. Text book of OPerative Orthopaedics
   Campbell – by Terry Canale
2. Text book of Fractures – Rockwood and Greene
3. Text Book of Fractures – Jupiter & Browner
4. Surgical Exposures – Hoppenfeld
5. Text Book of ORthopaedics – Turek
6. Text Book of Orthopaedics – Mercer
7. Clinical examination – S. Das
8. Clinical Orthopaedic Examination – Ronald McRae
9. Atlas of Orthopaedic Surgery – Koval
10. Netter is atlas of Anatomy

11. Tractions in Orthopaedics – Stewart & Hallet
12. Tuberculosis of Musculoskeletal System – S.M. Tuli
13. Paediatric Orthopaedics – Tachdjian
14. Paediatric Orthopaedics – Lowell & Winter
15. Spine – Herkowitz
16. Pathology of Bone tumours – Mirra
17. Clinical Orthopaedic Examination – Bruce Reidder
18. Text books of Trauma & Orthopaedics – Ebenezer / Natarajan / Maheswari / sneray
19. Outline of Orthopaedics – Adams
20. Bone Pathology – (Aggartes, Kirkpatrick, Lichenstein)

Journals :

a) Journal of Bone & Joint Surgery (JBJS) – American & British
b) Orthopaedic Clinics of North America
c) ACTA Orthopaedics Scandinavica
d) Indian Journal of Orthopaedics
e) Clinical Orthopaedics & Related Research (cross)
f) Arthroscopy
g) Spine
h) Instruction Course Lecture s(Part of JBJS)
i) Injury
j) Journal of Paediatric Orthopaedics
k) Journal of Orthopaedic Trauma
l) International Orthopaedics
m) Orthopaedics

GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR MS IN OTORHINOLARYGOLOGY

Preamble:

A postgraduate specialist having undergone the required training should be able to recognize the health needs of the community, should be competent to handle effectively the medical problems, and should be aware of the recent advances pertaining to his specialty. The postgraduate student should acquire the basic knowledge, attitude and skills in teaching of medical/para-medical students. He/she is also expected to know the principles of research methodology and modes of consulting library including internet use.

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, his 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 and rehabilitative aspects of health and diseases in the specialty of ENT.
5. Play the assigned role in the implementation of National Health Programs
6. Demonstrate competence in basic concepts of research methodology and writing thesis and research papers.
7. Develop good learning, communication and teaching skills.

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. He/she should acquire in-depth knowledge of his subject including recent advances. 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, lumber puncture etc. He/she 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:**

   He/she 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:**

   Should learn the basic methodology of teaching and assessment and develop competence in teaching medical/paramedical students and their assessment.

CURRICULUM

SUBJECT SPECIFIC THEORETICAL COMPETENCIES

Course Contents

The course contents may be divided into '*must know*" and "*good to know*" areas.

Must Know:

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 middleear 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. 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 duck development of major cervical and thoracic blood vessels.
9. Head and neck reconstructive surgery.

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.

Good to know

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

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. Vaspressive and other agents used in shock like states.

Syllabus for Individual Papers:

Paper I: Basic Sciences related 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, Lymphoepithetical 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.

Paper II: Principles and Practices of Otolaryngology

- 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.

Paper III: 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.

Paper IV: 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.

SUBJECT SPECIFIC PRACTICE BASED OR PRACTICAL COMPETENCIES

A student should be adept at the following:

- good history taking,
- physical examination,
- providing basic life support and advanced cardiac life support,
- common procedures like FNAC, biopsy, aspiration from serous cavities, lumber puncture etc.
- He/she 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.

TEACHING AND LEARNING METHODS

Although didactic lectures are of least importance, such lectures may be taken by senior faculty on newer areas in which expertise is available. Emphasis may be made on presenting seminars, journal clubs, symposia, reviews and guest lectures and they should get priority for theoretical knowledge. Bedside teaching, grand rounds, interactive group discussions and clinical demonstrations, CPCs should be the hallmark of clinical/ practical learning. Student should have hand-on training in performing various procedures in ENT on Simulated models and cadavers before practicing on the patient, *albeit* under supervision and develop ability to interpret various tests/investigations. Exposure to newer specialized diagnostic/therapeutic procedures concerning his ENT should be given. During the course, the students are expected to participate in scientific meetings, paper presentations and hands on workshops to enhance clinical exposure.

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TEACHING METHODS:

The following learning methods are to be used for the teaching of the postgraduate students:

1. Journal Club
2. Paper presentation/discussion
3. Seminar: Lecture/discussion: Lectures on newer topics by Faculty, in place of seminar/as per need.
4. Case presentation in the ward
5. Afternoon Special clinics (such as vertigo/otology Tumour clinics).
6. Surgico-pathological Conference: Special emphasis is to be made on the surgical pathology and the radiological aspects of the case in the pathology department. Such exercises help the ENT/Pathology/Radiology Residents.
7. Combined Round/Grand Round: These exercises are to be done for the hospital once/week or twice/month involving presentation of unusual or difficult patients. Presentations of cases are to be done in Clinical Combined Round and a clinical series/research data on clinical materials for benefit of all clinicians/Pathologists/other related disciplines once in a week or fortnightly in the Grand Round.
8. Community camps: For rural exposure and also for experience in preventive aspects in rural situation/Hospital/School, Patient care camps are to be arranged 2-3/year, involving Residents/Junior faculty.
9. Emergency situation: Casualty duty to be arranged by rotation among the PGs with a faculty cover daily by rotation.

Speciality clinics:

1. **Vertigo Clinic**: All the patients of vertigo attending ENT OPD/referred cases are worked up in details by the Junior Residents and are discussed with one/two Faculty and treatment decided upon.

2. **Tumour clinic/Head-neck Cancer Clinic:** In collaboration with the Radiotherapy Department, the patients with head and neck cancer in the field of ENT and Head and Neck are worked up by the Junior Resident and discussed about the their management by the ENT as well as Radiotherapy Consultants and treatment decision, made.

3. **Rhinology Clinic**: For patients with sinus diseases and nasal deformity for rhinoplasty - presented and discussed. Decision for FESS/Rhinoplasty or only other treatment taken.
4. **Otology Clinic:** The ear cases are thoroughly investigated and are discussed by the Junior Residents with the faculty for their management/discussions are made after each case is presented. Audiologist also participates in this clinic.

Clinical training for patient care management and for bedside manners:

Bedside patient care discussions are to be made daily for half to one hour's duration during ward round with faculty and 1-2 hours in the evening by senior resident/Faculty on emergency duty. Faculty should take Teaching Rounds by Rotation

1. **Death Cases:**

   The records of such cases are presented by Senior Residents. The Junior Residents are encouraged to participate actively in the discussion in the presence of Faculty of ENT and Hospital Administration. This programme helps to take corrective measures as well as to maintain accountability in patient management.

2. **Clinical Teaching**:

   In OPD, Ward rounds, Emergency, ICU and the Operation Theatres: Residents/Senior Residents and Faculty on duty in respective places - make discussion on clinical diagnosis/surgical procedures/treatment modalities, including post operative care and preparation discharge slip.

   The student should compulsorily undergo a basic life support course where the skills of endotracheal intubations and tracheotomy are reinforced. This may be assisted by the use of dummies and mannequins.

. Clinical interaction with audiologists/speech therapist: Clinical interaction with Audiologist/speech therapist pertaining to management of the patients with audiological/speech problems are to be made/discussion arranged. Audiologic methods and therapy strategies are to be made known to Resident doctors.

3. General lectures:

Courses and Lectures are to be arranged for the residents for language proficiency by humanity teachers besides few lectures on human values and ethical issues in patient care.

4. Writing Thesis:

Thesis progress is presented periodically and discussion held in the department. Guides/co-guides are to hear the problems of the candidate; can provide assistance to the student. Progress made or any failure of the candidate may be brought to the notice of college Dean/Principal.

5. Cadaveric dissection Lab:

Cadaveric temporal bone. Nose and paranasal sinuses and head and neck dissections must be arranged in the Departmental Laboratory and/or in the Anatomy Department for learning surgical anatomy by dissection as well as for learning different operative procedures under faculty supervision and independently (for middle ear operations using operating microscope and for other head and neck surgical procedures including endoscopic (FESS) sinus surgery using endoscopes during 2nd and 3rd year of Residency on a regular basis before/during exposure of particular batch of students to real operative procedures in patients.

ASSESSMENT

FORMATIVE ASSESSMENT, during the training programme

The formative evaluation should be done by the following:

- Using structured and objective methods
- Maintenance of Log book including evaluation reports of seminars, journal clubs, case presentations etc. which should be evaluated at the time of presentation and entered in Logbook
- The candidate should be trained on cadavers, and anatomical sections for skill development
- Use of simulators for developing clinical and surgical skills would form a part of formative evaluation.
- The candidate should be routinely evaluated for subject knowledge, professional competence, skill demonstration, communicational skills and his attitude to new

learning skills using the conventional method of evaluation as well as Objective Structured Clinical Examination, wherever feasible.

END ASSESSMENT, at the end of the training programme

Postgraduate examination (50% marks for theory and 50% marks for clinical/practical).

The Examination for the degree (MS-ENT) shall consist of:

1. Thesis
2. Theory Examination: 04 Papers
3. Practical Examination: - Clinical, Oral, instruments/specimen/X-rays.

1. Thesis:

Thesis, to be submitted by each candidate at least six months before the theoretical and 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; on the acceptance of the thesis by two examiners, the candidate shall appear for the final examination.

2. Theory:

There shall be four papers, each being of three hours duration.
Each paper may have 8-10 short questions from the curriculum.

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. Practical Examination:

a) Identification of Surgical Pathology, excised specimens and discussion, reading X-rays and CT Scan/MRI.

Identification of Instruments and discussion, interpretation as audiovestibular investigations such as audiogram, ABR, ENG etc. simulated surgical situation/steps of operative procedures, required instruments/discussion.

b) Clinical Patient presentation /discussion:

1. One long case: The long case will be structured, comprising – history taking, clinical examination, investigations, decision making, proposed treatment modalities, ethical justification and personal attributes.
2. Two short cases: The short cases will also be structured in which only one particular system may be considered and therapy decision/discussion, made.

Note: Modifications may be made in the method of practical examination to bring about objectivity in the exam and an attempt may be made to eliminate individual bias in the conduction of the exam. **The formative evaluation should be done by using structured and objective methods (as described earlier) while the summative evaluation should be done by a competency based evaluation which should evaluate the subject knowledge, professional competence, skill demonstration, communicational skills and his attitude to new learning skills using the conventional method of evaluation as well as Objective Structured Clinical Examination, wherever feasible.**

Recommended Reading:

Books

Journals

SYLLABUS/CURRICULUM
POSTGRADUATE COURSES

M.D.RADIODIAGNOSIS

Similar syllabus is prevalent in most of the universities in India and in the region.

Syllabus is a dynamic document and evolves over a period of time in view of new information, inputs, research findings and teaching methodologies. For example, the Clinical Skills Laboratory, OSCE and OSPE were not in vogue at the time of launch of the MBBS course; however it has been subsequently included in the syllabus.

As such, proposed PG syllabus too is open to revision in light of new inputs in future.

M.D. Radiodiagnosis

1. Specific Title:

M.D. Radiodiagnosis.

2. Objectives:

The three year course in Radiodiagnosis is aimed at imparting training in both conventional radiology and modern imaging techniques so that the candidate is fully competent to practice, teach and do research in the broad discipline of radiology including ultrasound, Computed Tomography and Magnetic Resonance Imaging. Candidate should be well versed with medical ethics and consumer protection act and the Prenatal Diagnostic legislation.

A resident on completing his/her MD (Radiodiagnosis) should have acquired good basic knowledge in the various sub-specialties of radiology such as Neuro-radiology, GI-radiology, Uro-radiology, Vascular- radiology, Musculoskeletal, Interventional radiology, Emergency radiology, Pediatric radiology and Mammography, and be able to

- Independently conduct and interpret all routine and special radiological and imaging investigations.
- Provide radiological services in acute emergency and trauma including its medico legal aspects.
- Elicit indications, diagnostic features and limitation of application of ultrasonography, CT and MRI and should be able to describe proper cost-effective algorithm of various imaging techniques in a given problem setting.
- Perform (under supervision) basic image guided interventional procedures for diagnosis and therapeutic management.
- Formulate basic research protocols and carry out research in the field of radiology related clinical problems.
- Undertake further specialization in any of the above mentioned branches in Radio-diagnosis such as Gastrointestinal radiology, Uro-radiology, Neuro-radiology, Vascular radiology, Musculoskeletal radiology, Interventional radiology etc.
- To interact with other specialists and super-specialists so that maximum benefit to the patient accrues.
- Work as a Senior Resident/consultant in Radiodiagnosis and conduct the teaching programme for undergraduates, postgraduates as well as paramedical and technical personnel.
- Organize CME in the specialty utilizing modern methods of teaching and

evaluation.

3. General Entry Requirements:

- Successful completion of an undergraduate Medical degree (MBBS) with completion of Compulsory Rotating Internship.
- Registration with Medical Council.

A Merit List will be compiled based on All India NEET and admission is given accordingly

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4. Programme Duration:

The period of training for M.D. and M.S. courses shall be three years after registration of the candidate Any candidate, after registration for any of the Degree/Diploma course, can not have a break of more than three months (six months in case of medical emergencies like pregnancy during residency period) at a stretch during the period of training and must appear in the final examination with in 5 years of the date of his registration, failing which his/her registration shall be treated as cancelled automatically.

Further, if a candidate selected for the course is subsequently appointed for Government service and if she/he discontinues the studies during the tenure up to three years as Resident/Registrar, his/her registration shall continue provided he/she has got such appointment with permission to pursue his/her studies in the same subject, failing which his/her registration shall be treated as cancelled automatically.

Course	**Full-Time**
Master's Degree (MD)	*6 Semesters*

5. Assessment

All the PG residents are assessed daily for their academic activities and also periodically.

5.1. General Principles

The assessment is valid, objective, and reliable.
It covers cognitive, psychomotor and affective domains.

Formative, continuing and summative (final) assessment is also conducted in theory as well as practicals. In addition, dissertation is also assessed separately.

5.2. Formative Assessment

The formative assessment is continuous as well as end-of-term. The former is based on the feedback from the senior residents and the consultants concerned. All the consultants of the unit in which resident is working will give marks based on performance. These marks will be summated over a period of tenure. End-of-term assessment is held at the end of each semester (upto the 5th semester). Formative assessment will provide feedback to the candidate.

5.3. Internal Assessment

The performance of the Postgraduate student during the training period should be monitored throughout the course and duly recorded in the log books as evidence of the ability and daily work of the student. Marks should be allotted out of 100 as followed.

Sr. No.	Items	Marks
1.	Practical Work	25
2.	Academic activities	25
3.	End of term theory examination	25
4.	End of term practical examination	25

(1) Practical Work:

Availability: Punctual, available continuously on duty, responds promptly on calls and takes proper permission for leave.

Diligence: Dedicated, hardworking, does not shirk duties, leaves no work pending, does not sit idle, competent in clinical case work up and management.

Academic ability: Intelligent, shows sound knowledge and skills, participates adequately in academic activities, and performs well in oral presentation and departmental tests.

Clinical Performance: Proficient in clinical presentations and case discussion during rounds and OPD work up. Preparing documents of the case history/examination and progress notes in the file (daily notes, round discussion, investigations and management) Skill of performing radiological procedures and handling emergencies.

(2) Academic Activity: Performance during presentation at Journal club/ Seminar/ Case discussion/Stat meeting and other academic sessions. Proficiency in skills as required.

(3) End of term theory examination conducted at end of 1st, 2nd year and after 2 years 9 months

(4) End of term practical/oral examinations after 2 years 9 months.

Marks for **clinical work** should be given annually by all the consultants under whom the resident was posted during the year. Average of the three years should be put as the final marks out of 25.

Marks for **academic activity** should be given by the all consultants who have attended the session presented by the resident.

The Internal assessment should be presented to the Board of examiners for due consideration at the time of Final Examinations.

5.4. Summative Assessment

Ratio of marks in theory and practicals will be equal.
Thepass percentage will be 50%.
Candidate will have to pass theory and practical examinations separately

A. Theory Examination (Total= 400)

Paper	Title	Marks
Paper 1	Basic sciences related to radiology	100
Paper 2	Principles and practice of Radio-diagnosis	100
Paper 3	Radio-diagnosis as related to pathology	100
Paper 4	Recent advances & radiology as applied to other specialties	100

Each paper should have two long questions of 25 marks each and 5 of 6 short notes of 10 marks each.

B. Practical Examination and Viva voce (Total=400)

Clinical Exam	Number	Marks
Long Case	One	100
Short case	Two	100
Imaging spots + Rapid reading of selected films	Thirty + twenty	60+40
Radiation Physics Viva		50
Practical Radiography / USG demonstration		50

FINAL ASSESSMENT (Total=1000)

Theory	400
Practicals and Viva voce	400
Dissertation	100
Internal Assessment	100
Total Marks:	1000

6. Plan of Study:

6.1. General Principles

- Acquisition of practical competencies being the keystone of postgraduate medical education, postgraduate training is skills oriented.
- Learning in postgraduate program is essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

6.2. Teaching Sessions

In addition to conducting and reporting of routine and special investigation in the area of posting under direct supervision, formal teaching session to be held on working days. These include seminars in physics and general radiology, journal clubs, case presentations; Interdepartmental meets, Film reading session.

6.3 Teaching schedule

The suggested teaching schedule of the department will be as follows:

1. Seminar — Once a week
2. Film Reading — Once a week
3. Case presentation — Once a week
4. Inter department meet — Once a week
5. Journal club — Once a week
6. Film Reading / Physics Seminar — Once a week

Lectures on different topics are given by the consultants every month.

All sessions are attended by the faculty members. All PGs are supposed to attend the

sessions except the ones posted in ICU and emergency.

All the teaching sessions are assessed by the consultants at the end of session and kept in the office for internal assessment.

The PG students will be involved in clinical teaching of undergraduate students from the first year whereas the PG students in the third year will take undergraduate classes in the evenings. This helps them to prepare and make them confident in clinical presentation. The undergraduate students are encouraged to clarify their doubts and sharpen their clinical skills.

Ward rounds may be service or teaching rounds. Service rounds should be taken every day for the care of patients and every unit should have grand rounds for teaching purpose. Entry of both the rounds should be made in Log Book.

Recommended that at least two CME programmes should be attended by each student during the three year tenure.

Attending conferences is encouraged although it is optional.

6. Postings

The postgraduate student should be posted in all sections (Conventional radiology, U/S, CT, MRI etc.) so that there is adequate exposure to all modalities.
The proposed duration of postings is as under:

Conventional	6 months
-U/S	15 tmonths
-CT / MRI	15 tmonths

SCHEDULE FOR ROTATION OF RESIDENTS

Semester						
I	Musculoskeletal	Emergency	US	US	Chest	Chest
2	GU	GU	GIT	GIT	CT	CT
3	US	US	Chest	Musculoskeletal	Emergency	Emergency

4	CT	CT	US/CT Intervention	US	MRI	MRI
5	GIT	GIT	US	US/CT Intervention	CT	CT
6	MRI	MRI	US	Chest	Elective	Elective

Contact Hours:

Hours/day	**3**
Days /week	**5**
Duration (weeks)	continuous
Hours/3 years (40 weeks / year)	1800

Hours of Clinical Practice (Total : 1800) :

Year	Supervised (hours)	Independent (hours)
First	600	nil
Second	400	200
Third	100	500

The clinical service to be provided by the trainees will depend upon the following conditions:

1. The student's stage in the course.
2. The student's individual proficiency.
3. The complexity of the procedure/ intervention.
4. Relevant co-morbid factors.
5. The patient's express and informed consent.

The final decision will be at the discretion of the supervising faculty in concurrence with the unit head.

8. Dissertation:

Every candidate shall carry out work on an assigned research project under the guidance of a recognized postgraduate teacher, the project shall be written and submitted in the form of a Dissertation.

Every candidate shall submit Dissertation plan to the University within time frame set by university.

Dissertation shall be submitted to the University six months before the commencement of final theory examination i.e. for examination May/June session, 30th November of the preceding year of examination and for November/December session 31st May of the year of examination.

The student will

- Identify a relevant research problem
- 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.

Dissertation : Marking Scheme:

Serial No.	Items	Marks
1	Topic and Title	10
2	Introduction	15
3	Critical Review of literature related to research topic	15
4	Critical appraisal of methods and materials applied to the research topic	15
5	Capability to apply observational methods to interpret and analyse the data	15
6	Capability on drawing conclusion (Discussion)	20
7	Bibliography / References	10
	Total	100

9. Syllabus (Standard Implementation Plan: detailed in logbook)

During the training period, efforts are always made that adequate time is spent in teaching the students skill required for performing basic radiological procedures and making them accustomed to handling difficult and critical diagnoses.

9.1. Theory

Basic science related to the specialty of Radiodiagnosis

Radiation Physics and Radiation Biology

* Introduction to general properties of radiation
* Production of X-Ray
* Characteristic properties of X-Ray
* Interaction of X-Rays with matter and their effects
* Units of radiation, radiation measurement
* Image receptors . X-Ray film, intensifying screen
* Formation of radiographic image
* X-Ray equipments .Conventional X-Ray Units, Fluoroscopy units (conventional, image intensifier), Advanced imaging equipments. US, CT, MRI, Angiography, cine fluoroscopy and cine angiography
* Film procession dark room equipments and procedures-manual, automatic,
* Day light processing
* Ultrasound Physics: Principe, transducer composition & types, sonography equipment details.
* CT Physics: Principle, various generations of CT, Advances in CT.
* MRI Physics: Principle, Types, Different protocols.

Quality assurance

Radiation hazards and radiation protection

Contrast media . types, chemical composition, mechanism of action, dose schedule, route of administration, adverse reaction and their management.

Nuclear Medicine. Diagnostic use of important isotopes in different organ systems.

Instruments/equipment in Nuclear Medicine and their recent advances.

Picture archiving and communication system (PACS) and Radiology information system (RIS) to make a film less department.

Respiratory System

Disease of the chest wall, diaphragm, pleura and airway; pulmonary vasculature; pulmonary; infections; pulmonary neoplasm; diffuse lung disease; mediastinal disease; chest trauma; post-operative and intensive care imaging.

Gastrointestinal (GIT) and Hepato-Biliary-Pancreatic System

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 hepato-biliary-pancreatic system. Conventional and other imaging methods like US, CT, MRI, DSA and isotope studies pertaining to these systems.

Genito-Urinary System

Various diseases and disorders of genito-urinary system. These include: congenital inflammatory, traumatic, neoplastic, calculus disease and miscellaneous conditions. He/she should also be able to perform and interpret conventional and other diagnostic imaging procedures used to evaluate urinary tract pathology i.e., ultrasound, CT, MRI, angiography. He/She should be able to perform vascular/non-vascular interventions of genito-urinary system.

Musculoskeletal System
Imaging (Conventional, Ultrasound, CT, MRI, angiography, Radio-isotope studies) and interpretation of disease of muscles, soft tissue, bones and joints including congenital inflammatory, traumatic, metabolic and endocrine, neoplastic and miscellaneous conditions.

Cardiovascular Radiology
Diseases and disorder of cardiovascular system (congenital and acquired conditions) and the role of imaging by conventional radiology, ultrasound, Color-Doppler, CT, MRI, angiography radio nuclide studies.

Neuro-Radiology
Includes imaging (using conventional and newer methods) and interpretation of various diseases and disorders of the head, and spine covering congenital, infective, vascular, traumatic and neoplastic conditions. This will also include disease of the eye and ENT.

Radiology Emergency Medicine
The student should be able to evaluate emergency radiographic examinations with reasonable accuracy and have clear understanding of the protocol of imaging in emergency situations of different organ systems.

Mammography and Breast Intervention
Role of screen film mammography (conventional and digital) in screening of breast cancer, benign and malignant lesions of the breast.

General Radiology

Conventional Radiology
The student should be able to evaluate conventional radiographs including radiographs on chest abdomen, pelvis, skull (including PNS + Orbit), spine, musculoskeletal and soft tissues. Student should be able to perform radiography of different body parts.

Ultrasound
The student should be able to perform and interpret all ultrasound studies. These studies include: abdomen, pelvis, small parts, neonatal head, breast, color-duplex imaging (arterial and venous studies), obstetric/gynecology and intervention procedures using ultrasound guidance.

CT
* Select CT protocol according to the clinical diagnosis.
* Demonstrate knowledge of the CT finding of the common pathological conditions.
* Interpret conventional and modified body CT examinations.
* Know limitations of CT in the diagnosis of certain diseases.
* Perform CT guided simple interventions (under supervision)

Angiography
The student should be able to interpret and preferably perform (under supervision) routine angiographic procedures and vascular interventions.

MRI
* Select MRI protocol according to the clinical diagnosis
* Knowledge of conventional and modified MRI examinations, including MRA, MRV, MRCP, MRS.
* Demonstrate knowledge of the MRI of the common pathological conditions.

Interventional Radiology
The student should be able to perform (under supervision) simple interventional `procedures of all the organ systems.

9.2. Practical

Practical Schedule –Physics
- Film characteristics
- Effectiveness of Lead Apron and other protective Devices
- Beam parameters check
- Optical Radiation field alignment
- Assessment of Scatter radiation
- Quality control of X-rays and Imaging equipments
- Evaluation of performance of a film processing unit

Practical radiography
- Dark room techniques
- Radiography of the extremities
- Radiography of the spine, abdomen, pelvic girdle and thorax
- Radiography of the skull
- Contrast techniques and interpretation of GI tract, biliary tract, etc.
- Contrast techniques and interpretation of the Genito-urinary system
- Contrast techniques and interpretation of the central nervous and Cardiovascular system
- Miniature radiography, Macro-radiography and magnification techniques
- Dental and portable radiography

Anatomy
Gross and cross sectional Anatomy of all the body systems

Pathology
Gross morphology of pathological condition of various systems

Contrast Media
Their types, formulations, mechanism of action, dose schedule, routes of administration, adverse reactions and their management.

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SGT Medical College, Hospital & Research Institute

(A Constituent of SGT University)

Budhera, Gurugram-Badli Road, Gurugram (Haryana) – 122505 Ph. : 0124-2278183, 2278184, 2278185

Minutes of meeting of board of studies of the department of obs. and gynae was held on 10/12/2019

In the department of obs. and gynae at SGT medical college Hospital at 2:00 pm

Following member attended the meeting

Dr.S.P.S. Kochar Prof. & HOD Chairman

Dr. B. Das Prof.

External Experts

Dr R.D.Wadhwa

SH medical college hospital Mewat, Haryana

Dr.Garima

ASOCIATE Prof. Dept of Obst &Gynae VMMC

Certification for the course M.S.(obs. and Gynae) was placed before the board

The board passed the curriculum for the M.S.(obs. and Gynae) course after due deliberations .

Dr. S.P.S. Kochar
Prof. & HOD Dept of Obst &Gyn
SGT Med College

DrBDas
Prof. Dept of Obst &Gyn
SGT Med College

Dr R.D.Wadhwa(Prof and Dean)
SH medical college hospital Mewat, Haryana

Dr.Garima
ASOCIATE Prof. Dept of Obst &Gyn
VMMC

Prof. & HOD
Deptt. of Obs & Gynae
SGT University Budhera, Gurugram

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.

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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.

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- 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.

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- 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.

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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

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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.

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- 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.

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- 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:

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- 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 once (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

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- 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 3rd stage of labor - retained placenta, inversion of uterus, rupture of uterus, post partum hemorrhage.

3. Post Partum

- Complication of 3rd 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 purpureum - sepsis, thrombophlebitis, mastitis, psychosis.

  Hematological problems in Obstetrics including coagulation disorders. Use of blood and blood components/products.

4. Operative Obstetrics:

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- 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

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- 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 (galoctorrhea), 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 Gyanecology
  - **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.

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- 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.

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- 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.

1st term - ***working under supervision of senior residents and teaching faculty.***

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2nd & 3rd term- ***Besides patient care in O.P.D., wards, Casualty and labor room, carrying out minor operations under supervision and assisting in major operation.***

4th 5th & 6th 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.

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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:

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- 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 - Thrnbull
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

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Annexure I

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

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SGT Medical College, Hospital & Research Institute
(A Constituent of SGT University)
Budhera, Gurugram-Badli Road, Gurugram (Haryana) – 122505 Ph. : 0124-2278183, 2278184, 2278185

DEPARTMENT OF PEDIATRICS

MINUTES OF MEETING

The meeting of the Board of Studies, Department of Pediatrics was held on 12.12.2019 at 02:30 PM in Room No. 212, Department of Pediatrics

The following members were present

1. Dr. Pankaj Abrol- Convener
2. Dr. Anita Sharma- Member
3. Dr. Shashi Sharma- Member
4. Dr. Satya Kiran Kapur – Member
5. Dr. Richa – Member
6. Dr. T.P Yadav – External Member
7. Dr. Anand Kumar Bhardwaj – External Member

The agenda discussed was consideration of Syllabus, curriculum and evaluation scheme for MD Pediatrtics.
The Board deliberated in details and approved the syllabus, curriculum and scheme of evaluation for MD Pediatrics placed at Annexure- I

Dr. Pankaj Abrol
Professor & Head
(Convener)

Dr. T. P Yadav
Professor, Pediatrics
(External Member)

Dr. Anand Kumar Bhardwaj
Professor & Head
(External Member)

Dr. Anita Sharma
Professor, Pediatrics
(Member)

Dr. Shashi Sharma
Professor, Pediatrics
(Member)

Dr. Satya Kiran Kapur
Professor, Pediatrics
(Member)

Dr. Richa
Assistant Professor
(Member)

Professor & Head
Department of Paediatrics
SGT Medical College & Hospital,
Budhera, Gurgaon

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(A Constituent of SGT University)
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DEPARTMENT OF PEDIATRICS Date: 05.12.2019

OFFICE ORDER

The Board of Studies, Department of Pediatrics, SGT University is being constituted as below:

1. Dr. Pankaj Abrol- Convener
2. Dr. Anita Sharma- Member
3. Dr. Shashi Sharma- Member
4. Dr. Satya Kiran Kapur – Member
5. Dr. Richa – Member
6. Dr. T.P Yadav – External Member
7. Dr. Anand Kumar Bhardwaj – External Member

Professor & Head
Dept. of Pediatrics

Copy to:
1. Dean FMHS
2. All PG Board Members

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Department of Paediatrics
SGT Medical College & Hospital,
Budhera, Gurgaon

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(A Constituent of SGT University)
Budhera, Gurugram-Badli Road, Gurugram (Haryana) – 122505 Ph. : 0124-2278183, 2278184, 2278185

DEPARTMENT OF PEDIATRICS Date: 06.12.2019

MEETING NOTES

A meeting of Board of studies of Department of Pediatrics is scheduled to be held on 12.12.2019 at 02:30 PM in the office of the undersigned in room No. 212 to consider MD Pediatrics syllabus curriculum and scheme of evaluation of SGT University.

Professor & Head
Dept. of Pediatrics

Copy to:
1. Dean FMHS
2. All Members of PG Board of Studies

Professor & Head
Department of Paediatrics
SGT Medical College & Hospital,
Budhera, Gurgaon

Annexure – I

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.

SUBJECT SPECIFIC OBJECTIVES

The objectives of MD Course in Pediatrics 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 Pediatrics 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

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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 car, 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.

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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

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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 heir 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

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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. Conducing clinical sessions for undergraduates medical students
iv. Desirable: writing and presenting a paper. Teaching sessions for nurses and medical workers

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Syllabus

I 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.
- Vaccination
- 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
- Failure to thrive and short stature
- ADHD.
- Sexual maturation and its disturbances
- Autism (as mentioned in objective 24)

Neonatology

- Perinatal care
- Care in the labor room and resuscitation
- Prematurity
- Hypothermia
- Infections
- Low birth weight
- Newborn feeding
- Respiratory distress
- Apnea
- Anemia and bleeding disorders

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- Jaundice
- Neurologic disorders
- Renal disorders
- Thermoregulation and its disorders

- Gastrointestinal disorders
- Malformations
- Understanding of perinatal medicine

Nutrition

- Maternal nutritional disorders; weight impact on fetal outcome
- Infant feeding including deficiencies complementary feeding
- Protein energy malnutrition
- Adolescent nutrition
- Nutritional management of systemic illness (gi, hepatic, renal illness)

- Nutrition for the low birth
- Breast feeding
- Vitamin and mineral
- Obesity
- Parenteral and enteral nutrition

Cardiovascular

- Heart diseases Congenital (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, **tract tonsils** and adenoids
- Congenital anomalies of lower respiratory tract
- Foreign body in larynx, trachea and bronchus
- Subglottic stenosis (acute, chronic)
- Bronchial asthma
- Acute pneumonia
- Recurrent, interstitial pneumonia
- Atelectasis, pneumothorax
- Pleural effusion, empyema.

- **Infections of upper respiratory**
- 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
- Peptic ulcer disease
- Intestinal obstruction
- Malabsorption syndrome
- Irritable bowel syndrome
- Hirschsprung disease
- Hepatitis
- Chronic liver disease
- Metabolic diseases of liver

- Disorders of deglutition and esophuags
- Congenital pyloric stenosis
- Acute and chronic pancreatic disorders
- Acute and chronic diarrhea
- Inflammatory bowel disease
- Anorectal malformations
- Hepatic failure
- Budd-chiari syndrome
- Cirrhosis and portal hypertension

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Nephrologic and Urologic disorders

- Acute and chronic glomerulonephritis
- Hemolytic uremic syndrome
- Vur and renal scarring
- Renal tubular disorders
- Congenital and hereditary renal disorders
- Posterior urethral valves
- Undescended testis, hernia, hydrocoele

- ☐ Urinary tract infection
- ☐ Involvement in systemic diseases
- ☐ Neurogenic bladder, voiding dysfunction
- ☐ Renal and bladder stones
- ☐ Hydronephrosis

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, Wilms tumor

- ☐ Hemolytic anemias
- ☐ Pancytopenia
- ☐ Disorders of hemostasis
- ☐ Transfusion related infections
- ☐ Acute and chronic leukemia
- ☐ Lymphoma
- ☐ Hypercoagulable states

Endocrinology

- Hypopituitarism/hyperpituitarism
- Pubertal disorders
- Adrenal insufficiency
- Adrenogenital syndromes
- Hypoglycemia
- Gonadal dysfunction and intersexuality

- ☐ Diabetes insipidus
- ☐ Hypo – and hyper-thyroidism
- ☐ Cushing's syndrome
- ☐ Diabetes mellitus
- ☐ Short stature
- ☐ Obesity

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Infections

- Bacterial (including tuberculosis) ☐ Viral (including HIV)
- Fungal ☐ Parasitic
- Rickettssial ☐ Mycoplasma
- Protozoal and parasitic ☐ Nosocomial infections
- Control of epidemics and infection prevention ☐ Safe disposal of infective material

Emergency and Critical Care

- Emergency care of shock ☐ Cardio-respiratory arrest
- Respiratory failure ☐ Acute renal failure
- Status epilepticus ☐ Acute severe asthma
- Fluid and electrolyte disturbances ☐ Acid-base disturbances
- Poisoning ☐ Accidents
- Scorpion and snake bites

Immunology and Rheumatology

- Arthritis (acute and chronic) ☐ Vasculitides
- Immunodeficiency syndromes ☐ Systemic lupus erythematosus

ENT

- Acute and chronic otitis media ☐ Hearing loss
- Post-diphtheritic palatal palsy ☐ Acute/chronic tonsillitis/adenoids
- Allergic rhinitis/sinusitis ☐ Foreign body

Skin Diseases

- Exanthematous illnesses ☐ Vascular lesions
- Pigment disorders ☐ Vesicobullous disorders
- Infections ☐ Steven-johnson syndrome
- Atopic, seborrheic dermatitis ☐ Drug rash
- Alopecia ☐ Icthyosis

Eye problems

- Refraction and accommodation ☐ Partial/total loss of vision
- Cataract ☐ Night blindness, xerophthalmia
- Strabismus ☐ Conjunctival and corneal disorders
- Disorders of retina, including tumors

Behavioral and Developmental disorders

- Rumination, pica ☐ Enuresis, encopresis
- Sleep disorders ☐ Habit disorders
- Breath holding spells ☐ Anxiety disorders
- Mood disorders ☐ Temper tantrums
- Attention deficit hyperactivity disorders ☐ Autism (as mentioned in objective 24)

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Orthopaedics

- Major congenital orthopedic deformities
- Common bone tumors

☐ Bone and joint infections

II. 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

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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	Once a week
• Seminar	Once a fortnight
• Case discussions	once a month
• Interdepartmental case or seminar [Cardiology, Pediatric Surgery]	Once a month

- 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,

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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
Posting 15 days each.

- 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 2nd yr	Mid-term presentation
6 months prior to examination	Final presentation; submission

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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

Cluster I: Nutrition, Growth and Development, Immunization, Infectious disease,

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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

Minimum 03-05 International Journals and 02 national (all indexed) journals

A. International Journals

1. Pediatrics
2. The Journal of Pediatrics
3. Archives of disease in childhood
4. Pediatric clinic of North America
5. Pediatric Research
6. The Pediatric infectious disease Journal

B. National Journals

1. Indian Pediatrics
2. Indian Journal of Pediatrics
3. Journal of Neonatology
4. Pediatric Hematology Oncology Journal

Annexure I

Orientation sessions for PG students joining MD in Pediatrics

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

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Pediatric PGs

Introduction to Residency in Pediatrics (Seminars)

- 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

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Annexure II

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**

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Department of Paediatrics
SGT Medical College & Hospital,
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