UNIVERSITY OF HEALTH SCIENCES LAHORE

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NOTIFICATION

The Syndicate has, in exercise of its powers under section 27 (1) of UHS Ordinance 2002, approved the Revised Syllabi, Table of Specifications and OSPE format for First Professional MBBS Part-I and Part-II Examinations, in the subjects of Anatomy including Histology, Physiology and Biochemistry, to be implemented with effect from the academic session 2013-2014 and onwards.

REGISTRAR

No. UHS/REG-13/3446 Dated: 13-12-2013

Copy forwarded for information to:

i. Principals/Heads of the Affiliated Medical Colleges for information of the Faculty and students
ii. Controller of Examinations
iii. Director (I.T.)
iv. PSO to Vice Chancellor
v. PS to Registrar

Encl. As above

REGISTRAR

SYLLABUS, ToS & OSPE

M.B.B.S.

FIRST PROFESSIONAL

PART-I

ANATOMY INCLUDING HISTOLOGY

"GROSS ANATOMY"

The study of gross anatomy must lay emphasis on applied anatomy as related to clinical medicine and surgery. For teaching, actual dissection of cadaver, dissected specimens, models, and computer aided programs shall be used. Normal images of different diagnosis techniques i.e. X-rays and CT scans, MRI and Ultra-sonography shall also be introduced.

The time for dissection of the cadaver for each region is as under:

Upper Limb	-	12 weeks
Lower Limb	-	12 weeks
Thorax	-	8 weeks

"GENERAL ANATOMY"

After the end of the course, the students are able to:

1. **Explain anatomical terms and sectional planes of the body.**
2. **Skeletal System:**
    1. Classify the skeleton system (appendicular and axial).
    2. Classify bones on the basis of shape, size, evolution, structure, development, region and miscellaneous
    3. Describe general features of bones of human body
    4. Explain the functions of bones
    5. Discuss the general concepts of ossification and growth of bones.
    6. Describe the blood supply of bones
    7. Comprehend clinical correlates of skeletal system (fractures, rickets, osteoporosis, osteomalacia, sternal puncture, avascular necrosis, radiological appearance of bone, cartilage and fractures)
3. **Joints:**
    1. Explain the basis of classification of joints.
    2. Discuss the characteristics, types and movement of synovial, cartilaginous and fibrous joints.
    3. Mention and describe the factors responsible for the stability of joints.
    4. Explain general principles of blood and nerve supply of joints.
    5. Understand, describe, and analyze different clinical scenario resulting into dislocation of joints.
4. **Muscles:**
    1. Describe different terms related to muscles.
    2. Comprehend the basis of classification of muscles.
    3. Describe general principles of blood and nerve supply of muscles.
    4. Explain sprain, spasm, trophic degeneration and regeneration changes
    5. Define and explain the mechanism of sprain and spasm.

6. Comprehend and explain the function of synovial structures related to muscles (tendon sheaths, bursae)
7. Understand and describe different form of fibrous structures occurring in skeletal muscles (aponeurosis, tendon, raphae)

5. Circulatory Systems:

1. Give the classification of circulatory systems (cardiovascular, lymphatic)

a) Cardiovascular System:

1. Understand and describe different types of cardiovascular circulation (Systemic, Pulmonary and Portal)
2. Understand and explain the classification and structures of different types of blood vessels.
3. Define, understand and classify anastomoses with examples and their clinical correlates

b) Lymphatic System:

1. Define and describe components of lymphatic system (lymph nodes and lymph vessels)
2. Comprehend the mechanism of production and circulation of lymph.
3. Describe the functions of lymphatic system and its role in spread of infection and cancer

6. Nervous System:

1. Name different components of nervous tissue (neuron, ganglion, nuclei, nerve, tracts)
2. Define and classify different types of nervous system (Somatic and Autonomic)
3. Enumerate different parts of somatic nervous system, their morphology and functions (central nervous system and peripheral nervous system).
4. Describe the formation and distribution of a typical spinal nerve.
5. Discuss the nerve plexus formation; define dermatomes and give their clinical importance.
6. Enumerate and describe different parts of autonomic nervous system and their functions (sympathetic nervous system and parasympathetic nervous system).
7. Define and comprehend reflex, reflex arc and referred pain.

7. Skin and Fascia:

1. Name different types of skin and mention its components (dermis and epidermis).
2. Enumerate its appendages and give their function (hair, nail, arrector pili muscles, sebaceous and sweat glands).
3. Comprehend and describe the structure and function of superficial and deep fasciae including retinaculae and septae.
4. Describe the skin lines and their significance.
5. Give clinical significance of discolouration of skin (jaundice, cyanosis and anemia).

8. Common Diagnostic Techniques used in the study of Human Body

1. Interpret normal radiographs of different regions of the body.
2. Identify displacement of the fracture segments of the bone.
3. Diagnose dislocation of the joints.
4. Understand and interpret ultra-sonographs of abdominal viscera.
5. Understand principle of CT scan and interpret the normal scans.
6. Comprehend MRI and interpret normal images of different diagnosis techniques i.e. X-rays and CT scans, MRI and Ultra-sonography.
7. Take the Biopsy and prepare it for examination.

"Course objectives of Upper & Lower Extremities / Limbs"

After the end of the course, the students are able to:

1. Develop an expertise in prosection and identification of structures in a cadaver
2. Develop clear concepts of the topographic anatomy of the regions.
3. Understand muscle attachments, their actions, nerve supply and effect of paralysis occurring in groups and important individual muscles
4. Develop clear concept of structure and mechanism of joints and the clinical conditions involving them.
5. Understand bones of the appendicular skeleton, their general and special features
6. Recognize and describe the bones of the foot and hand individually, in articulation and in skiagrams.
7. Develop clear concept about common fractures of the bones, displacement of their fragments and, factors causing it.
8. Understand nerve plexuses of limbs, their normal variations and different clinical conditions related to them.
9. **Understand different kinds of injuries to the important nerves of the extremities, the ways these injuries are produced, their effects and clinical tests to diagnose the conditions.**
10. Recognize important superficial veins and their clinical uses.
11. Understand the mechanism by which the blood is pumped from lower limb and anatomical factors which predispose to development of varicose veins.
12. **Understand anatomical relevance to important clinical conditions in the regions.**
13. Understand the scheme of regional lymphatic drainage and vascular supply.
14. Interpret normal skiagrams, C.T. Scans, MRI and Ultrasound.

"Course objectives of Thorax"

On completion of the Gross Anatomy of Thorax the students are able to:

1. Develop an understanding of the topographic anatomy of the region and describe it.
2. Understand and describe the anatomy of the bony thorax and costo-vertebral and other joints of thorax and the mechanism of respiration.
3. Understand and mark the important thoracic viscera and pleural reflections on the surface of the body.
4. Understand the importance of percussion nodes in eliciting the extent of resonant and non resonant viscera and their clinical importance.

5. **Give a precise account of the Anatomy of thoracic viscera, muscles, nerves, blood vessels and fasciae of the region and correlate anatomical information to common clinical conditions.**
6. Understand and describe the scheme of the regional lymphatic drainage and lymph nodes.
7. Interpret normal skiagram, CT scan, MRI and other diagnostic techniques.

"GENERAL HISTOLOGY"

After the end of the course, the students are able to:

1. Enumerate and describe structure of different components of cell.
2. Classify the basic tissues of the body.
3. Classify and describe different types of epithelia with examples.
4. Comprehend and describe surface modification of plasmalemma (intercellular junctions, microvilli, cilia, stereocilia, basal striations).
5. Define, classify and describe different types of connective tissue proper with examples.
6. Comprehend and describe the structures of connective tissue cells, fibers and ground substance.
7. Classify and describe different types of cartilages with examples.
8. Classify bones from histological point of view (spongy and compact), and describe their microscopic structure.
9. Comprehend and describe histogenesis of bone (intramembranous and intracartilagenous).
10. Classify and describe light and electron microscopic structure of muscles (smooth, cardiac and skeletal).
11. Classify and describe the structure of neuron, neuroglial cells and nerve fibre
12. Describe microscopic structure of lymphoid organs (lymph node, spleen, tonsils and thymus) and give their functions.
13. Classify and describe different sub-division of vascular system.
14. Understand and describe microscopic structure of different types of blood vessels.
15. Describe microscopic structure of skin and its appendages (hair follicle, sebaceous and sweat glands) and give their functions.
16. Understand and describe the microscopic structure of mammary gland in different functional stages.
17. Describe the microscopic structure of respiratory system (nasal cavity, epiglottis, trachea, bronchi and lungs) and give the changes in structure correlating these to their functions.
18. Define apoptosis, hypertrophy, atrophy, metaplasia, hyperplasia, anaplasia, neoplasia, necrosis.
19. Identify, draw and label light microscopic structures of above mentioned tissues.

"EMBRYOLOGY"

After the end of the course, the students are able to:

1. Comprehend and describe the process of cell division (mitosis and meiosis) and gametogenesis.
2. Understand and describe ovarian and menstrual cycle.
3. Understand and describe fertilization, cleavage, blastocyst formation and implantation of the embryo (1^{st} week of development).
4. Comprehend and describe stages of early embryonic development in second and third week of intrauterine life.
5. Understand and describe development of embryo (4^{th} - 8^{th} week of development).
6. Comprehend and describe fetal period (9^{th} week to birth).
7. Define and describe fetal structures (amnion, chorion, yolk sac, allantois and umbilical cord)
8. Comprehend and describe formation of placenta, its structure and anomalies.
9. Understand and describe the basis of multiple pregnancies.
10. Understand and describe procedures for assessment of fetal status.
11. Define and understand clinical correlates i.e. anovulatory cycles, semen analysis and abnormal sites of implantation.
12. Understand In-Vitro Fertilization (IVF), assisted in-vivo fertilization.
13. Understand and describe the rationale of choriocarcinoma, pregnancy test, sacro-coccygeal teratoma, hydatidiform mole.
14. Understand the check points of estimation of gestational age and viability of fetus.
15. Understand the basis of intrauterine growth retardation, hydramnios, twin transfusion syndrome, conjoined twins, umbilical cord length variation, and amniotic bands.
16. Define teratogenesis and name common teratogens.
17. Describe the development of Integumentry system including mammary gland and their anomalies.
18. Describe the development of limbs and vertebral column including their anomalies.
19. Understand and describe the development of muscular system and their anomalies.
20. Understand and describe the structural and numerical chromosomal anomalies i.e. Klinefelter syndrome, Turner's syndrome, Super-female, Down's syndrome, Polyploidy.

Clinical Module

1. Describe clinical effects of nerve injuries of the upper and lower limbs
2. Explain the anatomical aspects of fracture of bones of upper and lower limbs (clavicle, humerus, radius, ulna, femur, tibia, fibula, scaphoid) and ribs
3. Explain the anatomical aspects of dislocation of joints of limbs
4. Describe anatomical basis of contracture, ganglia, pulp infection, carpel tunnel syndrome
5. Explain the anatomical basis of femoral hernia, varicose veins, bursitis and lymphadenitis
6. Describe anatomical basis of spread of carcinoma breast
7. Explain clinical importance of coronary circulation with reference to angina and myocardial infarction
8. Define cardiac temponade, pericarditis and paracentesis in relation to anatomical aspects
9. Define pleural effusion pleurisy, pleural tap, pneumothorax, hydrothorax, haemothorax, pneumonia, bronchogenic carcinoma, foreign body in airways in relation to anatomical aspects

RECOMMENDED BOOKS (Latest Edition):

1. General Anatomy by Prof. Tassaduq Hussain Sheikh
2. Medical Histology by Prof. Laiq Hussain Siddiqui
3. Cunningham's Clinical Dissector
4. Di-Fiore Atlas of Histology
5. Clinically Oriented Embryology by Keith L Moore
6. Clinically Oriented Anatomy by Keith Moore.
7. Cunningham's Manual of Practical Anatomy by G.J. Romanes, 15th Ed., Vol-I, II.

REFERENCE BOOKS

1. **Clinical Anatomy** by Snell**.**
2. **Grant's** Dissector of Anatomy.
3. Wheater's Functional Histology
4. **Basic histology** by Junqueira and Carniero
5. **Grant's** Atlas of Anatomy
6. **Langman's embryology**

MBBS 1st Professional Part (I) OSPE

Gross Anatomy, Radiological Anatomy & Embryology

Gross & Radiological Anatomy and Embryology.

1. Total No. of stations 12, each station will have 02 marks and 04 spots of identification.
2. Each station shall be given 1.5 min.
3. Total marks shall be 24.

Gross Anatomy of Upper Limb, Lower Limb, Thorax, Radiological Anatomy & Embryology

Time per station: 1.5 minutes (18 minutes)

Sr.No	Region/Area	Station No	No of Spots	Marks Each Stations
1	Upper Limb	01	04	02
	Upper Limb	02	04	02
	Upper Limb	03	04	02
2	Lower Limb	04	04	02
	Lower Limb	05	04	02
	Lower Limb	06	04	02
3	Thorax	07	04	02
	Thorax	08	04	02
4	Radiological Anatomy	09	04	02
5	Embryology	10	04	02
	Embryology	11	04	02
	Embryology	12	04	02
	Total	**12**	**48**	**24**

HISTOLOGY OSPE AND VIVA

1. There shall be 10 slides fixed on 10 microscopes.
2. They will move from one to the next slide in a predetermined direction.
3. For each station one minute shall be given, students will give point/points of identifications for each slide **(Annexure A).**
4. Total number of identifications spots 10

    a. Each spot will be given 01 mark (0.5 marks for identification and 2 points of identification, 0.25 marks each)

    b. Total marks allocated shall be: 10
5. Time consumed shall be 10 min.

Long slide (Total Marks 10):

6. Time: 15 minutes will be given for

Identification	1 mark
Drawing	1 mark
Labeling	1 mark

Interactive Examination Long Slide: 7 marks

ANATOMY STRUCTURED VIVA

The following areas shall be examined; the questions are framed with emphasis on those areas which are not easily evaluated in theory examinations. Course segments, the marks allocation and number of questions for each are given as under:

Sr. #	Course Area	Marks allocated	Minimum Number of Questions
1.	Surface marking	04	01
2.	Upper limb	10	02
3.	Lower limb	10	02
4.	Thorax	10	02
5.	Embryology	12	03
Total		**46**	**10**

Note: Materials for the examination shall be the responsibility of the Department/ College which should be put in place well before the time of the examination. Examination space and facilities shall be evaluated by the external examiner who will make sure that the movements of the candidate are well organized to maintain the transparency of the procedure.

Annexure A

Standardized Identification Points for Histology Slides for 1st Year MBBS Class

General Histology

SIMPLE EPITHELIUM

Simple squamous epithelium:

Slide view →

a) Single layer of flattened / elongated/ fusiform cells

b) Central elongated bulging nucleus

Surface view →

a) Single layer of flattened / squamous cells

b) Central round nucleus

Simple cuboidal epithelium:

a) Single layer of cuboidal / square shaped cells

b) Central round / spherical nucleus

Simple columnar epithelium:

a) Single layer of tall / cylindrical cells

b) Elongated nucleus in basal part of each cell/ oval basal nucleus

Simple columnar ciliated epithelium:

a) Single layer of tall / cylindrical cells

b) Hair like cilia (on luminal surface)

Pseudostratified columnar epithelium:

a) Single layer of short basal and tall columnar cells

b) Nuclei at different levels

Pseudostratified columnar ciliated epithelium:

a) Single layer of tall columnar ciliated cells and short round / cuboidal basal cells

b) Nuclei at different levels

STRATIFIED EPITHELIUM

Stratified squamous non keratinized epithelium:

a) Multilayered epithelium
b) Superficial layer consisting of non-keratinized squamous cells

Stratified squamous keratinized epithelium:

a) Multilayerd epithelium
b) Superficial layer of keratinized squamous cell

Stratified cuboidal:

a) Multilayered epithelium
b) Superficial / surface cuboidal cells

Stratified columnar epithelium:

a) Multilayered epithelium
b) Surface columnar cells

Transitional epithelium:

a) Multilayered epithelium
b) Surface layer consists of dome-shaped cells] Any one of b, c, d
c) Middle layer consists of pear shaped cells / polyhedral cells]
d) Basal layer consists of cuboidal / columnar cells]

CONNECTIVE TISSUE

Areolar tissue / Loose connective tissue:

a) Abundant ground substance with Connective tissue cells
b) Scattered / dispersed fibres (collagen fiber bundles / elastic fibers)

Adipose tissue (H & E):

a) Vacuolated round or oval cells
b) Peripheral nucleus

Dense regular fibrous connective tissue:

a) Regularly-arranged densely packed collagen fibre bundles
b) fibroblasts in between the fibre bundles

Dense regular elastic connective tissue:

a) Densely packed elastic fibres
b) Fibroblasts in between the fibres

Dense irregular connective tissue:

a) Densely packed scattered various types of connective tissue fibres
b) Fibroblasts nuclei in between the fibres / scanty ground substance

Mucoid connective tissue:

a) Abundant ground substance
b) Stellate fibroblasts / mesenchymal cells

Hyaline costal cartilage:

a) Homogeneous matrix with isogenous group of chondrocytes
b) Perichondrium

Hyaline articular cartilage:

a) Isogenous groups of chondrocytes in homogenous matrix
b) Perichondrium absent] Any one of b, c
c) Isogenous groups of chondrocytes in vertical columns]

Elastic cartilage:

a) Elastic fibres in the matrix
b) Perichondrium] Any one of b, c
c) Isogenous groups of chondrocytes]

Fibrocartilage:

a) Collagen fibres in the matrix
b) Chondrocytes in between fibres] Any one of b, c
c) Perichondrium absent]

Compact bone:

a) Haversian systems
b) Outer and inner circumferential, interstitial lamellae

Spongy bone:

a) Bony traneculae with osteocytes
b) Irregular marrow cavities

MUSCLES:

L.S. Skeletal muscles:

a) Elongated / cylindrical muscles fibres with cross striations
b) Multiple subsarcolemmal / peripheral nuclei

T.S. Skeletal muscles:

a) Bundles of transversely cut muscle fibres
b) Peripheral rounded nuclei

Cardiac muscles:

a) Elongated / cylindrical branching striated muscle fibres
b) Central single nucleus] Any one of b, c
c) Intercalated discs]

Smooth muscles:

a) Spindle shaped non striated muscle cells
b) Single oval central nucleus

NERVOUS TISSUE

TS peripheral Nerve:

a) Bundles of transversely cut nerve fibres (axons)
b) Epineurium / perineurium / endoneurium

Sensory ganglion:

a) Rounded pseudounipolar neurons in groups at the periphery
b) Bundles of nerve fibres in central region] Any one of b, c
c) Thick connective tissue capsule]

Autonomic ganglion:

a) Small multipolar neurons
b) Cells bodies of neurons scattered irregularly

Spinal cord:

a) Central canal
b) Inner H-shaped gray matter] Any one of b, c
c) Out white matter]

Cerebrum:

a) Outer gray matter and inner white matter
b) Pyramidal cells in gray matter

Cerebellum:

a) Outer gray matter and inner white matter
b) Purkinje cell layer

Elastic artery:

a) Predominant elastic fibres in tunica media
b) Internal elastic lamina not identifiable in tunica media

Muscular artery:

a) Predominant smooth muscle fibres in tunica media
b) Prominent internal elastic lamina

Vein:

a) Thin tunica media
b) Thick tunica adventitia containing abundant collagen fibres

RESPIRATORY SYSTEM

Epiglottis:

a) Elastic cartilage
b) Stratified squamous non keratinized epithelium / pseudostratified columnar epithelium

Trachea:

a) Pseudostratified columnar ciliated epithelium
b) C-shaped hyaline cartilage

Lung:

a) Alveoli lined by simple squamous epithelium
b) Sections of bronchi and bronchioles

LYMPHOID ORGANS:

Lymph node:

a) Cortex containing lymph nodules
b) Cords of lymphoid tissue in medulla

Palatine tonsil:

a) Non-keratinized stratified squamous epithelium
b) Tonsillar crypts] Any one of b, c
c) Lymph nodules]

Thymus:

a) Thymic (Hassall's) corpuscles in medulla
b) Cortical lobules containing densely packed lymphocytes (thymocytes)

Spleen:

a) Red pulp with splenic cords and venous sinuses
b) White pulp containing lymphatic nodules

INTEGUMENTARY SYSTEM

Thin skin:

a) Epidermis with thin layer of keratinized cells
b) Dermis containing hair follicles

Thick skin:

a) Epidermis with thick stratum cornium and prominent stratum lucidum
b) No hair follicles

SYLLABUS, ToS & OSPE

M.B.B.S.

FIRST PROFESSIONAL

PART-I

PHYSIOLOGY

PHYSIOLOGY (MBBS 1st Prof. Part-I)

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

Basic and Cell Physiology

1. *Understand functional organization of human body*
2. Describe homeostasis / control systems in the body
3. Describe *structure*, functions of cell membrane and its transport mechanisms
4. List cell organelles and describe their functions
5. Understand basic concepts about DNA and RNA

Blood

1. Describe the composition and general functions of blood
2. Enumerate plasma proteins, give their properties, their sites of production and explain their functions
3. Explain erythropoiesis and factors affecting erythropoiesis
4. Explain the functions of red blood cell
5. Understand the structure; describe functions of hemoglobin and enumerate its different types.
6. Describe the role of various elements especially iron in hemoglobin synthesis.
7. Enumerate and define various blood indices
8. Explain leucopoiesis and describe types and functions of white blood cells
9. Describe monocyte-macrophage system and functions of spleen
10. Explain various types of immunity
11. Explain thrombocytopoiesis and describe functions of platelets
12. Explain hemostasis, mechanism of blood coagulation, fibrinolysis and anticoagulants
13. Explain the blood groups and their role in blood transfusion
14. Understand fate of red blood cells and bilirubin formation

Applied Physiology

Understands:

1. Anemia, its types and the effects on human body
2. Polycythemia, its types and effects on the human body

3. Blood indices in various disorders
4. Clotting and bleeding disorders
5. Hazards of blood transfusion
6. Rh incompatibility
7. Abnormal immune responses
8. Jaundice

Nerve and Muscle

1. Understand the *structure of the neuron* and describe the properties of nerve fibres
2. Classify the nerve fibres
3. Describe the physiological basis of resting membrane potential
4. Describe the genesis of action potential and compound action potential
5. Describe the propagation of action potential
6. Outline the structural-functional relationship of skeletal muscle
7. Describe neuromuscular junction and transmission
8. Explain and compare the mechanism and characteristics of contraction of the three muscle types.
9. Differentiate between the isometric and isotonic contraction
10. Understands the difference between tetany and tetanization
11. Excitation contraction coupling
12. Understand chemical changes during muscle contraction and muscle fatigue

Applied Physiology

Understands**:**

1. Peripheral nerve injuries
2. Myasthenia gravis
3. Muscular dystrophy
4. Muscular hypertrophy / atrophy
5. Rigor mortis / contracture
6. Drugs / poisons affecting neuromuscular junctions

Cardiovascular System

1. Describe scheme of circulation through the heart and body
2. Describe the properties of cardiac muscle
3. Explain the generation of cardiac impulse and its conduction

4. Compare and contrast action potential of SA node and ventricular myocardium
5. Describe the various events in cardiac cycle
6. Explain the mechanism for production of heart sounds
7. Describe the lead systems for a 12 lead ECG
8. Define, draw and label normal ECG and explain the physiologic basis of waves, segments and intervals
9. List types of blood vessels and their function
10. Describe the haemodynamics of blood flow (local control systemic circulation its regulation and control)
11. Explain the microcirculation and capillary dynamics.
12. Discuss peripheral resistance its regulation and effect on circulation
13. Describe the arterial pulse
14. Define venous return and explain the factors affecting it.
15. Explain cardiac output and its control
16. Describe blood pressure and its regulation
17. Describe coronary circulation and factors affecting it
18. Describe the factors regulating cerebral and cutaneous circulations
19. Define shock and its various types with their physiological / pathophysiological basis
20. Describe the various stages of shock and their physiological compensation.

Applied Physiology

Understands**:**

1. Basic concepts related to electrical axes and cardiac vectors
2. Differentiation between various ECG recordings on the basis of rate and rhythm (bradycardia, tachycardia, heart-blocks, ventricular fibrillation, atrial fibrillation, myocardial ischemia / infarction)
3. Development of Oedema
4. Effects of hypertension and cardiac failure
5. Clinical significance of heart sounds and murmurs
6. Varicose veins

Respiratory System

1. Describe the functional organization of the respiratory tract.
2. Describe respiratory and non-respiratory function of the respiratory tract
3. Explain the mechanics of breathing

4. Describe the production & function of surfactant and compliance of lungs
5. Describe the protective reflexes
6. Explain lung volumes and capacities including dead space
7. Describe pulmonary circulation and pulmonary capillary dynamics
8. Describe the composition of atmospheric, alveolar and expired air
9. Describe the diffusion of gases across the alveolar membrane
10. Explain the relationship between ventilation and perfusion
11. Describe the mechanism of transport of oxygen and carbon dioxide in blood
12. Describe the nervous and chemical regulation of respiration
13. Explain abnormal breathing
14. Define and explain hypoxia, its causes and effects
15. Define and explain cyanosis, its causes and effects

Applied Physiology

Understands:

1. Causes of abnormal ventilation and perfusion
2. Effects of bronchial asthma, pneumothoax, pleural effusion and pneumonia
3. Respiratory failure
4. Artificial respiration and uses & effects of O_2 therapy
5. Clinical significance of hypoxia, asphyxia, cyanosis, and dyspnoea
6. Respiratory distress syndrome
7. Differentiation between obstructive and restrictive lung disorders on the basis of pathophysiology and lung function test
8. Respiratory acidosis and alkalosis.

Skin and Body Temperature Regulation

1. Describe body temperature regulation
2. Describe functions of skin

Applied Physiology

Understands:

Abnormalities of temperature regulation

Human Responses in Varied Environments:

1. Describe cardiovascular, muscular and respiratory adjustments in exercise
2. Explain physiologic responses to high altitude and space
3. Explain physiologic responses to deep sea diving and hyperbaric conditions

Applied Physiology

1. Acute and chronic mountain sickness
2. Nitrogen narcosis and decompression sickness

PHYSIOLOGY PRACTICALS

Haematology

1. Use of the microscope
2. Determination of haemoglobin
3. Osmotic fragility of RBCs
4. Blood groups
5. Determination of erythrocyte sedimentation rate
6. Determination of packed cell volume
7. Determination of bleeding and clotting times
8. RBC count
9. Platelet count
10. Red cell indices
11. Total Leukocyte count
12. Differential leucocyte count

Respiratory System

1. Clinical examination of respiratory system
2. Pulmonary volumes, capacities and their clinical interpretation
3. Recording of respiratory movements using Stethograph

Cardiovascular System

1. Cardiopulmonary resuscitation (to be coordinated with the department of medicine)
2. Examination of arterial pulse
3. Examination of jugular venous pulse
4. ECG recording and interpretation of normal ECG
5. Recording of arterial blood pressure
6. Effects of exercise and posture on blood pressure
7. Apex beat and normal heart sounds
8. Triple response
9. ICU / CCU / Medical ward visit to study the cases of CCF, Murmurs, Hypertension, Myocardial infarction etc.

Skin and body temperature regulation

Recording of body temperature

Demonstration of power lab (computerized data acquisition system) related experiments

RECOMMENDED BOOKS

1. **Textbook of Physiology** by Guyton and Hall, Latest Ed.
2. **Review of Medical Physiology** by William F. Ganong, Latest Ed.

REFERENCE BOOKS

1. **Human Physiology** by Laurali Sherwood
2. **Physiology** by Berne and Levy, Latest Ed.
3. **Essentials of Medical Physiology by** Prof. Dr. Mushtaq Ahmad
4. Physiology by Linda and Constanzo

MBBS FIRST PROFESSIONAL (Part-I)

PHYSIOLOGY

Objectively Structured Performance Evaluation (OSPE)

(Total Marks: 90)

The structure of OSPE/ Practical/ Viva should be as follows:

- **Viva Voce (35 marks)**
  - Internal ------- 15 marks
  - External ------- 20 marks

- **OSPE (25 marks)**
  - Non-observed stations 10 of 01 marks each (2 minutes each)
  - Observed stations 03 of 05 marks each (4 minutes each)

30% C1
40% C2 } OSPE
30% C3

- **Practical (30 marks)**
  - Practical 20 marks
  - Procedure Writing 05 marks
  - Yearly Workbook Assessment 05 marks

SYLLABUS, ToS & OSPE

M.B.B.S.

FIRST PROFESSIONAL

PART-I

BIOCHEMISTRY

SYLLABUS MBBS FIRST PROF. PART-I
BIOCHEMISTRY

Course Duration

- 35 weeks per academic year
- Five hours lecture per week for 35 weeks (175 hours)
- Two hours practicals per week for 35 week (70 hours)
- Two hours tutorial/interactive group discussion classes per week (70 hours)
- Seminar / clinically-oriented presentation / case discussion one hour per week (35 hours)
- Total teaching hours for the subject of biochemistry (350 hours)

Teaching objectives (Biochemistry Part-I):

The general objectives and overall aims of the teaching course include:

1. To teach sufficient biochemistry to give the student a basic understanding of life processes at the molecular level.
2. To provide an understanding of the normal biochemical processes in the human body in which the function of the various organs and tissues are integrated.
3. To undertake practical classes that would familiarize the student with the various chemical methods which are used in the qualitative analysis of carbohydrates, lipids, amino acids/proteins, and biological fluids (urine, etc)
4. To familiarize the students with laboratory instruments / equipment used in biochemistry laboratory.
5. To undertake practical classes that would familiarize the student with the various chemical methods by which normal and abnormal constituents of urine are detected along with the interpretation of presence of these constituents in urine.

Learning objectives (Part-I)

At the end of the Part-I course, the student should be able to demonstrate his knowledge and understanding on the subject with following learning objectives:

1. Molecular and functional organization of a cell, and sub-cellular components.
2. In-depth knowledge of structure, function and interrelationship of biomolecules and consequences of deviation from normal.
3. Delineating, learning and understanding the chemistry of biomolecules of biologic significance. In order to accomplish this, the student will learn the basic chemical aspects of the biomolecules (carbohydrates, lipids, amino acids, polypeptides, nucleic acids).
4. Description of mechanisms involved in maintenance of body fluid & pH and the related homeostatic processes.
5. Recognizing homeostatic dynamics through the concepts of human nutrition and be familiar with the biochemical role of micro- and macro-nutrients like vitamins, minerals, and electrolytes along with their clinical implications of their dietary use.

6. Having a clear understanding of the fundamental aspects of enzymology & clinical applications along with regulation of enzyme activity.
7. Developing skills as a self-directed learner, recognize continuing educational needs; use appropriate learning resources and critically analyze relevant literature in order to have a comprehensive understanding and knowledge of biochemistry.

1- Cell Biochemistry

a) Introduction to biochemistry: An overview of biochemistry and its significance in medicine.

b) Biochemical composition and functions of cell: Organization and composition of eukaryotic and prokaryotic cells (only biochemical aspects)

c) Cell membranes (biochemical composition)

d) Membrane phenomena: Transport of substances across the cell membrane via active (primary and secondary active) transport; diffusion (simple and facilitated), and vesicle-mediated transport (phagocytosis, endocytosis, and exocytosis); Gibbs-Donnan equilibrium, osmosis and osmotic pressure

e) Membrane receptors and other biologically important regulatory and catalytic membrane-bound proteins like G-proteins, adenlylyl cyclase, phospholipase.

f) Basic methods to study cell biochemistry: Centrifugation, ultracentrifugation, radioimmunoassay, ELISA (enzyme-linked imnunosorbent assay); chromatography; electrophoresis, spectrophotometry, and pH metry.

2- Water, pH and buffers

a) Ionization of water; weak acids and bases

b) pH and pH scale: Concept of pH and related topics (determination of pH), and concept of pI (isoelectric pH)

c) pKa value, dissociation constant (Ka), and titration curve of weak acids

d) Determination of pH of buffer: Henderson-Hasselbalch equation and its applications (derivation not required).

e) Body buffer systems (bicarbonate, ammonia, phosphate, and proteins) and their mechanism of action.

3- Carbohydrates

a) Definition, biochemical functions and classification of carbohydrates.

b) Structure and function of biologically important monosaccharides and their important derivatives (sugar acids, sugar alcohols, sugar amines, and glycosides)

c) Isomerism in carbohydrates (types and description)

d) Biologically important disaccharides, their properties and their biomedical importance

e) Oligosaccharides, their combination with other macromolecules and their biomedical importance

f) Homopolysaccharides of biologic significance and their structural and functional characteristics

g) Structural and functional characteristics of heteropolysaccharides including details of glycosaminoglycans; proteoglycans, peptidoglycans; and mucopolysaccharidoses.

4- Amino acids and Proteins

a) Biomedical importance and classification (biologic functions; nutritional value; and overall shape of molecule) of proteins.

b) Structure, functions and properties of amino acids

c) Classification of standard (proteinogenic) amino acids (based upon side chain structure, polarity of side chain, nutritional, and metabolic end-products), biologically important non-standard (non-proteinogenic) amino acids and their principal functions.

d) Dissociation and titration of amino acids; determination of pI of amino acids with two and three dissociable groups; importance of amino acids in the maintenance of pH; and mechanism of buffering action of proteins.

e) Structural organization of proteins: Details of four orders of protein structure (primary, secondary, tertiary, and quaternary); denaturation of proteins; and protein misfolding (amyloidoses and prion disease)

f) Important techniques for separation of proteins (electrophoresis, isoelectric focusing, chromatography, filtration, centrifugation, and dialysis).

g) Immunoglobulins; their types; structure, and biomedical significance.

h) Plasma proteins (viz, prealbumin, albumin, haptoglobin, ceruloplasmin, alpha1-anti-trypsin; alpha 2-macroglobulin and transferrin) and their principal biologic functions along with their clinical significance. Alpha fetoprotein and clinically important acute phase proteins (alpha 1-acid glycoprotein, C-reactive protein).

i) Glycoproteins: components of glycoproteins (overview of linkages between proteins and carbohydrates, N- and O-linked oligosaccharides).

5- Nucleotides and nucleic acids

a) Chemistry of purines and pyrimidines; their types and structure

b) Structure and functions of nucleotides and nucleosides (EXCLUDING metabolism of nucleotides).

c) Natural and synthetic derivatives of purines and pyrimidines and their biomedical role.

d) Structure, functions and types of nucleic acids (EXCLUDING metabolism)

6- Lipids and fatty acids

a) Classification of lipids and their general biological functions.

b) Fatty acids: Definition; nomenclature; classification; chemical and physical properties; isomerism in fatty acids; role of saturated and unsaturated fatty acids in health and disease; role of trans fatty acids (*trans*-fats) in coronary heart disease; omega-3 and omega-6 fatty acids and the importance of their dietary use.

c) Nutritionally essential fatty acids and their functions

d) Eicosanoids and their biologic functions along with their significance in health and disease.

e) Physical and chemical properties of fats and oils (triacylglycerols); saponification, iodine number, and acid number of fats; rancidity of fats

f) Structure and biologic functions & significance of phospholipids, glycolipids, sulfolipids and gangliosides

g) Cholesterol and its related compounds such as bile acids: Structure (constituent structural components), properties and biologic role

h) Lipid peroxidation and its significance

7- Enzymes

a) Introduction, classification and nomenclature of enzymes: Definitions of enzymes and IU of enzyme activity; Enzyme Commission Classification of enzymes along with main subclasses.

b) Properties of enzymes: Chemical nature, active site, catalytic efficiency, specificity, proenzymes, and kinetic properties

c) Coenzymes and cofactors: Coenzymes derived from various vitamins along with the examples of enzymes requiring these coenzymes; and metal cofactors

d) Isozymes and their clinical significance

e) Allosteric enzymes and their biological significance

f) Factors affecting enzyme activity

g) Types of enzyme inhibitors and their biomedical importance: Effects of competitive, non-competitive and uncompetitive inhibitors on enzyme activity, effects of competitive and non-competitive inhibition on Lineweaver-Burke plot.

h) Mechanism of enzyme action and kinetics of enzyme activity (Michaelis-Menten and Lineweaver-Burke equations WITHOUT derivation)

i) Regulation of enzyme activity (covalent modification, allosteric regulation and regulation by gene induction, repression & de-repression of enzyme synthesis)

j) Therapeutic use of enzymes and diagnostic application of determination of enzyme activities of certain enzymes in plasma in hepatic, muscle, prostatic, pancreatic,bone and cardiac diseases.

8- Porphyrins and hemoproteins

a) Chemistry and biosynthesis of heme and other porphyrins including disorders of heme bionsynthesis (porphyrias)

b) Important hemoproteins found in body along with their principal biologic functions; structure and function of hemoglobin and myoglobin, and types of hemoglobin. Hemoglobin A_{1c}

c) Oxygen binding capacity of hemoglobin, factors affecting and regulating the oxygen-binding capacity of hemoglobin. Methaemoglobin (metHb) and methaemoglobinemia.

d) Bilirubin Metabolism: Degradation of heme, synthesis, hepatic uptake, conjugation, and excretion of bilirubin and fate of bilirubin in intestine.

e) Hyperbilirubinemias: Causes of hyperbilirubinemias along with the acquired and congenital disorders leading to hyperbilirubinemias; jaundice and kernicterus.

f) Hemoglobinopathies: Sickle cell anemia (biochemical cause and its clinical manifestations), haemoglobin C disease, haemoglobin SC disease and thalassemias.

9- Vitamins and Minerals

a) General features of vitamins as essential nutrients

b) Classification of vitamins according to their physico-chemical nature and biochemical functions

c) Important dietary sources and recommended dietary allowances of vitamins.

d) Intestinal absorption, transport and storage of vitamins.

e) Mechanism of action of vitamins and their biochemical functions in body.

f) Disorders associated with vitamin deficiency and hypervitaminoses.

g) Minerals (sodium, potassium, chloride, calcium, phosphorus, magnesium, and sulfur) and trace elements (iron, zinc, selenium, iodine, copper, chromium, manganese, cadmium and fluoride) in human nutrition and their sources, absorption, transport, storage, and biochemical functions along with their recommended dietary allowances (RDA).

10- Nutrition

a) Energy metabolism: Caloric value of food, Specific dynamic action (SDA) of food, respiratory quotient, metabolic rate (determination and factors affecting metabolic rate), basal metabolic rate (BMR) (measurement, calculation, and factors affecting BMR)

b) Balanced diet

c) Proteins in nutrition: Obligatory nitrogen loss, nitrogen balance, nutritionally essential amino acids and their role in body growth and nitrogen equilibrium, determination of comparative nutritional efficiency and quality of dietary protein, recommended dietary allowance of protein, protein energy malnutrition (kwashiorkor and marasmus).

d) Fats and lipids in nutrition: Fats as a source of energy, role of saturated and unsaturated fats in health and disease, effect of dietary intake of transfats on health, and nutritionally essential fatty acids.

e) Carbohydrates in human nutrition: Protein sparing effect of carbohydrates, dietary carbohydrates and blood glucose along with the details of glycemic index, dietary fibers (types and biomedical importance).

f) Calculation of caloric requirement of a person and nutritional requirements in pregnancy, lactation, infancy, and old age.

g) Obesity and food additives (artificial sweeteners and flavor enhancers)

11- The Extracellular Matrix

a) Collagen: Types and structure of collagen; biosynthesis & degradation of collagen; collagenopathies (Ehlers-Danlos syndrome (EDS) and Osteogenesis imperfecta (OI))

b) Elastin: Structural characteristics of elastins; role of alpha1-antitrypsin in elastin degradation; major biochemical differences between collagen and elastin; genetic disorders associated with elastin like Williams-Beuren syndrome, supravalvular aortic stenosis, pulmonary emphysema, and aging of the skin.

c) Fibrillin-1 as a protein of microfibrills; Marfan syndrome; fibronectin and its role in cell adhesion and migration; laminin as a protein component of renal glomerular and other basal laminas.

d) Glycosaminoglycans (GAGs): Structure, classification, functions and distribution of GAGs; diseases associated with enzyme deficiencies of degradation of GAGs (mucopolysaccharidoses – Hunter syndrome & Hurler syndrome)

e) Structure and functions of proteoglycans

Laboratory Experiments

- Introduction to use of laboratory facilities / equipment including safety measures
- Preparation of solutions:
  - Preparation of solutions (molar and normal) from various kinds of laboratory chemicals (solid and liquids);
  - Preparation of various kinds of buffer solutions;
  - Basic methods of laboratory calculations;
- Introduction and conversion of conventional and SI measuring units.
- Demonstration of buffer action, and determination of pH (by using indicators and pH meter).
- Qualitative analysis of carbohydrates and proteins.

- Tests to detect monosaccharides of biomedical significance ----- glucose, fructose and Galactose (Benedict's test, Selivanoff's test, and Osazone test)
- Tests to detect proteins / peptides / amino acids (Heat coagulation test, sulphosalicylic acid test, Heller's Ring test and Ninhydrin test)

- Collection and storage of urine samples for laboratory analysis, and physical and chemical analysis of urine to detect normal and abnormal constituents.
- Writing a urine report and interpretation of results of urine analysis.

RECOMMENDED BOOKS

- Harper's Illustrated Biochemistry by Murrary RK, Granner DK and Rodwell VW, latest edition, McGraw Hill
- Lippincott's Illustrated Reviews: Biochemistry by Harvey R and Ferrier D, Latest edition, published by Lippincott Williams & Wilkins
- Marks' Basic Medical Biochemistry – A Clinical Approach, by Smith C, Marks AD, and Lieberman M. Latest edition, published by Lippincott Williams & Wilkins
- Practicals and Viva in Medical Biochemistry by Dandekar SP and Rane SA, latest edition, published by Elsevier.

REFERENCE BOOKS

- Textbook of Biochemistry with Clinical Correlations by Devlin TM, latest edition, published by Wiley-Liss
- Biochemistry by Berg JM, Tymoczko JL, and Stryer L, latest edition, published by W.H. Freeman and Company
- Clinical Chemistry and Metabolic Medicine by Martin A. Crook, latest edition, Edward Arnold (Publishers) Ltd
- Lehninger Principles of Biochemistry by David L Nelson and Michael M. Cox
- Tietz Textbook of Clinical Chemistry by Burtis CA and Ashwood ER published by Saunders.
- Fundamentals of Biochemistry Life at Molecular Level by Donald Voet, Judith G Voet and Charlotte W. Pratt

Table of Specifications for Biochemistry Oral & Practical Examination
MBBS First Professional Examination (Part-I)

Oral and Practical Examination carries 100 marks

Examination Component	Marks
A- Internal Assessment	**10**
B- Practical Notebook/Manual (Internal Examiner)	**05**
C- Viva voce a. External examiner: 25 Marks b. Internal Examiner: 25 Marks	**50**
D- OSPE a. ***Observed stations (6 Marks):*** There are two observed stations; 3 marks for each station – time allowed is 3 minutes for each observed station) b. ***Non-observed stations (16 Marks):*** There are eight non-observed stations; 2 marks for each station – time allowed is 2 minutes for each non-observed station.	**22**
E- Practical a. Principle, supposed calculation, etc: 4 Marks (External Examiner) b. Performance of the experiment: 4 Marks (Internal Examiner) c. Structured table viva: 5 Marks (External Examiner)	**13**

Format (Practical Examination / OSPE)
MBBS First Professional Examination (Part-l)
BIOCHEMISTRY *(PART-I)*

Total Marks: 100

Total marks allocated to Oral and Practical Examination are 100

Internal Assessment: 10 Marks

General Viva (Theory Viva): 50 Marks

25 Marks are allocated to internal examiner and 25 marks to external examiner.

Practical Examination: 40 Marks

Practical examination comprises three components i.e. Yearly Workbook, OSPE and Experiment.

A- Yearly Workbook: 5 Marks (Internal Examiner)

B- OSPE: 22 Marks

OSPE comprises10 stations (two observed stations carrying 3 marks each and 8 non-observed stations 2 marks each)

Observed Stations (3 minutes for each station)

i. Tests for carbohydrates and proteins/ peptides / amino acids of clinical importance: 1 station
ii. Test for normal constituents and abnormal constituents of urine: 1 station

List of Tests for Observed Stations:

i. Benedict's Test.
ii. Selivanoffs Test.
iii. Identification of osazones of monosaccharides.
iv. Biuret Test.
v. Ninhydrin test.
vi. Heller's ring test.
vii. Sulphosalicylic acid test.
viii. Heat Coagulation Test.
ix. RothrasTest.
x. Hays Test.

Non-Observed Stations (2 minutes for each station)

i. Carbohydrate chemistry, biologic significance of carbohydrates and clinical implications of carbohydrates.
ii. Chemistry of proteins & amino acids, plasma proteins, and clinical implications of proteins.
iii. Chemistry of lipids, biologic significance of lipids, and clinical implications of lipids and lipoproteins.
iv. Interpretation of normal and abnormal constituents of urine.
v. Laboratory equipment/techniques (pH meter and laboratory glassware).
vi. Preparation of solutions.

C- Experiment: 13 marks

- Principle/supposed calculations of the experiment: 4 Marks (External Examiner)
- Performance of experiment. 4 Marks (Internal Examiner)
- Table Viva: 5 Marks (External Examiner)

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NOTIFICATION

The Syndicate has, in exercise of its powers under section 27 (1) of UHS Ordinance 2002, approved the Revised Syllabi, Table of Specifications and OSPE format for First Professional MBBS Part-I and Part-II Examinations, in the subjects of Anatomy including Histology, Physiology and Biochemistry, to be implemented with effect from the academic session 2013-2014 and onwards.

REGISTRAR

No. UHS/REG-13/3446 Dated: 13-12-2013

Copy forwarded for information to:

i. Principals/Heads of the Affiliated Medical Colleges for information of the Faculty and students
ii. Controller of Examinations
iii. Director (I.T.)
iv. PSO to Vice Chancellor
v. PS to Registrar

Encl. As above

REGISTRAR

SYLLABUS, ToS & OSPE

M.B.B.S.

FIRST PROFESSIONAL

PART-II

ANATOMY INCLUDING HISTOLOGY

"NEURO AND GROSS ANATOMY"

The study of gross anatomy must lay emphasis on applied anatomy as related to clinical medicine and surgery. For teaching, actual dissection of cadaver, dissected specimens, models, and computer aided programs shall be used. Normal images of different diagnosis techniques i.e. X-rays and CT scans, MRI and Ultra-sonography shall also be introduced.

The time for dissection of the cadaver for each region is as under:

1. **Neuroanatomy including Brain and Spinal cord 09 weeks**
2. **Head and Neck 13 weeks**
3. **Abdomen and Pelvis 13 weeks**

NEUROANATOMY COURSE OBJECTIVES

After the end of the course, the students are able to:

1. Define, enumerate and describe the structure and functions of receptors.
2. Define and describe motor end plates and their functions.
3. Understand and describe the meninges of brain and spinal cord.
4. Describe subdural and subarachnoid spaces including subarachnoid cisterns.
5. Understand and describe internal structure of spinal cord at different levels:
6. Understand and describe ascending and descending tracts of spinal cord, their functions and effects of their lesions.
7. Understand and describe internal structure of medulla oblongata.
8. Comprehend and describe the internal structure of pons.
9. Understand and describe internal structure of mid brain.
10. Comprehend and describe the surfaces of cerebral hemisphere, its lobes, their sulci and gyri.
11. Locate, identify and describe functions of different functional areas of the brain.
12. Locate, identify and describe different types of projection and association fibres of brain and their functions.
13. Identify, locate and describe hypothalamus, its nuclei and their connection and functions.
14. Identify, locate and describe thalamus, its nuclei and their connection and functions.
15. Identify, locate and describe metathalamus and its connections and functions.
16. Understand and describe the ventricular system of the brain.
17. Comprehend and describe production and circulation of CSF and clinical conditions associated with it.
18. Comprehend, describe and discuss blood supply of the brain and spinal cord and the effect of hemorrhagic and thrombotic lesions.
19. Describe intra cranial course of cranial nerves and their applied aspects.

20. Identify, locate and describe cranial nerves nuclei and their connection and functions.
21. Understand and describe different lobes of cerebellum, its white and grey substances including the deep cerebellar nuclei.
22. Understand afferent and efferent connections of cerebellum and correlated these to its functions.
23. Understand and describe the signs and symptoms of cerebellum disease with logical explanation.
24. **Understand and describe clinical conditions related to nervous system.**
25. Comprehend and understand neuroanatomical basis of the following:
    a) Hemiplegia / hemiperesis.
    b) Upper motor and lower motor neuron lesions.
    c) Parkinsonism
    d) Syringomyelia.
    e) Hemi-section / complete section of spinal cord.
    f) Cerebellar ataxia
    g) Other clinical conditions

"HEAD AND NECK COURSE OBJECTIVES"

On completion of the course of Head and Neck, the students are able to:

1. Describe mandible and different normae of the articulated skull.
2. Identify individual bones of the skull, their parts with important features.
3. Give post-natal growth changes in skull and face.
4. Comprehend cranial fossae, identify the foramina of the skull base and the structures passing through them.
5. Understand the vertebral column as a whole including sacrum and coccyx; describe regional features of the vertebrae, intervertebral joints, the movements thereof, and **comprehend clinical problems of the region**.
6. Identify, comprehend and describe cervical vertebrae, and the joints of the region i.e. temporo-mandibular, intervertebral, and cranio-vertebral. (cricothyroid and crico-arytenoid joints).
7. Identify and describe important muscles of the region i.e. muscles of: Facial expression, Mastication, prevertebral, postvertebral, infra and suprahyoid, suboccipital, tongue and palate; (pharynx, and larynx) **comprehend their actions nerve supply, effect of injury to them and clinical tests applied for diagnosis.**
8. Name and identify muscles of the floor of the mouth, sternocleidomastoid, trapezius, levator scapulae, and describe their origin, insertion, nerve supply, actions, important relations and effects of injury to their nerves and clinical tests to diagnose the nature of injury.
9. Identify and describe important arteries of the region, their branches and distribution i.e. subclavian, common, internal and external carotid arteries.
10. Comprehend clinical importance related to the arteries of head and neck and their branches

11. Identify subclavian, internal, external, and anterior Jugular veins, give their course, relationship, tributaries and clinical importance.
12. Identify and describe cranial venous sinuses and give their clinical significance.
13. Locate, identify and enlist the regional lymph nodes and describe the scheme of lymphatic drainage of the region.
14. Understand and describe the course and distribution of the cervical spinal and cranial nerves; comprehend formation of Cervical and Brachial plexuses, describe their branches and distribution.
15. **Understand and describe clinical conditions related to the nerve plexuses and their clinical manifestations**.
16. **Comprehend, understand and clearly describe the effects of injuries to different nerves and their clinical tests.**
17. **Identify sympathetic trunk and describe the scheme of sympathetic and parasympathetic innervations of the region, including the four parasympathetic ganglia, their roots, branches and distribution along with the clinical and applied anatomy..**
18. .Identify and describe the boundaries, contents and subdivisions of the anterior and posterior triangles of the neck.
19. **Understand and describe the superficial and deep fasciae of the region and correlate different fascial planes to their clinical importance.**
20. Identify and describe the viscera of the region i.e. salivary, thyroid, parathyroid glands, trachea and esophagus, and describe their anatomy and its applied aspects correctly
21. **Identify the anatomical features of the oral cavity, tongue, cheek, lips, gums and teeth, and describe these in detail with particular emphasis on their clinical applications.**
22. **Understand and describe the anatomy of the scalp, orbital and cranial cavities, their contents including meninges with highlights on important clinical aspects.**
23. **Understand and describe the anatomy of the nasal cavity, Para nasal sinuses, eye ball and external, middle and internal ear along with the clinical aspects.**
24. **Understand and describe the anatomy of pharynx, its muscles, their nerve supply and actions; clinical and applied aspects of pharynx.**
25. **Comprehend and describe the anatomy of larynx, its joints, muscles, their nerve supply and actions; clinical conditions related to the organ.**
26. **Correlate the anatomical information of the region to their clinical applications.**
27. **Interpret normal radiographs, CT Scans, MRI, and Ultrasound images.**

Additional Clinical Correlates

Cranial nerves distributions and lesions, dislocation of temporomandibular and intervertebral joints, scalp wounds, danger area of face, Little's area, Horner's syndrome, cavernous sinus thrombosis, intracranial hemorrhages, tracheostomy, mumps, sinusitis and retropharyngeal abscess, lymph nodes and lymphatic drainage of head and neck and, different conditions associated with lymphatics. Important muscles of head and neck their functions and effect of their nerve lesions.

"COURSE OBJECTIVES OF ABDOMEN AND PELVIS"

On completion of the Gross Anatomy of Abdomen and Pelvis, the students are able to:

1. Develop a sound understanding of the topographic anatomy of the regions.
2. Mark the regions of the abdomen on the surface of the body.
3. Mark the important abdominal and pelvic viscera on the surface of the body
4. Understand the importance of percussion notes in eliciting the extent of resonant and non-resonant viscera and their clinical importance.
5. Give a description of the Anatomy of the anterolateral and posterior abdominal walls.
6. **Understand and give clear description of inguinal canal, different varieties of external hernias and their complications.**
7. **Understand the peritoneum, peritoneal cavity and possible sites of internal hernias along with their clinical features.**
8. **Comprehend, understand and describe the abdomino-pelvic fasciae and their clinical importance.**
9. **Give a precise account of the Anatomy of abdominal and pelvic viscera, muscles, nerves and blood vessels of the regions and correlate anatomical information to common clinical conditions.**
10. **Understand the clinical effects and apply clinical tests to verify injuries to different nerves of the region.**
11. Develop clear concepts of anatomy of normal male and female pelvises, and differences between them.
12. **Understand the dimensions of the normal and contracted adult female pelvis and their clinical importance in the mechanism of delivery.**
13. **Understand the anatomy of the perineal region in both male and female and comprehend the anatomical basis of clinical conditions of the area.**
14. **Understand anatomical basis of possible birth injuries to the mother in difficult labor and the clinical conditions produced thereafter.**
15. Understand the scheme of the regional lymphatic drainage and lymph nodes.
16. **Comprehend normal radiological anatomy of the region, CT Scans, MRI, Ultrasound and, other diagnostic techniques.**

Additional Clinical Correlates

Portosystemic anastomosis, spread of carcinoma stomach, duodenal and peptic ulcer, appendicitis, hemorrhoids, anal fistula, anterior abdominal wall hernias, abdominal incisions, varicocele, hydrocoele, benign prostatic hyperplasia and carcinoma of prostate and uterus prolapse

“SYSTEMIC HISTOLOGY”

At the end of the course, the students are able to:

Digestive System:

1. Name and describe the epithelium lining the oral cavity, tongue, gums, hard and soft palate, pharynx and lips and, explain the histology of tongue.
2. Understand and describe the histological structure of oesophagus, stomach, small intestine, large intestine, appendix and anal canal; explain the change in structure of their epithelium in relations to the function.
3. Comprehend and describe the histological structure and functions of salivary glands.
4. Understand and describe the histological structure and functions of Liver, Pancreas and Gall Bladder.

Urinary System:

Comprehend and describe the histological structure of kidney, ureter and urinary bladder, and their functions.

Male Reproductive System:

Comprehend and describe histological structure of testis, epididymis, vas deferens, seminal vesicle and prostate, and relate it to their functions.

Female Reproductive System:

Understand and describe histological structure of ovaries, fallopian tube, uterus and vagina, and explained their functions related to their structure.

Endocrine System:

Understand and describe the histological structure and functions of the following glands:

1. Pituitary
2. Thyroid
3. Parathyroid
4. Adrenal
5. Islets of Langerhans.

Eye and Ear:

1. Understand and describe the histological structure of eyeball with emphasis on cornea and retina, and give their functions related to their structure.
2. Comprehend and describe the Membranous Labyrinth and give the histological structure of different parts; correlate their functions to the structure.

Nervous System:

Understand and describe the histological structure of spinal cord, cerebellum and cerebrum and correlate it to the functions.

Identify, draw and label light microscopic structures of above mentioned tissues.

"EMBRYOLOGY"

At the end of the course, the students are able to:

Head and Neck:

1. Understand and describe the development and derivatives of pharyngeal apparatus (arch, cleft, pouch and membrane).
2. Comprehend and describe the development of tongue.
3. Describe the development of thyroid gland.
4. Understand and describe the development of pituitary gland.
5. Comprehend and describe the development of face and palate.
6. **Understand different congenital malformations of the region.**

Digestive System, Body Cavities and Diaphragm:

1. Understand and discuss the development of the body cavities, mesenteries and diaphragm.
2. Comprehend and describe the development of gastrointestinal tract (fore-gut, mid-gut and hind- gut).
3. Understand and describe the development of liver, pancreas and gall bladder.
4. Understand and describe the development of spleen.
5. **Understand different congenital malformations of the region.**

Respiratory System:

Comprehend and describe the development of upper and lower respiratory passages, and give their congenital anomalies.

Cardiovascular System:

1. Describe the development of heart, aortic arches, aorta, superior and inferior vena cavae and portal vein.
2. Describe the foetal circulation and changes at birth.
3. Understand and describe the congenital anomalies of cardiovascular system.

Urinary System:

1. Comprehend and describe the development of kidneys, ureters, urinary bladder and urethra, and their congenital malformations.

Reproductive System:

1. Understand and describe the development of testes, epididymis, vas deferens, seminal vesicles and prostate.
2. Comprehend and describe the development of the ovaries, uterus and vagina.
3. Describe the development of external genital organs.
4. **Comprehend and describe congenital abnormalities of the regions.**

Nervous System:

1. Name different brain vesicles, comprehend and describe their derivatives.

2. Understand and describe the development of spinal cord.
3. Comprehend and describe the derivatives of neural crest.
4. Understand and describe congenital abnormalities of the nervous system.

Ear:

1. Understand and describe the development of external, middle and internal ear.
2. Describe congenital abnormalities of the region.

Eye:

1. Comprehend and describe the development of lacrimal apparatus, eyeball and their congenital abnormalities.

RECOMMENDED BOOKS

1. **Clinically Oriented Anatomy** by Keith L Moore.
2. **Cunningham's Manual of Practical Anatomy** by G.J. Romanes, 15th Ed., Vol. II and III.
3. **The Developing Human. Clinically Oriented Embryology** by Keith L. Moore, 6th Ed.
4. **Medical Histology** by Prof. Laiq Hussain Siddiqui.
5. **Neuroanatomy** by Richard S.Snell.

REFERENCE BOOKS

1. **Gray's Anatomy** by Prof. Susan Standring 39th Ed., Elsevier.
2. **Clinical Anatomy for Medical Students** by Richard S.Snell.
3. **Clinical Anatomy** by R.J. Last, Latest Ed.
4. **Wheater's Functional Histology** by Young and Heath, Latest Ed.
5. **Langman's embryology**

MBBS 1st Professional Part (II) OSPE

Gross Anatomy, Radiological Anatomy & Embryology:

Gross Anatomy

1. Total No. of stations 12, each station will have 02 marks and 04 spots of identification.
2. Each station shall be given 1.5 min.
3. Total marks shall be 24.

Time per station: 1.5 minutes (18 minutes)

Sr.No	Region/ Area	Station No.	No. of Spots	Marks Each spot
1	Head & Neck	01	04	2
	Head & Neck	02	04	2
	Head & Neck	03	04	2
2	Abdomen	04	04	2
	Abdomen	05	04	2
	Abdomen	06	04	2
3	Pelvis	07	04	2
4	Brain	08	04	2
	Brain	09	04	2
5	Radiological Anatomy	10	04	2
6	Special Embryology	11	04	2
	Special Embryology	12	04	2
	Grand Total	**12**	**48**	**24**

Arrangement of OSPE in Histology:.

1. Histology Practical Examination shall also be used to cover nearly all areas of the subjects.
2. Histology long slide and Viva shall be arranged simultaneously on the same day.

Histology OSPE and VIVA (Total Marks 20)

There shall be 10 slides fixed on 10 microscopes.

1. They will move from one to the next slide in a predetermined direction.
2. For each station one minute shall be given, students will give point/points of identifications for each slide **(Annexure B).**
3. Total number of identifications spots 10
   a. Each spot will be given 01 mark (0.5 marks for identification and 2 points of identification, 0.25 marks each)
   b. Total marks allocated shall be: 10
4. Time consumed shall be 10 min.

Long Slide (Total Marks 10):

5. Time: 15 minutes will be given for

Identification	1 mark
Drawing	1 mark
Labeling	1 mark

Interactive Examination Long Slide: 7 marks

ANATOMY STRUCTURED VIVA

The following areas shall be examined; the questions are framed with emphasis on those areas which are not easily evaluated in theory examinations. Course segments, the marks allocation and number of questions for each are given as under:

Sr. #	Course Area	Marks allocated	Minimum Number of Questions
1.	Surface marking	04	01
2.	Head & Neck	10	02
3.	Brain & Spinal cord	08	02
4.	Abdomen	10	02
5.	Pelvis	04	01
6.	Special Embryology	10	02
Total		**46**	**10**

Note: Materials for the examination shall be the responsibility of the Department/ College which should be put in place well before the time of the examination. Examination space and facilities shall be evaluated by the external examiner who will make sure that the movements of the candidate are well organized to maintain the transparency of the procedure.

Annexure A

Identification Points for Histology Slides for 2nd Year MBBS Class

DISGESTIVE SYSTEM

1. **Tongue:**
   a) Lingual papillae of various types
   b) Skeletal muscle fibres
2. **Esophagus:**
   a) Stratified squamous non-keratinized epithelium
   b) Submucosal glands
3. **Stomach Fundus & Body:**
   a) Shallow gastric pits
   b) Gastric glands containing chief cells and parietal cells
4. **Stomach-Pylorus:**
   a) Deep gastric pits
   b) Pyloric glands lined mostly by mucous cells
5. **Duodenum:**
   a) Leaf shaped villi
   b) Brunner's glands (submucosal glands)
6. **Jejunum:**
   a) Tall rounded villi / finger like villi
   b) Crypts of Leiberkuhn in lamina propria] Any One of b, c
   c) Muscularis externa / inner circular outer longitudinal]
7. **Ileum:**
   a) Club-shaped villi
   b) Peyer's patches
8. **Colon:**
   a) Simple columnar epithelium with abundant goblet cells
   b) Villi are absent

9. Appendix:

a) Star-shaped lumen

b) Prominent lymph nodules in lamina propria

10. Rectum:

a) Rectal folds lined by simple columnar epithelium with abundant goblet cells

b) Muscularis mucosa & submucosa extending into the rectal folds

11. Parotid Gland:

a) All serous acini

b) Striated / intercalated / interlobular ducts

12. Sublingual Gland:

a) Predominant mucous acini and few serous acini

b) Few serous demilunes] Any One of b, c

c) Very few intercalated ducts]

13. Submandibular Gland:

a) Predominant serous acini

b) Many serous demilunes

14. Pancreas:

a) Serous acini

b) Islets of Langerhans

15. Liver:

a) Cords of hepatocytes radiating from the central vein

b) Hepatic sinusoids] Any One of b, c

c) Portal triad]

16. Gall Bladder:

a) Mucosal folds lined by simple tall columnar epithelium

b) Fibromuscular layer outer to mucosa

URINARY SYSTEM

17. Kidney:

a) Renal corpuscles

b) Sections of proximal and distal convoluted tubules

18. Ureter:

a) Transitional epithelium

b) Star shaped small lumen] any one of b, c

c) Inner longitudinal & outer circular smooth muscle layers]

19. Urinary Bladder:

a) Transitional epithelium

b) A thick smooth muscle coat

20. Testis:

a) Seminiferous tubules lined by spermatogenous cells and sertoli cells

b) Groups of Leydig cells in the intertubular connective tissue

21. Dustus Epididymis:

a) Pseudostratified columnar epithelium with stereocilia

b) Numerous cut sections of the duct

22. Ductus Deferens:

a) Pseudostratified columnar epithelium with stereocilia

b) Thick muscularis externa with 3 layers of smooth muscle fibres

23. Seminal Vesicles:

a) Pseudostratified columnar epithelium

b) Highly convoluted lumen with crypts and cavities

24. Prostate:

a) Glandular acini containing corpora amylacea

b) Fibromuscular stroma in between the acini

25. Ovary:

a) Outer surface covered by simple cuboidal epithelium

b) Ovarian follicles in various stages of development in cortex

26. Fallopian Tubes:

a) Simple columnar ciliated epithelium

b) Very prominent mucosal folds

27. Uterus: (in proliferative phase)

a) Endometrium with simple columnar epithelium

b) Simple tubular glands in lamina propria

28. Vagina:

a) Stratified squamous non-keratinized epithelium

b) No glands] any one of b, c

c) Thick muscular layer]

29. Mammary glands-inactive state:

a) Lobules and abundant inter lobular connective tissue

b) Cord like tubules lined by simple cuboidal epithelium

30. Mammary gland (lactation state):

a) Alveoli of various sizes and shapes containing secretions

b) Scanty connective tissue stroma

31. Thyroid gland:

a) Follicles lined by simple cuboidal epithelium

b) Colloid in follicles] any one of b, c

c) Parafollicular cells]

32. Parathyroid gland:

a) Anastomosing cords of chief cells

b) Oxyphil cells

33. Pituitary gland:

a) Chromophiles and chromoprobes

b) Acidophils and basophils

34. Adrenal gland:

a) Three zones of cortex (Zona glomerulosa, fasciculata and reticularis)

b) Medulla with irregular cords of chromaffin cells and sinusoids

SPECIAL SENSES

35. Eye Lid:

a) Thin skin with hair follicles

b) Tarsal plate containing tarsal glands

36. Cornea:

a) Stratified squamous non keratinized epithelium

b) Bowman's membrane, substantia propria and Descemet's membrane

37. Retina:

a) Ten layers

b) Rods & Cones present

38. Pinna:

a) Thin skin

b) Elastic cartilage

SYLLABUS, ToS & OSPE

M.B.B.S.

FIRST PROFESSIONAL

PART-II

PHYSIOLOGY

PHYSIOLOGY (MBBS 1st Prof. Part-II)

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

Body Fluids and Kidney

1. Describe the components and quantitative measurements of body fluids.
2. Discuss the different fluid compartments, tissue and lymph fluid.
3. Describe the structure of the kidney and nephron, and explain general functions of the kidney.
4. Describe the GFR and its regulation.
5. Describe the formation of urine including filtration, re-absorption and secretion.
6. Discuss plasma clearance.
7. Describe the mechanism of concentration and dilution of urine
8. Describe regulation of osmolality, water balance and acid base balance
9. Describe the role of the kidney in blood pressure regulation.
10. Describe the hormonal functions of the kidney.
11. Describe acidification of urine and its importance.
12. Describe the mechanism of micturition and its control.

Applied Physiology:

Understands:

1. Renal plasma clearance tests and their clinical significance.
2. Dehydration, rehydration, overhydration and oedema.
3. Renal failure and dialysis.
4. Metabolic acidosis and alkalosis.
5. Abnormalities of micturition.

Nervous System

1. Describe general organization of the nervous system.
2. Describe the properties of synaptic transmission.
3. Classify the neurotransmitters and explain their functions.
4. Explain neuropeptides and their functions
5. List the types and describe the properties and functions of sensory receptors.
6. Describe the pathways for transmission of somatic sensations
7. Define reflex action. Classify and describe reflexes

8. Describe the muscle spindle and Golgi tendon organ. Explain their functions.
9. Describe the physiology of pain and analgesia system.
10. Explain the functions of the cerebral cortex.
11. Differentiate between the sensory and motor cortex and their functions.
12. Describe the motor pathways including pyramidal and extrapyramidal.
13. Describe basal nuclei (basal ganglia) and their functions.
14. Describe cerebellum and its function.
15. Describe the functions of vestibular apparatus.
16. Explain the organization and functions of reticular formation.
17. Explain mechanism and regulation of the muscle tone.
18. Describe the control of posture and equilibrium.
19. Explain the physiology of sleep.
20. Describe the physiology of memory.
21. Describe the mechanism and control of speech.
22. Discuss the functions of thalamus
23. Discuss the functions of hypothalamus
24. Explain the components and functions of limbic system.
25. Describe the production, circulation, absorption and functions of CSF.
26. Describe the blood brain and blood CSF barriers and their clinical significance.
27. Describe the organization and functions of the autonomic nervous system.

Applied Physiology

Understands:

1. Significance of dermatomes.
2. Injuries of the spinal cord.
3. Hemiplegia and paraplegia.
4. Diseases related to Basal ganglia.
5. Effects of cerebellar dysfunction.
6. Hydrocephalus.
7. Alzheimer’s disease.
8. Speech disorders
9. Sleep disorders.
10. Clinical abnormalities of pain.

Endocrinology

1. Classify the hormones and describe mechanism of their action
2. Name the hormones secreted by the anterior and posterior pituitary and describe their regulation and functions.
3. Describe the neuroendocrine functions of the hypothalamus
4. Describe the physiological changes of growth and aging.
5. Describe the functions and regulation of the hormones secreted by thyroid gland.
6. Describe the hormones regulating calcium homeostasis (parathormone, vitamin D and calcitonin)
7. Name the hormones secreted by the adrenal cortex and describe their functions and regulation.
8. Name the hormones secreted by the adrenal medulla and describe their functions and regulation.
9. Describe the endocrine functions of the pancreas and regulation of pancreatic hormones.
10. Describe the endocrine functions of pineal gland.

Applied Physiology

Understands:

1. Acromegaly, gigantism and dwarfism.
2. Effects of panhypopitutiarism.
3. Diabetes insipidus.
4. Thyrotoxicosis, myxoedema and cretinism
5. Pheochromocytoma.
6. Cushing's disease / syndrome.
7. Addison's disease.
8. Hypocalcemia and hypercalcemia.
9. Adrenogenital syndrome.
10. Conn's syndrome.
11. Diabetes mellitus and hypoglycaemia.

Gastrointestinal Tract

1. Describe the general functions of gastrointestinal tract.
2. Describe the enteric nervous system, control of gastrointestinal motility and secretion
3. Describe mastication, swallowing and their control

4. Describe the motility of the stomach, small intestine, large intestine and regulation.
5. Describe the functions of GIT hormones
6. Describe gallbladder motility and its regulation
7. Explain mechanism of vomiting and its control pathway
8. Explain defecation and its control pathway

Applied Physiology

Understands:

1. Dysphagia
2. Achalasia cardia
3. Diarrhea and constipation
4. Megacolon

Reproduction

1. Describe the functions of the male reproductive system.
2. Describe the mechanism of erection and ejaculation.
3. Describe the production and function of testosterone.
4. Describe the physiological changes during male puberty.
5. Describe the function of the female reproductive system.
6. Explain the production and function of oestrogen and progesterone.
7. Describe the functions of hypothalamo-hypophysio-gonadal axis.
8. Describe the ovarian and endometrial cycle.
9. Describe the physiological changes during female puberty and menopause.
10. Discuss pregnancy and explain the physiological changes taking place in the mother.
11. Describe the functions of placenta.
12. Discuss the hormones regulating parturition, lactation and development of breast.

Applied Physiology

Understands:

1. Male infertility.
2. Female infertility.
3. Postmenopausal syndrome / Andropause.

4. Contraception.
5. Basis for pregnancy tests.
6. Hypogonadism / hypergonadism.
7. Cryptorchoidism.

Special Sense

1. Describe the optics of the eye, mechanism of accommodation, light reflex.
2. Explain visual acuity, depth perception, neural functions of the retina.
3. Describe the errors of refraction and their corrections.
4. Describe the secretion, circulation, drainage and functions of aqueous humor.
5. Describe the movements of eyeballs.
6. Describe the visual transduction, color vision, visual cortex and visual pathway.
7. Describe the mechanisms for the light and dark adaptation.
8. Describe the functions of external ear.
9. Enumerate the contents of middle ear cavity and functions of the middle ear
10. Describe the structure and functions of internal ear.
11. Explain the determination of the sound frequency, loudness, direction of sound, auditory pathway and auditory cortex.
12. Describe the signal transduction for hearing.
13. Describe the signal transduction for taste and smell.
14. Describe the pathways for the sense of taste and smell.

Applied Physiology

Understands:

1. Types of deafness.
2. Errors of refraction.
3. Lesions of the visual pathway.
4. Night blindness.
5. Colour blindness.
6. Squint.
7. Argyll Robertson pupil.
8. Horner’s syndrome.
9. Abnormalities of sense of smell and taste.
10. Glaucoma.

PHYSIOLOGY PRACTICAL

Nervous System

1. Examination of superficial reflexes.
2. Examination of deep reflexes.
3. Examination of motor system.
4. Cerebellar function tests.
5. Examination of sensory system.
6. Examination of 12 cranial nerves (3-4 settings).

Special Senses

1. Plotting of the field of vision (perimetry and confrontational methods).
2. Testing the visual acuity for near and distant vision.
3. Elicitation of light reflex (direct and consensual) and accommodation reflex.
4. Ophthalmoscopy.
5. Testing the colour vision.
6. Testing for hearing.
7. Testing taste and smell.

Pregnancy Tests

RECOMMENDED BOOKS

1. **Textbook of Physiology** by Guyton and Hall, Latest Ed.
2. **Review of Medical Physiology** by William F. Ganong, Latest Ed.

REFERENCE BOOKS

1. **Human Physiology** by Laurali Sherwood
2. **Physiology** by Berne and Levy, Latest Ed.
3. **Essentials of Medical Physiology by** Prof. Dr. Mushtaq Ahmad
4. Physiology by Linda and Constanzo

MBBS FIRST PROFESSIONAL (Part-II)

PHYSIOLOGY

Objectively Structured Performance Evaluation (OSPE)

(Total Marks: 90)

The structure of OSPE/ Practical/ Viva should be as follows:

- **Viva Voce (35 marks)**
  - Internal ------- 15 marks
  - External ------- 20 marks

- **OSPE (25 marks)**
  - Non-observed stations 10 of 01 marks each (2 minutes each)
  - Observed stations 03 of 05 marks each (4 minutes each)

30% C1
40% C2 } OSPE
30% C3

- **Practical (30 marks)**
  - Practical 20 marks
  - Procedure Writing 05 marks
  - Yearly Workbook Assessment 05 marks

SYLLABUS, ToS & OSPE

M.B.B.S.

FIRST PROFESSIONAL

PART-II

BIOCHEMISTRY

SYLLABUS MBBS 1st PROF. PART-II
BIOCHEMISTRY

Course Duration

- 35 weeks per academic year
- Four hours lecture per week for 35 weeks (175 hours)
- Two hours practicals per week for 35 week (70 hours)
- Two hours tutorial/interactive group discussion classes per week (70 hours)
- Seminar / clinically-oriented presentation / case discussion one hour per week (35 hours)
- Total teaching hours for the subject of biochemistry (350 hours)

Teaching objectives (Biochemistry Part-II):

The general objectives and overall aim of the teaching course include:

1. To teach sufficient biochemistry to give the student a basic understanding of life processes at the molecular level.
2. To provide an understanding of the normal biochemical processes in the human body in which the function of the various organs and tissues are integrated.
3. To comprehend the principles of metabolic integration that would contribute to the students' understanding of the biochemical basis of various disease processes.
4. To familiarize the students with laboratory instruments / equipment used in biochemistry laboratory.
5. To undertake practical classes that would familiarize the student with the various chemical methods which are used in the diagnosis of disease.
6. To familiarize the students with modern biochemical techniques and their uses in the diagnosis of diseases especially genetic diseases.

Learning objectives (Part-II)

At the end of the Part-II course, the student should be able to demonstrate his knowledge and understanding on the subject with following learning objectives

1. To be familiar with the homeostatic mechanisms through the concepts of inter-regulation of carbohydrates, lipids and protein metabolism and its relation to hormone actions in the human body.
2. Once these basic concepts are understood, it will be straightforward to understand how alterations in the basic processes can lead to a disease state.
3. To have understanding and knowledge about many pathological situations where these can be related to biochemical defects, and to have some experience of biochemical techniques in order to understand the practical/clinical problems in biochemistry.
4. To develop skills as a self-directed learner, recognize continuing educational needs; use appropriate learning resources and critically analyze relevant

literature in order to have a comprehensive understanding and knowledge of biochemistry.

5. To learn and understand the basic biochemical processes taking place in the body, since these underline an understanding of normal and abnormal human metabolism. In order to accomplish this, the student should learn how large molecules are synthesized and used (DNA, RNA, and proteins), and how energy is generated, stored, and retrieved (metabolism).
6. To describe digestion assimilation of nutrients & consequences of malnutrition. Integrate the various aspects of metabolism & their regulatory pathways.
7. To explain biochemical basis of inherited disorders with their associated sequelae.
8. To outline the molecular mechanisms of gene expression, the principles of genetic engineering & their applications in medicine.
9. To outline the biochemical basis of cancer & carcinogenesis.
10. To make use of conventional techniques/instruments to perform biochemical analysis relevant to clinical screening & diagnosis. Familiarize with principles of various conventional & specialized lab investigations & instrumentation analysis & interpretation of a given data.
11. Applying basic knowledge of protein synthesis, post translational modification and targeting to its cellular destination.
12. Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data; the ability to suggest experiments to support theoretical concepts and clinical diagnosis

1- Bioenergetics and Biologic Oxidation

a) Endergonic and exergonic reactions, free energy, free energy change, ATP and other compounds as carriers of energy

b) Electron transport chain: Components and organization of electron transport chain (ETC)

c) Reactions of electron transport chain, redox potential, methods of electron transfer among the components of electron transport chain, and energy release during electron transport

d) Oxidative phosphorylation: ATP synthesis in ETC, inhibitors and uncouplers of oxidative phosphorylation, and chemiosmotic hypothesis of oxidative phosphorylation.

2- Metabolism of Carbohydrates

a) Glycolysis

- Reactions of aerobic and anaerobic glycolysis occurring in RBCs and other tissues
- Biomedical significance and energy yield of aerobic and anaerobic glycosis and its significance, and substrate-level phosphorylation
- Regulation of glycolytic pathway

- Metabolic fates of pyruvate
- Lactic acidosis; genetic deficiency of pyruvate kinase and pyruvate dehydrogenase

b) Tricarboxylic acid (TCA) cycle

- Reactions of TCA cycle and their regulation along with energy yield.
- Importance of TCA cycle and its amphibolic role

c) Gluconeogenesis

- Reactions of gluconeogenesis using pyruvate and glycerol as precursors, and regulation of gluconeogenesis.
- Important gluconeogenic precursors: Entrance of amino acids, intermediates of TCA cycle, glycerol, and other compounds as gluconeogenic precursors.
- Biomedical significance of gluconeogenesis: Role of gluconeogenesis in plasma glucose level regulation, and the Cori cycle, and glucose-alanine cycle.

d) Glycogen metabolism

- Synthesis and importance of UDP glucose
- Reactions of glycogenesis and glycogenolysis
- Regulation of glycogenic synthase and glycogen phosphorylase
- Importance of allosteric regulation of glycogen phosphorylase ‘a’ (a plasma glucose sensor) by plasma glucose
- Disorders of glycogen metabolism (glycogen storage diseases)

e) The hexose monophosphate pathway and other pathways of hexose metabolism

- Hexose monophosphate (HMP) pathway: Reactions of oxidative and non-oxidative phases of HMP pathway, importance of HMP pathway along with uses of NADPH, and glucose 6-phosphate dehydrogenase deficiency.
- Reactions of uronic acid pathway along with its biologic importance.
- Metabolism of fructose: Metabolic fate of fructose in human body, sorbitol metabolism along with effect of hyperglycemia on sorbitol metabolism, essential fructosuria and hereditary fructose intolerance.
- Metabolism of galactose: Metabolic fate of galactose in body and synthesis of lactose; and disorders of galactose metabolism (galactokinase deficiency and classic galactosemia).
- Metabolism of ethanol

f) Regulation of blood glucose level

- Regulation of plasma glucose hormonally (insulin, glucagon, growth hormone, epinephrine, and cortisol) and non-hormonally, and the role of various metabolic pathways in blood glucose level regulation

- Hypoglycemia and hyperglycemia: An overview of hypoglycemia and hyperglycemia, their important causes, and clinical manifestations.
- Diabetes mellitus: Types of diabetes mellitus along with its clinical manifestations, metabolic changes in type 1 and type 2 diabetes mellitus, and diagnosis of diabetes mellitus.

3- Metabolism of lipids

a) de novo synthesis of fatty acids: Production of cytosolic acetyl CoA, fatty acid synthase multienzyme complex, reactions of cytosolic fatty acid synthesis, elongation of fatty acid chain, synthesis of polyunsaturated fatty acid, and regulation of fatty acid synthesis.

b) Synthesis and storage of triacylglycerols in body.

c) Mobilization of stored triacylglycerols along with its regulation

d) Oxidation of fatty acids: Activation of fatty acid, translocation of fatty acyl CoA into mitochondrial matrix, reactions of β-oxidation of saturated and unsaturated fatty acids, energy yield of β-oxidation, fate of acetyl CoA, and other types of fatty acid oxidation (alpha-oxidation, omega-oxidation, and oxidation of odd-carbon fatty acids).

e) Synthesis and utilization of ketone bodies: Reactions of hepatic ketogenesis, and utilization of ketone bodies by extrahepatic tissues.

f) Ketoacidosis and regulation of ketogenesis.

g) Synthesis of eicosanoids, their regulation and functions along with their biomedical importance.

h) Metabolism of phospholipids and sphingolipids: Synthesis of phospholipids (phosphatidylcholine and phosphatidylethanolamine), synthesis of glycerol ether phospholipids (cardiolipin and platelet activating factor), degradation of phospholipids, deficiency of lung surfactant, metabolism of glycolipids, biosynthesis of ceramide, sphingomyelin, and gangliosides, and degradation of sphingolipids along with sphingolipidoses.

i) Cholesterol metabolism: Reactions and regulation of cholesterol biosynthesis, and fate and functions of cholesterol in body.

j) Biosynthesis and fate of bile acids and their significance in health and disease.

k) Plasma lipoproteins: Synthesis, transport, and fate of chylomicrons, VLDL, IDL, LDL, and HDL; disorders associated with impairment of lipoprotein metabolism, and atherogenic effect of oxidized LDL.

l) Biochemical defects leading to fatty liver

4- Metabolism of Proteins and Amino Acids

a) An overview of protein turnover in human body; nitrogen balance (positive and negative).

b) Inter-organ amino acid exchange in normal post-absorptive state

c) Degradation of amino acids; removal of nitrogen from amino acids by transamination and deamination; sources of ammonia in body; transport of ammonia, ammonia toxicity; fate of ammonia in body, reactions and regulation of the urea cycle along with metabolic disorders of the urea cycle.

d) An overview of amphibolic intermediates formed from the carbon skeleton of amino acids.

e) Concept of glucogenic and ketogenic amino acids; an outline of the metabolism of individual amino acids like glycine, cysteine, arginine, proline, phenylalanine, tyrosine, histidine, tryptophan, methionine amino acids; causes and salient features of important metabolic defects in amino acid metabolism like phenylketonuria, maple syrup urine disease (MSUD), histidinemia, alkaptonuria, cystathioninuria, homocystinuria, hyperprolinemia, cystinuria, cystinosis, tyrosinemias, and albinism.

f) Metabolism of epinephrine and norepinephrine, creatine, creatinine, histamine, gamma-aminobutyrate, serotonin, melatonin, and melanin

5- Integration and Regulation of Metabolic Pathways

a) Fed-fast cycle and starvation.

b) Basic concepts of intermediary metabolism, introduction of anabolic and catabolic pathways.

c) An overview of regulation and integration of various metabolic pathways (role of liver, heart, brain, skeletal muscle and adipose tissue).

6- Metabolism of Nucleotides

a) *de novo* Synthesis of purines and pyrimidines; the salvage pathways of nucleotide synthesis; degradation of purine and pyrimidine nucleotides

b) Disorders associated with purine nucleotide metabolism like adenosine deaminase deficiency, purine nucleoside phosphorylase deficiency, and hyperuricemia

c) Natural and synthetic derivatives of purines and pyrimidines and their role in health and disease.

7- Biochemical Genetics (Informational Flow in the Cell)

a) The structural basis of cellular information

b) Organization of DNA: chromosomes, Karyotyping.

c) Replication of DNA: Reactions of DNA replication in eukaryotes and prokaryotes; types of damage to DNA and DNA repair; mutations

d) Transcription (DNA-dependent RNA synthesis): Steps in the transcription of eukaryotic and prokaryotic genes; post-transcriptional modifications (processing) of RNA; reverse transcription in retroviruses and its relation to cancers and AIDS.

e) Translation (protein synthesis): The genetic code; components required for protein synthesis, composition of eukaryotic and prokaryotic ribosomes; steps of protein synthesis; post-translational modifications of polypeptide chains; protein targeting.

f) Regulation of gene expression in prokaryotes and eukaryotes

g) Molecular biology techniques: Basic information and biomedical importance of molecular biology techniques; DNA extraction; recombinant DNA technology; DNA cloning; polymerase chain reaction (PCR); hybridization; blotting techniques.

h) Oncogenes and their role in carcinogenesis; mechanisms of activation of proto-oncogenes; mechanism of action of oncogenes; tumour supressor genes and oncogenic viruses.

i) Genetic basis of disease

j) Important tumor markers and their clinical significance (Carcinoembryonic Antigen, Alpha fetoprotein, human chorionic gonadotropin, calcitonin and prostatic acid phosphatase).

8- Biochemistry of Endocrine System

a) An overview of endocrine system; classification of hormones based on their mechanism of action and chemical nature; mechanisms of action of each class of hormone; general characteristics of various types of hormone receptors; types and actions of various kinds of G-proteins in mediating the actions of hormones; signal transduction pathways of various hormones; types and role of various kinds of second messengers

b) Pituitary and hypothalamic hormones: Structure, biosynthesis, secretion, transport, regulation, catabolism, and biologic actions of all hypothalamic and pituitary hormones; disorders associated with hyper- and hypo-activities of these hormones such as growth hormone deficiency (dwarfism), gigantism, acromegaly, Cushing's syndrome, Addison's disease, Diabetes insipidus, and the inappropriate secretion of ADH (SIADH).

c) Thyroid Hormones: Structure, biosynthesis, secretion, transport, regulation, catabolism, and biologic actions of all thyroid hormones; disorders associated with hyper- and hypo-activities of these hormones like goiter, hypothyroidism, hyperthyroidism, Graves' disease.

d) Calcium Regulating Hormones: Structure, biosynthesis, secretion, transport, regulation, catabolism, and biologic actions of parathyroid hormone; disorders associated with hyper- and hypo-activities of these hormones like; role of parathyroid hormone, calcitriol, and calcitonin in calcium homeostasis; hypoparathyroidism, hyperparathyroidism (primary, secondary, and tertiary), pseudohypoparathyroidism, rickets, and osteomalacia).

e) Adrenal Cortical Hormones: Structure, biosynthesis, secretion, transport, regulation, catabolism, and biologic actions of all adrenal cortical hormones; disorders associated with hyper- and hypo-activities of these hormones like Cushing's disease / syndrome, secondary adrenal deficiency, Addison's disease, primary aldosteronism and secondary aldosteronism.

f) Adrenal Medullary Hormones: Structure, biosynthesis, secretion, transport, regulation, catabolism, and biologic actions of all adrenal medullary hormones; and associated disorders like pheochromocytoma

g) Male and Female Gonadal Hormones: Structure, biosynthesis, secretion, transport, regulation, catabolism, and biologic actions of all male and female gonadal hormones; disorders associated with hyper- and hypo-activities of these hormones like; hypergonadism and hypogonadism in males and females.

h) Hormones of Pancreas: Structure, biosynthesis, secretion, transport, regulation, catabolism, and biologic actions of all pancreatic hormones (insulin, glucagon, somatostatin and pancreatic polypeptide); disorders associated with hyper- and hypo-activities of these hormones like; pathophysiology of insulin deficiency and diabetes mellitus

9- Biochemistry of Digestive Tract

a) Introduction, chemical composition, and secretion and regulation of various digestive juices of GIT such as saliva, gastric juice & HCl, pancreatic juice, bile, and succus entericus

b) Hydrolysis (digestion) of carbohydrates, lipids, proteins, and nucleic acids in gastrointestinal tract

c) Absorption of carbohydrates, lipids and amino acids.

d) Disease states associated with GIT disorders like achlorhydria, peptic ulcers, lactose intolerance, cholelithiasis and pernicious anemia, cystic fibrosis and celiac disease.

e) Site of synthesis and major actions of gastrointestinal hormones like gastrin, cholecystokinin (CCK), secretin, gastric inhibitory peptide (GIP), vasoactive intestinal polypeptide (VIP), motilin, enkephalins, substance P, neurotensin, and enteroglucagon.

10- Metabolism of Xenobiotics

a) Definition and classes of important xenobiotics of medical relevance, their phases of metabolism and clinical significance (Cytochrome P450: Cytochrome P450 hydroxylase cycle in microsomes; role of cytochrome P450 in phase I metabolism of xenobiotics; induction of cytochrome P450)

b) Phase II metabolism of xenobiotics; types of phase II reactions;

c) Responses to xenobiotics including pharmacologic, toxic, immunologic and carcinogenic effects

11- **Water & electrolyte balance; acid-base regulation**

a) Biochemical mechanisms to regulate water and electrolyte balance in body: Fluid compartments of the body; gain and loss of body water; regulation of body water balance, effect of pure water deprivation, water excess or water

intoxication; and electrolytes of body fluids (sodium, potassium, magnesium and chloride).

b) Body buffer systems, role of lung and kidney in maintenance of acid-base balance.

c) Acid-base disturbance in the body like respiratory and metabolic acidosis (lactic acidosis and ketoacidosis); respiratory and metabolic alkalosis; concept of anion gap, base excess and base deficit.

d) Clinical interpretation of laboratory report of arterial blood gases.

Laboratory Experiments

- The introduction of techniques and instrumentation of clinical biochemistry like centrifugation, spectrophotometry (visible, UV, infra red and atomic absorption), pH metry, chromatography, electrophoresis, enzyme-linked immunosorbent assay (ELISA), micropipetting, flame photometry and ion selective electrode (ISE) technique
- Collection, preservation, and storage of blood sample
- Estimation of various substances in blood and other biological fulids, like glucose, creatinine, urea, protein, albumin, uric acid, and calcium, total cholesterol; HDL cholesterol, and triacylglycerols; demonstration of creatinine clearance; and oral glucose tolerance test (OGTT)
- Determination of plasma enzyme activities of alanine aminotransferase (ALT), aspartate aminotransferase (AST), amylase, creatine phosphokinase (CK), alkaline phosophatase (ALP), and lactate dehydryogenase (LDH)
- Clinical interpretation of common laboratory values of the compounds and enzymes as listed above
- Determination of amino acids in urine by paper chromatography (demonstration)

RECOMMENDED BOOKS

- Harper's Illustrated Biochemistry by Murrary RK, Granner DK and Rodwell VW, latest edition, McGraw Hill
- Lippincott's Illustrated Reviews: Biochemistry by Harvey R and Ferrier D, Latest edition, published by Lippincott Williams & Wilkins
- Marks' Basic Medical Biochemistry – A Clinical Approach, by Smith C, Marks AD, and Lieberman M. Latest edition, published by Lippincott Williams & Wilkins
- Practicals and Viva in Medical Biochemistry by Dandekar SP and Rane SA, latest edition, published by Elsevier.

REFERENCE BOOKS

- Textbook of Biochemistry with Clinical Correlations by Devlin TM, latest edition, published by Wiley-Liss
- Biochemistry by Berg JM, Tymoczko JL, and Stryer L, latest edition, published by W.H. Freeman and Company
- Lehninger Principles of Biochemistry by David L Nelson and Michael M. Cox
- Tietz Textbook of Clinical Chemistry by Burtis CA and Ashwood ER published by Saunders.
- Fundamentals of Biochemistry Life at Molecular Level by Donald Voet, Judith G Voet and Charlotte W. Pratt
- Biochemistry by Berg JM, Tymoczko JL, and Stryer L, latest edition, published by W.H. Freeman and Company
- Tietz Textbook of Clinical Chemistry by Burtis CA and Ashwood ER published by Saunders.
- Clinical Chemistry and Metabolic Medicine by Martin A. Crook, latest edition, Edward Arnold (Publishers) Ltd
- Practicals and Viva in Medical Biochemistry by Dandekar SP and Rane SA, latest edition, published by Elsevier.

Table of Specifications for Biochemistry Oral & Practical Examination
MBBS First Professional Examination (Part-II)

Oral and Practical Examination carries 100 marks

Examination Component	Marks
A- Internal Assessment	**10**
B- Practical Notebook/Manual (Internal Examiner)	**05**
C- Viva voce a. External examiner: 25 Marks b. Internal Examiner: 25 Marks	**50**
D- OSPE a. ***Observed stations (6 Marks):*** There are two observed stations; 3 marks for each station – time allowed is 3 minutes for each observed station) b. ***Non-observed stations (16 Marks):*** There are eight non-observed stations; 2 marks for each station – time allowed is 2 minutes for each non-observed station.	**22**
E- Practical a. Principle, supposed calculation, etc: 4 Marks (External Examiner) b. Performance of the experiment: 4 Marks (Internal Examiner) c. Structured table viva: 5 Marks (External Examiner)	**13**

Format (Practical Examination / OSPE)
MBBS First Professional Examination (Part-ll)
BIOCHEMISTRY (PART-II)

Total Marks: 100

Total marks allocated to Oral and Practical Examination are 100

Internal Assessment: 10 Marks

General Viva (Theory Viva): 50 Marks

25 Marks are allocated to internal examiner and 25 marks to external examiner.

Practical Examination: 40 Marks

Practical examination comprises three components i.e. Yearly Workbook, OSPE and experiment

A- Yearly Workbook: 5 Marks (Internal Examiner)

B- OSPE: 22 marks

OSPE comprises 10 stations (two observed stations carrying 3 marks each and 8 non-observed stations 2 marks each).

List of Tests for Observed Stations (3 minutes at each station)

i. Spectrophotometer.

ii. Centrifuge Machine.

iii. Pipettes.

iv. Blood samples.

Non-Observed Stations (2 minutes for each station)

i. Tests to determine the concentration of total cholesterol, HDL cholesterol, and triacyglycerols, in plasma.

ii. Tests to determine the concentration of total proteins, and glucose in plasma and CSF, and albumin in plasma.

iii. Determination of plasma uric acid and calcium.

iv. Determination of creatinine and urea in plasma, and creatinine clearance.

v. Determination of activities of ALT and alkaline phosphatase in plasma.

Estimation of plasma bilirubin.

vi. Determination of activities of creatine kinase, LDH, and AST

C- Experiment: 13 marks

- Principle/supposed calculations of the experiment:: 4 Marks (External Examiner)
- Performance of experiment : 4 Marks (Internal Examiner)
- Table viva : 5 Marks (External Examiner)

SYLLABUS OF

SECOND PROFESSIONAL

M.B.B.S.

(A) **GENERAL PATHOLOGY**

(B) **PHARMACOLOGY AND THERAPEUTICS**

(C) **FORENSIC MEDICINE AND TOXICOLOGY**

(D) **BEHAVIOURAL SCIENCES**
(Syllabus published with the curriculum of first professional M.B.B.S. Part-I and II).

(A) GENERAL PATHOLOGY

CELL INJURY

1. Necrosis, Ischemia, Hypoxia, Infarction and Gangrene Oncosis and Autolysis.
2. Sequence of the ultrastructural and biochemical changes which occur in the cell in response to the following:
   - Ischemia
   - Immunological injury, e.g., Asthma / SLE / Anaphylactic reaction
   - Physical agents, e.g., Radiation
   - Genetic defects, e.g., Thalassemia / Hemophilia
   - Nutritional deficiency, e.g., Kwashiorkor
   - Infectious agents
   - Viruses, e.g., Hepatitis
   - Bacteria, e.g., Staphylococcus aureus
   - Fungi, e.g., Candida
   - Parasites, e.g., Malaria
   - Nutritional deficiency
3. Irreversible and reversible injury
4. Apoptosis and its significance.
5. Necrosis and its types
6. Exogenous and endogenous pigmentation.
7. Dystrophic and metastatic calcification along with clinical significance.
8. Metabolic disorders

   • Lipid disorders, Steatosis of liver, Hyperlipidemia
   • Protein disorders
   • Carbohydrate disorders

INFLAMMATION, MEDIATORS OF INFLAMMATION

1. Role of inflammation in the defense mechanisms of the body.
2. Vascular changes of acute inflammation and their relation to morphological and tissue effects.
3. Process of Chemotaxis, Opsonization and Phagocytosis.
4. Role of cellular components in inflammatory exudate.
5. Exudates and transudate.
6. Important chemical mediators of inflammation.
7. Pathway of Arachidonic Acid metabolism.
8. Role of products of Arachidonic acid metabolism in inflammation.
9. Mechanism for development of fever, with reference to exogenous and endogenous pyrogens.
10. Chronic inflammation including Granulomas.
11. Granuloma and its types along with causes.
12. Systemic effects of acute and chronic inflammation and their possible outcomes.
13. Significance of ESR.
14. Induced hypothermia in medicine.
15. Healing in specialized tissue.

WOUND HEALING

1. Repair and regeneration.
2. Wound healing by first and second intention.
3. Factors that influence the inflammatory reparative response.
4. Wound contraction and cicatrisation.
5. Formation of granulation tissue.
6. Complications of wound healing.

DISORDERS OF CIRCULATION

a. Thrombo-embolic disorders and their modalities

1. Etiology and pathogenesis of thrombosis.
2. Possible consequences of thrombosis
3. Difference between thrombi and clots
4. Classification of emboli according to their composition.
5. Difference between arterial and venous emboli.

b. Hemorrhage, Hyperemia and Congestion

1. Definitions of common types of Hemorrhage
2. Types of hyperemia
3. Difference between hyperemia and congestion

c. Infarction

1. Types of infarction
2. Difference between anemic and hemorrhagic infarct
3. Morphological picture of infraction in different organ systems

d. Disorders of the circulation and shock

1. Edema, ascites, hydrothorax and anasarca.
2. Pathophysiology of edema with special emphasis on CHF.
3. Pathogenesis of four major types of shock (Hypovolemic, cardiogenic, vasovagal & septic) and their causes.
4. Compensatory mechanisms involved in shock.

MICROBIOLOGY

1. Defence mechanisms of the body.
2. Microbial mechanisms of invasion and virulence.
3. Difference between sterilization and disinfection.
4. Methods of disinfection and sterilization of the following:
   a. Facility where the doctor practices,
   b. Examination table,
   c. Any spillage e.g. sputum, vomitus, stool, urine, blood,
   d. Examination tools, e.g., thermometer, nasal and ear specula and spatula,
5. Principles of aseptic techniques such as Venepuncture, urinary catheterization, bandaging, suturing and lumber puncture.
6. Universal precautions for infection control.
7. General principles of the following serological tests:
   a. ELISA – Hepatitis (A,B,C,D,E,G) Rubella, CMV and HIV
   b. PCR
   c. Haemagglutination – TPHA
   d. Western Blot –HIV
      Malaria.
8. Interpretation of :
   a. Culture reports
   b. Serological reports and
   c. Microscopic reports of gram stain and ZN stain.
9. Principles of proper collection and submission of specimens for laboratory investigations
9. General characteristics and taxonomy of Bacteria, Rickettsia, Chlamydia, Viruses and Fungi.
11. Communicable, Endemic, Epidemic, and Pandemic Diseases, Carriers Pathogens, Opportunists, Commensals and Colonizers.
12. Microorganisms responsible for infection of the following organ systems:
    - Central Nervous System
    - Respiratory System
    - Gastrointestinal System
    - Genital System
    - Urinary System
    - Infections of Bones and Joints
    - Zoonosis
    - Infection of the Skin
    - Hepatic Infections

13 Pathogenesis, Treatment, Epidemiology, Prevention and Control of the following organisms:

(i) Bacteria

Staphylococcus aureus

Streptococcus pneumoniae

Beta hemolytic streptococcus group a & b

Diphtheria sp.

Bordetella sp.

Bacillus anthracis

Clostridium perfrignes

Clostridium botulinum,

Clostridium difficile

Clostridium tetani

Actinomycies israelli

Nocardia asteroides

Neisseria meningitis

Neisseria gonorrhoeae

Gardenella vaginalis

Haemophilus influenzae

Mycobacterium tuberculosis

Mycobacterium leprae

E.coli

Klebsiella

Proteus

Salmonella

Shigella

Yersinia pestis

Pseudomonas

Vibrio cholera

Vibrio parahemolyticus

Campylobacter jejuni

Helicobacter pylori

Legionella

Mycoplasma pneumoniae

Chlamydia

Treponema pallidium

Leptospira

Rickettsia sp.

(ii) Viruses

Mumps

Herpes

Measles

Influenza,

Para influenza

RSV

Hepatitis A, B, C, D, E

Rota

CMV

EBV

Rubella

Chicken Pox

HIV

Rabies

(iii) Fungus

Cryptococcus neoformans

Candida albicans

Tinea species

(iv) Protozoa

Plasmodium species

Giardia lamblia

Entamoeba histolytica

Cryptosporidium

Leishmania species

Trichomonas vaginalis

Toxoplasma gondii

Pneumocyctis carinii

(v) Helminths

Ascaris lumbricoides

Ancylostoma duodenale

Trichuris trichuria

Enterobius vermicularis

Filaria species

Strongyloides stercoralis

Schistosoma species

Echinococcus species

Taenia solium

Taenia saginata

Hymenolepis nana

PRINCIPLES OF ANTI MICROBIAL ACTION.

1. Antibiotics, selective toxicity, bacteriostatic and bactericidal.
2. Host determinants in relation to selection of an antimicrobial drug for therapy.
3. Minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC)
4. Bacterial resistance and the mechanisms involved in acquiring bacterial resistance
5. Mechanisms involved in transfer of drug resistance to bacterial resistance.
6. Mode of action of various antimicrobial drug groups.
7. Superinfection and cross sensitivity.

LIST OF COMMON ORGANISMS CAUSING ORGAN SYSTEM EFFECTS

a. <u>Common organisms causing CNS Infections</u>

(i) Bacteria

Steptococcus pneumoniae

Beta hemolyticus srteptococcus group b

Neisseria meningitidis

Haemophilis influenzae

Mycobacterium tuberculosis.

E.coli

Listeria monocytogenes

(ii) viruses

Enterovirus

Mumps

Herpes

Adenovirus

(iii) fungus

Cryptococcus neoformis

(iv) protozoa

Malaria

Toxoplasma

B. <u>Common organisms causing respiratory tract infection</u>

(i) bacteria:

Steptococcus pneumoniae

Beta hemolyticus streptococcus group b

Diptheria sp.

Bordetella sp.

Hemophilus influenzae

Mycobacteriurn tuberculosis

Klebsiella

Legionella

Mycoplasma pneumoniae

(ii) viruses

Herpes

Adeno virus

Measles

Influenza

Para influenza

Rhinovirus

RSV

(iii) protozoa

Pneumocystic carinii

C. Organisms causing gastrointestinal tract infection / infestation

(i) Bacteria

Clostridium difficile

Mycobacterium tuberculosis

Salmonella

Shigella

Vibrio cholera

Vibrio parahemolyticus

Campylobacter jejuni

Helicobacter pylori

(ii) Viruses

Hepatitis A

Rota

Astro

(iii) Fungus

Cryptococcus neoformis

(vi) Protozoa

Giardia lamblia

Entameba histolytica

Cryptosporidium

D. Common organisms causing hepatic infections

(i) Bacteria

Streptococcus species

Coliforms

Anaerobes

(ii) Viruses

Herpes

Hepatitis A, B, C, D, E

CMV

EBV

(iii) Protozoa

Entameba histolytica

Tape worms

Echinococcus granulosus

E. Common organisms causing skin infection

(i) bacteria

Staphylococcus aureus

Streptococcus pyogenes

Actinomyces israelli

Nocardia asteroides

Mycobacterium tuberculosis

Mycobacterium leprae

Corynebacterium diphtheriae

(ii) viruses

Herpes

Measles

Rubella,

Chicken pox

Moluscum contagiosum

(iii) fungus

Candida albicans

Tinea species

(iv) arthropodes

Sarcoptes scabiei

Pediculus species

Cinex lectularius

(v) helminths

Filaria species

Strongyloides stercoralis

Schistosoma sp.

(vi) protozoa:

Leishmania species.

f. <u>Common organisms causing bone and joint infection</u>

Bacteria: Staph aureus, Streptococcus pyogenes, Haemophilus influenzae, Neisseria gonorrhoeae, Brucella melitenesis, Salmonella typhi, Strep. pneumonae, Pseudomonas sp. and Mycobacterium tuberculosis.

g. <u>Common organisms causing genital infection</u>

(i)	**Bacteria:**	Mycoplasma urealyticum
(ii)	**Viruses:**	Pox, Herpes, Hepatitis B, HIV
(iii)	**Fungus:**	Candida albicans
(iv)	**Arthropodes:**	Sarcoptes scabiei
(v)	**Protozoa:**	Tricomonas vaginalis

h. <u>Common organisms causing zoonosis</u>

(i)	**Viruses:**	Rabies,
(ii)	**Protozoa:**	Toxoplasma gondii, Leishmania sp.
(iii)	**Helmenthics:**	Echinococcus sp.

GENETICS

1. Common sex linked, autosomal recessive and autosomal dominant disorders.
2. Common genetic mutations.
3. Diseases associated with consanguineous marriages.
4. Molecular biology techniques.

GROWTH DISORERS/NEOPLASIA

1. Atrophy and Hypertrophy, Agenesis, Dysgensis, Aplasia, Hypoplasia, Hyperplasia, Metaplasia, Dysplasia, Neoplasia, Anaplasia,.
2. Cell cycle and cell types (stable, labile, permanent)
3. Mechanisms controlling cell growth
4. Classification systems of tumors.
5. Characteristics of benign and malignant tumors
6. Difference between Carcinoma and Sarcoma.
7. Grading and staging system of tumors.
8. Biology of tumor growth
9. Process of carcinogenesis
10. Host defense against tumors.
11. Mechanism of local and distant spread.
12. Local and systemic effects of tumors.
13. Tumor markers used in the diagnosis and management of cancers.
14. Common chemical, physical agents and viruses related to human cancer.
15. Epidemiology of common cancers in Pakistan.
16. Radiation and its effects on tissues.
17. Cancer screening.

IMMUNOLOGY

1. Antigen, antibody, epitope, hapten and adhesion molecules.
2. Difference between innate and acquired immunity.
3. Structure and function of major histocompatibility complex (MHC).
4. Cytokines.
5. Mechanism of humoral and cell medicated immunity.
6. Hypersensitivity reactions, Type I, Type II, Type III and Type IV.
7. Autograft, homograft, allograft and xenograft.
8. Immunotolerance and immunoparalysis.
9. Mechanism involved in allograft rejection and steps that can be taken to combat rejection.
10. Classification of Immunodeficiency disorders
11. Basis of autoimmunity.
12. Tissue transplantation.
13. Pathology and pathogenesis of AIDS.
14. Lab diagnosis of immunological diseases.

RECOMMENDED BOOKS

1. **Pathological Basis of Disease** by Kumar, Cortan and Robbins, 7th Ed., W.B. Saunders.
2. **Medical Microbiology and Immunology** by Levinson and Jawetz, 9th Ed., Mc Graw-Hill.
3. **Medical Genetics** by Jorde, 3rd Ed., Mosby.
4. **Clinical Pathology Interpretations** by A. H. Nagi

B. PHARMACOLOGY AND THERAPEUTICS

The course outline is as follows:

1) General Pharmacology:

1. Definition of pharmacology, objectives of learning pharmacology, definition of drug and drug nomenclature.
2. Branches/divisions of pharmacology.
3. Sources of drugs.
4. Active principles of drugs and pharmacopoeias.
5. Dosage forms and doses of drugs.
6. Route of drug administration.
7. Absorption of drugs and processes involved in drug absorption.
8. Factors modifying absorption of drugs.
9. Transport of drugs across cell-membrane.
10. Bio-availability, its clinical significance and factors affecting bio-availability.
11. Drug reservoirs, distribution and redistribution of drugs, plasma protein binding.
12. Pro-drug, bio-transformation of drugs, enzyme induction, enzyme inhibition and entero-hepatic circulation.
13. Plasma half-life of drugs, steady state concentration, its clinical importance and factors affecting it.
14. Excretion of drugs.
15. Mechanism of drug action.
16. Dose response curves, structure-activity relationship.
17. Factors modifying action and doses of drugs.
18. Pharmacokinetics, pharmacodynamics and receptors.
19. Pharmacogenetics.

2) Dermatological and topical drugs (Locally Acting Drugs)

- Demulcents, emollients, irritants, counter irritants, astringents. Antiseborrhoeics, locally acting enzymes.
- Antiseptics and disinfectants.
- Ectoparasiticides.

3) Drugs Acting on Gastrointestinal Tract:

- Emetics and anti emetics.
- Drugs affecting motility of GIT.
- Ulcer healing drugs.
- Purgatives/ laxatives.
- Antidiarrhoeals.

4) Cardiovascular Drugs

- Antiarrhythmic drugs.
- Inotropic drugs.
- Antihypertensive drugs.
- Thrombolytics/ anticoagulants/ antiplatelets.
- Antihyperlipidemic drugs.
- Anti-anginal drugs.
- Drug management of CCF.

5) Diuretics

6) Autocoids

7) Drugs Acting on Autonomic Nervous System Cholinergic Drugs.

- Choline esters.
- Anticholine-esterases cholinomimetic alkaloids.

Anti-cholinergic drugs

- Anti muscarinic
- Anti nicotinic

Sympathomimetics / adrenergic drugs:

- Catecholamine
- Non catecholamine

Sympatholytics/antiadrenergics

- Alpha adrenergic receptor blockers.
- Beta adrenergic receptor blockers

Adrenergic neuron blockers

Autonomic ganglionic blockers

Skeletal muscle relaxants

A) neuromuscular blocking agents - d-tubocurarine, suxamethonium, etc.

B) central muscle relaxants , meprobamate, mephenesin, diazepam, etc.

8) Central Nervous System

a. Sedative-hypnotics.
b. Anti-epileptics.
c. General anaesthetics.
d. Local anesthetics.
e. Drugs for movement disorder/ muscle relaxant.
f. Alcohol.
g. Drugs for migraine.
h. Stimulants of the central nervous system:
   - Caffeine, theophyline, theobromine
   - Brain stem stimulants: picrotoxin, nikethamide.
   - Ethamivan, doxapram.
   - Spinal cord stimulants: strychnine.

i. Psychopharmacology:
   - Anti-psychotics.
   - Anxiolytics.
   - Anti-depressant / anti mania drugs.
   - Alcohol and drugs of abuse.
   - Anti-parkinson drugs.
   - Anti epileptic drugs

9) Analgesics

a. Opioids and narcotics analgesics.
b. Nonsteroidal anti inflamatory drugs (nsaid).
c. Antigout drugs.

10) Drugs Acting on Respiratory System

a. Drugs used in treatment of bronchial asthma.
b. Expectorants.
c. Mucolytics.
d. Antitussives.

11) Drugs Acting on Endocrine System

a. Pituitary-hypothalamic drugs.
b. Adrenocorticoids.
c. Sex hormones
d. Thyroid/ parathyroid drugs.
e. Pancreatic hormones and oral anti diabetic drugs.
f. Oral contraceptives and anabolic steroids.

12) Drugs Acting on Uterus

a. Ergometrine.
b. Terbutaline.
c. Dinoprostone.
d. Carboprost.
e. Ritodrine.

f. Oxytocin.

Antimicrobial Drugs

a. Sulfonamides.
b. Penicillins.
c. Cephalosporins.
d. Aminoglycosides.
e. Tetracyclines.
f. Macrolides:
   Chloramphenicol.
g. Quinolones.
h. Anti- tuberculous drugs.
i. Antileprosy drugs.
j. Anti fungal drugs.
k. Antiviral drugs.
l. Anti-protozoal drugs:
   - Anti- malarial drugs.
   - Anti-amoebic drugs.
m. Urinary tract antiseptics.
n. Anti cancer drugs.
o. Immunosuppressive agents.
p. Miscellaneous.
q. Vaccines and immunoglobulin drug interaction.

P R A C T I C A L S

A - EXPERIMENTAL PHARMACOLOGY

Experiments designed to observe the action of drugs on animals and isolated tissue.

Experiments on the actions of selected drugs to be demonstrated to the students.

1. Effects of drugs on reflex time.
2. Effects of drugs on frog's heart in situ.
3. Effects of drugs on rabbit's eye.
4. Effects of Acetylcholine and Atropine on isolated rabbit's ileum.
5. Effects of histamine and antihistamines on isolated rabbit's ileum.
6. Schemes to find out unknown drug having stimulatory or inhibitory effect on isolated rabbit's ileum.
7. Effects of neuromuscular blocking agents on frogs rectus abdominus muscle.
8. Methodology of clinical trials.
9. Introduction to Biostatistics.

B. PRESCRIPTION WRITING

General principles

- General principles
- Guideline for rational use of drugs
- Prescription writing for common ailments
  - Acute watery diarrhea
  - Bacillary dysentery
  - Amoebic dysentery
  - Ascariasis
  - Tape-worm infestation
  - Acute streptococcal pharyngitis
  - Iron deficiency anemia
  - Allergic rhinitis
  - Scabies
  - Acute malarial fever
  - Cerebral malaira
  - Typhoid fever
  - Bronchial asthma
  - Hypertension
  - Migraine
  - Cardiac failure
  - Shock

Clinico-Pharmacological Seminars on Rational Drug Therapy and Drug Interaction should be conducted

Antibiotics:

Frequency distribution of antibiotic prescribed in different clinical settings/units. Rational prescribing pattern of antibiotics.

Parameters: provisional diagnosis, investigation, empirical therapy. Prescribing after culture and sensitivity.

Vitamins:

Parameters

Groups of vitamin prescribed.
Vitamins prescribed on basis of therapeutic indication or empirical.
Single / multiple vitamins
Frequency of prescribing and rational use of vitamins/ otherwise.

Analgesics

Parameters

a. Frequency distribution of various groups of analgesic prescribed.
b. Single / multiple drug prescription.
c. Non specific indications of analgesic prescription.

Adverse Drug Reactions

a. Anti-microbials, Cytotoxic drugs , Steroids etc.

RECOMMENDED BOOKS

1. **Basic and Clinical Pharmacology** by Katzung, 10th Ed., Mc Graw-Hill.
2. **Pharmacology** by Champe and Harvey, 2nd Ed., Lippincott Williams & Wilkins.

C. FORENSIC MEDICINE & TOXICOLOGY

The course outline is as follows :

1. FORENSIC MEDICINE

a) Pakistan's Legal System:

The powers and jurisdiction of courts, procedures for inquest, and legal procedures. Important legal terms. Application of relevant Legal Sections of the Penal Code. The role of a medical doctor in the medico-legal system. To give Medical evidence in courts. Document information to be prepared by a medical doctor for legal procedures. Procedure of court attendance and recording of evidence.

b) Forensic Sciences:

Role of Forensic Sciences in crime detection.

c) Law in relation to medical men:

Privileges and obligations of Registered medical practitioner. Doctor-patient relationship in the context of the highest ethical standards. Temptations to professional misconduct. Guarding professional secrets and privileged communication. Maintaining highest ethical principles in medical examination and when obtaining consent. Medical negligence. Declaring Brain death, using the highest ethical and biological principles for the decision. The pros and cons of organ transplantation in each individual case.

Develop and defend a personal moral view on Artificial insemination, Therapeutic abortions, Euthanasia, Biomedical research etc. in keeping with the norms of society and highest ethical principles.

d) Personal Identity

Parameters of personal identity, methods of identifying living, dead, decomposed, mutilated and burnt bodies, and skeletal and fragmentary remains, using special techniques (Dentistry Radiology, Neutron Activation Analysis etc.), and objective methods of identification (Osteomtery, Dactyloscopy, D.N.A. Technique, Super imposition photography, etc.) Describe the role of various blood groups in resolving paternity and maternity disputes. Methods to determine time since death.

Methods of determination of age, sex and race by various methods with their medico-legal aspects.

Methods to trace evidence, Locard's Principle of exchange and its medico-legal significance.

e) Thanatology

Scientific concepts regarding death, medico-legal aspect of brain death, indicators of death, medico-legal aspects of sudden and unexpected deaths, causes, manner, mode and mechanisms of death.

Physicochemical changes subsequent to death occurring in various body tissues and organs under various environmental conditions.

To write a certification of death according to W.H.O guidelines.

f) Traumatology

i) *Mechanical Injuries*: Mechanisms of wound production, classification of wounds, wounds produced by conventional weapons and their medico-legal aspects. Firearms, ammunition, classification, nomenclature, wound ballistics and medico-legal aspects.

Ii) *Mechanical injuries medicolegal considerations:* Laws in relation to causing bodily harm, wounding and homicide.
- Examination of an injured person, certify nature, manner of injury, causative agent and dating of wounds.
- Link Sequelae of trauma to its original cause and search for the relationship of sequelae to pre-existing disease.
- Causes of death from wounds.
- Difference between ante-mortem and post-mortem wounds.
- To diagnose whether death is suicidal, homicidal or accidental.

Iii) The student should also have knowledge of and be able to describe methods of treatment and possible etiologies of regional injuries, and should be able to suture simple superficial wounds of:
Head (scalp, skull, brain) and face, vertebral column and its contents, neck, chest, abdomen, limbs, bones and joints.

and

Special trauma such as transportation injuries, police torture, and

Death in custody

and

Should be able to determine the medico-legal aspects of heat, cold, electrical injuries.

g) Violent deaths due to asphyxia

Anatomical, physiological, biochemical and pathological signs of violent death and of mechanical, chemical and environmental as physical death and their medico-legal implications. Death due to drowning.

h) Autopsy:

- Types, objectives, rules, and techniques and describe procedure for postmortem.
- Methods for assessment of fatal period and postmortem interval. Post-mortem artifacts. Risks and hazards of autopsy, and autopsy protocol.
- Procedure for selection and preservation, labeling and dispatch of biological and non-biological materials for laboratory examination; and collection of relevant samples.
- Exhumation procedures, and their value and limitations.

i) Forensic Sexology.

Virginity, pregnancy and criminal processes during delivery, their medico-legal aspects, examination procedure and reporting.

j) Sexual offences and relevant sections of law (Zina and Hudood Ordinance)

- Natural and unnatural sexual offences. Medical examination of victim and assailant, collection of specific specimens and writing a required certification.
- Common sexual perversions and their cause.

k) Miscarriage

Medico-legal aspects applicable to miscarriage examining mother and aborted material.
Sending aborted material in proper preservative for examination.

l) Crime against new born, infants and child:

Infanticide, and criminal and non-accidental violence or abuse to a newborn, infant or child.

m) Forensic Psychiatry

- To diagnose mental illness.
- To distinguish between true and feigned insanity.
- To advise on procedure of restraint of the mentally ill, Limitations to civil and criminal responsibilities of mentally ill.

n) Examination of biological specimens

- Forensic importance of biological specimens (blood, semen, salvia, vomitus, breath, urine, hair),
- The method of their collection, preservation, dispatch and the common laboratory tests performed.

2. TOXICOLOGY

a) General principles of Toxicology

- The scope of Toxicology.
- To access the laws regulating drugs and noxious products.
- Common Toxicants in our environments and their abuse.
- Cause of drug dependence, the fate and detoxification of poisons in the biological tissues.
- To diagnose toxicological cases in acute and chronic exposure in living and dead. Utilize general principles of treatment with antidotal therapy and management.
- To handle specimens, work within the framework of duties of Doctor in cases of poisoning to prepare and interpret chemical examiners reports.

b) Autopsy techniques with collection, preservation and dispatch of biological material to analytical laboratory.

c) Specific Poisons

Poisons/drugs of abuse prevailing in our society along with medico-legal aspects:

i) Alcohol
ii) Opiates, opioids and other narcotics
iii) Salicylates and paracetamol
iv) Hypnotics and sedatives
v) Stimulants (cocaine), cannabis
vi) Poisonous plants (aconite, belladonna, hyoscyamus, stramonium, digitalis, ergot, mushrooms, nux vomica, oleander, tobacco)
vii) Venomous insects (snakes)
viii) Inorganic elements, antimony, arsenic, lead, mercury, phosphorus
ix) Volatile poisons and corrosives (carbon monoxide, hydro carbons, cyanides, sulfuric acid, oxalic acid, carbolic acid and alkalis)
x) Pesticides, herbicides and insecticides

Forensic Medicine

a) Oral
b) Practical
c) Note book

Toxicology

a) Oral
b) Practical
c) Note book

Learning Methodology:

Recommendations are as under:-

A) Theory in the form of tutorials, seminars, videos and lectures
B) Practical in the form of :
   - Demonstrations
   - Posting in autopsy rooms
   - Postings such as in medico-legal clinics / casualty departments / poison centers.
   - Experiments in biological laboratory.
C) Visits.
D) Periodical tests will provide feedback to the teachers and assess adequacy of learning.

Practical work will include

1. In Forensic Medicine

   - Autopsies
   - Medico-legal examination of injured
   - Estimation of age and forensic radiology
   - Sexual assaults and sex related cases (impotence, pregnancy etc.).
   - Procedure of preservation, dispatch of biological and other evidentiary material.
   - Practical in biological laboratory (identification of blood, semen, saliva, etc.).
   - Procedure of consent taking and medical certification.

2. In Toxicology, students should have an understanding of and be able to describe :

   - Diagnostic and management process (alcohol, narcotics and insecticide poisons).
   - Collection, preservation and dispatch of biological materials.
   - Visual, olfactory and tactile identification of common poisons found in communities and country.

3. Visits

For proper orientation and practical demonstration, visits are also suggested to a :

- Court.
- Forensic science laboratory.
- Psychiatric unit or jail
- Site during conduction of exhumation.

RECOMMENDED BOOKS

1. **Simpson's Forensic Medicine** by Barnard Knight, 11th Ed., Edward Arnold, London.

2. **Parikh's Text book of Medical Jurisprudence, Forensic Medicine and Toxicology** by C.K. Parikh 6th Ed., CBS Publisher.

3. **Buchanan's Text book of Forensic Medicine and Toxicology** by Buchanan, 9th Ed., Livingstone.

4. **G. Principles and Practice of Forensic Medicine** by Prof. Nasib R. Awan.

5. **Medical Jurisprudence and Toxicology** by Dr. Siddique Hussain.

SYLLABUS OF

THIRD PROFESSIONAL

M.B.B.S.

(A) SPECIAL PATHOLOGY

(B) COMMUNITY MEDICINE

(C) OPHTHALMOLOGY

(D) E.N.T.

(A) SPECIAL PATHOLOGY

The course outline is as follows :-

1. BLOOD VESSELS & HEART

- Atherosclerosis
    - Etiology and pathogenesis
    - Early lesion
    - Late and complicated lesion
    - Vessels affected
    - Complications
- Monkeberg's medial calcific sclerosis
- Arteriolosclerosis.
- Hypertension
    - Classification
    - Causes of secondary hypertension
    - Vascular changes in hypertension.
- Common pathogenetic mechanisms of vasculitis.
- Aneurysm
    - Classification
    - Etiology.
- Atherosclerotic aneurysm
    - Pathogenesis.
    - Type of vessel involved.
    - Morphological & clinical features.
- Varicose veins
    - Common sites
    - Predisposing factors
    - Clinical features.
- Benign and malignant tumours of blood vessels.
- Pathogenesis of ischemic heart disease.

- Myocardial infarction
    - Sequence of changes in myocardial infarction (M.I)
    - Pattern of elevation of biochemical markers used in the evaluation of M.I
    - Complications.
- Causes of sudden cardiac death.
- Cor-pulmonale
- Predisposing disorders.
- Rheumatic Endocarditis
- Bacterial Endocarditis
    - Etiology
    - Pathogenesis
    - Morphological & clinical features.
    - Complications
- Myocarditis.
- Morphological and clinical features of myocarditis.
- Cardiomyopathy
    - Dilated
    - Hypertrophic
    - Restrictive.
- Pericarditis.
- Clinical and morphological feature of pericarditis.
- Primary & secondary cardiac tumours.
- Fallot's tetralogy
- Coarctation of aorta

2. HEMATOPOIETIC AND LYMPHOID SYSTEMS

- Stages in the formation of red blood cell and white blood cells.
- Normal values of red cell count
- Hemoglobin level

- Packed cell volume
- MCH
- MCV
- MCHC
- WBC Count
- Platelet count.
- Anemia
    - Classification
    - Causes
- Etiology, Blood picture, clinical features and Lab Diagnosis of;
    - Iron deficiency anemia
    - Megaloblastic anemia.
    - Folate deficiency anemia.
    - Vit. B12 deficiency anemia.
    - Anemia of chronic disease
    - Nutritional deficiency anemia.
- Hereditary spherocytosis
    - Incidence
    - Etiology
    - Pathogenesis
    - Morphological and Clinical features
- Thalassemia.
    - Classification
    - Pathogenesis
    - Blood picture
    - Clinical and genetic features.
- Hemolytic anemia
- Glucose-6-phosphate dehyrogenase deficiency.
- Immunohemolytic anemia.
- Warm and cold antibodies immunohemolytic anemias.
- Aplastic anemia

        - Etiology
        - Pathogenesis
        - Clinical features
        - Lab. Diagnosis
- Neutropenia
- Agranulocytosis.
- Leukocytosis.
- Infectious mononucleosis
        - Epidemiology
        - Morphology
        - Clinical features
- Acute and chronic nonspecific lymphadenitis.
- Non-hodgkin's lymphoma
- Classification (real and working formulations)
- Hodgkin's disease
        - Classification
        - Clinical stages
        - Etiology and pathogenesis
- Leukemia
- Prognostic factors of acute lymphoblastic and acute myeloblastic leukemias.
- Pathophysiology of chronic myeloid and chronic lymphocytic leukemias
- Multiple myeloma
        - Etiology
        - Pathogenesis
        - Morphology
        - Clinical features
- Disseminated intravascular coagulation
        - Etiology
        - Pathogenesis
        - Clinical features
        - Laboratory diagnosis

- Causes of decreased production and decreased survival of platelets.
- Idiopathic & thrombotic thrombocytopenic purpura
- Value of following tests in the assessment of bleeding disorders
    - Bleeding time
    - Clotting time
    - Platelets count
    - Platelet function test
    - Partial thromboplastin time
    - Prothrombin time
    - Mixing test studies
- Polycythemia
    - Etiology
    - Pathogenesis
    - Clinical significance
    - Lab. Diagnosis
- ABO and Rhesus blood groups
- Screening of Donors
- Hazards of blood transfusion and their prevention.

3. RESPIRATORY SYSTEM

- Micro-organisms causing upper respiratory tract infection.
- Etiology and clinical features of;
    - Rhinitis
    - Nasal polyps
    - Acute pharyngitis
    - Acute tonsillitis
    - Acute bacterial epiglottis
    - Acute laryngitis
    - Pleural effusion
    - Hemothorax,

        - Hydrothorax
        - Pleuritis,
        - Pneumothorax
        - Chylothorax
- Malignant & benign tumours of nasopharynx and larynx.
- Atelectasis
        - Classification
        - Pathogenesis
- Restrictive & obstructive lung disease
- Etiology pathogenesis, morphology & clinical features of;
        - Asthma.
        - Various types of emphysema
        - Chronic bronchitis.
        - Bronchiectasis.
        - Adult respiratory distress syndrome.
        - Restrictive lung diseases.
        - Sarcoidosis
        - Hypersensitivity pneumonitis.
        - Idiopathic pulmonary fibrosis.
        - Goodpasture's syndrome.
        - Thromboemboli.
        - Pulmonary infarction.
        - Pulmonary hypertension and vascular sclerosis.
- Acute bacterial pneumonia.
- Micro-organisms causing atypical pneumonia.
- Etiology, pathogenesis & clinical features of;
        - Tuberculosis of the lung.
        - Pneumoconiosis
- Fungi (candida, pneumocystis carinii) causing lung infections.
- Bronchogenic carcinoma and mesothelioma
        - Classification

- Etiology
- Pathogenesis
- Clinical features

4. THE ORAL CAVITY AND GASTROINTESTINAL TRACT

- **Oral cavity**
- Leukoplakia.
- Oral cancer
    - Risk factors
    - Morphology
    - Clinical feature
- Benign and malignant tumours of salivary glands.
- Pleomorphic adenoma.
    - Clinical features
    - Morphology

- **Esophagus**
- Predisposing factors of esophagitis.
- Carcinoma of the esophagus
- Stomach
- Etiology, pathogenesis, morphological and clinical features of ;
    - Acute gastritis
    - Chronic gastritis.
    - Peptic ulcer.
- Gastric carcinoma
    - Risk factors
    - Pathogenesis
    - Morphology
    - Clinical features and diagnosis
    - Prognosis
- Intestine

- Etiology, pathogenesis, morphological and clinical features of;
    - Hirschsprung's disease
    - Celiac sprue
    - Tropical sprue
    - Ischemic bowel disease.
    - Crohn's disease
    - Ulcerative colitis.
    - Acute appendicitis
- Major causes of intestinal obstruction.
- Clinico-pathological features of following diseases of intestine
    - Amebiasis
    - Tuberculosis
    - Typhoid
- Non-neoplastic polyps of intestine.
- Adenomas
    - Classification on the basis of epithelial architecture.
    - Clinical and morphological features
- Colorectal carcinoma.
    - Classification
    - Etiology
    - Pathogenesis
    - Morphological and clinical features
- Aster-Coller classifications of carcinoma of the colon and rectum.
- Carcinoid tumour
    - Peak incidence
    - Most prevalent sites in the gut
    - Morphological features
    - Clinical features of carcinoid syndrome.
- Etiology, pathogenesis, morphological and clinical features of tumours of appendix.

- **Liver and Biliary Tract**
- Liver
- Pathway of bilirubin metabolism and its elimination from the body
- Jaundice
    - Classification
    - Causes
    - Clinical features
    - Lab diagnosis
- Intrahepatic and extrahepatic biliary obstruction.
- Etiology, pathogenesis, morphology, clinical features and complication of;
    - Hepatic failure
    - Cirrhosis
- Viral hepatitis A,B,C,D and E
    - Route of transmission
    - Incubation period
    - Clinical features.
    - Potential outcome of acute infection.
    - Carrier state
    - Acute and chronic hepatitis.
- Etiology, morphological and clinical features of liver abscess.
- Drugs and toxins causing hepatic injury
- Pathogenesis of alcohol liver disease.
- Morphological and clinical features of alcoholic hepatitis and cirrhosis.
- Classification, etiology, pathogenesis, morphological and clinical features of;
    - Hemochromatosis.
    - Secondary hemochromatosis.
    - Wilson's disease.
    - Alpha-1 antitrypsin deficiency.
    - Neonatal hepatitis.
    - Primary and secondary biliary cirrhosis.
- Hepatocellular carcinoma

- Epidemiology
- Pathogenesis
- Morphology
- Clinical features

- **Biliary tract**
- Pathogenesis and risk factors of cholelithiasis.
- Morphological and clinical features of acute and chronic cholecystitis.
- Clinical and morphological features of gall bladder cancer.

- **Pancreas**.
- Acute and chronic pancreatitis
  - Etiology
  - Pathogenesis
  - Morphology
  - Clinical features.
- Clinical and morphological features of carcinoma of pancreas.

5. THE URINARY SYSTEM

- Etiology, pathogenesis, clinical features and complications of;
  - Azotemia
  - Uremia
  - Acute renal failure
  - Chronic renal failure
  - Polycystic kidney disease (its Classification)
  - Glomerulonephritis (its Classification)
  - Nephrotic and nephritic syndrome
  - Acute pyelonephritis.
  - Chronic pyelonephritis.
  - Hydronephrosis
- Pathogenesis and clinical course of acute tubular necrosis.
- Benign and malignant nephrosclerosis

- Characteristics of various types of renal stones
- Pathogenesis, clinical features and lab diagnosis of nephrolithiasis
- Epidemiology, morphology, clinical features and prognosis of Wilm's tumour
- Classification, Epidemiology, morphology, clinical features and prognosis of renal cell carcinoma
- Etiology, morphology & clinical features of cystitis.
- Clinical features, etiology and morphology of transitional cell carcinoma of the urinary bladder.

6. MALE GENITAL SYSTEM

- Hypospadias
- Undescended testis
- Urethritis (Gonococcal, Non gonococcal)
    - Etiology
    - Route of infection
    - Pathogenesis
    - Diagnosis
- Etiology, pathogenesis and natural history of;
    - Prostatitis
    - Prostatic hyperplasia
- Causes, pathogenesis and clinical features of scrotal swelling.
    - Testicular adnexa
    - Varicocele
    - Hydrocele
    - Spermatocele
    - Testis and epididymis
    - Inflammation (Orchitis)
    - Epididymitis
- Causes, pathogenesis and relevant investigations of male inferitlity.
- Classification, pathogenesis, morphology, clinical features and prognosis of the tumours of the male genital tract (Prostate,Testis)

7. FEMALE GENITAL SYSTEM

- Causes, routes of infection & methods of diagnosis of sexually transmitted diseases.
- Route of infection, pathogenesis and Lab diagnosis of;
    - Gonorrhea
    - Syphilis
    - Chlamydia
    - HPV
    - Herpes simplex
    - Trichomonas vaginalis.
- Cervical intraepithelial neoplasia
- Neoplasms of cervix
- Causes, pathogenesis and clinical features of dysfunctional uterine bleeding with special reference to endometrial hyperplasia,endometrial polyp and carcinoma.
- Etiology, clinical features and pathogenesis of;
    - Adenomyosis
    - Endometriosis
    - Ectopic pregnancy
    - Toxemia of pregnancy.
- Classification, pathogenesis, morphology, clinical features and prognosis of the tumours of the female genital tract (uterus, ovary and Gestational trophoblastic tumours).

8. BREAST

- Etiology and causes of lump in the breast
- Etiology, Pathogenesis, Morphology and clinical features;
    - Mastitis
    - Fibrocystic disease of the breast
    - Intraductal papilloma
- Benign tumours of the breast (Fibroadenoma and Phyllodes tumour)
- Gynaecomastia
- Carcinomas of the breast (Ductal and Lobular)

9. MUSCULOSKELETAL SYSTEM

- Pathogenesis and clinical features of ;
    - Achondroplasia.
    - Osteogenesis imperfecta.
    - Osteoporosis.
- Acute and chronic osteomyelitis
    - Common causative micro-organism
    - Common routes of spread
    - Complications.
- Common sites involved in tuberculous osteomyelitis
- Pathogenesis, morphological and clinical features of Paget's disease (osteitis deformans).
- Benign and malignant bone forming tumours.
- Common sites, morphological and clinical features of osteogenic sarcoma.
- Benign and malignant cartilaginous tumours.
- Chondrosarcoma
    - Peak incidence
    - Common sites of origin
    - Morphological and clinical features.
- Most frequent sites, clinical and morphological features of giant cell tumours of bone.
- Ewing's sarcoma
    - Peak incidence
    - Common sites of origin
    - Chromosomal abnormality
    - Morphological and clinical features.
- Pathogenesis, morphological and clinical features of osteoarthritis
- Rheumatoid arthritis
    - Pathogenesis
    - Morphological and clinical features
    - Lab Diagnosis

- Gout.
    - Classification
    - Pathogenesis
    - Morphological and clinical features
    - Lab Diagnosis
- Pathogenesis, morphological and clinical features of;
    - Duchenne muscular dystrophy
    - Myotonic dystrophy
    - Congenital myopathies
    - Inflammatory myopathies
    - Myasthenia gravis.
- Lipoma and lipasarcoma.
- Rhabdomyosarcoma
    - Peak incidence
    - Histological variants
    - Frequent sites

10. ENDOCRINE SYSTEM

- **Pituitary.**
- Causes of hyperpituitarism.
- Morphology and clinical features of;
    - Pituitary adenomas.
    - Acromegaly
    - Gigantism.
- Causes of hypopituitarism.
- Etiology, pathogenesis and clinical features of;
    - Sheehan's syndrome
    - Dwarfism
- Etiology, clinical features, pathogenesis and lab findings in inappropriate secretion of ADH.
- **Adrenal Cortex and Medulla**

- Adrenal cortical hyperfunction. (CUSHNG'S SYNDROME)
- Etiology, pathogenesis clinical features and lab diagnosis of;
    - Conn's syndrome
    - Adrenogenital syndrome.
- Causes of hypofunction of adrenal cortex.
- Etiology, pathogenesis and clinical features of Addison's disease.
- Tumours of adrenal medulla and cortex.
- Clinical features and diagnosis of pheochromocytoma.
- **Thyroid**
- Etiology and clinical features of hyperthyroidism.
- Etiology and clinical features of hypothyroidism including Cretinism and Myxedema.
- Investigation / lab tests for diagnosis of thyroid dysfunction.
- Goiter and its types
- Etiology, pathogenesis and clinical features of diffuse and multinodular goiter.
- Causes of solitary thyroid nodule and its diagnostic approach.
- Thyroiditis
    - Types
    - Pathogenesis
    - Morphology
    - Clinical features
- Etiology, pathogenesis, morphology and clinical features of;
    - Follicular adenoma
    - Papillary carcinoma
    - Follicular carcinoma
    - Medullary carcinoma.
    - Undifferentiated.
- Types of MEN syndromes.
- **Parathyroid**
- Etiology and clinical features of hyperparathyroidism and hypoparathyroidism.
- Primary, secondary and tertiary hyperparathyroidism.
- Calcium homeostasis

- Causes of hyper and hypocalcemia.
- **SKIN**
- Macule, papule, nodule, plaque, vesicle, bulla, blister, putsule, scale,lichenification, excoriation, hyperkeratosis, parakeratosis, acanthosis,dyskeratosis, acantholysis, papillomatosis, lentiginous spongiosis.
- Morphological and clinical features of urticaria.
- Etiology, pathogenesis morphological and clinical features of;
    - Eczematous dermatitis.
    - Contact dermatitis
    - Atopic dermatitis
    - Photoeczematus eruptions
    - Primary irritant dermatitis
    - Erythema multiforme..
    - Psoriasis.
    - Pemphigus
    - Bullous pemphigoid.
- Premalignant epithelial lesions.
- Types of warts and their most frequent locations.
- Predisposing factors, morphology, clinical features and prognosis of;
    - Squamous cell carcinoma
    - Basal cell carcinoma.
- Types, clinical and morphological features of;
    - Nevocellular Nevi
    - Dysplastic nevi.
- Malignant melanoma
    - Classification
    - Frequent site of origin
    - Clinical and morphological features.

11. NERVOUS SYSTEM

- Clinico-pathological features of hydrocephalus.

- Cerebral edema (vasogenic & cytotoxic).
- Types of herniation of brain and their clinical significance.
- Intra-cranial hemorrhage.
- Etiologic agents, clinical and morphological features of;
    - Acute purulent meningitis
    - Acute lymphocytic meningitis
    - Chronic meningitis
    - Brain abscess
    - Tuberculosis meningitis.
    - Viral encephalitis
- Clinico-pathological features of Guillain Barre syndrome.
- Polyneuropathies
- Toxic neuropathy
- Important intracranial tumours (astrocytoma,oligodendrogliomas, ependymoma, medulloblastoma and meningioma)
- Clinical significance of glial tumours.
- Frequent metastatic tumours to the brain
- Primary peripheral nerve sheath neoplasms

RECOMMENDED BOOKS

1. **Pathological Basis of Disease** by Kumar, Cotran, Robbins. 7th. Ed.
2. **Medical Microbiology and Immunology** by Levinson and Jawetz, 9th Ed. Mc Graw-Hill
3. **Ackerman's Surgical Pathology**
4. **Clinical Pathology Interpretations** by A.H. Nagi
5. **Theory and Practice Of Histololgical Techniques** by John D Bancroft
6. **District Laboratory Practice in Tropical Countries** by Monica Cheesburgh, 2nd Ed. Part I & II
7. **Online Journals and Reading Materials through HEC Digital Library Facility.**

(B) COMMUNITY MEDICINE

The course outline is as follows :

Concept of Health & Disease

- Concept of health
- Definition of health (Dimensions, physical, mental, social and spiritual).
- Spectrum of health
- Determinants of health. Responsibility for health
- Indicators of health
- Concept of disease. Concept of causation (all theories including ecological triad, agent, host & environmental factors).
- Spectrum of disease. Iceberg phenomenon.
- Natural history of disease. Levels of prevention.
- Disease elimination and eradication. Disease surveillance.

Introduction to Public Health and Health Systems in Pakistan

Background and Concepts:

- Definitions and concepts in Public Health
- Development of Public Health in Pakistan.
- Economics and Health. Health Policy and planning in Pakistan.
- “Health for all”, background, concepts and progress.
- “Primary Health Care”: Concepts and progress.
- The National Disease Control programmes; policies, strategies and operations.

Health System in Pakistan:

- The role of Federal and Provincial Governments in Health care.
- The District Health System, in the context of devolution.
- The Physician as a manager:
- Functions of manager, management of material, human and financial resources.
- Leadership and motivation.

Partners in Health:

- The public and private sector.
- Nongovernmental Organizations and International Agencies.

- Resources for health. Community Mobilization.

Epidemiology and disease control

- General epidemiology and research methodology.
- Background and concepts, uses, basic measurements in epidemiology (morbidity, mortality, disability and fatality).
- Epidemiological methods (descriptive, analytic and experimental).
- epidemiological transition. Association and causation.
- Investigation of an outbreak or an epidemic.
- Screening for disease. Community diagnosis.
- Research and survey methodology.
- Introduction to qualitative research methodology.

Prevention and control of Infectious diseases

- Definitions to differentiate between:
- Infection, contamination, pollution, infestation
- Infectious disease, communicable disease, contagious disease
- Host, Immune and susceptible persons
- Sporadic, Endemic, Epidemic, Pandemic
- Epizootic, Exotic, Zoonosis
- Contact, fomites, Carriers, Insect Vectors, Reservoir of infection
- Incubation period, Infective period, Generation time
- Cross infection, Nosocomial infection, Opportunistic infections, Iatrogenic (Physician induced) disorders
- Surveillance, Eradication, Elimination.

Dynamics of infections disease Transmission

- Reservoir and source of infection, Escape of organism, Mode of transmission, Entry into the body, Susceptible host, Immunity (different types of immunity and immunization)

Control of infection.

- Controlling the reservoir-notification, early diagnosis treatment, isolation, quarantine, disinfections.
- Interruption of transmission.

- The susceptible host (active & passive immunization,Combined Chemoprophylaxis, Non-specific measures).
- Health advice to travelers.
- National case management guide lines.

Epidemiology, control and prevention of infectious diseases of Public Health importance.

- Diseases transmitted through inhalation
- Diseases transmitted through faeco-oral route
- Arthropod borne diseases.
- Diseases of animals conveyed to man.
- Diseases due to direct contact

Epidemiology, control and prevention of non-infectious diseases of Public Health importance.

- Hypertension,
- Coronary heart disease
- Cancers,
- Injuries
- Diabetes mellitus
- Obesity
- Rheumatic fever and heart disease.

Biostatistics

- Concepts and uses
- Data and its types
- Rates, ratios and proportions
- Crude, specific and standardized rates.
- Collection and registration of vital events in Pakistan
- Sources of health related statistics
- Measures of central tendency, (Mean, Median, Mode),
- Measures of dispersion (Range, Standard deviation, Standard error)
- Normal curve
- Methods of data presentation (tables, graphs & diagrams).

- Interpretation of data (t-test and Chi-square test)
- Sampling and its various techniques.
- Health Management Information System

Demography and Population dynamics

- Concept, demographic principles and demographic processes
- Census, definition, methodology, types.
- Determinants of fertility, mortality
- Population pyramid, and its interpretation.
- Demographic transition, demographic trap and its public health importance.
- Demographic and social implication of high population growth.
- Social mobilization
- Urbanization

Food and Nutrition

- Concepts (nutrition, nutrient, food, diet).
- Food groups and their functions.
- Role of fiber in diet.
- Balanced diet.
- Malnutrition at all stages of life its types causes and prevention.
- Common nutritional problem of public health importance and their prevention and control.
- Dietary requirements of normal human being at different stages of life.
- Food hygiene, pasteurization, fortification, additives & adulteration and preservation
- Food poisoning
- Assessment of nutritional status of a community.

Reproductive and child health

- Safe mother hood, and its components. (ante-natal, post-natal, family planning & emergency obstetric care).
- Maternal mortality, causes and prevention.
- Infant care: growth and development. Breast feeding,
- Common causes of morbidity and mortality, their prevention

- And control.
- Child care: health promotion strategies. Common ailments, home accidents, child mortality prevention .
- Strategic approaches of integrated management of childhood illness (IMCI).
- Adolescent health
- Reproductive tract infections: guidelines for management of STD's.

Health of school age children.

- Role of teachers and role of doctor in maintenance of health
- Procedures for determining health status of school age children.
- Common health problems of school children.

Environmental Health Sciences

- Air: Composition of air. Causes of Air pollution. Purification of Air. Diseases caused by impurities in air and their prevention.
- Water: Sources of Water. Daily water requirement. Water pollution its causes and prevention. Purification of Water.
- Water quality Standards. Diseases due to polluted water.
- Waste disposal: contents, hazards and safety measures for solid and liquid; domestic, industrial and hospital waste.
- Climate: Climate and weather. Global environmental concerns
- Green house effect, depletion of ozone layer, acid rains.
- Effect of extremes of temperature, humidity, atmospheric pressure on human health and their prevention.
- Radiation: Sources, types, causes , hazards and prevention.
- Healthful housing. Urban and rural slums. Refugee camps and hostels.
- Noise : Definition, causes, acceptance level, hazards and control.

Occupational Health

- Concepts, of occupational health, occupational medicine and occupational hygiene.
- Ergonomics and its importance.
- Occupational hazards. Principles of control.
- General principles of occupational disease prevention.
- Organization of occupational health services.

- Health Insurance and Social Security Schemes

Arthropods and their public health importance

- Common arthropod borne diseases
- Control of arthropods of medical importance.
- Insecticides and their public health importance

Prevention and control of parasitic diseases of public health importance

Snake Bites: personal protection and management

Mental Health

- Concept. Common mental health problems, their causes, prevention and control.
- Juvenile delinquency

Behavioral Sciences and lifestyle

- Concept, attitudes, health and illness behaviour.
- Drug abuse, addiction and smoking
- Child abuse and child labour
- Role of physical exercise in health and disease.

Information, Education and Communication (IEC)

- Concept. Aims and objectives
- Approaches used in public health
- Contents, principles and stages of health education
- Communication methods, barriers and skills in health education
- Planning, organizing and evaluating a health education programme
- Social marketing

Disaster

- Definition, classification, (natural disasters like earthquake, floods.
- Epidemic of communicable diseases, man made disasters.
- Accidents, thermo nuclear warfare, causes and prevention),
- Magnitude and effects of disaster and public health consequences
- Disaster: preparedness and management

Medical Ethics

- Background concepts and components
- National recommended guidelines.

PRACTICAL AND COMMUNITY BASED TRAINING

- Student should have practical experience in questionnaire development, data collection, compilation, presentation, analysis and report writing.

Field visits

- Visit to BHU and RHC
- Visit to an NGO
- Visit to a primary school to asses the nutritional status of school children
- Visit to MCH/Reproductive Health Centre to observe the organization, and function of the centre and to demonstrate counseling skills in one of the following:
    - Nutritional counseling for children, pregnant and lactating women.
    - Antenatal Care
    - Family planning services
    - Immunization, others
- Visit to a hospital to see the hospital waste disposal.
- Visit to an industry
- Visit to a physical/mental/social rehabilitation centre.

Skills development lab

- Water purification at domestic level.
- Contraceptives
- Vaccination including the cold chain
- Oral rehydration solution

RECOMMENDED BOOKS

1. **Text book of Community Medicine** by Park J E. Latest Edition
2. **Text book of Community Medicine.** 6th Ed. by Ilyas Ansari.
3. **Text book of Community Medicine** by Maxie Rozani. Latest Edition
4. **Medical Statistics.** 2nd Ed. by R. Turkwood.
5. **Online Journals and Reading Materials through HEC Digital Library Facility.**

(C) OPHTHALMOLOGY

The course outline is as follows :

General Learning Objectives of the Ophthalmology Course:

To equip doctors with essential knowledge, skill and attitude in order to enable them to:

1. Identify ophthalmic diseases including emergencies, provide primary eye care, refer to the appropriate center and provide follow up to the patients.
2. Perform essential minor surgical procedures
3. Communicate effectively with the patient, the family and the community regarding eye diseases and its related issues
4. Understand medical ethics and its application pertaining to ophthalmology and maintaining confidentiality of the patient.
5. To understand the prevalence and prevention of the common public health problems related to ophthalmology.
6. Understand the principles of Medical Research including fundamentals of information technology.

INSTRUCTIONAL STRATEGY

- **METHODOLOGY**

- Problem-based Learning
- Tutorials/ Practical sessions/Skills Lab practice
- Clinical rotations and ward visits
- Lectures/Seminars/CPC's – using modern audio visual techniques,

- Distant learning using electronic devices and current Information
- Technology facilities.

COURSE CONTENTS

- Basic Anatomy and the functions of the Eyeball and Orbit
- **Orbit:** Orbital Cellulitis, Proptosis
- **Lids:** Blepharitis, Stye, Chalazion, Trichiasis, Entropion, Ectropion, Ptosis, and Common Tumors.
- **Conjunctiva:** Infective and Allergic Conjunctivitis, Pterygium.
- **Cornea:** Corneal Ulcers, risk factors, complications and its management.
- **Sclera:** Episcleritis and Scleritis
- **Pupil:** Pupillary reflexes and their common abnormalities
- **Lacrimal Apparatus:** Composition and function of Tear film, Dry Eye
- Excessive watering (Epiphora), Dacryocystitis (Acute & chronic).
- **Therapeutics:** Drugs used in common ophthalmic conditions
- **Vitamin "A":** Ocular manifestation of vitamin A deficiency and its management.
- **Uveal Tract:** Uveitis, and its differential diagnosis from other causes of the Red Eye.
- **Lens:** Classification of cataract,
- Congenital Cataract (lamellar, signs and symptoms and management), Rubella syndrome, Acquired Cataract (senile, traumatic, drug induced), cataract due to systemic diseases (clinical picture and management including visual rehabilitation).
- **Glaucoma:** Physiology of Aqueous humor formation and its circulation.
- Measurement of IOP
- Definition & classification of glaucoma
- Primary open angle and closed angle glaucoma
- Secondary glaucoma due to hyper-mature cataract and uveitis. Principles of medical and surgical management of glaucoma.
- **Vitro-Retina:** Posterior vitreous detachment, primary retinal detachment (common presentation and principle of management)
- Diabetic Retinopathy, Hypertensive Retinopathy,
- Retinitis Pigmentonsa, Retinoblastoma.
- **Optic Nerv**e: Papilloedema, Optic Neuritis (Papillitis and Retrobulbar Neuritis), Optic Atrophy

- **Visual Pathway:** Introduction to Visual Field defects in the lesions of Chiasma and visual Pathway.
- **Injuries:** Extraocular Foreign Bodies, Closed globe injuries,Open globe injuries with or without retained Intra ocular foreign bodies
- Burns and Chemical Injuries
- Sympathetic Ophthalmitis.
- **Squint and Amblyopia:** Definition, Classification and Principle of Management.
- **Errors of Refraction:** Introduction to Optical System of Normal Eye
- Emetropia, Myopia, Hypermetropia, Astigmatism, Presbyopia, Aphakia, Pseudophakia, Anisometropia and Amblyopia.

Details of Clinical and Practical Competence:

- Level of Learning:
- Level-1 Observer status
- Level-2 Assistant status
- Level-3 Perform under supervision
- Level-4 Perform Independently
- LEVEL 4

History Taking

- Defects in Vision
- Pain in and around the Eye
- Discharging Eye
- Abnormal appearance of the Eye and Orbit

Examination

- Visual Acuity, for distance and near
- Use of a pinhole
- Examination of Adnexa and anterior segment of the eye.
- Eversion of the upper Eye Lid and Lacrimal regurgitation Test
- Detection of the Deviated Eye

- Ocular Movement
- Pupillary Reflexes (Afferant Pupillary defects)
- Measurement of Intra ocular pressure.
- Palpation Assessment
- Schiotz Tonometer 1
- Distant Direct Ophthalmascopy for Identification of defects in Ocular Media
- Direct Ophthalmascopy with emphasis on disc and its abnormalities
- Swollen disc, cup disc and pale disc.
- Confrontation test for field of vision
- Familiarization with Retinoscopy
- Indirect Ophthalmascopy,
- Slit Lamp and its Uses
- Visual Fields and Use of Laser in Ophthalmology

Procedures

- Irrigation of eye
- Instillation of eye drops
- Staining for corneal ulcer
- Removal of superficial foreign bodies
- Rational use of topical anaesthesia
- Preparation for operation and post operative management
- Understand medical ethics and maintain the confidentiality of the patient

Assessment of Level of Competence:

- To Diagnose, treat and prevent certain common eye conditions e.g.
    - Blepheritis
    - Sty and Chalazion
    - Dacryocystitis
    - Conjunctivitis
    - Trachoma
    - Ocular Trauma (Corneal Foreign Body / Abrasion)
    - Ocular Allergies

- To diagnose certain eye disease, initiate first aid treatment and refer them in time e.g.
    - Corneal Ulcer
    - Uveitis
    - Acute Congestive Glaucoma
    - Open or closed globe injuries
    - Red Eye
- To enable them to diagnose other eye conditions and refer them to secondary or tertiary eye care centers for further management(Medical / Surgical) e.g.
    - Cataract
    - Squint and Amblyopia
    - Refractive Errors
    - Tumours (Leucocoria-white Pupil)
    - Serious Ocular Trauma
    - Painful or painless loss of vision.
- To understand the importance of prevention in Ocular Diseases
- Deficiency Diseases resulting in ocular problems(Thyroid, Vit"A")
- Early Detection of Glaucoma
- Diabetic Retinopathy

RECOMMENDED BOOKS

1. **Parson's Diseases of the Eye** by Ramanjit Sihala and Radhika Tandor. 3rd Ed
2. **Ophthalmology** by Renu Jogi
3. **Clinical Textbook of Ophthalmology** by Dr. Saleem Akhter
4. **Kanski's** Ophthalmology
5. **Ophthalmology Principles and Concepts** Newill F. W.
6. **Online Journals and Reading Materials through HEC Digital Library Facility.**

(D) ENT

General Learning Outcomes of the Ophthalmology Course:

To equip them with essential knowledge, skills and attitude to enable them to:

- Identify ENT diseases including emergencies, provide primary health care, refer to appropriate center and provide follow-up to the patients.
- Perform essential minor ENT procedures.
- Communicate effectively with the patient, the family and the community regarding disease and its relevant issues.
- Understand medical ethics and its application pertaining to ENT and maintain the confidentiality of the patient.
- To understand the prevalence and prevention of the common Public Health Problem related to ENT in the community
- Understand the principles of medical research including fundamentals of Information Technology

INSTRUCTIONAL STRATEGY

- **METHODOLOGY**

- Problem-based Learning
- Tutorials/ Practical sessions/Skills Lab practice
- Clinical rotations and ward visits
- Lectures/Seminars/CPC's – using modern audio visual techniques,
- Distant learning using electronic devices and current Information
- Technology facilities.

COURSE CONTENTS

NOSE:

- Anatomy and physiology
- History taking and examination

- **Diseases of external nose**
- Congenital lesions, choanal atresia, meningiocoele,encephalocoele, trauma, cut nose, fractures, external deformities.
- **Diseases of septum**
- Epistaxis
- Dns
- Haematoma
- Septal abscess
- Perforation
- **Rhinitis**
- Allergic
- Atrophic
- Hyper-trophic
- Foreign bodies.
- V.m.r.
- **Polyps**
- Mucous
- Ethmoidal
- Antrochoanal
- Bleeding polypus
- **Foreign body nose**
- Rhinolith
- Maggots

- **Sinusitis**
- Acute sinusitis
- Chronic sinusitis, complications
- Fungal infection of nose and paranasal sinuses
- Cfs rhinorhea
- **Tumours**
- Basal cell carcinoma

- Squamous cell carcinoma
- Pappiloma
- Osteoma
- Headache and its ent causes

BUCCAL CAVITY, ORAL CAVITY, OROPHARYNX

- Anatomy and physiology
- History and examination
- **ORAL CAVITY ULCERS:**
- Traumatic
- Aphthus,
- Vincents angina
- Agranulocytic
- Tuberculous
- Maligant uclers
- Thrush
- Leukoplakia
- Behcet's disease
- Ulcerative lesions of oral cavity
- **OROPHARYNX**
- Acute tonsillitis
- Chronic tonsillitis
- Peri tonsillitis and abscess
- Diphtheria
- Differential diagnosis of white patch on the tonsil
- Tonsil/oral cavity
- Tumours of tonsil
- Retro-pharyngeal abscess
- Pharyngeal abscess acute/chronic
- Sleep apnea syndrome
- AIDS

- Ludwig’s angina
- **LARYNX**
- Anatomy
- Physiology
- History
- Examination
- Glottic stenosis/larynogocoele
- Laryngomalacia
- **Truama, Foreign Body & Infections of Larynx**
- Supraglottitis
- Acute laryngitis
- Laryngotracheobronchitis
- Diphtheria
- Chronic laryngitis
- Tuberculosis
- Syphilis
- Leprosy
- Non specific chronic laryngitis
- Vocal nodules
- Vocal cord paralysis
- Functional aphonia
- **Tumuors**
- Papilloma laryrnx
- Polyp
- Carcinoma larynx
- TNM classification
- **Tracheostomy**
- Indications
- Contra indications
- Complication
- Operation steps

- Post op care
- **EAR**
- Anatomy and physiology
- History and examination
- Tuning fork tests. Pure tone audiometery/impedance audio metery
- Pre auricular sinus
- Deafness
- Pain in the ear
- **External ear**
- Perichondritis
- Trauma to pinna/haematoma
- Wax ear
- Foreign body ear
- Hyper ostosis
- Neoplasia
- Boil ear
- Fungus
- Acute diffuse otitis externa
- Malignant otitis externa
- Myringitis bulliosa
- Traumatic rupture
- **Middle ear**
- Acute otitis media
- Acute necrotising otitis media
- Serous otitis media
- Chronic otitis media
- i Tubo tumpanic
- ii Mucosal disease
- iii Attico antral
- **Complications Of Otitis Media / Mastoiditis**
- Oto toxicity

- Acustic trauma
- Trumatic perforation of tympanic membrane.
- Deaf child
- Speech therapy
- Oto sclerosis
- Vertigo
- Meniere's disease
- Facial nerve paralysis
- Eustachean tube dysfunction
- **HEAD & NECK**
- Cleft palate
- Hare lip
- Thyroglossal cyst / sinus
- Pre auricular cyst / sinus
- D/D of mass neck
- Lesions of salivary glands

PRACTICAL SKILLS:

By the end of the clerkship in the department of ENT,the student should be able to:

- Obtain an appropriate history.
- Perform a complete regional examination
- Identify common E.N.T. Head & Neck problems for a given patient and outline appropriate management plans.
- Identify problems needing referral to an Otolayngologist.

GENERAL SKILLS.

The students should be able to:

- Demonstrate the use of the head mirror for adequate illumination of the nasal cavity
- Examine the oropharynx and the neck
- Examine Larynx by indirect laryngoscopy
- Examination of postnasal space by posterior rhinoscopy.

SPECIAL SKILLS:

- Use the tongue blade to aid inspection of the buccal/cavity.
- Use the finger palpation examination of the oral cavity and tongue
- Palpate the neck to assess the lymph-nodes and salivary glands in the neck.
- Examination of cranial nerves
- Identify structures (of the neck, sinuses and ear) on X-ray (MRI, CT Scan)
- Demonstrate the appropriate use of nasal speculum
- Demonstrate the use of otoscope to aid in examination of the external auditory canal and the tympanic membrane.
- Learn pneumatic otoscopy. (Use of Seigle's speculum)
- Demonstrate the use of tuning fork and interpret the findings
- Interpret pure tone and speech audiometry
- Syringing of ear.
- Removal of wax from ear
- Anterior nasal packing

Observe the Following Operations and the Use Of the Listed Instruments

- Abscess incision drainage/ haematoma
- Reduction of fracture nose
- Septal correction surgery
- Antral wash out
- Cald Well Luc's operation

Introduction To New Procedures

- Nasal packing (anterior)
- Tracheostomy
- Laryngotomy
- Management of obstructed airway
- Foreign body in tracheo-bronchial tree and Larynx
- Ear operations

Instruments

- Ear instruments like myringotome and ear speculum

- Walsham’s Forceps
- Ashe’s Forceps
- Trocar and Cannula
- Nasal Speculum
- Freer elevator
- Suction Tube
- Lucl’s forceps
- Tilly Nasal Dressing Forceps
- Bayonet Nasal Forces
- Myle’s Retrograde Perforator.
- Nasal Snare
- Balenger Swivel Knife
- Eustachean Catheter
- Sinus forceps
- Endotracheal tube, cuffed, non-cuffed
- Mcgill forceps
- Tracheostomy tubes
- Tracheal dilator
- Retractors
- Crecoid hook
- Endoscopes
    - Laryngoscopes
    - Bronchoscopes
    - Oesophagoscopes
    - Nasopharyngoscope (Rigid/flexible)
- Adenoid curette
- Boyle Davis mouth gag
- Tonsil holding forceps
- Tonsilar artety forceps
- Tonsil snare
- Knot pusher

RECOMMENDED BOOKS

1. **Text book of ENT** by Logan Turner. Latest Ed.
2. **Diseases of ENT** by Dhengra. Latest Ed.
3. **Text Book of ENT** by Masud.
4. **Oxford Hand Book of ENT** by Prescott.
5. **Online Journals and Reading Materials through HEC Digital Library Facility.**

SYLLABUS OF

FINAL PROFESSIONAL

M.B.B.S.

(A). SURGERY

(B). MEDICINE

(C). OBSTETRICS

(D). GYNAECOLOGY

(E). PAEDIATRICS

(A) SURGERY

Distribution of Subjects:

Paper I: General Surgery, Surgical Anatomy, Principles of Anaesthesia, Principles of Radiology, Principles of Radiotherapy and Chemotherapy.

Paper II: **Systematic and Operative Surgery:** Musculoskeletal system, GIT, Renal system, Male and female reproductive system, Head and Neck, Thorax, Breast, Nervous system, Cardiovascular System, Orthopaedics and Traumatology.

The course outline is as follows :

Systems and the Diseases:

Head, Face and Neck

1. Developmental abnormalities of face, palate, lips.
2. Principles of management of head injuries and its complications.
3. Oral cavity including tongue.
4. Diseases of salivary glands (Inflammation, Calculus, Tumours)
5. Neck lumps including lymph nodes, thyroid and parathyroid

Breast

1. Diseases of the breast, nipple and areola
2. Benign and malignant tumours.

Chest Wall & Thorax

1. Blunt & penetrating injuries and their complications.
2. Lung abscess and empyema thoracis.
3. Tumors and cysts in the lungs.

Gastro Intestinal Tract

1. Diseases causing oesophageal obstruction.
2. Peptic ulcer disease & its complications.
3. Tumours of stomach.

5. Conditions causing chronic abdomen including malignant lesions of small and large bowel
6. Ano-rectal and peri-anal conditions requiring surgery.

Abdominal, Pelvic and Genital Trauma and Hernia.

1. Principles in management of abdominal pelvic and urogenital trauma.
2. Inguinal/ Inguinoscrotal and femoral hernia.
3. Epigastric hernia/umbilical/ para-umblical hernia.
4. Incisional hernia.

Liver

1. Trauma.
2. Obstructive jaundice.
3. Liver abscess.
4. Hydatid cyst.
5. Malignancy (Hepatoma & secondaries).

Gall Bladder

1. Acute and chronic cholecystitis.
2. Cholelithiasis and its complications.
3. Tumours

Pancreas

1. Acute, relapsing and chronic pancreatitis.
2. Pancreatic masses including cysts
3. Benign and malignant neoplasia.

Spleen

1. Trauma
2. Surgical aspects of spleen

Urinary Tract

1. Common congenital anomalies.
2. Infection & its sequelae.
3. Calculus disease and its sequelae.
4. Bladder lesions.
5. Enlarged prostate.
6. Urogenital trauma.
7. Neoplasms of kidney and urinary tract.

External Genitalia, Male and Female

1. Developmental abnormalities.
2. Common pelvic conditions

Scrotal and testicular lesions

1. Scrotal swelling.
2. Testicular swelling.

Skin & Soft Tissues

1. Common benign and malignant skin lesions.
2. Wounds/ulcers/abscesses/sinuses/fistulae.
3. Soft tissue lumps.

Orthopaedics and Trauma

1. Common congenital malformations of locomotive system.
2. Bone fractures & their complications.
3. Sports injuries and afflictions of tendons and bursae.
4. Bone and joint infections.
5. Arthritis.
6. Bone and cartilage tumours.
7. Spinal trauma.
8. Spinal tumours.
9. Common spinal deformities and other surgically correctable lesions.

Vascular and Nerve Disorders

1. Vascular afflictions and limb ischaemia.
2. Varicosities
3. Deep venous thrombosis.
4. Peripheral nerve injuries

Essential Skills to be acquired

1. Provide First Aid: Resuscitation (ABC) of polytrauma, CPR.
2. Collect samples of blood, urine, stool, sputum, pus swab etc.
3. Insert Naso-gastric tube, have observed chest intubation and paracentesis.
4. Do IV cannulation, have observed CV-line insertion and cut- down of veins.
5. Catheterize male and female patients.
6. Prepare the patient for and know the procedure of doing X-Ray chest, abdomen, KUB, bones, IVU, barium studies, ultrasound and other imaging investigations.
7. Principles of pre-operative preparations, sterilization/disinfection techniques.
8. Principles of wound care, skin suturing and suture removal, incision

tissue lumps, needle biopsies, aspiration of localized fluids, etc.

9. Have observed common surgical procedures, treatment of fracture/ dislocation and methods of general / local anaesthesia.
10. Apply bandage and splint/pop cast to the patient's limbs.
11. Have observed instillation of chemotherapy and principles of radiotherapy.

(I) ORTHOPAEDIC SURGERY & TRAUMATOLOGY

The course outline is as follows :

a. Necessary Applied Basic Sciences With Reference To Orthopaedics:

- Pathophysiology of trauma and shock.
- Mechanical properties of bone & soft tissue.
- Biomechanics of fracture.
- Healing & repair (bone & soft tissues).
- Healing principles of fracture.
- Principles of physiotherapy
- Orthotics – orthopaedic appliances to support and correct deformities
- Prosthesis – artificial substitute for missing body parts.

b. Systems and Diseases

1: Congenital & Development Diseases; Congenital talipes equino varus (CTEV) and talipes valgus; congenital dislocation of hip (CDH); flat foot; Perth's disease; Slipped Capital Femoral Epiphysis.

Specific required skills

- Clinical examination and x-ray interpretation of above mentioned diseases
- Observe the manipulation/application of POP cast for CTEV, pelvic harness, Von Rosen splint, hip spica.

2: Bone dysplasia (defect intrinsic to bone)

- Dwarf- Achondroplasia

3: Bone and joint infections

- Acute osteomyelitis and septic arthritis.
- Chronic osteomyelitis.
- Tuberculous arthritis/Caries spine.
- Osteolysis/bone cyst, sequestrum, periosteal reaction

Specific required skills

- Clinical examination for above mentioned diseases
- Interpretation of related x-ray and laboratory reports
- Observe or assist in joint aspiration, curettage and sequestrectomy, drainage of abscess etc.

4: Metabolic Bone diseases

- Rickets; osteomalacia; osteoporosis; hyperparathyroidism; diabetes.

Specific required skills

- Interpretation of related X-rays
- Interpretation of laboratory reports of serum Ca, PO_4, Alk. phosphatase, parathormone.
- Management of diabetes with relation to injury /surgical procedure and infections.

5: Neuromuscular disorders

- Muscular dystrophies e.g. Duchenne type and Becker's type; spina bifida; cerebral palsy.
- Post-polio paralysis (PPP); neurofibromatosis

Specific required skills

- Clinical examination of sensations, deep tendon jerks, muscle power and tone clonus.
- Management suggesting and explaining of orthosis, walking aids (walking stick, crutches, walkers), wheel chairs.

6: Bone Tumours

a. Benign
Exostosis/multiple hereditary exostosis/enchondroma, fibroma, lipoma, neuroma, osteoid osteoma, giant cell tumour.

B. Malignant
Osteogenic sarcoma, Ewings sarcoma, chondrosarcoma, multiple myeloma, metastatic bone tumors from thyroid, lungs, kidney, breast and prostate.

c. Principles, indications, techniques and orthotics related to amputation.

Specific Required Skills

- Observe biopsy – needle and open.
- Observe amputation/limb salvage surgery –

7: Neck Pain, Low Back Pain and Sciatica

- Deformities of scoliosis, kyphosis.
- Spinal injury, soft tissue injuries (sprains, strains etc.)
- Fractures (stable, unstable), neurological damage

Specific Required Skills

- Examination and basic management.
- Application of cervical collar, cervical traction, lumbosacral corset.
- Observe internal fixation of spinal fracture
- Log rolling, prevention of bed sores, bladder care/catheter care and rehabilitation.

8: Arthritis and Musculoskeletal Painful Disorders

- Rheumatoid arthritis, ankylosing spondylitis, osteoarthritis.
- Gout; frozen shoulder; tennis elbow, plantar fasciitis, trigger finger, de Quervains disease.

Specific Required Skills

- Clinical examination of patients with arthritis (differentiate on x-ray)
- Interpretation of related investigations; x-rays and laboratory.
- Management; prescription writing for arthritis and painful muscle disorders.

9: Soft Tissue Injuries

- Sprains/ruptures of muscles, ligaments, tendons; nerve injuries.
- Arterial injuries clean/contaminated wounds.

10: Fractures

- Basic and advanced trauma life support
- Triage of injured patients in emergency room,
- Principles of fracture classification
- Principals of fracture treatment in children.
- Principals of fracture fixation
- Management of common orthopaedic emergencies.
- Mal-united fractures; non-unions.

Specific Required Skills

- Examination; clinical examination of injured patient; record BP, pulse rate, respiratory rate peripheral pulses and capillary filling; recognition of associated injuries/complications e.g. Vascular, neurological, vascular compartment syndrome etc.
- Investigations; request and interpret urine and blood examination in trauma patient (CBC, ESR, blood urea and sugar etc; interpret x-ray of limbs with fractures and dislocations;
- Catheterize male and female patients.
- Shifting of patient from bed to trolley

- Serving patients with bed pan and urine bottle.
- Prepare patients for surgeries and post operative care.
- Dressing of surgical wounds post operatively.
- Pass nasogastric tube.
- Injections I/V and I/M.
- Interpret and explain the urine, stool and blood findings with relevance to orthopaedic diseases.
- Request and interpret x-rays, ultrasound, CT, MRI scans
- Management; provide first aid to a person with bone injury like common sprains, fractures and dislocations (immobilization of body part, resuscitation of injured patient.
- Apply dressings, splints, plasters and other immobilization techniques in fracture patients in emergency; maintain clear airway of patient; reductions and observation of surgical fixations; internal and external fixation of fractures (plates, nails others); manipulation and application of plaster of paris cast/back slab; use of external fixators in treatment of open fractures; application of traction skin/skeletal.

RECOMMENDED BOOKS:

- **Short Practice Of Surgery** By Bailey And Love's
- **Text Book Of Surgery** By Ijaz Ahsan
- **General Surgery (Lecture Notes Series)** by Harold Ellis, Roy Calne, Chris Watson
- **An Introduction to the Symptoms and Signs of Surgical Disease** by Norman Browse
- **Current Surgical Practice**: by Norman L. Browse, Alan G. Johnson, and Tom. Vol. 6
- **Schwartz's Principles of Surgery** by F. Charles Brunicardi, Dana K. Andersen, Timothy R. Billiar, and David L. Dunn 8th edition. 2004
- **Online Journals and Reading Materials** through HEC Digital Library Facility.

(II) ANAESTHESIOLOGY

The course outline is as follows :

- Pre-operative assessment of patients and pre-medication
- Local anaesthesia
    - Local anaesthetic agents (pharmacology)
    - Regional anaesthesia (spinal and epidural)
- Intravenous anaesthetic agents
- Muscle relaxants
- Inhalational anaesthetic agents
- Anaesthesia and associated diseases.
- Complications of anaesthesia.
- Perioperative management.
- Cardiopulmonary Resuscitation. CPR.
- Recovery from anaesthesia. Pain management and postoperative care.

LOG BOOK

The submission of a complete logbook duly signed by Head of Department should be compulsory to appear in final professional examination.

PROCEDURES

1. Pre-operative assessment of the patient.
2. I/V cannulation and Intra-operative fluid management.
3. Demonstration of induction of general anaesthesia and tracheal intubation.
4. Demonstration of spinal block.
5. Demonstration of epidural block.
6. Demonstration of local blocks in Eye, ENT and General Surgery.
7. Demonstration of CPR.
8. Post-operative care/pain management.
9. Introduction to the ICU.
10. Demonstration of anaesthesia machine and other instruments
11. Demonstration of sterilization procedures in O.T and ICU.
12. Demonstration of vital sign monitors and their application

RECOMMENDED BOOKS:

1. **Textbook of Anaesthesia** by G. Smith and A.R. Aitkenhead
2. **Short Practice of Anaesthesia** by M. Morgan, G. Hall. Latest edition
3. **A Synopsis of Anaesthesia** by J.Alfred Lee
4. **Online Journals and Reading Materials** through HEC Digital Library Facility.

(III) RADIOLOGY

The student will be able to:

- Select/advice the required radiological examination correctly
- Identify gross abnormalities in the films
- List indications and advantages of modern techniques
- Recognize major abdominal viscera and their imaging characters

Required Radiological Examinations and Abnormalities

- **Plain Radiography**

  Chest
  - Normal anatomy and projections
  - Pneumothorax
  - Pneumonia
  - Effusion
  - Cardiomegaly
  - Plumonary oedema
  - Fractures
  - Surgical emphysema
  - Neoplastic Diseases
  - Chronic inflammatory disease

  Skull
  - Normal anatomy and projections
  - Fracture
  - Lytic and sclerotic lesion
  - Calcifications
  - Pituitary fossa
  - Paranasal sinuses

  Abdomen
  - Normal anatomy and projections
  - Renal & urinary tract stones, gall stones and other calcifications

- Free gas under diaphragm, (perforation)
- Enlarged liver and spleen

Spine

- Normal anatomy and projections.
- Disc space reduction
- Vertebral collapse

Barium Meal and with double contrast (where applicable)

- Normal anatomy and various projections
- Gastric outlet obstruction
- Stomach mass/filling defect
- Oesophageal outline/varices/strictures
- Intussusception
- Colonic defects
- Malabsorption pattern
- Stricture
- Any filling defect
- Ulcerative colitis

- **Intravenous Urogram**
  - Hydronephrosis and renal masses

- **Micturating Cystourethrogram**
  - Reflux
- **Cholecystogram**
  - Gall bladder diseases and stones
- **Echocardiogram**
  - Be able to interpret the report

- **CT Scanning**
  - Be able to interpret the report

- **MRI**
  - Basic principle

RECOMMENDED BOOKS:

1. **Aids to Radiological Differential Diagnosis** by Chapman S. and Nakielny R. 4th ed. Elsevier Science Limited; 2003.

2. **Online Journals and Reading Materials** through HEC Digital Library Facility.

(B) MEDICINE

Distribution of subjects

Paper-I All except Paper-II

Paper-II will include:

1.Infectious Diseases
2.Metabolic Diseases
3.Immunology
4.Oncology
5. Acid and Base Balance
6. Dermatology
7.Endocrinology including Diabetes
8.Genitourinary System
9. Genetics
10.Water and Electrolyte Balance
11.Psychiatry

1. CARDIOLOGY

The course outline is as follows :

- Rheumatic fever and infective endocarditis.
- Valvular heart diseases.
    - Mitral valve
    - Aortic valve
- Ischaemic heart disease.
    - Angina
    - Myocardial infarction
- Cardiac arrhythmias
    - Atrial fibrillation
    - Ventricular tachycardia
    - Premature atrial and ventricular beats.
- Heart failure.
    - Left ventricular failure.
    - Congestive cardiac failure.
    - Cor pulmonale.
- Congenital heart diseases (brief).
    - Cyanotic/acyanotic heart diseases.
    - Fallot's tetralogy
    - Atrial septal defect
    - Ventricular septal defect
    - Patent ductus arteriosus
- Cardiomyopathies
- Pericardial diseases.
- Constrictive pericarditis

- Pericardial diseases
- Pericardial effusion
- Atherosclerosis/arteriosclerosis.
- Hypertension.
- Peripheral vascular disease.
    - Symptoms and signs
    - Arteriosclerosis
    - Acute & chronic ischaemia of the leg
    - Aneurysms
    - Buerger's disease
    - Raynaud's disease
    - variocose veins
    - Venous thrombosis
- Investigations.
    - Electrocardiography, Xray chest, Echocardiography, Thallium Scan, Stress Testing, Holter And Angiography Etc.

CLINICAL TRAINING:

Important Topics To Be Discussed:

Case discussion for diagnosis and management of common cardiovascular diseases.

- Systemic hypertension
- Ischaemic heart diseases
- Congestive cardiac failure
- Valvular diseases and infective endocarditis

Understand the Symptomatology to reach the Differential Diagnosis:

Palpitation, breathlessness, chest pain, raised JVP, jaundice etc.

Skills To Be Learnt:

- History taking in CVS.
- GPE in CVS – clubbing, koilonychia, osler's nodes, splinter haemorrhages, cyanosis.
- Pulse, JVP, blood pressure.
- Inspection, palpation of precordium.
- Percussion, auscultation of precordium – mitral, tricuspid, aortic, pulmonary areas.
- Interpretation of related radiological and laboratory investigations
- General medication and prescription writing in CVS diseases.

Procedures (Observe/ Assist):

- ECG taking and basic reading i.e. Normal, Acute MI, Ischemia, complete heart block, APC, VPC, SVT, VT etc.

- X-ray chest interpretation – (Cardiology).
- Should observe, learn and even may assist electroversion therapy (DC shock) with indications, complications etc.
- Observe Echo and should recognize chambers and valves on echo print.
- Observe pericardial effusion aspiration.
- Should learn thrombolytic therapy, heparinisation/anticoagulation therapy and control, anti-platelet therapy, nitrates infusion, digitalization, treatment of acute pulmonary edema, o_2 therapy.
- Cardiac monitoring.
- Basics of ETT.

2. PULMONOLOGY

COURSE OUTLINES:

- Asthma.
- Environmental lung diseases/occupational.
    - Asbestosis
    - Silicosis
    - Bagassosis
    - Pneumoconiosis
    - Byssinosis
    - Farmer's lung
- Pneumonia
    - Community acquired
    - Nosocomial
    - Lobar and bronchopneumonia
- Adult respiratory distress syndrome
- Acute respiratory failure
- Mechanical ventilation.
- Bronchiectasis.
- Chronic obstructive airway diseases.
    - Chronic bronchitis
    - Emphysema
- Interstitial lung diseases.
- Pulmonary thromboembolism
- Acute corpulmonale.
- Type-I and type-II respiratory failure
- Pleural effusion.
- Pneumothorax.
- Tuberculosis
- Tumors of the lung
- Disorders of chest wall and pleura
- Chest trauma
- Deformities of the rib cage

- Dry pleurisy, pleural effusion, empyema, pneumothorax.
- Basics of pulmonary function tests.
- Imaging in pulmonary diseases/investigations

CLINICAL TRAINING:

Important Topics To Be Discussed:

Case discussion for diagnosis and management of common pulmonary diseases.

- Bronchial asthma
- Pleural effusion
- Pneumonia
- Hemoptysis
- Pulmonary tuberculosis
- Chronic obstructive airway disease
- Type-I and type-II respiratory failure
- Bronchogenic carcinoma

Understand the Symptomatology to reach the Differential Diagnosis:

- Breathlessness
- Wheezing
- Haemoptysis
- Orthopnoea
- Paroxysmal nocturnal dyspnoea (PND)
- Pain in calf on walking
- Undue coldness, redness or blueness of extremities
- Chest pain
- Cough/expectoration/sputum

Skills To Be Learnt:

- History taking in respiratory system – dyspnoea, cough, expectoration, haemoptysis.
- Chest pain, wheezing.
- Inspection, palpation, percussion, auscultation front of chest.
- Inspection, palpation, percussion, auscultation back of chest.
- Interpretation of related radiological and laboratory investigations.
- Interpretation of pulmonary function tests.
- General medication and prescription writing in pulmonology
- Any deficient program.

Procedures (Observe/ Assist):

- How to start O_2 therapy, indications, complications.
- Learn pleural aspiration and assist
- Endotracheal suction, assist

- Pleural biopsy, observe
- FNA biopsy, observe
- Under water seas aspiration, observe/assist
- Management of respiratory failure
- Observe bronchoscopy

3. DERMATOLOGY

COURSE OUTLINES:

- Anatomy, physiology of skin related to clinical dermatology
- Infestations: scabies, pediculosis.
- Bacterial and mycobacterial infections
- Fungal and viral diseases.
- Acne vulgaris
- Eczemas.
- Psoriasis
- Lichen planus
- Bullous disorders.
- Pigmentary disorders
- Disorders of nails.
- Disorders of hairs.
- Sexually transmitted diseases.

CLINICAL TRAINING:

Important Topics To Be Discussed:

Case discussion for diagnosis and management of common dermatological diseases.

Should recognize lesions of:

- Leprosy
- Syphilitic lesions (chancre, secondary syphilis, gumma)
- Tinea (corporis, capitis, inguinale, unguam)
- Candida (oral, skin)
- Scabies
- Lice
- Mosquito bite
- Acute & chronic eczema
- Lesions of small pox, chicken pox, herpes simplex, herpes zoster
- SLE.
- Psoriasis
- Lichen planus
- Impetigo contagiosum
- Moluscum contagiosum
- Acne vulgaris

- Seborhoea
- Exfoliative dermatitis
- Skin neoplasm like squamous cell cacinoma, basal cell carcinoma and melanoma
- Leukoderma
- Pityriasis versicolor
- Alopecia and hirsutism
- Sexually transmitted diseases
- Furnculosis, cellulitis
- Drug eruption

Understand the Symptomatology to reach the Differential Diagnosis:

- Alopecia
- Eruption and rashes
- Itching
- Pigmentation and depigmentation

Skills To Be Learnt:

- History taking in Dermatology
- Clinical examination of various skin lesions
- Interpretation of related radiological and laboratory investigations
- General medication and prescription writing in Dermatology

Procedures (Observe/ Assist):

- Scraping for fungus
- Use of magnifying glass
- Observe skin biopsy
- Use of Wood's lamp

4. Neurology and Central Nervous System

COURSE OUTLINES:

- Infections and inflammatory lesions
  - Meningitis
    - Bacterial.
    - Tuberculous.
    - Viral etc.
  - Brain abscess
  - Encephalitis
  - Hydrocephalus
- Epilepsy and other convulsive disorders
- Cerebrovascular diseases (stroke).
    - Ischemic
    - Embolism
    - Infarction

- Haemorrhage
    - Intra-cerebral
    - Subarachnoid
- Dementia and Alzheimer's disease.
- Parkinson's disease and other movement disorders.
- Motor neuron disease.
- Multiple sclerosis.
- Cranial nerve disorders.
    - Transient mono-ocular blindness (amaurosis fugax).
    - Trigeminal neuralgia.
    - Facial palsy (Bell's).
    - Vertigo, nystagmus
- Spinal cord disorders.
    - Spinal cord compression
    - Hemiplegia, paraplegia, quadriplegia
    - Myelitis.
    - Spondylosis.
    - Syringomyelia and syringobulbia.
- Peripheral nerve disorders.
    - Peripheral polyneuropathy
    - Gullian Barry syndrome
    - Mononeuritis multiplex.
- Space occupying lesions of brain and spinal cord.
- Muscular dystrophies
- Myopathies, myasthenia gravis

CLINICAL TRAINING:

Important Topics To Be Discussed:

Case discussion for diagnosis and management of common CNS disorders:

- Cerebrovascular accident
- Paraplegia
- Polyneuropathy
- Muscular dystrophies and Motor neuron disease
- Parkinsonism
- Meningitis
- Tetanus
- Hemiplegia
- Facial Palsy

Understand the Symptomatology to reach the Differential Diagnosis:

- Behaviour
- I.Q
- Speech disturbances

- Memory
- Confusional states
- Dementia
- Tremor
- Fasciculations
- Athetosis
- Chorea
- Gait abnormalities
- Convulsions/fits
- Coma
- Syncope/dizziness
- Vertigo
- Deafness
- Blindness
- Numbness, tingling, sensory loss
- Rigidity / paralysis.
- Movement disorders

Skills To Be Learnt:

- History taking in CNS.
- Higher mental functions – level of consciousness, behaviour, speech, memory.
- Examination of cranial nerves.
- Examination of motor system.
- Examination of sensory system – crude touch, pain, temperature.
- Fine touch, pressure, vibration, joint position.
    - Cortical sensations
    - Two point localization, two point discrimination.
    - Reflexes
    - Examination of cerebellar system
- Examination of nystagmus
- Examination of rigidity
- Assessment of movement disorders
- Interpretation of related radiological and laboratory investigations
- General medication and prescription writing in Neurology

Procedures (Observe/ Assist):

- Observe and learn lumbar puncture

5. ALIMENTARY SYSTEM

COURSE OUTLINES:

- Oral cavity
  - Infections and inflammatory disorders
  - Benign and malignant diseases
- Esophagus.
  - Dysphagia with special reference to
  - Ca oesophagus
  - GERD
  - Achalasia
  - Candiasis of oral cavity and oesophagus
- Stomach
  - Gastritis.
  - Peptic ulcer
- Intestines
  - Malabsorption syndromes.
    - Tropical sprue
    - Coeliac disease
  - Inflammatory bowel diseases.
    - Ulcerative colitis
    - Crohn's disease
  - Irritable bowel syndrome (IBS).
- Liver
  - Ascites.
  - Jaundice.
    - Congenital hyperbilirubinaemia
    - Gilbert syndrome
    - Dubin Johnson syndrome
    - Rotor syndromes
    - Haemolytic
    - Obstructive
    - Hepatitis
    - Viral, acute and chronic
    - Toxic
    - Drugs
  - Auto immune hepatitis.
  - Cirrhosis of liver.
  - Hepatic encephalopathy.
  - Carcinoma liver and transplant.
  - Acute and chronic pancreatitis.
  - Upper GI bleeding, lower GI bleeding
  - Drugs contraindicated in liver diseases

CLINICAL TRAINING:

Important Topics To Be Discussed:

Case discussion for diagnosis and management of common gastrointestinal and hepatobiliary diseases.

- Acid peptic disease
- Tender hepatomegaly
- Hepatosplenomegaly
- Jaundice
- Chronic liver disease
- Acute and chronic diarrhoea
- Variceal bleeding and peptic ulcer bleeding.
- Abdominal Koch's infection

Understand the Symptomatology to reach the Differential Diagnosis:

- Oral ulceration
- Dysphagia
- Heart burn
- Nausea/vomiting
- Indigestion/flatulence
- Diarrhoea and constipation
- Melena, hematemesis, bleeding per rectum
- Jaundice
- Hepatomegaly
- Abdominal distension/ascites

Skills To Be Learnt:

- History taking in GIT – vomiting, diarrhoea, pain abdomen, constipation, haematemesis, melena, dyspepsia, distension.
- Examination of GIT –
- Inspection, palpation.
- Percussion, auscultation.
- Interpretation of related radiological and laboratory investigations
- General medication and prescription writing in GIT diseases.
- Any deficient programme.

Procedures (Observe/ Assist):

- Learn N/G tube passing and feeding
- Learn and observe aspiration of peritoneal fluids
- Learn and observe endoscopies, upper and lower GIT
- Preparing a patient for GI endoscopies

6. KIDNEYS AND URINARY SYSTEM

COURSE OUTLINES:

- Acute renal failure.
- Chronic renal failure
- Nephrotic syndrome.
- Nephritic syndrome.
- Urinary tract infections
    - Infections of the kidneys
    - Infections of the lower urinary tract
- Inflammatory lesions of the kidneys
- Introduction to dialysis & renal transplant
- Drugs causing renal disease (brief).
    - Analgesic nephropathy.
    - Lead, uric acid, hypercalcemia, radiation & hypersensitivity
    - Nephropathy.
    - Drugs contra indicated in renal insufficiency
    - Drugs to be used with caution in renal disease.
- Polycystic kidneys.
- Renal vascular disorders
    - Renal artery stenosis
    - Renal vein thrombosis
    - Tumours
- Hemolytic uremic syndrome.
- Prostatic diseases

CLINICAL TRAINING:

Important Topics To Be Discussed:

Case discussion for diagnosis and management of common Renal & Urinary system diseases

- Nephrotic syndrome
- Nephritic syndrome
- Acute renal failure
- Chronic renal failure

Understand the Symptomatology to reach the Differential Diagnosis:

- Lumbar /pelvic pain
- Anuria, oliguria
- Hematuria
- Dysuria, pyuria
- Urgency / frequency of micturation

- Urinary retention
- Urinary incontinence
- Nocturia

Skills To Be Learnt:

- History taking – lumbar pain, anuria, oliguria, hematuria, dysuria, urgency/frequency of micturition, pyuria, urinary retention, nocturia, urinary incontinence, pelvic pain.
- Examination of abdominopelvic and lumbar area
- Inspection, palpation, percussion, auscultation.
- Interpretation of related radiological and laboratory investigations
- General medication and prescription writing in upper & lower urinary tract diseases.

Procedures (Observe/ Assist):

- Observe and assist insertion of Foley's catheter/Red rubber catheter
- Learn and observe peritoneal and hemodialysis
- Indications and outcomes of renal transplant
- Observe I/V urograms

7. ENDOCRINOLOGY

COURSE OUTLINES:

- Anterior pituitary.
  - Growth hormone disorders
    - Acromegaly
    - Gigantism.
    - Short stature
  - Infertility
- Diseases of hypothalamus and posterior pituitary.
  - Empty sella syndrome
  - Diabetes insipidus
  - Syndrome of inappropriate ADH secretion (SIADH).
- Thyroid gland.
  - Hyperthyroidism (thyrotoxicosis)
  - Hypothyroidism (myxedema, cretinism)
  - Inflammatory lesions
  - Benign and malignant tumors
- Adrenal Gland.
  - Cushing Syndrome
  - Aldosteronism Primary/Secondary.
  - Hirsutism.
  - Addison's disease
  - Acute Addisonian crisis

        - Inflammatory lesions
        - Adrenocortical tumors including Pheochromocytoma
    - Endocrine Pancreas
        - Diabetes mellitus and hypoglycaemic states
        - Other associated endocrine disorders
    - Testes
        - Sexual precocity
        - Heterosexual precocity
        - Gynaecomastia
        - Inflammations
        - Tumours
    - Multiple endocrine neoplasia
        - Type I
        - Type II

CLINICAL TRAINING:

Important Topics To Be Discussed:

Case discussion for diagnosis and management of common endocrine disorders

- Diabetes mellitus
- Thyroid diseases
- Cushing's disease
- Infertility and common reproductive disorders

Skills To Be Learnt:

- History taking and correlate with a specific diagnosis.
- Examination of thyroid gland, male and female genital organs etc.
- Interpretation of related radiological and laboratory investigations
- General medication and prescription writing in endocrinology

8. RHEUMATOLOGY

COURSE OUTLINES:

- Osteoarthritis
- Osteoporosis
- Rheumatoid arthiritis and related arthropathies
- Paget's disease of the bone.
- Osteopetrosis (marble bone disease).
- Multiple myeloma
- **Multi-System Immunological Diseases**
- Systemic lupus erythematosis (SLE)
- Serum sickness

- Systemic sclerosis (scleroderma).
- Mixed connective tissue diseases (brief).
- Sjogren's syndrome (brief).
- Ankylosing spondylitis.
- Bechet's syndrome (brief).
- Vasculitis syndromes (brief).
- Anaphylactoid purpura
- Polyarteritis nodosa
- Hpersensitivity vasculitis
- Wegner's granulomatosis
- Temporal arteritis
- Takayasu's arteritis
- Thromboangitis obliterans (Burger's disease)
- Sarcoidosis (brief).

CLINICAL TRAINING:

Important Topics To Be Discussed:

Case discussion for diagnosis and management of common rheumatological diseases.

- Rheumatoid arthritis
- Osteoarthritis
- Multiple Myeloma
- SLE etc.

Understand the Symptomatology to reach the Differential Diagnosis:

- Joint pain and joint swelling
- Joint deformities
- Muscle cramps
- Muscle weakness
- Muscular wasting
- Other related systemic signs and symptoms

Skills To Be Learnt:

- History taking and correlate with a specific diagnosis.
- Examination and assessment of the pattern of involvement of bones, joints, skin and other organs
- Interpretation of related radiological and laboratory investigations
- General medication and prescription writing in rheumatology.

Procedures (Observe/ Assist):

- Observe aspiration of fluids from joints (knee)
- Observe bone marrow aspiration/terphine

9. METABOLIC DISORDERS

COURSE OUTLINES:

- Hyperlipidemia
- Hemochromatosis
- Porphyrias
- Wilson's disease
- Gout and hypercalcemia
- Storage diseases.
- Lipid.
    - Leukodystrophies
    - Niemann pick disease.
    - Gaucher's disease.
- Glycogen.
    - Fabry's disease.
- Hereditary connective tissue disorders
- Osteogenesis imperfecta.
- Ehler's danlos syndrome.
- Chondrodysplasias.
- Marfan syndrome.
- Alport syndrome.
- Disorders of amino acid metabolism and storage
    - Homocystinuria.
    - Alkaptonuria.
    - Hartnup disease.
- Renal glycosuria

10. INFECTIOUS DISEASES

COURSE OUTLINES:

- Clinical syndromes.
    - Sepsis and septic shock, meningococcaemia
    - Acute infectious diarrhoeal diseases and bacterial food poisoning.
    - Hospital acquired infections.
- Common disease syndromes caused by the following bacteria and their drug therapy.
    - Pneumococci
    - Staphylococci.
    - Streptococci.
    - Hemophilis influenzae.
    - Shigella.
    - Gonococci.

        - Pseudomonas.
    - Following diseases in detail.
        - Tetanus.
        - Enteric fever/salmonellosis.
        - Cholera.
        - Tuberculosis.
        - Leprosy.
        - Amoebiasis/giardiasis/trichomoniasis.
        - Malaria.
        - AIDS.
        - Rabies.
        - Infectious mononucleosis.
    - Helminthic infestations
        - Ascariasis
        - Hookworm
        - Whipworm (trichuriasis)
        - Threadworm (entrobiasis)
        - Taenia (tapeworm)
        - Hydatid diseases

CLINICAL TRAINING:

Important Topics To Be Discussed:

Case discussion for diagnosis and management of common infectious diseases in Pakistan

- Malaria
- Typhoid fever
- Acute diarrhoeal diseases
- Acute / chronic respiratory tract infections
- Generalized septicemia etc.

Understand the Symptomatology to reach the Differential Diagnosis:

- Fever
- Headache, pain
- Anorexia/ weight loss
- Haemoptysis/ chest pain/ epigastric
- Cough/expectoration/sputum
- Dysuria, pyuria
- Diarrhoea / vomiting
- Melena, hematemesis
- Jaundice/hepatomegaly
- Eruption and rashes
- Itching
- Joint pain and joint swelling etc.

Skills to Be Learnt:

- History taking and correlate with a specific diagnosis.
- Examination and assessment of the pattern of fever, involvement of organ systems and any positive findings.
- Interpretation of related radiological and laboratory investigations
- Symptomatic treatment and prescription writing in infectious diseases.

Procedures:

Perform:

- Injection I/V, I/M, S/C, intradermal
- Oxygen therapy
- Urinary catheterisation – collection of samples
- Collection of blood samples/ blood film preparation

Observe:

- Observe I/V lines/Fluids/Blood/Blood products, direct, branula, cutdown, CVP
- N/G tube passing and feeding
- Foley's catheter/Red rubber catheter
- IOP record maintenance
- Aspiration of fluids (Pleural, Pericardial, Peritoneal, Knee)
- Lumbar Puncture
- O_2 therapy
- Nebulisation etc.

11. HAEMATOLOGY

COURSE OUTLINES:

Anaemias.

- Classification
- Iron deficiency
- Megaloblastic
    - B-12 deficiency
    - Folic acid deficiency
- Anaemia of chronic disorder
- Haemolytic anaemia
    - Hereditary
    - Acquired
    - Intra-corpuscular
    - Extra-corpuscular
- Aplastic anemia

Haemoglobinopathies.

- Sickle cell syndromes

- Thalassaemias

Myeloproliferative diseases.

- Chronic myeloid leukemia (CML)
- Polycythemia vera
- Myelofibrosis
- Essential thrombocytosis
- Leukemias.
    - Acute
    - Chronic
- Lymphomos
    - Non-Hodgkin's
    - Hodgkin's

Blood groups and blood transfusion.

Bone marrow transplantation.

Disorders of haemostasis.

- Thrombocytopenia
- Idiopathic thrombocytopenic purpura (ITP)
- Von Willebrand's disease.
- Vessel wall disorders.
- Disorders of coagulation.
- Haemophilia
- Vitamin K deficiency.
- Disseminated intravascular coagulation (DIC).

Anticoagulants Therapy

- Heparin
- Oral (warfarin etc.)
- Vit. K infusion
- Antiplatelet drugs

CLINICAL TRAINING:

Important Topics To Be Discussed:

Case discussion for diagnosis and management of common haematological disorders

- Anaemias
- Bleeding disorders
- Myeloproliferative or lymphoproliferative diseases

Understand the Symptomatology to reach the Differential Diagnosis:

- Lassitude
- Dyspnoea
- Infections
- Edema
- Gum hypertrophy

- Bleeding tendency
- Bruising purpura
- Lymph node enlargement
- Weight loss
- Facial swelling
- Bone pain
- Jaundice
- Hepatosplenomegaly
- Hypersensitivity/ allergic reactions etc.

Skills To Be Learnt:

- History taking in general
- General physical examination, pallor, cyanosis, jaundice, clubbing, koilonychia, lymph nodes, edema, pulse, cyanosis, fever, headache, anorexia, weight loss, pain, facial swelling etc.
- Examination and assessment of the extent of the disease
- Interpretation of related radiological and laboratory investigations
- General medication and prescription writing in Haematology.

Procedures (Observe/ Assist):

- Injection I/V, I/M, S/C, intradermal
- Collection of samples of blood/blood film preparation
- Perform I/V lines/fluids/blood/blood products, direct branula, cutdown, CVP etc.
- Observe bone marrow aspiration/ trephine

12. PSYCHIATRY

COURSE OUTLINES:

- Mood disorders.
- Major depressive episodes
    - Unipolar
    - Bipolar
    - Dysthymic
    - Atypical
- Maniac episodes
- Anxiety disorders.
- Acute anxiety states
- Panic disorders
- Generalized anxiety disorders
- Psychic Traumatic disorders
- Obsessive-compulsive disorders
- Phobic disorders

- Schizophrenia.
- Alcoholism.
- Addiction.
- Psychosexual disorders in men and women.

CLINICAL TRAINING:

Important Topics To Be Discussed:

Case discussion for diagnosis and management of common Psychiatric disorders like-

- Anxiety
- Depression
- Schizophrenia
- Manic depressive psychosis
- Phobias
- Eating disorders

Understand the Symptomatology to reach the Differential Diagnosis:

Skills To Be Learnt:

- History taking in psychiatry
- Clinical examination of patients
- Counseling and psychoanalysis especially in patients with suicidal and homicidal attitude.
- Interpretation of related radiological and laboratory investigations
- General medication and prescription writing in psychiatry

Procedures:

- Psychotherapy
- Electroconvulsive Therapy (ECT)
- Electroencephalogram (EEG)

13. MISCELLANEOUS AND EMERGENCIES

- Heat stroke
- Snake bite
- Electric shock
- Poisoning etc.

Procedures To Be Performed/Observed/Assisted:

Perform:

- Injection I/V, I/M, S/C, intradermal
- Oxygen therapy
- Urinary catheterisation – collection and samples of blood

Observe:

- Observe I/V lines/fluids/blood/blood products, direct, branula, cutdown, CVP
- N/G tube passing and feeding
- Foley's catheter/Red rubber catheter, IOP record maintenance
- Endotracheal tube placement
- Endotracheal suction/maintenance of airway/nursing on side etc.
- Aspiration of fluids (Pleural, Pericardial, Peritoneal, Knee)
- Lumbar puncture
- O_2 therapy
- Nebulisation
- ECG taking/reading
- X-ray chest reading
- Barium series
- I/V urograms
- Bone and joint X-ray reading for medical problems (Rheumatoid arthritis, osteoarthritis, collapse vertebra, caries spine, multiple myeloma, cervical rib etc.)
- Preparing a patient for endoscopies, upper and lower GIT

THE LOG BOOK/CLINICAL CARD RECORD

The student is expected to make a record of his/her achievements in the log book. The log book is a collection of evidence that learning has taken place, it is a reflective record of achievements. The log book shall also contain a record of the procedures which student would have performed in 3^{rd}, 4^{th} & 5^{th} year.

RECOMMENDED BOOKS:

1. **Practice of Medicine** by Davidson.
2. **Clinical Medicine** by Parveen J Kumar & Michaell, Clark
3. **Hutchison's Clinical Methods** by Michael Swash. 21st edition
4. **Basic psychiatry** by Myre Sim, e. B. Gordon
5. **Oxford Text Book of Psychiatry**
6. **ABC of Dermatology.** Latest Edition.
7. **Smith's General Urology** by Emil A. Tanagho and Jack W. McAninch 15th edition. 2007
8. **Online Journals and Reading Materials** through HEC Digital Library Facility

(C) OBSTETRICS

The course outline is as follows :

1. Introduction.
2. Obstetric history taking and examination.
3. Conception, implantation and development of placenta, fetal circulation, abnormalities of placenta.
4. Foetal skull and bony pelvis.
5. Diagnosis of pregnancy.
6. Physiological changes associated with pregnancy.
7. Ante-natal care.
8. Early pregnancy loss and its management (Abortions)
9. Physiology of labour.
10. Mechanism of labour.
11. Management of labour.
12. Complications of 3rd stage of labour.
13. Abnormal labour e.g. Prolonged labour/obstructed labour.
14. Pre-term labour.
15. Induction of labour.
16. Pre-maturity.
17. Post-maturity.
18. Conduction of normal delivery.
19. Operation delivery.
20. Forceps delivery.
21. Vacuum delivery.
22. Caesarean section.
23. Ante-partum haemorrhage.
24. Hydramnios.
25. Hyperemisis gravidarum.
26. Medical Disorder associated with pregnancy e.g.
    - Pregnancy with anaemia
    - Pregnancy with heart disease
    - Pregnancy with diabetes
    - Pregnancy with jaundice/hepatitis
    - Renal problems during pregnancy
    - Pyrexia in pregnancy
27. Hypertensive disorders of pregnancy e.g.
    - PET
    - Eclampsia
    - Essential hypertension
28. Obstetric shock.
29. Intra uterine growth retardation and its management.
30. Fetal distress and its management.

31. Fetal Monitoring.
32. Fetal presentations.
33. Breech presentation.
34. Occipito posterior position.
35. Brow presentation.
36. Face presentation.
37. Cord prolapse/compound presentation.
38. Transvese lie/unstable lie.
39. Multiple pregnancy.
40. Puerperium (normal and abnormal).
41. Examination of the new-born baby.
42. Resuscitation of new-born.
43. Minor problems of the new-born.
44. Breast feeding and its importance.
45. Obstetric injuries/ruptured uterus.
46. Haematological disorder of pregnancy e.g.
    - Rh incompatibility
    - Thalassemia major/minor
47. Role of Ultrasound in obstetric.
48. Foetal congenital abnormalities.
49. Vital statistics.

Practical:

Log Book of 20 assisted deliveries.

RECOMMENDED BOOKS:

1. **Obstetrics by Ten Teachers** by Stuart Campbell and Christoph Lees. 17th Ed 2000
2. **Essentials of Obstetrics and Gynecology** by Neville F. Hacker, J. George Moore, and Joseph C. Gambone. 4th ed. 2004
3. **Notes on Obstetrics & Gynecology.** Stirrat, Mills, Draycott. 5th Ed. 2003.
4. **Text book of Obstetrics and Gynecology** by Rashid Lateef
5. **Obstetrics and Gynecology** by Arshad Chauhan
6. **Online Journals and Reading Materials** through HEC Digital Library Facility.

(D) GYNAECOLOGY

The course outline is as follows :

1. Introduction.
2. Anatomy of female
    i. Genital organs
    ii. Development of female genital organs
3. Puberty and adolescence.
4. Ovulation and its clinical importance.
5. Normal menstruation.
6. Menstrual abnormalities.
7. Gynaecological history taking and examination
8. Minor gynaecological operative procedures.
9. Amenorrhoea
10. Infertility.
11. Contraception.
12. Ectopic pregnancy.
13. Trophoblastic tumours.
14. Vulval lesions
15. Tumours of vagina.
16. Tumours of cervix.
17. Tumours of uterus.
18. Tumours of ovaries.
19. Tumours of fallopian tubes.
20. Menopause, Hormone replacement therapy.
21. Genital prolapse.
22. Pelvic floor injuries.
23. Urogynaecology.
24. Problems of marriage and sex.
25. Vaginal discharges.
26. Infections of female genital tract
    i. Infections of upper genital tract
    ii. Infections of lower genital tract
27. Pre-operative preparations.
28. Post-operative complications and its management.
29. Role of USG in gynaecology

Practical:

Log Book of 20 patients of Gynaecology.

RECOMMENDED BOOKS:

1. **Gynaecology by Ten Teachers** by Stanley G. Clayton and Ash Monga 2006.
2. **Essentials of Obstetrics and Gynecology** by Neville F. Hacker, J. George Moore, and Joseph C. Gambone. 4th ed. 2004
3. **Notes on Obstetrics & Gynecology** by Stirrat, Mills, Draycott. 5th Ed. 2003.
4. **Text book of Obstetrics and Gynecology** by Rashid Lateef
5. **Obstetrics and Gynecology** by Arshad Chauhan
6. **Online Journals and Reading Materials** through HEC Digital Library Facility.

(E) PAEDIATRICS

The course outline is as follows :

List of suggested topics for teaching the undergraduates is given below, however the individual faculties can alter/add topics as per their discretion in respective institution:

- Common problems of children in Pakistan and statistics of Pakistani children
- Clinical methods in paediatrics
- Nutrition (breast feeding, infant feeding , weaning) and nutritional disorders:(PEM, rickets, vitamin A deficiency, iodine deficiency, iron deficiency)
- Growth and development.
- Common pediatric infections: measles, tetanus, polio, diphtheria, whooping cough, aids
- Malaria, enteric fever, tuberculosis, chicken pox, common skin infections
- Expanded program of immunization (EPI) .newer vaccines
- Diarrheal diseases.
- Acute respiratory infections (ARI).
- IMCI (integrated management of childhood illness).
- Neonatology: resuscitation of new born, care of normal new born, birth asphyxia, premature and low birth weight babies, neonatal jaundice, neonatal sepsis, neonatal fits, respiratory distress of new born, common skin conditions of neonates; pyloric stenosis, myelomeningocele, hydrocephalus, common congenital abnormalities and birth trauma.
- Neurology: meningitis, febrile, convulsions, epilepsy, cerebral palsy, mental handicap, cerebral malaria, encephalitis
- Cardiology: congenital heart diseases [VSD, PDA, TOF, ASD], rheumatic fever. Congestive cardiac failure, clinical assessment of a cyanotic neonate/infant.
- Haematology: anaemias, thalassemia, leukemias, bleeding disorders.
- Nephrology: nephrotic syndrome, urinary tract infections, acute glomeulonephritis
- Endocrinology: hypothyroidism, short stature, diabetes
- Pulmonology: croup, asthma, tuberculosis, pneumonias , pleural effusions.
- Gastroenterology: abdominal pain, malabsorption, hepatitis, cirrhosis, acute liver failure
- Diarrhea[acut/echronic] dysentery, worm infestations, giardia, amoebiasis, rectal polyp.
- Genetics: patterns of inheritance, Down's syndrome,

- Social pediatrics: right of child, child abuse, enuresis, encoparesis, hyperactivity
- Dyslexia, attention deficit disorder
- Miscellaneous: poisoning, prevention of home accidents, behavioral disorders.
- Pediatric surgery: hernia, intussusceptions, intestinal obstruction, tallipes, congenital dislocation of hip, vesico ureteral reflux.

SKILLS:

1. Students will demonstrate his ability to obtain a relevant clinical history from a parent or an older child.

2. Student will demonstrate his ability to perform adequate clinical examination of a child of any age (including newborn).

3. Student will be able to interpret clinical and laboratory data to arrive at a diagnosis.

4. Student will be able to advise appropriate nutritional measures for healthy and sick children (Breast feeding, avoidance of bottle, proper weaning)

5. Student will be able to counsel the parents on health promotive and disease preventive strategies for the child e.g. immunization procedures; hand washing)

6. Student will be able to recognize and manage common health problems of children.

7. Student will recognize the danger signs of disease in children and be able to appropriately refer children with severe disease to appropriate specialists/hospitals.

8. Student will demonstrate his ability to perform essential clinical procedures relevant to children e.g.
- Resuscitation of newborn.
- Basic cardio-pulmonary resuscitation.
- Anthropometric measurements.
- Measuring blood pressure
- Starting intravenous lines/ draw blood sample
- Administration of oxygen therapy
- Giving nebulizer therapy [bronchodilator]
- Use of growth chart

OBSERVE THE FOLLOWING SKILLS:

1. Lumbar puncture
2. Bone marrow aspiration
3. Supra pubic puncture
4. Subdural tap
5. Thoracentesis
6. Pericardiocentesis
7. Liver biopsy
8. Renal biopsy
9. Observe passing of catheter
10. Observe pericardial tap

RECOMMENDED BOOKS:

1**. Text book of paediatrics** by Pervaiz Akbar

2. **Essentials of Paediatrics** by Nelson. Latest Edition.

3. **Online Journals and Reading Materials** through HEC Digital Library Facility