

CURRICULUM
OF
M.B.B.S



Prepared by:
PAKISTAN MEDICAL & DENTAL COUNCIL
&
HIGHER EDUCATION COMMISSION
ISLAMABAD

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PREFACE

Curriculum of a subject is said to be the throbbing pulse of a nation. By looking at the curriculum of a subject, one can judge the state of intellectual development and the state of progress of a nation. The world has turned into a global village, new ideas and information are pouring in a constant stream. It is, therefore, imperative to update our curricula by introducing the recent developments in the relevant fields of knowledge.

The Pakistan Medical & Dental Council is a statutory body constituted by the Federal Government under the Pakistan Medical & Dental Council Ordinance, 1962, presently controlled by the Council. One of the main functions of the Council is to lay down the minimum standard of basic and higher qualifications in Medicine & Dentistry. The Council has been empowered to:

- Prescribe a uniform minimum standard of courses of training for obtaining graduate and post-graduate dental qualification.
- Prescribe minimum requirements for the content and duration of courses of studies for the degree of MBBS.
- Prescribe condition for admission to courses of training for the degree of MBBS.
- Prescribe the standards of examinations method of conducting the examination.

Curriculum Development, Review and Revision at Graduate and Post-graduate level is one of the major on-going activities of Higher Education Commission as provided under Section (10) Sub-Section (V) of its Ordinance No.LIII of 2002 and Ministry of Education, Government of Pakistan Notification No.D.733/76-JEA(Curr) dated December 4, 1976 appointed Higher Education Commission as the Competent Authority to look after the Curriculum Revision Work beyond Class XII at Bachelor level and onwards to all Degrees, Certificates and Diplomas awarded by Degree Colleges, Universities and other Institutions of higher education.

For this purpose senior teachers of all specialities in M.B.B.S. were invited to review/revise the existing curriculum. A draft curriculum was finalized after due consideration of the comments and suggestions received from the Universities and Colleges where the subject under consideration is taught.

The curriculum prepared by the National Curriculum Revision committee (NCRC) of Higher Education commission and Pakistan medical & Dental Council was approved by PM&DC which is being circulated for implementation by the concerned institutions.

This Curriculum is to be followed by all Medical Colleges and Universities in Pakistan to get registration of the Council for Medical practitioners.

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GUIDING PRINCIPLES

Pakistan Medical & Dental Council realized the situation to revise the MBBS curriculum in accordance with need, time and recent progress in the medical field. It is one of the main functions of PM&DC to lay down the minimum standard of basic and higher qualification in Medicine & Dentistry. The sub-section(2) of section 33 of PM&DC ordinance states the powers/function of the Council as:

- To prescribe minimum standard of courses of training for obtaining graduate and post graduate medical & dental qualifications.
- To prescribe minimum requirements for the content and duration of courses of studies for the degree of MBBS.

Medical education is a life long process and revision of MBBS curriculum is a part of education starting from pre-medical education, MBBS, and proceeding to house job, post-graduation, professional development and CME/CPD. Many areas of content extend into more than one discipline for e.g. genetics, bio-statistics, infectious diseases, diabetes mellitus, ethics. It is, therefore appropriate that no important aspect is left out and there should be no duplication. For this reason teachers from all disciplines have been involved in MBBS curriculum formulation. This document lays down general principles and guidelines in a flexible framework which allows universities and institutions to determine ways of teaching and student assessment within the bound of a uniform national curriculum. The Higher Education Commission (HEC) will monitor and ensure that the curriculum is being implemented by public as well as private universities and will also assist universities to implement curriculum. PM&DC through its monitoring process will make sure that the medical institutions are following the curriculum. It is important to build an indigenous curriculum which builds a competent and confident graduate who serves the society's needs.

The curriculum should aim at application of knowledge and problem solving rather than only recall of factual knowledge and to define the psychomotor skills that the students should be able to perform themselves and differentiate them from those that should be observed. The overall curriculum document should emphasise on areas that the student must know, incorporate new fields of knowledge, and yet ensure that the student is not over burdened and hence eliminate details of uncommon conditions.

Additional compulsory courses should be balanced by the reduction of information overload by deleting obsolete material or those more relevant to postgraduate studies. Taking into consideration the rapid changes occurring in the field of Bio-medical Sciences, institutions wishing to add topics may do so. Advanced courses may be placed as elective opportunities.

Repetitive teaching of the same contents by different disciplines should be eliminated. It is not necessary to expect the student to know every thing, because of the ready availability of knowledge; therefore, the curriculum will be continuously refined to state principles and concepts; and clearly define what the student *must* know. Additional subjects such as English, Information Technology, Ethics, may be added by the universities as optional subject.

Instructional Strategy for implementing this curriculum and assessment is the responsibility of the concerned universities. Multiple methods of instruction should be encouraged. There should be flexibility in implementation, allowing implementation according to staff, faculty and resources.

The curriculum should be student oriented utilizing active processes for learning and should not make the student a passive recipient.

The curriculum should be attractive (and therefore should have early clinical involvement). Integration in education would reflect graduate function in real-world practice settings. It is recommended that the curriculum should move towards concurrent teaching of basic sciences in an organ based system; like introduction of a case-of-the-course, involving a clinical presentation which requires students to integrate knowledge from multiple disciplines/subjects; Integration of clinical and preventive sciences, where students are provided experiences to manage undifferentiated health problems. The university faculty should decide the order in which to teach subjects and the grouping of subjects specified in each examination. The desired humanistic attributes of a caring doctor with effective communication skills should be defined, methods that build these attributes should be included and tested, including trust-building in a professional patient-doctor relationship. In order to facilitate the learning process the students should be given more free time for self-study. This document represents the first phase in an ongoing effort to improve medical education across the country. At this stage, curricular content and general guiding principles have been enunciated and general terminal competencies are listed after the General Education Objectives, the preamble to the proposed curriculum. In the next phases of curriculum development detailed definition of the depth of study will be refined. With time, the Universities and institutions should move towards a uniform system of assessment.

1) Methodology*

1. Problem-based Learning
2. Tutorials/Practical sessions/Essential Skills and Lab practice
3. Clinical rotations and ward visits

4. Lectures/Seminars/CPC's – using modern audio-visual techniques, distant learning using electronic devices and current Information Technology facilities.
5. Journal Club
6. Community -based learning
7. Acquisition of Competencies through any other sources

*** It is mandatory for the institute to provide necessary teaching aids and training facilities to implement the methodology**

SCHEME OF STUDIES
PROFESSIONAL MBBS EXAMINATIONS

1. First Professional MBBS Part-I Examination:
To be held at the end of the 1st year in the following subjects in course work completed in the first year:

PART-I

(a)	Anatomy and Histology	
	One Paper:	90 Marks
	Internal Evaluation	10 Marks
	Oral & Practical	90 Marks
	Internal Evaluation	10 Marks
	Total	200 Marks

(b)	Physiology	
	One Paper:	90 Marks
	Internal Evaluation	10 Marks
	Practical & Oral Exam:	90 Marks
	Internal Evaluation	10 Marks
	Total	200 Marks

(c)	Biochemistry	
	One Paper:	45 Marks
	Internal Evaluation	5 Marks
	Oral & Practical	45 Marks
	Internal Evaluation	5 Marks
	Total	100 Marks

PART-II

(a)	Anatomy and Histology	
	One Paper:	90 Marks
	Internal Evaluation	10 Marks
	Oral & Practical	90 Marks
	Internal Evaluation	10 Marks
	Total	200 Marks

(b)	Physiology	
	One Paper:	90 Marks
	Internal Evaluation	10 Marks
	Practical & Oral Exam:	90 Marks
	Internal Evaluation	10 Marks
	Total	200 Marks

(c) Biochemistry	
One Paper:	45 Marks
Internal Evaluation	5 Marks
Oral & Practical	45 Marks
Internal Evaluation	5 Marks
Total	100 Marks

***Note:** Any students who fails to clear the first Professional MBBS Part-I & Part-II examination separately in three chances availed or un-availed after becoming eligible for each examination shall cease to become eligible for further medical education in Pakistan.

2. 2nd Professional MBBS Examination:

To be held at the end of the 3rd year in the following subjects:

(a) Pharmacology & Therapeutics	
Theory	135 Marks
Internal Evaluation	15 Marks
Oral & Practical	100 Marks
Animal experiment	35 Marks
Internal evaluation	15 Marks
Total	300 Marks
(b) Pathology General & Microbiology	
Theory	135 Marks
Internal Evaluation	15 Marks
Practical & Oral Exam	135 Marks
Internal Evaluation	15 Marks
Total	300 Marks
(c) Forensic Medicine	
Theory	90 Marks
Internal Evaluation	10 Marks
Viva Voce	90 Marks
Internal Evaluation	10 Marks
Total	200 Marks

3. 3rd Professional Examination:

To be held at the end of the 4th year in the following subjects:

(a) Community Medicine	
Theory	135 Marks
Internal Evaluation	15 Marks
Oral & Practical	110 Marks
Internal Evaluation	15 Marks
Project	25 Marks
Total	300 Marks

(b)	Special Pathology	
	Theory	135 Marks
	Internal Evaluation	15 Marks
	Practical & Oral Exam:	135 Marks
	Internal Evaluation	15 Marks
	Total	300 Marks
(c)	Otorhinolaryngology (ENT)	
	Theory	90 Marks
	Internal Evaluation	10 Marks
	Oral & Practical	90 Marks
	Internal Evaluation	10 Marks
	Total	200 Marks
(d)	Ophthalmology	
	Theory	90 Marks
	Internal Evaluation	10 Marks
	Oral & Practical	90 Marks
	Internal Evaluation	10 Marks
	Total	200 Marks

4. Final Professional MBBS Examination:

To be held at the end of the 5th year in the following subjects:

(a)	Medicine including Psychiatry & Dermatology	
	Theory	
	- Paper I	135 Marks
	- Internal Evaluation	15 Marks
	- Paper II	135 Marks
	- Internal Evaluation	15 Marks
	- Total	300 Marks
	Clinical/Practical exam	
	- Clinical	240 Marks
	- OSCE	30 Marks
	- Internal Evaluation	30 Marks
	- Total	300 Marks
(b)	Surgery including Orthopaedic & Anaesthesia	
	Theory	
	- Paper-I	135 Marks
	- Internal Evaluation	15 Marks
	- Paper II	135 Marks
	- Internal Evaluation	15 Marks
	- Total	300 Marks

	Clinical/Practical exam	
	- Clinical	240 Marks
	- OSCE	30 Marks
	- Internal Evaluation	30 Marks
	- Total:	300 Marks
(c)	Obstetrics and Gynaecology	
	Paper I	90 Marks
	Internal Evaluation	10 Marks
	Paper II	90 Marks
	Internal Evaluation	10 Marks
	Oral & Practical	180 Marks
	Internal Evaluation	20 Marks
	Total	400 Marks
(d)	Paediatrics	
	Theory	90 Marks
	Internal Evaluation	10 Marks
	Oral & Practical	90 Marks
	Internal Evaluation	10 Marks
	Total	200 Marks

DETAILS OF COURSES FOR MBBS ALL DISCIPLINES

SYLLABUS FOR 1ST PROFESSIONAL PART-I&II

PART-I

A. ANATOMY

GENERAL ANATOMY

1. Brief history of Anatomy. Different disciplines of the subject
2. Anatomical nomenclature-descriptive terms
3. Skeletal system-bones
 - Axial skeleton
 - Appendicular skeleton
 - Functions of bone
 - Classification on the basis of shape, development, region and structure
 - General concepts of development & ossification of bones
 - Parts of young bone
 - Blood supply
 - Properties of bones and cartilages
 - Applied aspects
4. Joints
 - Structural classification
 - Regional classification
 - Functional classification
 - Characteristics and classification of Synovial joints
 - Movements of Synovial joints
 - Anatomy of joints with reference to dislocation, sprain and inflammation
5. Muscle
 - Parts of a muscle
 - Classification
 - Blood supply and nerve supply of muscle
 - Neuromuscular junction
 - Applied anatomy of muscle with reference to spasm, paralysis, atrophy and regeneration
6. Cardiovascular system
 - Heart & Blood vessels
 - Types of circulation
 - Anastomoses

7. Lymphatic system
 - Introduction
 - Lymph capillaries
 - Lymph Vessels
 - Lymph nodes
 - Main channels
8. Somatic Nervous system
 - Introduction
 - Different parts of Central Nervous System (CNS) with their brief functions
 - Peripheral nervous system (cranial and spinal nerves) — introduction
9. Autonomic nervous system
 - Introduction to parasympathetic and sympathetic nervous system
10. Skin and fasciae
 - Parts of skin
 - Appendages of skin
 - Types of fasciae
11. Embalming & museum keeping

GROSS ANATOMY

1. Upper limb
2. Lower limb
3. Thorax

GENERAL HISTOLOGY

- Histology will be taught concurrently with Anatomy throughout the course. Underlying principles of histological techniques and staining should be given due consideration. Most of teaching will be done on stained and mounted sections and every type of normal tissue will be covered.
1. Cell
 - Cell as a whole
 - Cell Membrane
 - Interior of cell
 - Nucleus
 2. Microscopy
 3. Epithelial tissues
 4. Connective tissue proper
 5. Cartilage

6. Bone
7. Muscular tissue
8. Nervous System
 - Nervous tissue
 - Cerebral cortex
 - Cerebellar cortex
 - Spinal cord
9. Lymphoid organs
10. Circulatory system
11. Integumentary system
12. Routine histological techniques

GENERAL EMBRYOLOGY

Embryology should be taught with the object of making students understand and grasp those fundamental principles, which result in better comprehension of the structural organization in the body. Stress should be laid on those developmental processes such as growth and differentiation, which have a direct bearing on clinical subjects. The genesis of congenital malformations should be one of the chief aims. All details should be kept on the essential outlines.

1. Male & female reproductive systems
2. Cell Division and Gametogenesis
3. Fertilization, cleavage, blastocyst formation and implantation
4. Development during second week
5. Development during third week
6. Embryonic period
7. Foetal period
8. Foetal membranes and Placenta
9. Introduction to genetics.
10. Teratogenesis

PART-II

ANATOMY

SPECIAL EMBRYOLOGY

1. Head and Neck
 - Pharyngeal apparatus
(including pharyngeal arches, pharyngeal pouches & pharyngeal clefts)
 - Tongue
 - Thyroid
 - Parathyroid

- Thymus
- Pituitary
- Upper respiratory system
- Face and palate
- 2. Body cavities
 - Development of body cavities
 - Formation of diaphragm
- 3. The respiratory system
- 4. The cardiovascular system
 - Heart
 - Great vessels
 - Foetal circulation and changes at birth
- 5. The urinary system
 - Development of Kidney
 - Urinary bladder
 - Urethra
 - Development of adrenal glands
- 6. The male reproductive system
 - Testis
 - Genital ducts
 - External genitalia
- 7. The female reproductive system
 - Ovaries
 - Oviducts
 - Uterus
 - Vagina
 - External genitalia
- 8. The Musculo-skeletal system
 - Development of skeleton
 - Development of muscles
- 9. Development of Limbs
- 10. Development of Integumentary System (consisting of development of skin and its appendages and development of mammary glands)
- 11. Special Senses (eye and ear)
- 12. Nervous system
- 13. Digestive system
 - Division of Gut tube
 - Mesenteries
 - Liver, Gall bladder, Pancreas, Spleen

GROSS ANATOMY

1. Head & neck
2. Brain and spinal cord
3. Abdomen and pelvis

SPECIAL HISTOLOGY

- Digestive System
- Respiratory System
- Urinary System
- Male Reproductive System
- Female Reproductive System
- Endocrine Glands
- Organs of Special Senses

NEURO-ANATOMY

- Spinal Cord
- Medulla Oblongata
- Pons
- Mid Brain
- Cerebellum
- Thalamus
- Hypothalamus
- Basal Ganglia
- Cerebral Cortex
- Autonomic Nervous System

During study of Gross Anatomy, emphasis should be given on applied aspect, radiological anatomy, surface anatomy and cross-sectional anatomy.

PART-I

B. BIOCHEMISTRY

1. Introduction of Biochemistry:

Biochemistry of the Cell:

- a) Introduction to cell (Biochemical point of view)
- b) Scientific methods to study the cell biochemistry
- c) Biochemical composition of the cell

2. Biochemistry of the Cell and Body Fluids:

- a) Ionization of water & weak acids, bases
- b) Concept of pH, and pH scale
- c) Dissociation constant & titration curve of weak acids, the concept of pK values
- d) Buffers, their mechanism of action
- e) Henderson-Hasselbalch Equation (**No derivation**)
- f) Types of particles, solution
- g) Importance of selectively permeable membranes, osmosis, osmotic pressure, surface tension, viscosity & their importance related to body fluids

Carbohydrates:

- a) Definition, biochemical function and classification
- b) Structure and functions of Monosaccharides, and their derivatives
- c) Disaccharides, their important examples
- d) Oligosaccharides, their combination with other macromolecules
- e) Polysaccharides, their important examples and biochemical role
- f) The biomedical importance of carbohydrates

Proteins:

- a) Definitions, Biomedical importance and classification of proteins based on
 - Physiochemical properties
 - Functional
 - Nutritional
 - Structural
- b) Amino acids, their structure, properties & functions
- c) Classification and nutritional significance of amino acids
- d) Dissociation, titration and importance of amino acid in pH maintenance
- e) Structure of proteins and their significance
- f) Separation of proteins e.g. salting out, Electrophoresis, Chromatography, Centrifugation
- g) Immunoglobulins and its biomedical significance
- h) Plasma Proteins & their clinical significance

Nucleotide & Nucleic Acid:

- a) Chemistry and structure of nucleosides and their biochemical role
- b) Nucleotides, structure, their derivatives and their biochemical role
- c) Synthetic derivatives of purine and pyrimidines, their role in health and disease
- d) Nucleic acids, their types, structure and functions

Lipids:

- a) Definition, biomedical function
- b) Classification of lipids
- c) Phospholipids, Glycolipids, Sphingolipids and their Biochemical Significance
- d) Fatty acids, chemistry, classification and biochemical function
- e) Essential fatty acids
- f) Eicosanoids, their classification and functions in health and disease
- g) Steroids, Sterol e.g. Cholesterol, their chemistry, functions and clinical significance
- h) lipid peroxidation and its significance

Biological Membrane:

- a) Biochemical composition
- b) Biochemistry of cell membrane, chemical composition, importance of lipid and proteins in membranes, chemistry of signals and receptors
- c) Biochemistry of membrane transport mechanism, active transport, passive transport, simple and facilitated diffusion

Enzymes:

- a) Introduction, definition, mechanism of catalysis
- b) Coenzymes, co-factors
- c) Isoenzymes, their clinical importance
- d) Factors affecting enzymes activity, Michaelis-Menten Equation, Lineweaverburk equation and their application in enzyme kinetics (no derivation of equations)
- e) Enzyme inhibitors and their classification & biomedical importance
- f) Application of enzyme in clinical diagnosis and therapeutic use

Prophyrins & Hemoglobin:

- a) Chemistry and biosynthesis of porphyrins and its disorders
(Porphyrins)
- b) Structures, functions and types of haemoglobin
- c) Oxygen binding capacity of haemoglobin, factors affecting and regulating the oxygen binding capacity of haemoglobin
- d) Degradation of heme, formation of Bile pigments, its types, transport and excretion
- e) Hyperbilirubinemia, their biochemical causes and differentiation, jaundice and its types
- f) Haemoglobinopathies (Hb-S, thalassaemia etc.) and their biochemical causes.

Vitamins:

- a) Introduction, classification
- b) Chemistry, Biochemical Functions, Deficiency manifestations, daily allowances and source of water soluble and fat-soluble vitamins
- c) Hypervitaminosis

Biochemistry of Digestive Tract:

- a) Introduction of digestion and absorption
- b) Introduction, composition, functions, daily secretion, stimulants and depressants of
 - Saliva
 - Gastric Juice & HCL
 - Pancreatic Juice
 - Bile Juice
 - Succus Entericus
- c) Digestion and absorption of carbohydrates, proteins, nucleic acid and lipids
- d) Biochemical disorders of GIT, e.g. achlorhydria, peptic ulcers, lactose intolerance, cholelithiasis and related disorders

Mineral & Trace Elements:

- a) Classification and Biochemical role of:
 - Macro minerals (Na, K, Ca, Cl, PO₄)
 - Micro minerals (Fe, Zn, Mg, Se, I, Cu, Cr, Cd, Mn)

PART-II

B. BIOCHEMISTRY

1. Bioenergetics and Biological Oxidation:

- a) Endergonic and exergonic reactions, their coupling through ATP
- b) Biologic oxidation and reduction, methods of electron transferring, redox potential, enzymes and coenzymes of biologic oxidation and reduction
- c) Respiratory chain and oxidative phosphorylation, components of respiratory chain, electron carriers
- d) ATP synthesis coupled with electron flow, phosphorylation of ADP coupled to electron transfer
- e) The ATP-synthase, their relation to proton pump, PMF, and active transport
- f) Uncouplers and inhibitors of oxidative phosphorylation

2. Introduction to Metabolism:

Metabolism of Carbohydrates

- a) Glycolysis
 - Phases and reactions of Glycolysis
 - Energetics of Aerobic and Anaerobic glycolysis and their importance
 - Regulation of Glycolysis
 - Cori's cycle
 - The fate of Pyruvate
- b) The Citric Acid Cycle
- c) Reactions, energetics and regulation and importance of Citric acid cycle
 - Amphibolic nature of citric acid cycle. The anaplerotic reactions and regulations of TCA cycle
- d) Gluconeogenesis
 - Important three by-pass reaction of gluconeogenesis
 - Entrance of amino acids and intermediates of TCA cycle and other nutrients as gluconeogenic substrates
 - Significance of gluconeogenesis
- e) Glycogen Metabolism
 - Reactions of Glycogenesis and glycolysis
 - Importance of UDP-Glucose
 - Regulation of Glycogen Synthase and Glycogen Phosphorylase
 - Glycogen phosphorylase 'a' and the blood glucose sensor
 - Disorders of Glycogen metabolism (Glycogen Storage Diseases)

- f) Secondary pathways of carbohydrate (Hexose) metabolism
 - Hexose Mono Phosphate Shunt, its reactions and importance
 - Glucuronic acid pathway, its reactions and importance
- g) Metabolism of Fructose, Galactose and Lactose
- h) Regulation of Blood Glucose Level
 - Hyperglycemia, hypoglycemia and their regulating factors
 - Biochemistry of Diabetes Mellitus, its Laboratory findings and Diagnosis

3. Metabolism of Lipids:

- a) Mobilization and transport of fatty acids, tricylglycerol, and sterols
- b) Oxidation of fatty acids
 - Activation and transport of fatty acid in the mitochondria
 - B-oxidation, fate of Acetyl CoA, regulation of B-oxidation
 - Other types of oxidation, i.e. alpha-oxidation, w-oxidation, peroxisome oxidation, oxidaton of odd number carbon containing fatty acids and Unsaturated fatty acids etc.
- c) Ketogenesis
 - Mechanism and utilization of Ketone bodies and significance
 - Ketosis and its mechanism
- d) Biosynthesis of fatty acids
- e) Eicosanoids, synthesis from Arahidonic acid, their mechanism and biochemical functions
- f) Triacylglycerol synthesis and regulation
- g) Synthesis and degradation of phospholipids and their metabolic disorders
- h) Cholesterol synthesis, regulation, functions, fate of intermediates of Cholesterol synthesis, Hypercholesterolemia, Atherosclerosis
- i) Plasma Lipoproteins, VLDL, LDL, HDL, and Chylomicrons, their transport, functions and importance in health and disease
- j) Glycolipid metabolism and abnormalities

4. Metabolism of Proteins and Amino Acids:

- a) Amino acid oxidation, metabolic fates of amino acid, transamination, deamination decarboxylation, deamidation and transamination
- b) Transport of amino group, role of Pyridoxal phosphate, Glutamate, Glutamine, Alanine
- c) Ammonia intoxication, Nitrogen excretion and Urea formation, Urea cycle and its regulation, genetic defects of Urea cycle

- d) Functions, pathways of amino acid degradation and genetic disorders of individual amino acids

5. Integration and regulation of Metabolic Pathways in Different Tissues:

6. Metabolism of Nucleotide:

- a) De Novo Purine synthesis
- b) Synthesis of Pyrimidine
- c) Recycling of purine and pyrimidine bases (The salvage pathway)
- d) Degradation of purine, formation of Uric acid
- e) Disorders of purine nucleotide metabolism

7. Biochemical Genetics (Informational Flow in the Cell):

- a) The structural basis of the cellular information
- b) DNA, Chromosomes, Discovery and organization of DNA in Genomes
- c) Super coiling of DNA
- d) The replication of DNA (DNA dependant DNA synthesis)
 - DNA polymerase, its components and functions
 - Initiation, elongation and termination of Replication
 - DNA Repair, Mutation and Cancers
- e) The Transcription (DNA dependant RNA synthesis)
 - RNA polymerase, its components and functions
 - Initiation, elongation and termination of transcription
 - RNA processing
 - RNA dependant synthesis of RNA and DNA
 - Reverse transcription — DNA synthesis from Viral RNA
 - Retroviruses in relation to Cancer and AIDS
- f) The Translation (Protein Synthesis)
 - The genetic codes and their characteristics
 - Initiation, elongation and termination of protein synthesis
 - Post-translational modification
 - Regulation of Gene Expression
- g) Molecular biology technology
 - DNA isolation
 - DNA-recombinant technology
 - Hybridization, blotting techniques
- h) Genetic disorders

8. **Biochemistry of Endocrine System:**
 - a) Chemistry, Secretion, Mechanism of action, regulation and effect on Carbohydrates, Lipids, Proteins, Mineral and water metabolism and disorders of various endocrine glands

9. **Biochemistry of water & Electrolyte imbalance and Acid Base Balance:**

10. **Nutrition:**
 - a) Caloric requirements of the body
 - b) Balanced Diet
 - c) Protein Energy Malnutrition
 - Marasmus
 - Kwashiorkor
 - Marasmic-Kwashiorkor
 - d) Nutritional requirements in:
 - Pregnancy
 - Lactation
 - New born
 - In nutritional disorders

Laboratory Practicals

- Introduction to use of laboratory facilities / equipments
 Basic techniques and fundamental information
 Preparation of solutions-Normal solution and Normal saline
 Experiments on Carbohydrates qualitative analysis
 Experiments on proteins-qualitative analysis
 Experiments on Fats-qualitative analysis
 Chemical analysis of Urine-Normal and abnormal specimens
8. The techniques and instrumentation of clinical biochemistry
 - a) Spectrophotometry
 - b) Flame photometry
 - c) UV Spectrophotometry
 - d) PH metery
 - e) Collection and preservation of clinical specimens
 9. Estimation and clinical interpretation of:
 - a) Blood Glucose
 - b) Glucose Tolerance Test (Demonstration)
 10. Determination of Amino acids in Urine by Paper Chromatography (Demonstration)
 11. Estimation of various biochemical parameters in blood (urea,uric acid, creatinine, billirubin ,Protein, cholesterol and electrolytes)
 12. Measurements of plasma enzymes (ALT, AST, LDH, CK, ALP and amylase)

PART-I

C. PHYSIOLOGY

Basic Concepts

General Physiology/Cell

Functional organization of human body

Homeostasis

Control systems in the body

Cell membrane and its functions

Intercellular Connections

Cell organelles

Transport through cell membrane

Genetics

Blood

Composition and General Functions

Plasma Proteins

Red Blood Cell (Erythropoiesis)

Haemoglobin & Blood Indices, Iron metabolism, Fate of Hb.

White Blood Cells,

Leucopoiesis, functions

Platelets

Haemostasis

Blood Groups,

Blood Transfusion & complications

Reticuloendothelial System – Spleen

Nerve and muscle

The neuron-structure & functions

Properties of Nerve Fibres

Physiology of action Potential including compound action potentials

Conduction of Nerve Impulse, Nerve

Degeneration and regeneration

Synapses

Structure of the Muscle

Skeletal muscle contraction

Isometric and isotonic contraction

Smooth muscle contraction

Neuromuscular Transmission

Excitation — contraction coupling

Motor Unit

Clinical/Applied Concepts

Abnormalities of the cell and its organelles

Anaemia

Blood indices in various disorders

Leucopaenia, Leucocytosis

Thrombocytopenia

Clotting disorders (Haemophilia etc.)

Blood grouping/cross matching & significance

Immunity

Nerve conduction studies

EMG

Nerve Injury

Rigor Mortis & Contractures

Myasthenia Gravis

Myopathies/Neuropathies

Neuromuscular Blockers

Gastrointestinal Tract

Structure and General Functions

Enteric nervous system (Gut Brain)

Mastication, Swallowing and their control

Functions and movements of stomach

Functions and movements of small intestine

Functions and movements of large intestine

Hormones of GIT

Vomiting and its pathway

Defecation and its pathway

Functions of Liver

Cardiovascular system

Introduction to heart & circulation

Physiology of cardiac muscle

Action potential in atrial & ventricular muscle and pace-maker potential

Regulation of cardiac functions

Cardiac impulse-origin & propagation

Cardiac cycle – various events

ECG-Recording & interpretation

Arrhythmias- mechanism of development

Functional types of blood vessels

Haemodynamics of blood flow

Local control of blood flow

Systemic circulation, characteristics & control

Regulation of peripheral resistance

Arterial pulse

Arterial blood pressure (short/long term regulation)

Cardiac output (regulation/measurement)

Heart Sounds/murmurs

Venous return & its regulation

Coronary circulation

Splanchnic circulation

Pulmonary circulation

Cerebral circulation

Cutaneous circulation- Triple response

Dysphagia, achlasia of esophagus

Examination of abdomen, peptic Ulcer, Pancreatitis

Gastric function tests

Vomiting and effects

Diarrhoea, Constipation

Jaundice, Liver functions tests

Correlation of cardiac cycle with ECG & heart sounds

Significance of Apex beat/abnormalities

ECG interpretation in cardiac muscle abnormalities and cardiac arrhythmias

Flutter, Fibrillation-Ectopics

Conduction defects

Jugular venous pulse

Radial/other pulses

Hypertension, types & effects

Clinical evaluation of heart sounds and murmurs

Ischemic Heart Disease

Heart Failure

Echocardiogram

Types of shock

Fetal circulation and readjustments at birth
Cardiovascular changes during exercise

Respiratory System

Organization/functions of Respiratory Tract
Functions of Lungs (respiratory & non respiratory)

Mechanics of Breathing
Surfactant and Compliance

Protective reflexes
Lung volumes and capacities

Dead space
Diffusion of Gases (gas laws, composition)
Ventilation/perfusion

Transport of O₂ in blood
Transport of CO₂ in blood
Regulation of respiration
(Nervous/Chemical)
Abnormal breathing
Hypoxia-types and effects
Physiology of Cyanosis
Physiology of high altitude, space, deep sea diving
Oxygen debt
Respiratory changes during exercise

Examination of Chest
Types of respiration
(Intrapleural pressure, pneumothorax, effusion)
Atelectasis
Lung function tests
(Spirometry)

Obstructive/Restrictive lung disease (FEV₁/FVC)

Abnormal
Ventilation/Perfusion

Respiratory failure

Asphyxia
Hypoxia, cyanosis, dyspnoea
Artificial respiration
Oxygen therapy

Caisson's disease

PART-II

D. PHYSIOLOGY

Body fluids and Kidneys

Compartments of body fluids & measurement
Tissue and lymph fluids

Structure of Kidney/Nephron
General functions of kidney
GFR-factors regulating
Formation of urine, filtration, reabsorption, secretion
Plasma Clearance

Renal function tests

Fluid Excess/depletion

Concentration & Dilution of urine
Electrolyte Balance
Water Balance
Regulation of blood pressure by kidneys
Hormones of kidneys
Acidification of urine
Acid Base balance
Micturition

Renal failure/uraemia

Nephrotic syndrome

Artificial kidney/Hemodialysis
Metabolic acidosis/alkalosis
Abnormalities of micturition
including incontinence

Nervous system

Organization of Nervous system
Classification of nerve fibres
Properties of Synaptic transmission
Neurotransmitters and neuropeptides
Types and function of sensory receptors

Significance of Dermatomes

Functions of spinal cord, ascending tracts
Reflex action/ reflexes
Muscle spindle / muscle tone

Receptors &
Neurotransmitters (applied
aspect)

Tactile, temperature and pain sensations
Structure of cerebral cortex
Sensory Cortex
Motor Cortex
Motor pathways, (Pyramidal & extra
pyramidal)
Basal Ganglia, connections and functions

Interpretation of Reflexes
UMN/LMN Lesion-features
and localisation
Injuries and diseases of spinal
cord, Analgesia system
Disorders of cranial nerves

Cerebellum, connections and functions
Vestibular Apparatus/Regulation of Posture
& Equilibrium
Reticular formation
Physiology of sleep/EEG
Physiology of memory

Hemiplegia/Paraplegia

Parkinsonism & other lesions
of basal ganglia
Cerebellar Disorders
Sleep Disorders

Physiology of speech
Thalamus-Nuclei & functions
Hypothalamus & limbic System
Cerebrospinal fluid
Regulation of body temperature
Functions of skin
Autonomic Nervous System
Physiology of aging

Higher mental function
assessment
Abnormalities of speech
Thalamic syndrome
Lesion of Hypothalamus

Hydrocephalus

Special senses

Structure & functions of eye-ball

Intraocular pressure &
Glaucoma

Optical Principles

Accommodation of eye

Errors of refraction

Visual acuity

Photochemistry of vision

Colour vision/night blindness

Colour blindness, fundoscopy

Dark and light adaptation

Neural function of Retina

Visual pathway, light reflex and pathway

Field of vision and lesions of
visual pathway

Visual cortex

Intraocular fluids

Visual evoked potentials and
electroretinogram

Eye movements and control

Physiological anatomy of cochlea

Functions of external & middle Ear

Functions of inner Ear-Organ of Corti

Auditory pathway

Hearing test audiometry

Physiology of smell- receptors and pathway

Types of deafness

Physiology of taste

Auditory evoked potentials
Olfaction/taste abnormalities

Endocrinology

General principles(classification,
mechanism of action, feed back control)
Biosynthesis, transport, metabolism, actions
and control of secretion of hormones of:

Acromegaly, Giantism

Hypthalamus

Hormonal assay

Anterior Pituitary

Dwarfism

Posterior Pituitary

Panhypopituitarism

Thyroid gland

Sheehan's syndrome

Parathyroid, calcitonin

Diabetes insipidus

Adrenal Medulla

Syndrome of inappropriate

ADH secretion

Adrenal Cortex

Myxoedema, Cretinism,

thyrotoxicosis

Pancreas

GIT

Pheochromocytoma

Pineal gland

Cushing's syndrome, Conn's
syndrome

Thymus

Addison's disease,

Adrenogenital syndrome

Kidney

Diabetes Mellitus

&Hypoglycemia

Physiology of growth

Zollinger Ellison's syndrome

Reproduction

Functional anatomy of Male reproductive system	Chromosomal abnormalities
Spermatogenesis	
Semen analysis	Male infertility
Erection and ejaculation	
Testosterone	
Male puberty	
Oogenesis and functional anatomy of female gonads	
Oestrogen & Progesterone	Female infertility
Menstrual cycle	Contraception
Puberty and Menopause	Pregnancy Tests
Pregnancy — Physiological changes in mother during pregnancy	
Placenta	
Parturition	
Lactation	
Neonatal Physiology	

EXPERIMENTAL PHYSIOLOGY

Haematology

- Study of the microscope
- Determination of:
 - Haemoglobin (Hb%)
 - Erythrocyte sedimentation Rate (ESR)
 - Packed cell volume (PCV)/Haematocrit
 - Bleeding Time (BT)
 - Clotting Time (CT)
 - Blood Groups
- Study of Neubauer chamber
- RBCs Count
- Red cell indices
- WBCs Count
- Differential leucocyte Count (DLC)
- Osmotic fragility of RBCs
- Demonstration of prothrombin time and thrombin time

Respiratory System

- Clinical examination of chest
- Measurement of Pulmonary volumes and capacities (Spirometry)
- Stethography

Nervous System

Examination of superficial reflexes
Examination of deep reflexes
Examination of sensory, motor system
Clinical examination of cranial nerves

Cardiovascular System

Frog's Heart

Recording of normal cardiogram and affect of temperature
Effect of drugs on cardiac contractility
Effect of Ions on cardiac contractility

Properties of cardiac muscle in frog's heart (Demonstration)

Study of sheep's heart

Cardiopulmonary resuscitation

Cold pressor test

Triple response

Examination of arterial pulse

ECG recording/interpretation

Measurement of arterial blood pressure

Effect of exercise & posture on BP

Examination of Apex Beat

Heart Sounds- auscultation of normal sounds/murmurs

Special Senses

Field of vision by confrontation method

Field of vision by Perimetry

Light reflex

Ophthalmoscopy

Visual acuity

Colour Vision

Hearing tests

Audiometry

Taste Sensation

Olfaction sensation

Frog's Nerve & Muscle

Simple muscle twitch (SMT) in frog and effect of temperature

Effect of fatigue on muscle contraction

Tetanization in frog's muscle (Demonstration)

Effect of two successive stimuli on SMT (Demonstration)

Effect of preload and after load on SMT (Demonstration)

Determination of velocity of conduction in sciatic nerve (Demonstration)

Use of Physiograph (polygraph)

Elicit fatigue in human index finger

Miscellaneous

Recording of body temperature

Pregnancy tests

Introduction to biostatistics e.g. data collection and analysis

- Vitalograph
- Nerve conduction studies
- Muscle conduction studies
- Evoke Potential

SYLLABUS FOR SECOND PROFESSIONAL

PATHOLOGY AND MICROBIOLOGY

(A) GENERAL PATHOLOGY

A. CELL INJURY:

1. Definition of necrosis, ischemia, hypoxia, infarction and gangrene.
2. Sequence of the structural 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. Thalassaemia/haemophilia
 - Nutritional deficiency — e.g. Kwashiorkor
 - Infectious agents
 - Viruses: e.g. Hepatitis
 - Bacteria: e.g. Staphylococcus aureus
 - Fungi: e.g. Candida
 - Parasites: e.g. Malaria
3. Irreversible and reversible injury.
4. Apoptosis and its significance.
5. The necrosis and its types.
6. Exogenous and endogenous pigment deposition.
7. Dystrophic and metastatic calcification along with clinical significance.

8. Metabolic disorders
 - lipid disorders, steatosis of liver, hyperlipidemia
 - protein disorders
 - carbohydrate disorders
9. Adaptation to cell injury, atrophy, hypertrophy, hyperplasia, metaplasia.

B. INFLAMMATION, MEDIATORS OF INFLAMMATION

The role of inflammation in the defence mechanisms of the body.

The vascular changes of acute inflammation and their relation to the morphological and tissue effects.

The process of chemotaxis, opsonization and phagocytosis.

The role of cellular components in inflammatory exudate.

Exudate and transudate.

Important chemical mediators of inflammation.

The pathway of Arachidonic Acid metabolism.

The role of products of Arachidonic acid metabolism in inflammation.

The mechanism for development of fever, with reference to exogenous and endogenous pyrogens.

Chronic inflammations/Granulomatous diseases.

The systemic effects of acute and chronic inflammation and their possible outcomes.

Significance of ESR.

Examples of induced hypothermia in medicine.

Pathogenesis, clinical features and lab. Diagnosis of Gout.

Management of acute and chronic Gout.

C. WOUND HEALING:

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

D. DISORDERS OF CIRCULATION

a. THROMBO-EMBOLIC DISORDERS AND THEIR MODALITIES:

1. Pathogenesis of thrombosis.
2. Possible consequences of thrombosis
3. Define and classify emboli according to their composition.

b. DISORDERS OF THE CIRCULATION AND SHOCK:

1. Definition of 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.

E. MICROBIOLOGY

1. Defence mechanisms of the body.
2. Microbial mechanisms of invasion and virulence.
3. Differentiation between sterilization and disinfection.
4. Methods of disinfection and sterilization of the following:
 - a). Facility where he 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 catheterisation, bandaging, suturing and lumbar puncture.
6. Universal precautions for infection control.
7. General principles of the following serological tests:
 - ELISA — Hepatitis (A, B, C, D, E, G) Rubella, CMV and HIV
 - Haemagglutination — TPHA
 - Western blot - HIV
 - ICT — Malaria.
8. Interpretation: a) Culture reports, b) Serological reports and c) microscopic reports of gram stain and AFB stain.
9. Principles of proper collection and submission of specimens for laboratory investigations with due precautions.
10. General characteristics and taxonomy of Bacteria, Rickettsia, Chlamydia Viruses and Fungi.
11. Definition of communicable endemic epidemic and pandemic diseases, carriers, pathogens, opportunists, commensals and colonizers.
12. Micro-organisms responsible for infection of the following organ systems:
 - Central nervous system
 - Respiratory system
 - Gastrointestinal system
 - Genital infections
 - Urinary system
 - Infections of bone and joints
 - Zoonosis
 - Infection of the skin
 - Hepatic infections
13. Pathogenesis, treatment, epidemiology, prevention and control of the following organisms.

Bacteria: Staphylococcus aureus, streptococcus pneumoniae, Beta hemolytic streptococcus group A & B, Diphtheria sp. Bordetella sp. Bacillus anthracis, clostridium perfringens, clostridium botulinum, clostridium difficile, clostridium tetani, Actinomyces israeli, 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, Traponema pallidum, Leptospira, Rickettsia sp.

Viruses: Entero, Mumps, Herpes, Adeno, Measles, Influenza, Parainfluenza, Rhino RSV, Hepatitis A, B, C, D, E, Rota, Astro, CMV, EBV, Rubella, Chicken pox, Arbo, HIV Rabies.

Fungus: Cryptococcus neoformis, Candida albicans, Tinea species,

Immunity: Types of Immune Cells, Structure & Function of Immunity , Hypertensivity Reactions, Autoimmune diseases.

PRINCIPLES OF ANTI-MICROBIAL ACTION

1. Definitions: 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. Super infection and cross sensitivity.

LIST OF COMMON ORGANISMS CAUSING ORGAN SYSTEM EFFECTS

Common organisms causing CNS Infections

Bacteria: *Streptococcus pneumoniae*, *Neisseria meningitidis*, *Haemophilis influenza*, Beta hemolytic streptococcus group B, *E. Coli*, *Listeria monocytogenes* and *Mycobacterium tuberculosis*.

Viruses: Enterovirus, Mumps, Herpes, Adenovirus.

Fungus: *Cryptococcus neoformans*

Protozoa: Malaria

Common organisms causing Respiratory Tract Infection

Bacteria: *Streptococcus pneumoniae*, *Haemophilis influenza*, Beta hemolytic streptococcus group B, *Klebsiella*, *Legionella*, *Mycoplasma pneumoniae* and *Mycobacterium tuberculosis*, *Chlamydia*, *Staph aureus*, *Diphtheria sp.* *Bordetella sp.*

Viruses: Measles, Herpes, Adenovirus, Influenza, Parainfluenza, Rhinovirus, RSV.

Protozoa: *Pneumocystis carinii*.

Common organisms causing gastrointestinal infection/infestation

Bacteria: *Salmonella*, *Shigella*, *Vibrio cholerae*, *Mycobacterium tuberculosis*, *Campylobacter jejuni*, *Helicobacter pylori*, *Clostridium perfringens*, *Staph. aureus*, *Bacillus cereus*, *Vibrio parahaemolyticus*, *Clostridium botulinum*, *Clostridium difficile*.

Viruses: Hepatitis A, Rotavirus, Astrovirus.

Fungus: *Cryptococcus neoformans*.

Protozoa: *Giardia lamblia*, *E. histolytica*, *Cryptosporidium*.

Common organisms causing hepatic infections

Bacteria: *Streptococcus* species, Coliforms and Anaerobes.

Viruses: Hepatitis A, B, C, D, E, G, CMV, EBV, HERPES Simplex.

Protozoa: *E. histolytica*.

Common organisms causing skin infection

Bacteria: *Staph aureus*, *Strep pyogenes*, *Actinomyces israelii*, *Nocardia asteroides*, *Corynebacterium diphtheriae*, *Mycobacterium tuberculosis*, *Mycobacterium leprae*.

Viruses: Smallpox, *Molluscum contagiosum*, Herpes, Measles, Rubella, Chickenpox,

Fungus: *Candida albicans*, *Tinea* species.

Arthropods: *Sarcoptes scabiei*, *Pediculus* species, *Cimex lectularius*.

Helminths: *Filaria* species, *Strongyloides stercoralis*, *Schistosoma* sp.

Protozoa: *Leishmania* species.

Common organisms causing bone and joint infection

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

Viruses: Rubella, Arbo, Entero and mumps.

Fungi: Madurella mycetoma.

Common organisms causing urinary tract infection

Bacteria: E.Coli, Klebsella, Enterococcus, Proteus, Staph, Saprophyticus, Mycobacterium tuberculosis.

Common organisms causing genital infection

Bacteria: Mycoplasma urealyticum.

Viruses: Pox, Herpes, Hepatitis B, HIV.

Fungus: Candida albicans.

Arthropodes: Sarcoptes scabiei.

Protozoa: Tricomonas vaginalis.

Common organisms causing Zoonosis

Viruses: Rabies.

Protozoa: Toxoplasma gondii, leishmania sp.

Helmenthics: Echinococcus sp.

F. GENETICS

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

G. NEOPLASIA

1. Classification systems of tumours.
2. Characteristics of benign and malignant tumours.
3. Grading and staging system of tumours.
4. Biology of tumour growth
5. Process of carcinogenesis
6. Host defence against tumours.
7. Mechanism of local and distant spread.
8. Local and systemic effects of tumours.
9. Tumour markers used in the diagnosis and management of cancers.
10. Common Chemical, Physical agents and Viruses related to human cancer.
11. Epidemiology of common cancers in Pakistan.

H. IMMUNOLOGY

Definition antigen, antibody, epitope, hapten and adhesion molecules.

Differentiate between innate and acquired immunity.

The structure and function of Major Histocompatibility Complex (MHC).

Cytokines.

The mechanism of humoral and cell mediated immunity.

Type I, type II, type III and type IV hypersensitivity reactions giving relevant examples.

Definition autograft, homograft, allograft and xenograft.

Immunotolerance and immunoparalysis.

Discuss the mechanism involved in allograft rejection and steps that can be taken to combat rejection.

Classification of immunodeficiency disorders.

The basis of autoimmunity.

Amyloidosis-Pathogenesis, classification.

I. PARASITOLOGY

Protozoa: Plasmodium species, Giardia lamblia, Entamoeba histolytica, Leishmania species, Trichomonas vaginalis, Toxoplasma gondii, Pneumocystis carinii, Trypanosoma, Balantidium Coli.

Helminths:

A. Cestodes Taenia(Solium, Saginata), Echinococcus species, Hymenolepis nana. Diphyllbothrium latium.

B. Nematodes

Filaria species, Ascaris lumbricoides, Ancylostoma duodenale, Enterobius vermicularis, Trichuris trichiuria, Trichinella spiralis, Strongyloides stercoralis, Loa Loa.

C. Trematodes Schistosomia (Haematobium, Mansoni, Japonicum), Fasciola Hepatica, Clonorchis Sinensis

PHARMACOLOGY

The details of the syllabus are as under:

Theory

1. **General Pharmacology:**

- Definition of Pharmacology, Objectives of learning Pharmacology, definition of drug and drug nomenclature.
- Standard sources of drug information, pharmacopoeias, formularies.
- Branches/Divisions of Pharmacology.
- Sources of drugs.
- Active principles of drugs and Pharmacopoeias.
- Dosage forms and doses of drugs.
- Drug administration.
- Absorption of drugs and processes involved in drug absorption (transport of drugs across cell-membrane)
- Factors modifying absorption of drugs.
- Bioavailability, its clinical significance and factors affecting bioavailability.
- Drugs reservoirs, distribution and redistribution of drugs, plasma protein binding.
- Pro-drug, Biotransformation of drugs, enzyme induction, enzyme inhibition and entero-hepatic circulation.
- Plasma half-life of drugs, steady state concentration, its clinical importance and factors affecting it.
- Excretion of drugs.
- Mechanism of drug action.
- Dose response curves, structure-activity relationship.
- Factors modifying action and doses of drugs.
- Drug-drug interactions.

2. **Locally Acting Drugs**

- Demulcents, Emollients, Irritants, Counter irritants, Astringents, anti-seborrhoeics, Locally acting enzymes.
- Antiseptics and Disinfectants
- Ectoparasiticides

3. **Drugs Acting on Gastrointestinal Tract**

- Anti Emetics
- Drugs affecting motility of GIT
- Ulcer Healing drugs
- Purgatives/Laxatives

4. **Cardiovascular Drugs**
 - Anti-arrhythmic Drugs
 - Inotropic Drugs/Drugs used in cardiac failure.
 - Anti-hypertensive Drugs
 - Anti-anginal Drugs
 - Thrombolytics/Anti-coagulants/Anti-platelets
 - Anti-hyperlipidemic Drugs
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 Neurone Blockers

Autonomic Ganglionic Blockers

Skeletal Muscle Relaxants

- a) Neuromuscular Blocking Agents.
- b) Central Muscle Relaxants.
- c) Directly acting skeletal muscle and relaxants.

8. **Central Nervous System**

- a. Sedative-Hypnotics
- b. Antiepileptics
- c. General Anaesthetics
- d. Local Anaesthetics
- e. Drugs For Movement Disorders/ Anti Parkinsonism Drugs
- f. Alcohol
- g. Drugs For Migraine
- h. Psychopharmacology
 - Anti-psychotics —
 - Anxiolytics —

- Anti-Depressants/Anti-mania

9. Analgesics

- Opioids
- Non-Steroidal Anti-Inflammatory Drugs (NSAID)
- Anti-gout Drugs
- DMARDs

10. Drugs Acting on Respiratory System

- Drugs used in treatment of Bronchial Asthma
- Expectorants
- Mucolytics
- Anti-tussives

11. Drugs Acting on Endocrine System:

- Pituitary-Hypothalamic Drugs
- Adrenocorticoids
- Sex Hormones/Hormonal contraception
- Thyroid/ Parathyroid Drugs
- Pancreatic Hormones and Oral Antidiabetic Agents
- Drugs used in infertility

12. Drugs Acting on Uterus

Ergometrine, Terbutaline, Dinoprostone, Carboprost, Ritodrine, Oxytocin.

Antimicrobial Drugs

- Sulfonamides
- Penicillins
- Cephalosporins
- Aminoglycosides
- Tetracyclines
- Macrolides
- Quinolones
- Anti-tuberculous drugs
- Antileprotic drugs
- Anti-fungal drugs
- Anti-viral drugs
- Anti-protozoal drugs
 - Anti-malarial drugs
 - Anti-amoebic drugs
- Urinary tract anti-septics
- Anti cancer drugs
- Immunosuppressive agents
- Miscellaneous
- Antihelmintics

CLINICAL PHARMACOLOGY/THERAPEUTICS

The teaching of clinical Pharmacology should be designed to meet the daily needs of medical graduates. It should consist of lectures and demonstrations.

- Drug treatment of peptic ulcer
- Drug treatment of bronchial asthma
- Drug treatment of epilepsy
- Treatment of Parkinsonism syndrome
- Drug treatment of rheumatic diseases
- Drug treatment of ischaemic heart disease.
- Drug treatment of hypertension
- Treatment of congestive heart failure
- Drug treatment of hyperlipidemia
- Drug treatment of heavy metal poisoning
- Drug treatment of oedema
- Drug treatment of different types of shock

PRACTICALS

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 students on suitable animal/tissue models.

1. Effects of drugs on reflex time.
2. Effects of drugs on CNS.
3. Effects of drugs on heart.
4. Effects of drugs on blood vessels.
5. Effects of drugs on eye.
6. Effects of acetylcholine and atropine on isolated ileum.
7. Effects of histamine and antihistamines on isolated ileum.
8. Schemes to find out unknown drug having stimulatory or inhibitory effect on isolated ileum

B. PRESCRIPTION WRITING

General principles

- Guideline for rationale use of drugs
- Prescription writing for common ailments:
 - drug concept
 - Acute watery diarrhoea

- Bacillary dysentery
- Amoebic dysentery
- Ascariasis
- Tape-worm infestation
- Acute streptococcal pharyngitis
- Iron deficiency anaemia
- Allergic rhinitis
- Scabies
- Acute malarial fever
- Cerebral malaria
- Typhoid fever
- Bronchial asthma
- Hypertension
- Migraine
- Cardiac failure
- Shock

Clinicopharmacological Seminars on Rational Drug Therapy and Drug Interaction should be conducted

Antibiotics, vitamins, analgesics etc.

Antibiotics

- 1) Frequency, distribution of antibiotic prescribed in different clinical settings/units.
- 2) Rational prescribing pattern of antibiotics

Parameters:

Provisional Diagnosis, Investigation, Empirical Therapy, prescribing after culture and sensitivity.

Vitamins

Parameters:

- a) Groups of vitamins prescribed.
- b) Vitamins prescribed on basis of therapeutic indication or empirical.
- c) Single/multiple vitamins prescribing.
- d) Frequency of prescribing and rational use of vitamins/otherwise.

Analgesics

Parameters:

- a) Frequency distribution of various groups of analgesics prescribed.
- b) Single/multiple adverse drug prescription.
- c) Non specific indications of analgesics prescribed.

Adverse Drug Reactions

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

General Objectives:

It is expected that at the end of medical training, the students will be able to:

1. Prescribe drugs rationally
2. Monitor the drug therapy.
3. Observe drug interactions and adverse drug reactions (ADR).
4. Manage drug over dosage and poisoning.

FORENSIC MEDICINE & TOXICOLOGY

COURSES OF STUDY

1. FORENSIC MEDICINE

a) PAKISTAN'S LEGAL SYSTEM

Students should be able to:

Describe the powers and jurisdiction of courts, procedures for inquest, and legal Procedures.

Define important Legal terms.

Debate the application of relevant Legal sections of the penal code.

Define the role of a medical doctor in the medico-legal system.

Give medical evidence in courts.

Document information to be prepared by a medical doctor for legal procedures.

Describe Procedure of Court attendance and recording of evidence.

b) FORENSIC SCIENCES

The student will:

Describe the role of Forensic Sciences in Crime detection.

c) LAW IN RELATION TO MEDICAL MEN

The student will:

Understand and act according to and within the framework of Privileges and obligations of Registered medical practitioner.

Maintain a Doctor-patient relationship in the context of the highest ethical standards.

Understand and refrain from any temptations to professional misconduct.

Guard Professional secrets and privileged communication.

Maintain highest ethical principles in medical examination and when obtaining consent.

Define what constitutes medical negligence.

Debate 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

Students should be able to describe:

- 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 (Osteometry, Dactyloscopy, DNA Technique, Super imposition photography etc.).
- 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

The student should be able:

To describe:

- 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 WHO guidelines.

f) TRAUMATOLOGY

i) MECHANICAL INJURIES:

The student should be able to describe 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 — MEDICO-LEGAL CONSIDERATIONS:

The student should be able to:

- List and debate laws in relation to causing Bodily harm, Wounding and Homicide.
- Examine an injured person, certify nature, manner of cause, 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.
- Identify the causes of death from wounds.
- Distinguish between ante-mortem and post-mortem wounds.
- Diagnose whether death is suicidal, homicidal and accidental.

iii) The student should also have a 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 Deaths in Custody. And

Should be able to determine the medicolegal aspects of Heat, Cold, Electrical injuries.

g) VIOLENT DEATHS DUE TO ASPHYXIA.

Students should be able to:

Define, Classify, causes of; and detect the Anatomical, Physiological, Biochemical and Pathological signs of violent death; and of

Mechanical, chemical and environmental asphyxial death and their medicolegal implications.

h) AUTOPSY

Students should be able to list:

- Types, objectives, rules, and techniques and describe procedure for post-mortem;

Describe:

- Methods for Assessment of Fatal period and post-mortem interval. Post-mortem artefacts. Risks and Hazards of autopsy, and Autopsy Protocol.
- Procedure for selection and reservation, labelling and despatch of Biological and non-Biological materials for laboratory examination; and should be able to collect relevant samples.

- Exhumation procedures, and debate its value and limitations.

i) FORENSIC SEXOLOGY

Students should be able to:

Describe the approach to Impotence, determination of Virginitiy, 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)

Students should be able to:

Differentiate between Natural and unnatural sexual offences and know how to perform a Medical examination of victim and assailant, collect specific specimens and write a required certification.

Students should be able to list:

Common sexual perversions and address their cause.

k) MISCARRIAGE

Students should be able to:

- Determine the relevant sections of law, Medico-legal aspects applicable to miscarriage; and

Be able to:

- Examine mother and aborted material; and send aborted material in proper preservative for examination.

l) CRIME AGAINST NEW-BORN, INFANTS AND CHILD

Students should be able to identify infanticide, and criminal and non-accidental violence or abuse to a newborn, infant or child.

m) FORSENIC PSYCHIATRY

Students should be able to:

- Diagnose mental illness.
- Distinguish between true and feigned insanity.
- Advise on procedure of restraint of the mentally ill.
- List limitations to civil and criminal responsibilities of mentally ill.

n) EXAMINATION OF BIOLOGICAL SPECIMENS

Students should be able to describe:

- Forensic importance of Biological specimens (Blood, Semen, Salvia, Vomitus, Breath, Urine, Hair).
- The method of their collection, preservation, despatch and the common laboratory tests performed.

2. TOXICOLOGY

a) GENERAL PRINCIPLES OF TOXICOLOGY

The student should be able to describe:

- The scope of toxicology.
- Where to access the laws regulating drugs and noxious products.
- Describe common Toxicants in our environments and their abuse.
- Describe to cause of drug dependence, the fate and detoxification of poisons in the biological tissues,

Be able to:

- Diagnose toxicological cases in acute and chronic exposure in living and dead.
- Utilize general principles of treatment with anti-dotal therapy and management.
- Handle specimens.
- Work within the framework of duties of Doctor in cases of poisoning.
- Prepare and interpret chemical examiners reports.

b) THE STUDENT WILL BE ABLE TO DESCRIBE

- Autopsy techniques with collection, preservation and despatch of Biological material to analytical laboratory.

c) SPECIFIC POISONS

Study of Poisons/drugs of abuse prevailing in our society along with medico-legal aspects is recommended. Emphasis must be given to the following poisons/drugs:

- 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, Sulphuric Acid, Oxalic Acid, Carbolic Acid and Alkalis)
- x) Pesticides, Herbicides and Insecticides

Practical work will include:

1. In FORENSIC MEDICINE

- Autopsies — 10 with log book.
- 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 despatch 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.

***Note:** All autopsies and Medico-legal work has to be done by forensic medicine department.

SYLLABUS FOR THIRD PROFESSIONAL

COMMUNITY MEDICINE

CONTENTS OF CURRICULUM

1. 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.

2. 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. Non-governmental Organizations and International Agencies. Resources for health. Community Mobilization.

3. 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 control, Eradication, Elimination

Dynamics of infectious 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 travellers.

National case management guide lines.

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

1. Diseases transmitted through inhalation.
2. Diseases transmitted through Faeco-oral route.
3. Arthropod borne diseases.
4. Diseases of animals conveyed to man.
5. Diseases due to direct contact.

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

1. Hypertension.
2. Coronary heart disease.

3. Cancers.
4. Injuries.
5. Diabetes mellitus.
6. Obesity.
7. Acute Rheumatic fever and heart disease.

4. **Biostatistics**

- A. Concepts and uses
- B. Data and its types
- C. Rates, ratios and proportions
- D. Crude, specific and standardized rates.
- E. Collection and registration of vital events in Pakistan
- F. Sources of health related statistics
- G. Measures of central tendency, (Mean, Median, Mode),
- H. Measures of dispersion (Range, Standard deviation, Standard error)
- I. Normal curve,
- J. Methods of data presentation (tables, graphs & diagrams)
- K. Interpretation of data (t-test and Chi-square test)
- L. Sampling and its various techniques.
- M. Health Management Information System

5. **Demography and Population dynamics**

- A. Concept, demographic principles and demographic processes
- B. Census, definition, methodology, types
- C. Determinants of fertility, mortality
- D. Population Pyramid, and its interpretation
- E. Demographic Transition, Demographic Trap and its public health importance
- F. Demographic and social implication of high population growth
- G. Social Mobilization
- H. Urbanization

6. **Food and Nutrition**

- A. Concepts (Nutrition, Nutrient, Food, Diet). Food groups and their functions. Role of fibre in diet. Balanced Diet
- B. Malnutrition at all stages of life its types causes and prevention. Common nutritional problems of public health importance and their prevention and control
- C. Dietary requirements of normal human being at different stages of life
- D. Food hygiene, Pasteurization, fortification, additives & adulteration and preservation
- E. Food Poisoning
- F. Assessment of nutritional status of a Community

7. Reproductive and Child Health

- A. Safe motherhood, and its components. (Ante-natal, Post-natal, Family Planning & Emergency Obstetric Care)
- B. Maternal mortality, causes and prevention
- C. Infant care: Growth and development. Breast feeding, common causes of morbidity and mortality, their prevention and control
- D. Child Care: Health promotion strategies. Common ailments, home accidents, child mortality prevention. Strategic approaches of Integrated Management of Childhood Illness (IMCI)
- E. Adolescent health
- F. Reproductive tract infections: guidelines for management of STD's

8. Health of school age children

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

9. Environmental Health Sciences

- A. Air: Composition of air. Causes of Air pollution. Purification of Air. Diseases caused by impurities in air and their prevention
- B. Water: Sources of Water. Daily water requirement. Water pollution its causes and prevention. Purification of Water. Water quality Standards. Diseases due to polluted water
- C. Waste disposal: Contents, hazards and safety measures for solid and liquid; Domestic, Industrial and Hospital waste
- D. 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
- E. Radiation: Sources, types, causes, hazards and prevention
- F. Healthful housing. Urban and rural slums. Refugee camps and hostels
- G. Noise: Definition, causes, acceptance level, hazards and control

10. Occupational Health

- A. Concepts, of occupational health, occupational medicine and occupational hygiene. Ergonomics and its importance
- B. Occupational hazards. Principles of control
- C. General principles of occupational disease prevention
- D. Organization of occupational health services
- E. Health Insurance and Social Security Schemes

11. **Arthropods and their public health importance**
 - A. Common arthropod borne diseases
 - B. Control of arthropods of medical importance
 - C. Insecticides and their public health importance

12. **Prevention and control of Parasitic diseases of public health importance**

13. **Snake Bites: Personal protection and management**

14. **Mental Health**
 - A. Concept. Common mental health problems, their causes, prevention and control
 - B. Juvenile delinquency

15. **Behavioural Sciences and lifestyle**
 - A. Concept, attitudes, health and illness behaviour
 - B. Drug abuse, addiction and smoking
 - C. Child abuse and child labour
 - D. Role of physical exercise in health and disease

16. **Information, Education and Communication (IEC)**
 - A. Concept. Aims and objectives
 - B. Approaches used in public health
 - C. Contents, principles and stages of health education
 - D. Communication methods, barriers and Skills in health education
 - E. Planning, organizing and evaluating a health education programme
 - F. Social Marketing

17. **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.

18. **Medical Ethics:**
 - A. Background Concepts and components
 - B. National recommended guidelines
 - C. Code of Medical Ethics

PRACTICAL AND COMMUNITY BASED TRAINING

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

- II. **Field visits**
 - a) Visit to BHU and RHC
 - b) Visit to an NGO
 - c) Visit to a primary school to assess the nutritional status of school children
 - d) Visit to MCH/Reproductive Health Centre to observe the organization, and function of the centre and to demonstrate counselling skills in one of the following
 - Nutritional counselling for children, pregnant and lactating women
 - Antenatal Care
 - Family planning services
 - Immunization, others
 - e) Visit to a hospital to see the hospital waste disposal
 - f) Visit to an industry
 - g) Visit to a physical/mental/social rehabilitation centre

- III. **Skills development lab**
 - a. Water purification at domestic level
 - b. Contraceptives
 - c. Vaccination including the cold chain
 - d. Oral Rehydration solution

SPECIAL PATHOLOGY

1. **BLOOD VESSELS & HEART**
 - Differentiate among atherosclerosis, Monckeberg's medial calcific sclerosis and arteriosclerosis.
 - Describe atherosclerosis with respect to the following factors
 - Etiology and pathogenesis
 - Early lesion
 - Late and complicated lesion
 - Vessels affected
 - Complications
 - Classify hypertension.
 - List the causes of secondary hypertension
 - Describe the vascular changes in hypertension.
 - Discuss the common pathogenetic mechanisms of vasculitis.
 - .Classify aneurysm according to the etiology.

- Describe atherosclerotic aneurysm with respect to
 - Pathogenesis.
 - Type of vessel involved.
 - Morphological & clinical features.
- Describe varicose veins with respect to
 - Common sites
 - Predisposing factors
 - Clinical features.
- List the benign and malignant tumours of blood vessels.
- Describe the pathogenesis of ischemic heart disease.
- Describe myocardial infarction with respect to the following
 - Sequence of changes in myocardial infarction (MI)
 - Pattern of elevation of biochemical markers used in the evaluation of M.I
 - Complications
- List the causes of sudden cardiac death
- Describe cor-pulmonale and list the predisposing disorders
- Describe rheumatic fever with respect to
 - Etiology
 - Pathogenesis
 - Morphological & clinical features
- List the causes of myocarditis
- Describe morphological and clinical features of myocarditis
- Describe the three major clinico-pathological groups of cardiomyopathy (dilated, hypertrophic and restrictive)
- List the causes of pericarditis
- Describe the clinical and morphological feature of pericarditis
- List the primary & secondary cardiac tumours
- Describe the main features of Fallot's tetralogy and coarctation of aorta

2. HAEMATOPOIETIC AND LYMPHOID SYSTEMS

- Outline the stages in the formation of red blood cell and white blood cells.
- List the normal values of red cell count, haemoglobin level, packed cell volume, MCH, MCV, MCHC, WBC count and platelet count.
- Classify anaemia on the basis of mechanism of RBC production.
- Describe the causes of iron deficiency.
- Describe the morphological and clinical features of iron deficiency anaemia.
- List the types of megaloblastic anaemia.
- List the conditions which predispose to folate deficiency.
- Describe vit. B12 deficiency with respect to
 - The conditions which produce it

- Blood picture and clinical features
- Differentiate between anaemia of chronic disease and nutritional deficiency anaemia.
- Describe hereditary spherocytosis with respect to
 - The incidence
 - Etiology
 - Pathogenesis
 - Morphological and clinical features
- Discuss the pathogenesis of thalassaemia.
- Classify thalassaemia on the basis of clinical and genetic features.
- Differentiate between the blood picture and clinical feature of Beta-thalassaemia minor and major.
- Discuss the mechanism of haemolytic anaemia due to glucose-6-phosphate dehydrogenase deficiency.
- Classify immunohemolytic anaemia.
- Differentiate between warm and cold antibodies immunohemolytic anaemia.
- Describe aplastic anaemia with respect to the
 - Etiology and pathogenesis
 - Clinical features and Lab. Diagnosis
- Describe the mechanisms which can cause neutropenia/ agranulocytosis.
- Describe the causes of leukocytosis.
- Describe the epidemiological, morphological and clinical features of infectious mononucleosis.
- Differentiate between acute and chronic non-specific lymphadenitis.
- Describe the different classifications (REAL and working formulations) of non-Hodgkin's lymphoma.
- Describe Hodgkin's disease with respect to
 - The classification
 - The clinical stages
 - Etiology and pathogenesis
- Classify leukemia
- Discuss the prognostic factors of acute lymphoblastic and acute myeloblastic leukemias.
- Describe the pathophysiology of chronic myeloid and chronic lymphocytic leukemias
- Describe multiple myeloma with respect to
 - Etiology
 - Pathogenesis
 - Morphology
 - Clinical features
- Describe disseminated intravascular coagulation with respect to

- Etiology and pathogenesis
- Clinical features and laboratory diagnosis
- List the causes of decreased production and decreased survival of platelets.
- Describe the pathogenesis of idiopathic & thrombotic thrombocytopenic purpura
- Indicate the 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
- Describe polycythemia with respect to
 - Etiology
 - Pathogenesis
 - Clinical significance
 - Lab. Diagnosis
- Describe the ABO and Rhesus blood groups and outline the way in which a sample of blood is typed.
- List the hazards of blood transfusion and how these can be prevented.

3. RESPIRATORY SYSTEM

- List micro-organisms causing upper respiratory tract infection.
- Describe the etiology and clinical features of rhinitis and nasal polyps.
- List malignant & benign tumours of nasopharynx and larynx.
- Discuss pleural effusion, hemothorax, hydrothorax, pleuritis, pneumothorax and chylothorax.
- Discuss acute pharyngitis, acute bacterial epiglottitis and acute laryngitis.
- Classification of atelectasis on the basis of underlying mechanism.
- Differentiate between restrictive & obstructive lung disease on the basis of pulmonary function tests.
- Describe the etiology pathogenesis, morphology & clinical features of asthma.
- Describe various types of emphysema, its pathogenesis, morphology and clinical features.
- Describe pathogenesis and clinical features of chronic bronchitis.
- Describe the predisposing factors, pathogenesis, morphology & clinical features of bronchiectasis.
- List the clinical conditions associated with restrictive lung diseases.

- Describe the pathogenesis, morphology & clinical features of adult respiratory distress syndrome.
- Describe the pathogenesis, morphology & clinical features of sarcoidosis and hypersensitivity pneumonitis.
- Describe the pathogenesis, morphology and clinical features of idiopathic pulmonary fibrosis.
- Describe clinical features of Goodpasture's syndrome.
- List the pathogenesis, morphology & clinical features of thromboemboli.
- Describe the morphology & clinical features of pulmonary infarction.
- List the causes of pulmonary hypertension and vascular sclerosis.
- Describe the etiology, pathogenesis, morphology & clinical features of acute bacterial pneumonia.
- List the micro-organisms causing atypical pneumonia.
- Discuss the etiology, pathogenesis & clinical features of tuberculosis of the lung.
- List the Fungi (candida, pneumocystis carinii) causing lung infections.
- Describe the classification, etiology, pathogenesis and clinical features of bronchogenic carcinoma.
- Describe etiology & pathogenesis of mesothelioma.
- Describe pneumoconioses with respect to etiology, pathogenesis and clinical features.

4. THE ORAL CAVITY AND GASTROINTESTINAL TRACT

4.1 Oral cavity

- Define the term leukoplakia.
- List the possible predisposing factors (pipe smoking, ill-fitting denture, alcohol abuse, irritant foods) of leukoplakia.
- Discuss the risk factors of oral cancer.
- Describe the clinical and morphological feature of oral cancer.
- List the benign and malignant tumours of salivary glands.
- Describe the clinical and morphological features of pleomorphic adenoma.

4.2 Esophagus

- Describe the predisposing factors of esophagitis.
- Carcinoma of the esophagus.

4.3 Stomach

- List the predisposing factors associated with acute gastritis.
- Describe the pathogenesis and clinical features of acute gastritis.
- Describe the pathogenesis, morphological and clinical features of chronic gastritis.
- Describe the pathogenesis, morphological and clinical features of peptic ulcer.

- Describe the gastric carcinoma with respect to
 - Risk factors
 - Pathogenesis
 - Clinical and morphological features
 - Prognosis

4.4 Intestine

- Describe the clinical and morphological features of Hirschsprung's disease.
- Describe the pathogenesis, morphological and clinical features of
 - Celiac sprue
 - Tropical sprue
- Describe the predisposing conditions for ischemic bowel disease.
- Describe the clinical and morphological features of ischemic bowel disease.
- Differentiate between Crohn's disease and ulcerative colitis.
- List the major causes of intestinal obstruction.
- Describe the clinico-pathological features of following diseases of intestine
 - Amebiasis
 - Tuberculosis
 - Typhoid
- List the non-neoplastic polyps of intestine.
- Classify adenomas on the basis of epithelial architecture.
- Describe the clinical and morphological features of adenomas.
- Discuss the pathogenesis of colorectal carcinoma.
- Describe the morphological and clinical features of colorectal carcinoma.
- Describe the Aster-Collar classifications of carcinoma of the colon and rectum.
- Describe carcinoid tumour with respect to the
 - Peak incidence
 - Most prevalent sites in the gut
 - Morphological features.
- Describe the clinical features of carcinoid syndrome.
- Describe the etiology, pathogenesis, morphological and clinical features of acute appendicitis.
- List the tumours of appendix.

5. LIVER & BILIARY TRACT

5.1 Liver

- Describe the pathway of bilirubin metabolism and its elimination from the body.
- Describe the types of jaundice with respect to the following:
 - Causes

- Clinical features
- Lab diagnosis
- Differentiate between intrahepatic and extrahepatic biliary obstruction.
- List the causes of hepatic failure.
- Describe the morphological and clinical features of hepatic failure.
- Describe the important complication of liver failure (hepatic encephalopathy, hepatorenal syndrome).
- List the common causes of cirrhosis (viral hepatitis, cryptogenic, alcohol, biliary disease, genetic hemochromatosis, Wilson's disease, alpha-1 anti-trypsin deficiency).
- Discuss the pathogenesis of cirrhosis.
- Describe the complications of cirrhosis (progressive liver failure, portal hypertension, hepatocellular carcinoma).
- Differentiate among viral hepatitis A, B, C, D and E with respect to
 - Route of transmission
 - Incubation period
 - Clinical features.
 - Potential outcome of acute infection.
- Define carrier state and differentiate between acute and chronic hepatitis.
- List the common causes of liver abscess (amebic, echinococcal, bacterial, fungal).
- Describe clinical and morphological features of liver abscess.
- List the drugs and toxins which cause hepatic injury along with their specific effects.
- Discuss the pathogenesis of alcohol liver disease.
- Describe the morphological and clinical features of alcoholic hepatitis and cirrhosis.
- List the causes of secondary hemochromatosis.
- Describe the pathogenesis, morphological and clinical features of hemochromatosis.
- Discuss the clinico-morphological features of Wilson's disease.
- Describe the clinico-morphological features of alpha-1 anti-trypsin deficiency.
- List the causes of neonatal hepatitis.
- Differentiate between primary and secondary biliary cirrhosis.
- Discuss the epidemiology, pathogenesis, morphological and clinical features of hepatocellular carcinoma.

5.2 Biliary tract

- Describe the pathogenesis and risk factors of cholelithiasis.
- Describe the morphological and clinical features of acute and chronic cholecystitis.
- Describe clinical and morphological features of gall bladder cancer.

5.3 Pancreas

- Describe acute pancreatitis with respect to
 - Etiology and pathogenesis
 - Clinical and morphological features.
- Describe the clinical and morphological features of chronic pancreatitis.
- Describe the clinical and morphological features of carcinoma of pancreas.

6. THE URINARY SYSTEM

- Define the terms:
 - Azotemia
 - Uremia
 - Acute renal failure
 - Chronic renal failure
- Discuss the types, genesis, basis, clinical features and complications of polycystic kidney disease.
- Describe different types and pathogenesis mechanisms of glomerulonephritis.
- Differentiate between nephrotic and nephritic syndrome. List the diseases included in these categories, their etiology and pathogenesis mechanisms (membranous, minimal change, membranoproliferative & acute poststreptococcal glomerulonephritis).
- Discuss the etiology, clinical course, pathogenesis and complications of acute pyelonephritis.
- Discuss pathogenesis mechanism, morphology clinical features and complications of chronic pyelonephritis.
- Define acute tubular necrosis, its pathogenesis and clinical course.
- Differentiate between benign and malignant nephrosclerosis. (on the basis of clinical date). Discuss the pathogenetic mechanism, morphology and clinical course (Gross & microscope picture).
- Discuss the pathogenesis, clinical features and lab diagnosis of nephrolithiasis. List the various types of renal stones.
- Define hydronephrosis, what are its causes, clinical features and complications.
- Discuss the epidemiology, morphology and clinical features (paraneoplastic syndrome) of renal cell carcinoma.
- Describe the clinical features, morphology and prognosis of Wilm's tumour.
- Describe the etiology, morphology & clinical features of cystitis.
- Describe the clinical features, etiology and morphology of transitional cell carcinoma of the urinary bladder.

7. MALE GENITAL SYSTEM

- Discuss the following congenital conditions
 - Hypospadias
 - Undescended testis
- Describe the etiology, route of infection, pathogenesis and methods of diagnosing urethritis.
 - Gonococcal
 - Non gonococcal
- Discuss the etiology, pathogenesis and natural history of
 - Prostatitis
 - Prostatic hyperplasia
 - Prostatic carcinoma
- Discuss the causes, pathogenesis and clinical features of scrotal swelling.
- Testicular adnexae
 - Varicocele
 - Hydrocele
 - Spermatocele
- Testis and epididymis
 - Inflammation (Orchitis)
 - Epididymitis
 - Tumour
- Discuss the causes, pathogenesis and relevant investigations of male infertility.
- Classify the tumours of the male genital tract.
- Prostate
- Testis

8. FEMALE GENITAL SYSTEM

- List the causes, routes of infection & methods of diagnosis of sexually transmitted diseases. List the micro-organisms involved, route of infection, pathogenesis and methods of diagnosing the following:
- Gonorrhoea, syphilis, chlamydia, HPV, herpes simplex and trichomonas vaginalis.
- Classify the neoplasms of cervix with special reference to cervical intraepithelial neoplasia.
- Describe the clinical features and pathogenesis of adenomyosis and endometriosis.
- Describe the causes, pathogenesis and clinical features of dysfunctional uterine bleeding with special reference to endometrial hyperplasia, endometrial polyp and carcinoma.
- Classify tumours of the uterus.
- Classify tumours of the ovary.

- Describe the etiology, clinical features and pathogenesis of ectopic pregnancy and toxemia of pregnancy.
- Classify gestational trophoblastic tumours with special reference to their clinical features.

9. BREAST

- List the causes of lump in the breast and discuss etiology, pathogenesis, morphology, clinical features and natural history of
 - Mastitis
 - Fibrocystic disease of the breast
 - Benign tumours of the breast (Fibroadenoma and Phyllodes tumour)
 - Carcinomas of the breast (Ductal and Lobular)
- List the causes of nipple discharge with special reference to intraductal papilloma.
- Describe gynaecomastia, and list its causes.

10. MUSCULOSKELETAL SYSTEM

- Describe the pathogenesis and clinical features of each of the following
 - Achondroplasia.
 - Osteogenesis imperfecta.
- List the causes of osteoporosis.
- Describe the pathogenesis, morphological and clinical features of osteoporosis.
- Describe osteomyelitis with respect to
 - Common causative micro-organism (Staphylococcus aureus, Pseudomonas, Escherichia coli, group-B Streptococci, Salmonella, Mycobacterium tuberculosis).
 - Common routes of spread (hematogenous, direct extension from the focus of infection, traumatic implantation).
 - Complications.
- Differentiate between acute and chronic osteomyelitis.
- List the common sites involved in tuberculosis osteomyelitis (vertebral bodies, long bones).
- Describe the pathogenesis, morphological and clinical features of Paget's disease (osteitis deformans).
- List the benign and malignant bone forming tumours.
- List the common sites (lower end of femur, upper end of tibia, upper end of humerus) of osteogenic sarcoma.
- Describe the morphological and clinical features of osteogenic sarcoma.
- List the benign and malignant cartilaginous tumours.
- Describe chondrosarcoma with respect to

- Peak incidence (sixth decade)
- Common sites of origin (shoulder, pelvis, proximal femur, and ribs)
- Morphological and clinical features.
- List the most frequent sites (distal femur, proximal tibia, proximal humerus and distal radius) of giant cell tumours of bone.
- Describe the clinical and morphological features of giant cell tumours of bone.
- Describe the Ewing's sarcoma with respect to
 - Peak incidence (second decade)
 - Common sites of origin (femur, tibia, pelvis)
 - Chromosomal abnormality t(11:22) (q24; q12).
 - Morphological and clinical features.
- Describe the pathogenesis, morphological and clinical features of osteoarthritis
- Describe rheumatoid arthritis with respect to
 - Pathogenesis
 - Morphological and clinical features
- Classify gout.
- Describe the pathogenesis, morphological and clinical features of gout.
- Describe the pathogenesis, morphological and clinical features of
 - Duchenne muscular dystrophy
 - Myotonic dystrophy
- List congenital myopathies (central core disease, nemaline myopathy and centronuclear myopathy).
- List inflammatory myopathies (dermatomyositis, polymyositis and inclusion body myositis).
- Describe the clino-pathological features of myasthenia gravis.
- Differentiate between lipoma and liposarcoma.
- Describe rhabdomyosarcoma with respect to
 - Peak incidence (1st decade of life).
 - Histological variants (embryonal, alveolar, sarcoma botryoides, pleomorphic).
 - Frequent sites (head & neck region, genitourinary, retroperitoneum).

11. ENDOCRINE SYSTEM

Pituitary

- List the causes of hyperpituitarism.
- Describe the morphology and clinical features of pituitary adenomas.
- Describe the clinical features of acromegaly and gigantism.
- List the causes of hypopituitarism.
- Describe the etiology, pathogenesis and clinical features of
 - Sheehan's syndrome

- Dwarfism
- Describe the etiology factors, clinical features, pathogenesis and lab findings in inappropriate secretion of ADH.

11.1 Adrenal Cortex and Medulla

- List the causes of adrenal cortical hyperfunction.
- Describe the etiology, pathogenesis clinical features and lab diagnosis of
 - Conn's syndrome
 - Adrenogenital syndrome.
- List the causes of hypofunction of adrenal cortex.
- Describe the etiology, pathogenesis, and clinical features of Addison's disease.
- List the tumours of adrenal medulla and cortex.
- Describe the clinical features and diagnosis of pheochromocytoma.

11.2 Thyroid

- List the etiology and clinical features of hyperthyroidism.
- List the etiology and clinical features of hypothyroidism including
 - Cretinism
 - Myxedema.
- Discuss the investigation/lab tests for diagnosis of thyroid dysfunction.
- Define goiter and list its types (diffuse and multinodular).
- Describe the etiology, pathogenesis and clinical features of diffuse and multinodular goiter.
- List the causes of solitary thyroid nodule and discuss the diagnostic approach.
- Describe the types, with pathogenesis, morphology and clinical features of thyroiditis with special reference to auto-immune thyroiditis (Hashimoto's thyroiditis and Grave's disease).
- Classify the etiology, pathogenesis, morphology and clinical features of
 - Follicular adenoma
 - Papillary carcinoma
 - Follicular carcinoma
 - Medullary carcinoma.
- List the types of MEN syndromes.

11.3 Parathyroid

- List the etiologic factors and clinical features of hyperparathyroidism.
- List the etiologic factors and clinical features of hypoparathyroidism
- Differentiate between primary, secondary and tertiary hyperparathyroidism.
- Discuss calcium haemostasis and causes of hyper and hypocalcemia.

12. SKIN

- Define the following macroscopic and microscope terms: Macule, papule, nodule, plaque, vesicle, bulla, blister, pustule, scale, lichenification, excoriation, hyperkeratosis, parakeratosis, acanthosis, dyskeratosis, acantholysis, papillomatosis, lentiginous spongiosis.
- Describe the morphological and clinical features of urticaria.
- Classify eczematous dermatitis.
- Describe the etiology and pathogenesis of
 - Contact dermatitis
 - Atopic dermatitis
 - Drug related eczematous dermatitis
 - Photoeczematous eruptions
 - Primary irritant dermatitis
- Describe the morphological and clinical features of acute eczematous dermatitis.
- List the conditions which are associated with erythema multiforme.
- Describe the clinical features of erythema multiforme.
- Describe the pathogenesis, morphological and clinical features of psoriasis.
- Describe the variants of pemphigus with respect to frequent site of involvement and clinical features.
- Discuss the pathogenesis of pemphigus.
- Describe the clinical and morphological features of bullous pemphigoid.
- List the pre-malignant epithelial lesions.
- List the types of warts and their most frequent locations.
- List the predisposing factors of squamous cell carcinoma of skin.
- Describe the clinical and morphological features of basal cell carcinoma.
- List the types of Nevocellular Nevi (congenital nevus, blue nevus, spitz's nevus, halo nevus, dysplastic nevus) along with their clinical significance.
- Describe the clinical and morphological features of dysplastic nevi.
- Describe malignant melanoma with respect to frequent site of origin, clinical and morphological features.

13. NERVOUS SYSTEM

- Describe clinico-pathological features of hydrocephalus.
- Describe the categories of cerebral edema (vasogenic & cytotoxic).
- List the types of herniation of brain alongwith clinical significance.
- Describe the clinical and morphological features of intra-cranial haemorrhage.
- Differentiate between acute purulent meningitis and acute lymphocytic meningitis.

- List the etiologic agents of chronic meningitis (mycobacterium tuberculosis, Cryptococcus neoformas, Treponema pallidum).
- Describe clinical and morphological features of chronic meningitis.
- List the route of infecting agents causing brains abscess
- Describe the clinical and morphological features of brain abscess.
- Describe the clinical and morphological features of tuberculosis meningitis.
- List the causative organisms of viral encephalitis (herpes simplex virus, cytomegalovirus, HIV, JC virus, arbovirus).
- Describe clinico-pathological features of Guillain Barre syndrome.
- List the infectious agents associated with polyneuropathies (leprosy, C. diphtheria, Varicella-zoster virus).
- List the organic and inorganic compounds which can produce toxic neuropathy (organophosphorous esters, vincristine, acrylamide, hexame, ethanol, arsenic and lead).
- List the important types of intracranial tumours (astrocytoma, oligodendrogliomas, ependymoma, medulloblastoma and meningioma) along with clinical significance of glial tumours.
- List the frequent metastatic tumours to the brain (carcinoma of the lung, breast, malignant melanoma, leukemia and lymphoma).
- List common primary peripheral nerve sheath neoplasms along with their clinical significance.

14. CHEMICAL PATHOLOGY

1. Introduction to chemical pathology, reference/ranges conventional and SI units.
2. Renal functions.
3. Causes of proteinuria and its lab diagnosis.
4. Lab diagnosis of acid base disorders.
5. Lab diagnosis of diabetese mellitus.
6. Liver function tests.
7. Lab diagnosis of hyperlipidaemia and its clinical interpretation.
8. Role of enzymes in diagnosis of pancreatitis.
9. Lab diagnosis of inborn errors of metabolism.
10. Lab diagnosis/investigations of endocrinic disorders:-
 - i. Thyroid function tests.
 - ii. Adrenal function test.
 - iii. Lab diagnosis of hyper and hypoparathyroidism.
 - iv. Role of hormone estimation in diagnosis of infertility.
 - v. Role of hormone estimation in diagnosis of growth disorder.

SYLLABUS FOR FINAL (FOURTH) PROFESSIONAL

SURGERY

1. Course Contents (Syllabus)

Following basic syllabus is recommended:-

To Attain Core Knowledge of & Apply Principles of Surgery as listed below:

1. Physiological response to Surgical Trauma and homeostasis.
2. Wound and its Repair.
3. Pathophysiology and Management of Shock including fluid and electrolyte imbalance.
4. Investigation and treatment of Infections and Parasitic Infestations of Surgical Importance.
5. Haemorrhage, Blood Transfusion and their implications.
6. Management of Acutely Injured & critically ill patients including aspiration pneumonia and embolic phenomenon.
7. Principles in the Management of common Skin and Soft Tissue Problems: Ulcers, Abscesses, Sinus & Fistulae, Swellings, Embedded Foreign Bodies and Minor Injuries.
8. Principles of Anaesthesia.
9. Nutrition of surgical patients.
10. Principles of organ Transplantation and its implications.

To deal with Critical Situations:

1. Cardiac Arrest.
2. Polytrauma with airway difficulty and circulatory instability.
3. Uncontrolled External Haemorrhage.
4. Sudden Upper Respiratory Tract Obstruction.
5. Patient in Hypovolaemic or Septicaemic Shock.
6. Tension Pneumothorax.
7. Cardiac Tamponade.
8. Unconscious patient due to Head Injury.
9. Fracture Cervical Spine.
10. Patient with Gas Gangrene and Tetanus.
11. Burns

To acquire knowledge of 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 region including tongue.
 4. Diseases of Salivary glands (Inflammation, Calculus, Tumours)
 5. Neck lumps including Lymphatic Thyroid and parathyroid
- **Breast**
 1. Breast diseases including lumps benign and malignant tumours.
 - **Chest Wall & Thorax**
 1. Blunt & Penetrating Injuries and their Complications.
 2. Lung abscess and Empyema Thoracis.
 3. Growth of cysts in the lungs.
 - **Gastro Intestinal Tract**
 1. Diseases causing Oesophageal Obstruction.
 2. Peptic Ulcer disease & its complications.
 3. Tumours of Stomach.
 4. Conditions Causing Acute Abdomen.
 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/ Femoral Hernia.
 3. Epigastric Hernia/Umbilical/ Para-umbilical 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. Malignancies.

- **Pancreas**
 1. Acute, Relapsing and Chronic pancreatitis.
 2. Pancreatic masses including (benign, malignant) Neoplasia.

- **Spleen**
 1. Trauma
 2. Introduction to Surgical aspects of spleen

- **Urinary Tract**
 1. Common congenital anomalies.
 2. Infection & its sequelae.
 3. Calculus Disease and its sequelae.
 4. Bladder pathologies.
 5. Enlarged prostate.
 6. Urogenital Trauma.
 7. Neoplasms of Urinary Tract.

- **External Genitalia, Scrotal and testicular pathologies**
 1. Developmental abnormalities.
 2. Scrotal swelling.
 3. Testicular swelling.
 4. Common Pelvic conditions.

- **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. Understands the principles of pre-operative preparations, Sterilization/Disinfection techniques.
8. Understand principles of wound care, Skin Suturing and Suture Removal, Incision and Drainage of Superficial Abscesses, Excision of Small Soft 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.

Attitude/Affect/Values to be Inculcated

1. Demonstrate polite and gentle patient handling.
2. Observes Aseptic Techniques.
3. Keeps confidentiality of the patient.
4. Uphold medical ethics.

General Objectives:

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

1. Identify surgical diseases including emergencies, provide primary health care, refer to appropriate centre 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 disease and its relevant issues.

4. Understand medical ethics and its application pertaining to surgery and maintain the confidentiality of the patient.
5. To understand the prevalence and prevention of the common Public Health Problem related to his field in the community.
6. Understand the principles of medical research including fundamentals of Information Technology.

ORTHOPAEDIC SURGERY & TRAUMATOLOGY

Objectives

1. General Objectives

After successful completion of the course, the students are expected to demonstrate knowledge and exhibit skills regarding preservation, investigations and treatment of common affections of the upper and lower limb and the spine. The students should be able to give emergency care to patients with limb injury, all kinds of injuries to the limbs and spine and demonstrate holistic approach in managing patients inclusive of safe transportation of patients to tertiary care centres.

1.1 Cognitive domain

- a. explain principles of recognition of injuries to the bones, joints and soft tissue of limbs and spine.
- b. detect and manage related musculoskeletal infections.
- c. identify congenital malformations and deformities for referral with management.
- d. recognize metabolic bone diseases.
- e. explain pathology with diagnosis of neoplasm for appropriate referral and treatment.
- f. explain associated pathology of common painful disorders.

1.2 Psychomotor domain

- a. deliver first aid measures for common sprains fractures and dislocations.
- b. identify problems of patients severely injured in any kind of accidents inclusive of road traffic, explosions, falls, fights, etc.
- c. apply dressings, splints, plasters and other immobilization techniques.
- d. assist in drainage, debridment, sequestration, orthopaedics surgeries related to the problems listed below and amputations.

2. Specific Objectives

The following levels of competence in domains of cognition, psychomotor skills and attitudes should be kept in mind by the tutors and the students while looking at the objectives of the clerkship.

1. Cognition; C1-Recognition, C2-Interpretation, C3-Problem-solving
2. Psychomotor Skills; P1-Observation, P2-Assist in the procedure, P3-Perform under supervision, P4-Perform independently.
3. Attitudes (Affects).

2.1 With respect to the diseases and problems listed below, by the end of rotation the students will be cognizant (Cognitive domain) of and able to:

- identify, diagnose and treat common orthopaedic emergencies (C3 P3).
- define common orthopaedic problems in a scientific manner and with logical reasoning with clear understanding of their effect on body systems inclusive of congenital and acquired problems (C1).
- request relevant investigations (C2).
- exhibit holistic approach to an injured patient and identify haemodynamically unstable patient.
- identify the conditions/diseases effecting musculoskeletal system through their signs and symptoms (C1).
- identify the drugs needed for a person with orthopaedic and related problems (C3).
- explain the differential diagnosis with logical reasoning (C3).
- interpret, explain and advise needs of rehabilitation for PPP, CP, Amputations.
- prescribe treatment for common painful conditions.
- understand medical ethics and its application to surgical procedures related to orthopaedics like amputations, hip replacements, etc.
- identify the surgical procedures needed for a person with orthopaedic and related problems (C3).
- communicate effectively with the patients.
- counsel and help patients and his/her family independently for making informed choices regarding relevant surgical procedures (P3).

2.2 Necessary Applied Basic Sciences with reference to Orthopaedics (Cognitive Domain)

- 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, (*orthosis & prosthesis*).
- (Orthotics – Orthopaedic appliances to support and correct deformities).
- (Prosthesis – artificial substitute for missing body parts).

2.3 Required skills (psychomotor domain)

- provide first aid (ABC of management) to a person with bone injury like: common sprains , fractures and dislocations (P4);

- manage bone infections and discuss indications of drainage, sequestration, (debridement) and amputation (P2).
- catheterize male and female patients (P4).
- shifting of patient from bed to trolley (P4).
- serving patients with bed pan and urine bottle (P4).
- prepare patients for surgeries and post operative care (P3).
- dressing of surgical wounds post operatively (P3).
- pass nasogastric tube (P3).
- injections I/V and I/M (P4).
- interpret and explain the urine, stool and blood findings with relevance to orthopaedic diseases (C2 P3).
- recognize gross abnormalities on ultrasound and MRI (C2 P2).

3. Systems and the diseases

3.1 Congenital & Development Diseases (C2); 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 for CTEV (severity of deformity) (P2).
- clinical Examination for CDH (Ortoloni and Barlow test) (P2).
- X-ray interpretation of Perth's disease and slipped capital femoral epiphysis (C2P2).
- manipulation/application of POP cast for CTEV (P1).
- management – Pelvic Harness, Von Rosen Splint, Hip Spica (P1).

3.2 Bone dysphasia (defect intrinsic to bone)

Dwarf- Achondroplasia

3.3 Bone and joint infections

- Acute osteomyelitis and septic arthritis.
- Chronic osteomyelitis.
- Tuberculosis, arthritis/Carries spines.

Specific required skills

- clinical examination of red hot swollen joint (P2).
- discharging sinus abscess, X-ray interpretations (C2 P1).
- Osteolysis/bone cyst, Sequestrum, Periosteal reaction
- Interpretation of laboratory reports (C2).
- urine blood and bacteriology, Management joint aspiration (P1).
- curettage and sequestrectomy (P1), drainage of abscess (P1).

3.4 Metabolic Bone diseases

Rickets; Osteomalacia; Osteoporosis; Hyperparathyroidism; diabetes.

Specific required skills

- Interpretation of X-rays(C2 P1) of Rickets/Osteomalacia, Osteoporosis/osteopetrosis.
- Hyperparathyroidism.
- Interpretation of laboratory reports (C2 P1) of serum Ca, PO₄, Alk. Phosphatase, parathormone.
- Management of diabetes with relation to injury /surgical procedure and infections (P2).

3.5 Neuromuscular disorders

- Muscular Dystrophies e.g. Duchenne type and Becker's type; Spina Bifida; Cerebral Palsy (CP).
- Post-Polio Paralysis (PPP); Neurofibromatosis;

Specific required skills

- Clinical examination of (P3) of sensations, deep tendon jerks, muscle power and tone colonus.
- Management suggesting and explaining (P2) of Orthosis, Walking aids (walking stick, crutches, walkers), Wheal chairs.

3.6 Bone Tumours

- a. Benign (C2)
Exostosis/Multiple Hereditary Exostosis/Enchondroma, Fibroma, lipoma, neuroma, Osteoid osteoma, Giant Cell Tumour.
- b. Malignant (C2)
Osteogenic Sarcoma, Ewings, Chondrosarcoma, Multiple Myeloma, Metastatic Bone disease from thyroid, lungs, kidney, breast and prostate.

Specific Required Skills

- Biopsy – Needle and open (P1).
- Amputation/Limb salvage surgery – principles, indications, techniques (P1), Orthotics.

3.7 Neck Pain, Low Back Pain and Sciatica

- Deformities (C3) of Scoliosis, Kyphosis.
- Spinal Injury (C3), Soft tissue injuries (Sprains, Strains etc.)
- Fractures (stable, unstable), Neurological Damage (partial, complete) Paraplegia (C3).

Specific Required Skills

- Examination of patient with: low back pain/sciatica (P3), neck pain (P3).
- Management.

- Application of Cervical Collar (P2), cervical Traction (P1).
- Application of Lumbosacral corset (P2).
- Internal fixation of spinal fracture (P1), log rolling, prevention of Bed sores, bladder Care/Catheter Care and rehabilitation.

3.8 Arthritis and Musculoskeletal Painful Disorders

- Rheumatoid Arthritis (RA) (C3); Ankylosing Spondylitis (AS) (C3); Osteo Arthrosis (OA) (C3).
- Gout (C3); Frozen Shoulder (C3); Tennis Elbow, Plantar Fasciitis, Trigger Finger, De quervains Disease. (C3).

Specific Required Skills

- Examination of painful shoulder (P2); Investigations; X-rays (differentiate on X-ray).
- RA/AS/OA and Gout (P2).
- Management; prescription writing for arthritis and painful muscle disorders (P1).

3.9 Soft Tissue Injuries

- Sprains/ruptures of Muscles, Ligaments, tendons (C3); Nerve Injuries (C3).
- Arterial Injuries (C3) Clean/contaminated wounds (C3).

Specific Required Skills

- Management; application of cold and compression dressings on sprains of ligaments and tendons (P3); repair procedures for Nerve and Vessel Injuries (P1); dressing of Surgical Wounds post-operatively (P3); debridment (P2); wound cleaning/washing (P2); application and removal of wound stitches (P2); aseptic Dressing (P2).

3.10 Fractures

- Basic and advanced trauma life support (C3); Triage of injured patients in emergency room (C3),
- Principles of fracture classification (C3); Principals of fracture treatment in children (C3).
- Principals of fracture fixation (C3); Management of common orthopaedic emergencies (C3).
- Mal-united fractures (C3); Non-unions (C3).

Specific Required Skills

- Examination; Clinical Examination of injured patient (P2); 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. (P2); interpret X-ray of limbs with fractures and dislocations (C2);
- Request and interpret X-rays, ultrasound, CT, MRI scans (P2)
- 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 (P4); maintain clear airway of patient (P3); reductions and observation of surgical fixations (P1); internal and external fixation of fractures (Plates, nails others) (P1); manipulation and application of plaster of Paris cast/back slab (P2); use of external fixators in treatment of open fractures (P2); application of traction skin/skeletal (P2).

4. List of drugs

Antibiotics; Cephalosporins, Aminoglycosides, Fusidic Acid, Vancomycin, NSAID (non-steroidal anti-inflammatory agents); Diclofenac sodium/Diclofenac Potassium, Naproxen, Piroxicam, Analgesics, Mefenamic Acid, Paracetamol, Tramadol, Sosegon Calcium, Calcitonin, VID3, HRT (Premarin), Bi-phosphonates, Anticoagulant, Heparin, Low molecular weight heparin, Warfarin, Anti-tubercular drugs, Multivitamins (B6, B12), Morphine derivatives, Muscle relaxants, Norflex, Ternelin, Zyloric, Anti-depressants, Local Anaesthetic, Xylocaine, Abocaine, Steroids.

5. Instructional strategy

The methods that will be used for teaching learning for the students are given below:

- Lectures.
- Seminars.
- Emergency assignments.
- Community surgeries (observations, assistance and performance of some tasks under supervision).
- Ward rounds and bed-side teachings case-based learning in the tutorials and small group discussions.
- Teaching in the surgical theatres and minor operation theatres task-based learning (in TBL the trainee learns about the task, develops an understanding of the education related to the task, looks at the applications of knowledge and skills in another context and acquires general competencies as exemplified in the task). Following themes are considered to identify as task in TBL:
 - Clinical methods, investigations procedures.
 - Normal and abnormal structure and function.
 - Biomechanics and Biomaterials.
 - Health promotion and disease prevention.

- Ethics, self-audit.
- Information handling, computers.

ANAESTHESIOLOGY

COURSE CONTENT

- 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.
- CPR.
- Recovery from Anaesthesia. Pain Management and postoperative care.

GENERAL OBJECTIVES

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

1. Identify condition requiring Anaesthesia including emergencies, provide primary life support, refer to appropriate centre and provide follow-up to the patients.
2. Perform essential minor Anaesthesiological procedures.
3. Communicate effectively with the patient, the family and the community regarding Anaesthesia care and its related issues.
4. Understand medical ethics and its application pertaining to Anaesthesiology and maintain the confidentiality of the patient.
5. Understand the principles of medical research including fundamentals of Information Technology.

DISTRIBUTION OF CURRICULUM

4th Year MBBS

Clinical Rotation = 2 weeks

EVALUATION

Internal Evaluation (Log book) = 10 marks

Total: 10 marks

The Committee feels that the old system of one Question of Anaesthesia in surgery paper is not serving the practical purpose of learning. A log book consisting of 12 pages should be introduced for awareness and improved performance of Under-Graduate Student staying in the Department for 12 days and this log book should replace this conventional examination system of one question of Anaesthesia (in Surgery).

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

LOG BOOK

PROCEDURES

1. Pre-Operative assessment of the patient.
2. I/V Cannulation and Intra-operative fluid Management.
3. 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.

OBSTETRICS AND GYNECOLOGY

COURSE CONTENT

SUGGESTED SYLLABUS IN OBSTETRICS:

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)
Labour.
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. Hyperemesis 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. IUGR 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. Transverse 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.
50. Log Book of 20 assisted deliveries.

SUGGESTED SYLLABUS IN GYNAECOLOGY:

1. Introduction.
2. Anatomy of female
 - Genital organs
 - Development of female genital organs
3. Gynaecological History taking and examination. Minor gynaecological operative procedures.
4. Puberty and adolescence.
5. Ovulation and its clinical importance.
6. Normal Menstruation.
7. Menstrual abnormalities.
8. Amenorrhoea.
9. Infertility.
10. Contraception.
11. Ectopic pregnancy.
12. Trophoblastic Tumours.
13. Vulval lesions
14. Tumours of vagina.
15. Tumours of cervix.
16. Tumours of uterus.
17. Tumours of ovaries.
18. Tumours of Fallopian Tubes.
19. Menopause, HRT.
20. Genital Prolapse.
21. Pelvic Floor injuries.
22. Urogynaecology.
23. Problems of marriage and sex.
24. Vaginal Discharges.
25. Infections of female genital Tract
 - Infections of upper genital Tract
 - Infections of lower genital Tract
26. Pre-Operative preparations.
27. Post-Operative complications and its management.
28. Role of USG in Gynaecology.

GENERAL OBJECTIVES

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

1. Identify Gynaecology/Obstetric diseases including emergencies, provide primary Reproductive Health Care, refer to appropriate centre and provide follow-up to the patients.
2. Perform essential minor Gynaecology/Obstetric procedures.
3. Communicate effectively with the patient, the family and the community regarding Gynaecology/Obstetric diseases and its related issues.
4. Understand medical ethics and its application pertaining to Gynaecology/Obstetric and maintain the confidentiality of the patient.
5. To understand the prevalence and prevention of the common Public Health Problem related to Gynaecology/Obstetric in the community.
6. Understand the principles of medical research including fundamentals of Information Technology.

OPHTHALMOLOGY

COURSE CONTENT

Basics	Anatomy and the functions of the Eyeball/Adenexa and Orbit.
<u>Orbit:</u>	Orbital Cellulitis, Proptosis.
<u>Lids:</u>	Blepharitis, Stye, Chalazion, Trichiasis, Entropion, Ectropion, Ptosis, and Common Tumours.
<u>Conjunctiva:</u>	Infective and Allergic Conjunctivitis, Pterygium.
<u>Cornea:</u>	Keratits, Corneal Ulcers, risk factors, complications and its management.
<u>Sclera:</u>	Episcleritis and Scleritis.
<u>Pupil:</u>	Pupillary reflexes and their common abnormalities.
<u>Lacrimal Apparatus:</u>	Composition and function of Tear film, Dry Eye, Excessive watering (Epiphora), Dacryocystitis (Acute & chronic).
<u>Therapeutics:</u>	Drugs used in common ophthalmic conditions.
<u>Vitamin A</u>	Ocular manifestations of vitamin A Deficiency and its management.
<u>Uveal Tract:</u>	Uveitis, and its differential Diagnosis from other causes of the Red Eye.
<u>Lens:</u>	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 humour formation and its circulation. Measurement of IOP, Definition and 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.

Vitreo-Retina:

Posterior Vitreous/Haemorrhage, detachment, Primary Retinal Detachment (Common Presentation and Principles of Management), Diabetic Retinopathy, Hypertensive Retinopathy, Retinitis Pigmentosa, Retinoblastoma.

Optic Nerve:

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, Emmetropia, Myopia, Hypermetropia, Astigmatism, Presbyopia, Aphakia, Pseudophakia, Anisometropia, and Amblyopia.

Systemic Disease:

Diabetes, Thyroid Diseases, vitamin deficiencies

Common causes of Blindness:

Definition and standards of vision/Blindness.

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

- (a) History Taking 4
1. Defects in Vision
 2. Pain in and around the Eye
 3. Discharging Eye
 4. Abnormal appearance of the Eye and Orbit
 5. Colour vision, Diplopia
- (b) Examination 4
- 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
 - Schiottz Tonometer 1
- Distant Direct Ophthalmoscopy for Identification of defects in the Ocular Media
Direct Ophthalmoscopy with emphasis on disc and its abnormalities Swollen disc, cup disc and pale disc/retinal lesion.
- Confrontation test for field of vision 1
- (c) Familiarization with Retinoscopy, Indirect Ophthalmoscopy, Slit Lamp and its Uses, Visual Fields and Use of Laser in Ophthalmology 1
- (d) Procedure 4
- Irrigation of Eye
 - Instillation of Eye drops
 - Staining for Corneal Ulcer
 - Removal of Superficial Foreign Bodies
 - Rational use of Topical Anaesthesia
- (e) Preparation for operation and post Operative Management
- (f) Understand Medical Ethics and maintain the Confidentiality of the Patient

Assessment of Level of Competence:

- I. To Diagnose, treat and prevent certain common eye conditions e.g.
Blepharitis
Stye and Chalazion
Dacryocystitis
Conjunctivitis
Trachoma
Ocular Trauma (Corneal Foreign Body/Abrasion)
Ocular Allergies
 - II. To diagnose certain eye diseases, initiate first aid treatment and refer them in time e.g.
Corneal Ulcer
Uveitis
Acute Congestive Glaucoma
Open or closed globe injuries
Red Eye
 - III. To enable them to diagnose other eye conditions and refer them to secondary or tertiary eye care centres for further management

(Medical/Surgical) e.g.
Cataract
Squint and Amblyopia
Refractive Errors
Tumours (white Pupil)
Serious Ocular Trauma
Painful or painless loss of vision
 - IV. To understand the importance of prevention in Ocular Diseases
Deficiency Diseases resulting in ocular Problems
Early Detection of Glaucoma
Diabetic Retinopathy
- By the end of the training student should be a caring and compassionate, general purpose, doctor who is competent to deal with the common health problems related to Eye diseases.
- V. Understand the relationship between Eye and Systemic Diseases
 - VI. To visit community for Eye Health Care problems including Eye Camps

GENERAL OBJECTIVES

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

1. Identify Ophthalmic diseases including emergencies, provide primary Eye care, refer to appropriate centre 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 maintain the confidentiality of the patient.
5. To understand the prevalence and prevention of the common Public Health Problem related to Ophthalmology in the community.
6. Understand the principles of medical research including fundamentals of Information Technology.

E.N.T

COURSE CONTENT

1. NOSE:

Anatomy and Physiology
History taking and examination

Diseases of External Nose

Congenital lesions, choanal atresia, meningocele, encephalocele,
Trauma, Cut Nose, Fractures,
External Deformities

Diseases of Septum

Epistaxis
DNS
Haematoma
Septal Abscess
Perforation

Rhinitis

Allergic
Atrophic
Hyper-Trophic
Foreign bodies
VMR

Polyps

Mucous Ethmoidal
Antrochoanal
Bleeding Polypus

Foreign Body Nose

Rhinolith
Maggots

Sinusitis

Acute Sinusitis
Chronic Sinusitis, complications
Fungal Infection of nose and paranasal sinuses
CSF Rhinorrhoea

Tumours

Basal Cell Carcinoma
Squamous Cell Carcinoma
Papilloma
Osteoma

Headache and its ENT causes

2. BUCCAL CAVITY, ORAL CAVITY, OROPHARYNX

Anatomy and physiology
History and examination

ORAL CAVITY ULCERS

Traumatic
Aphthous,
Vincent's Angina
Agranulocytic
Tuberculous
Malignant Ulcers
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 tonsils
Retro-pharyngeal abscess
Pharyngeal abscess acute/chronic
Sleep apnoea syndrome
AIDS
Ludwig's angina

3. LARYNX

Anatomy
Physiology
History Taking
Examination
Glottic stenosis/Laryngocoele
Laryngomalacia

Trauma Larynx/Foreign Body Larynx Infections

Supraglottitis
Acute Laryngitis
Laryngotracheobronchitis
Diphtheria
Chronic Laryngitis
- Tuberculosis
- Syphilis
- Leprosy
Non-specific chronic laryngitis
Vocal Nodules
Vocal cord paralysis
Functional Aphonia
Tumours.
- Papilloma Larynx
- Polyp
- Carcinoma Larynx
TNM classification
Tracheostomy
Indications
Contra indications
Complication
Operation steps
Post-Operation care

4. Oesophagus

Causes of dysphagia
P.V.Syndrome
Foreign body oesophagus
CA oesophagus
Indications and contraindications and complication of
Oesophagoscopy.

5. EAR

Anatomy
Physiology

History and examination tuning fork tests. pure tone audiometry/impedance audiometry
Pre-auricular sinus
Deafness
Pain in the ear

External ear

- Perichondritis
- Trauma to pinna/haematoma
- Wax ear
- Foreign body ear
- Hyperostosis
- Neoplasia
- Boil ear
- Fungus
- Acute diffuse otitis externa
- Malignant otitis externa
- Myringitis bullosa
- Traumatic rupture

Middle ear

- Acute otitis media
- Acute necrotising otitis media
- Serous otitis media
- Chronic otitis media
 - i. Tubo tympanic
 - ii. Mucosal disease
 - iii. Attico antral

Complications of otitis media/mastoiditis

- Oto toxicity
- Traumatic perforation of tympanic membrane
- Deaf child
- Speech therapy
- Oto sclerosis
- Vertigo
- Meniere's disease
- Facial nerve paralysis
- Eustachian tube dysfunction

6. HEAD & NECK

- Cleft palate
- Hare lip
- Thyroglossal cyst/sinus
- Pre-auricular cyst/sinus
- D/D of mass neck

- Lesions of salivary glands

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 ENT, Head & Neck problems for a given patient and outline appropriate management plans.

Identify problems needing referral to an ENT specialist.

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 post nasal space by posterior Rhinoscopy.

SPECIAL SKILLS

1. Use the tongue blade to aid inspection of the buccal cavity.
2. Use the finger palpation examination of the oral cavity and tongue.
3. Palpate the neck to assess the lymph-nodes and salivary glands in the neck.
4. Examination of Cranial nerves.
5. Identify structures (of the neck, sinuses and ear) on X-ray, MRI, CT SCAN.
6. Demonstrate the appropriate use of nasal speculum.
7. Demonstrate the use of otoscope to aid in examination of the external auditory canal and the tympanic membrane.
8. Learn pneumatic otoscopy. (Use of Seigle's speculum).
9. Demonstrate the use of tuning forks and interpret the findings.
10. Syringing of ear.
11. Anterior Nasal Packing

Observe the following operations and the use of the listed instruments:

1. Abscess incision drainage/Haematoma
2. Reduction of fracture nose
3. Septal correction Surgery
4. Antral Wash Out
5. Cald Well Luc's operation
6. Tonsillectomy
7. Nasal packing
8. Tracheostomy
9. Management of obstructed airway

10. Foreign body in Tracheo-Bronchial tree and Larynx
11. Ear operations
12. Ear instruments like myringotome and ear speculum

Instruments

1. Walsham's Forceps
2. Ashe's Forceps
3. Trocar and Cannula
4. Nasal Speculum
5. Freer elevator
6. Suction, Tube
7. Luc's forceps
8. Tilly's Nasal Dressing Forceps
9. Nasal Forces
10. Nasal Snare
11. Balenger Swivel Knife
12. Eustachian Catheter
13. Sinus forceps
14. Endotracheal Tube, Cuffed, Non-Cuffed
15. Sucker Pharyngeal
16. Laryngoscope Macintosh
17. McGill Forceps
18. Tracheostomy Tubes
19. Tracheal Dilator
20. Retractors
21. Endoscopes
Laryngoscopes
Bronchoscopes
Oesophagosopes
Nasopharyngoscope
(Rigid/flexible)
22. Adenoid curette
23. Boyle Davis mouth gag
24. Tonsil holding forceps
25. Tonsilar artery forceps
26. Tonsil snare
27. Knot pusher

GENERAL OBJECTIVES

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

1. Identify ENT diseases including emergencies, provide primary health care, refer to appropriate centre and provide follow-up to the patients.
2. Perform essential minor ENT procedures.

3. Communicate effectively with the patient, the family and the community regarding disease and its relevant issues.
4. Understand medical ethics and its application pertaining to ENT and maintain the confidentiality of the patient.
5. To understand the prevalence and prevention of the common Public Health Problem related to ENT in the community
6. Understand the principles of medical research including fundamentals of Information Technology

MEDICINE **(Including Psychiatry, Dermatology)**

CORE CURRICULA

Suggested List of Topics

Instead of starting with the traditional systemic approach a **symptomatic approach** in Medicine is the theme of these topics. The students are given definition, how to look for these signs, causes, their basic anatomy, physiology and patho-physiology etc as per requirement. The 'dynamic' list of topics is:

1. GENERAL

- i. Oedema
- ii. Cyanosis
- iii. Fever
- iv. Headache
- v. Anorexia, Weight loss

2. ALIMENTARY SYSTEM

- vi. Melena, Hematemesis, Bleeding per rectum.
- vii. Abdominal Distension/Ascites
- viii. Jaundice.
- ix. Heart burn.
- x. Diarrhoea and Constipation

3. GENITOURINARY SYSTEM

- xi. All signs related to examination by the hands
- xii. Lumbar pain, Anuria, Oliguria, Hematuria
- xiii. Dysuria, Frequency of Micturation, Urgency, Pyuria

4. RESPIRATORY SYSTEM

- xiv. Chest pain
- xv. Cough/Expectoration/Sputum

5. **CARDIOVASCULAR SYSTEM**
xvi. Palpitation, Breathlessness, chest pain
6. **CENTRAL NERVOUS SYSTEM**
xvii. I.Q.
xviii. Paralysis.
xix. Speech disturbances
xx. Movement disorders
7. **MUSCULOSKELETAL SYSTEM**
xxi. Joint pain and Joint swelling
8. **SKIN**
xxii. Eruption and rashes
xxiii Itching, pigmentation and dyspigmentation
9. **BLOOD**
xxiv. Bleeding tendency, bruising purpura
xxv. Lymph Node, enlargement

Any other topic given below may also be included:-

1. **GENERAL**
 - Pain
 - Weight gain/Obesity
 - Insomnia
 - Facial swelling
2. **ALIMENTARY SYSTEM**
 - Oral ulceration
 - Dysphagia
 - Nausea/Vomiting
 - Indigestion/Flatulence
 - Constipation
3. **GENITOURINARY SYSTEM**
 - Urinary retention
 - Nocturia
 - Urinary incontinence
 - Pelvic pain
 - Menorrhagia
 - Oligomenorrhia
 - Genital ulceration
 - Impotence
 - Infertility

4. RESPIRATORY SYSTEM

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

5. CENTRAL NERVOUS SYSTEM

- Behaviour
- Memory
- Confusional states
- Dementia
- Tremor
- Fasciculations
- Athetosis
- Chorea
- Gait abnormalities
- Convulsions/Fits
- Coma
- Syncope/Dizziness
- Vertigo
- Deafness
- Blindness
- Nystagmus examination
- Numbness, Tingling, Sensory loss
- Rigidity examination

6. MUSCULOSKELETAL SYSTEM

- Muscle cramps
- Muscle weakness
- Muscular wasting

7. SKIN

- Alopecia

8. BLOOD

- Lassitude
- Dyspnoea
- Infections
- Gum hypertrophy

Lectures, Seminars, Tutorials, etc.

The respective teachers in the specialty will be responsible for teaching the suggested list of topics as under:

1. Cardiology

- i. Rheumatic fever and infective endocarditis.
- ii. Valvular heart diseases.
 - Mitral valve
 - Aortic valve
- iii. Cyanotic/Acyanotic heart diseases.
 - Fallot's tetralogy
 - Name of other diseases
- iv. Ischaemic heart disease.
 - Angina
 - Myocardial infarction
- v. Heart failure.
 - Left Ventricular Failure.
 - Congestive Cardiac Failure.
 - Cor pulmonale.
- vi. Congenital heart diseases (brief).
 - Atrial Septal Defect
 - Ventricular Septal Defect
 - Patent Ductus Arteriosus
- vii. Cardiomyopathies (brief).
- viii. Pericardial diseases (brief).
 - Constrictive pericarditis
 - Pericardial effusion
- ix. Atherosclerosis/Arteriosclerosis.
- x. Hypertension.
- xi. Peripheral vascular disease (brief).
- xii. Symptoms and signs.
- xiii. Investigations.
 - Electrocardiography, X-Ray chest, Echocardiography, Thallium scan, Stress testing, Holter and Angiography etc.

2. Pulmonology

- i. Pulmonary function tests.
- ii. Imaging in pulmonary diseases/investigations.
- iii. Asthma.
- iv. Environmental lung diseases/Occupational (brief introduction).
 - Asbestosis
 - Silicosis
 - Bagasosis
 - Pneumoconiosis

- Byssinosis
- Farmer's lung
- v. Pneumonia.
 - Community acquired
 - Nosocomial
 - Lobar/Broncho
- vi. Adult respiratory distress syndrome/Acute respiratory failure/
Mechanical ventilation.
- vii. Bronchiectasis.
- viii. Chronic obstructive airway diseases.
 - Chronic bronchitis
 - Emphysema
- ix. Interstitial lung diseases.
- x. Pulmonary thromboembolism/Acute cor pulmonale.
- xi. Pleural effusion.
- xii. Pneumothorax.
- xiii. Carcinoma lung.
- xiv. Tuberculosis.

3. Dermatology

- i. Anatomy, Physiology, of Skin related to Clinical Dermatology.
- ii. Infestations: Scabies, Pediculosis.
- iii. Bacterial and Mycobacterial infections.
- iv. Fungal and Viral diseases.
- v. Acne vulgaris.
- vi. Eczemas.
- vii. Psoriasis and Lichen planus.
- viii. Bullous disorders.
- ix. Pigmentary disorders.
- x. Disorders of nails.
- xi. Disorders of hairs.
- xii. Sexually transmitted diseases.

4. Psychiatry

- i. Mood disorders.
 - Major depressive episodes
 - Unipolar
 - Bipolar
 - Dysthymic
 - Atypical
 - Manic episodes
- ii. Anxiety disorders.
 - Acute anxiety states
 - Panic disorders
 - Generalized anxiety disorders

- Psychic Traumatic disorders
 - Obsessive-compulsive disorders
 - Phobic disorders
- iii. Schizophrenia.
 - iv. Alcoholism.
 - v. Addiction.
 - vi. Psychosexual disorders in Men and Women.

CLINICAL TEACHING (4TH YEAR)

The clinical methods of related systems are revised, repeated with case discussion on various common disease presentations and their management. The candidates will also observe/assist in various procedures in the ward.

1. Cardiology

Suggested list of topics for Clinical Training:-

- Systemic hypertension.
- Valvular heart diseases.
- Congestive cardiac failure.
- Rheumatic fever and infective endocarditis.
- Pericardial diseases
- Angina pectoris, Myocardial Infarction
- Atrial Fibrillation
- Ventricular tachycardia
- Premature atrial and ventricular beats.

Procedures:

- ECG taking and basic reading i.e. Normal, Acute MI, Ischemia, complete heart block, APC, VPC, SVT, VT etc.
- X-ray chest reading – (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, O₂ therapy.
- Cardiac monitoring.
- Basics of ETT.

2. Pulmonology

i. Suggested list of topics for Clinical Training:

- Bronchial asthma
- Pleural effusion

- Pneumonia
- Pulmonary tuberculosis
- Chronic obstructive airway disease
- Type-I and type-II respiratory failure

ii. Procedures:

A. Perform

- Start O₂ therapy, indications, complications, intermittent etc.

B. Observe

- 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
- Chest X-ray reading of common Pulmonary diseases.
Students should know how to start Oxygen Therapy

3. Dermatology

i. 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
- Seborrhoea
- Exfoliative Dermatitis
- Skin Neoplasm like Squamous cell carcinoma, basal cell carcinoma and melanoma
- Leukoderma
- Pityriasis versicolor
- Alopecia and Hirsutism

- Sexually transmitted diseases
- Furunculosis, cellulitis
- Drug eruption
- ii. Procedures:
 - Scraping for fungus
 - Use of Magnifying glass
 - Observe skin biopsy
 - Use of Wood's Lamp

4. Psychiatry

- i. Procedures:
 - Observe
 - Psychotherapy
 - ECT
 - EEG
- ii. Case discussion for diagnosis and management of common Psychiatric disorders like-
 1. Anxiety
 2. Depression
- iii. Diagnose and refer:
 1. Schizophrenia
 2. Manic Depressive Psychosis
 3. Phobias

ALIMENTARY SYSTEM

1. Esophagus.
 - Dysphagia with special reference to
 - a) CA Oesophagus
 - b) GERD
 - c) Achalasia
 - d) Candidiasis of Oral Cavity and Oesophagus
2. Peptic ulcer and Gastritis.
3. Malabsorption syndromes.
 - Sprue
 - Tropical
 - Coeliac Disease
4. Inflammatory bowel diseases.
 - Ulcerative colitis
 - Crohn's disease
5. Irritable bowel syndrome (IBS).
6. Ascites.
7. Jaundice.
 - Congenital hyperbilirubinaemia
 - Gilbert Syndrome
 - Dubin Johnson Syndrome

Rotor Syndromes

- Haemolytic
- Obstructive
- Hepatitis
 - Viral, acute and chronic
 - Toxic
 - Drugs

8. Auto Immune Hepatitis.
9. Cirrhosis of Liver.
10. Hepatic Encephalopathy.
11. Carcinoma liver and transplant.
12. Acute and chronic pancreatitis.
13. Upper GI Bleeding, Lower GI bleeding
14. Drugs Contraindicated in Liver Diseases

KIDNEYS AND URINARY SYSTEM

1. Acute renal failure. (Introduction
2. Chronic renal failure. to dialysis &
3. Nephrotic syndrome. Renal Transplant)
4. Nephritic syndrome.
5. Urinary tract infections.
6. Dialysis (detail).
7. Drugs and kidney (brief).
 - a) Causing Renal disease.
 - Analgesic nephropathy.
 - Lead, Uric acid, Hypercalcemia, Radiation & Hypersensitivity nephropathy.
 - b) Drugs contra indicated in Renal insufficiency and Drugs to be used with caution in Renal Disease.
8. Polycystic kidneys (brief).
9. Renal artery stenosis (brief).
10. Renal vein thrombosis (brief).
11. Hemolytic uremic syndrome (brief).

NEUROLOGY AND CNS

1. Investigations .
2. Epilepsy.
3. Cerebrovascular diseases (stroke).
 - Ischemic –
Embolism/
Infarction.
 - Haemorrhage –
Intra-cerebral/
Subarachnoid
4. Dementia and Alzheimer's disease.
5. Parkinson's disease and other movement disorders.

6. Motor neuron disease.
7. Multiple sclerosis.
8. Meningitis.
 - Bacterial.
 - Tuberculous.
 - Brain abscess.
 - Viral meningitis and encephalitis.
9. Cranial nerve disorders.
 - Transient mono-ocular blindness (Amaurosis fugax).
 - Trigeminal neuralgia.
 - Facial palsy (Bell's).
 - Vertigo, nystagmus
10. Spinal cord disorders.
 - Spinal cord compression, paraplegia, quadriplegia
 - Myelitis.
 - Spondylosis.
 - Syringomyelia and Syringobulbia.
11. Peripheral nerve disorders.
 - Peripheral polyneuropathy G.B.Syndrome
 - Mononeuritis multiplex.
12. Space Occupying Lesions of brain and spinal cord.
13. Myopathies, Myasthenia Gravis.

METABOLIC DISORDERS

(Definition, causes and some basic information).

1. Hyperlipidemia (brief).
2. Hemochromatosis (brief).
3. Porphyrias (brief).
4. Wilson's disease (brief).
5. Gout and Hypercalcemia
6. Storage diseases.
 - Lipid.
 - Leukodystrophies
 - Niemann Pick disease.
 - Gaucher's disease.
 - Glycogen.
 - Fabry's disease.
7. Hereditary Connective tissue disorders (Brief)
 - Osteogenesis imperfecta.
 - Ehler's Danlos syndrome.
 - Chondrodysplasias.
 - Marfan syndrome.
 - Alport syndrome.
8. Disorders of amino acid metabolism and storage (Brief)
 - Homocystinuria.

- Alkaptonuria.
- Hartnup disease.
- Renal glycosuria.

DISEASES OF BONES AND JOINTS

1. Osteoarthritis
2. Osteoporosis
3. Rheumatoid Arthritis and related Arthropathies
4. Paget's disease of the bone.
5. Osteopetrosis (Marble bone disease).

INFECTIOUS DISEASES

- A. Clinical syndromes.
 1. Sepsis and Septic shock, Meningococcaemia
 2. Acute infectious diarrhoeal diseases and Bacterial food poisoning.
 3. Hospital acquired infections.
- B. Common disease syndromes caused by the following bacteria and their drug therapy.
 1. Pneumococci (Streptococcus Pneumoniae).
 2. Staphylococci.
 3. Streptococci.
 4. Hemophilis influenzae.
 5. Shigella.
 6. Gonococci.
 7. Pseudomonas.
- C. Following diseases in detail.
 1. Tetanus.
 2. Enteric fever/Salmonellosis.
 3. Cholera.
 4. Tuberculosis.
 5. Leprosy.
 6. Amoebiasis/Giardiasis/Trichomoniasis.
 7. Malaria.
 8. AIDS.
 9. Rabies.
 10. Infectious mononucleosis.
- D. Helminthic infestations
 - Ascariasis
 - Hookworm
 - Whipworm (Trichuriasis)
 - Threadworm (Entrobiasis)
 - Taenia (tapeworm)

MULTI-SYSTEM IMMUNOLOGICAL DISEASES

- Systemic lupus erythematosus (SLE)
- Serum sickness
- Rheumatoid arthritis
- 1. Systemic sclerosis (scleroderma).
- 2. Mixed connective tissue diseases (brief).
- 3. Sjogren's syndrome (brief).
- 4. Ankylosing spondylitis.
- 5. Bechet's syndrome (brief).
- 6. Vasculitis syndromes (brief).
 - Anaphylactoid Purpura
 - Polyarteritis nodosa
 - Hypersensitivity vasculitis
 - Wegner's granulomatosis
 - Temporal arteritis
 - Takayasu's arteritis
 - Thromboangitis obliterans (Burger's disease)
- 7. Sarcoidosis (brief).

HAEMATOLOGY

1. Anaemias.
 - Classification
 - Iron deficiency
 - Megaloblastic
 - B-12 deficiency
 - Folic acid deficiency
 - Anaemia of chronic disorder
 - Haemolytic anaemia
 - Hereditary
 - Acquired
 - Intra-corporcular
 - Extra-corporcular
 - Aplastic anemia
2. Haemoglobinopathies.
 - Sickle cell syndromes
 - Thalassemias
3. Myeloproliferative diseases.
 - Chronic myeloid leukemia (CML)
 - Polycythemia vera
 - Myelofibrosis
 - Essential thrombocytosis
4. Leukemias.
 - Acute
 - Chronic

5. Lymphomas
 - Non-Hodgkin's
 - Hodgkin's
6. Blood groups and blood transfusion.
7. Bone marrow transplantation.
8. Clotting disorders.
 - Thrombocytopenia
 - Decreased production.
 - Increased destruction.

Idiopathic thrombocytopenic purpura (ITP)

- Von Willebrand's disease.
 - Vessel wall disorders.
 - Disorders of coagulation.
 - Haemophilia
 - Vitamin K deficiency.
 - Disseminated intravascular coagulation (DIC).
9. Anticoagulants Therapy
 - Heparin
 - Oral (warfarin etc.)
 - Antiplatelet drugs

ENDOCRINOLOGY

1. Anterior pituitary.
 - Growth hormone disorders
 - Acromegaly
 - Gigantism.
 - Short stature
 - Infertility
2. Diseases of hypothalamus and pituitary.
 - Empty sella syndrome
 - Diabetes insipidus
 - Syndrome of inappropriate ADH secretion (SIADH).
3. Thyroid gland.
 - Hyperthyroidism (thyrotoxicosis)
 - Hypothyroidism (myxedema, cretinism)
 - Interpretation of thyroid functions tests
4. Adrenal Gland.
 - Cushing Syndrome
 - Aldosteronism Primary/Secondary.
 - Hirsutism.
 - Addison's disease, Acute Addisonian crisis
 - Pheochromocytoma
5. Diabetes mellitus (detail) and Hypoglycaemic states

6. Testes (brief).
 - Sexual precocity
 - Heterosexual precocity
7. Gynaecomastia
8. Multiple endocrine neoplasia (brief).
 - Type I
 - Type II

CLINICAL TEACHING

Students come to wards for about 8 weeks for 4.5 hours for 6 times a week. They present and discuss cases; their clinical methods are checked and corrected. They write histories (10 in each ward), maintain clinical card of daily activity and perform day, night and casualty duties.

They observe, assist and perform various procedures in the ward. The students come to the wards in the evening as well for self-learning, writing histories, preparing case presentations etc. Once a week a CPC is held where various units/departments present cases in turn. Case presentation is by students and discussion covered by consultants of the same unit. Topic/Subjects/Systems are distributed to the wards to stream line training.

Topics to be discussed in clinical teaching are:

1. CENTRAL NERVOUS SYSTEM

- Cerebrovascular accident
- Paraplegia
- Polyneuropathy
- Muscular dystrophies or Motor neurone disease
- Parkinsonism
- Meningitis
- Tetanus
- Hemiplegia
- Facial Palsy

2. ALIMENTARY SYSTEM

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

3. RHEUMATOLOGY

- Rheumatoid arthritis, Osteoarthritis
- Systemic Lupus Erythematosus

- 4. CARDIOVASCULAR SYSTEM**
 - Systemic hypertension
 - Ischaemic Heart diseases
 - Congestive cardiac failure
 - Valvular diseases and Infective Endocarditis

- 5. RESPIRATORY SYSTEM**
 - Bronchial asthma
 - Pleural effusion
 - Pneumonia
 - Haemoptysis
 - Pulmonary tuberculosis
 - Chronic obstructive airway disease
 - Bronchogenic Carcinoma

- 6. FEVERS**
 - Malaria
 - Typhoid fever

- 7. ENDOCRINOLOGY**
 - Diabetes mellitus
 - Thyroid diseases
 - Cushing's disease

- 8. BLOOD**
 - Anaemia
 - Bleeding disorders
 - Myeloproliferative or lymphoproliferative diseases

- 9. KIDNEY**
 - Nephrotic syndrome, Nephritic Syndrome
 - Acute renal failure
 - Chronic renal failure

- 10. MISCELLANEOUS AND EMERGENCIES**
 - Heat stroke
 - Snake bite
 - Electric shock
 - Poisoning

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 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
- O₂ therapy
- Nebulisation
- ECG taking/reading basics
- 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
- Bone marrow aspiration/Terphine

DESIGN OBJECTIVES

A fresh medical graduate should have following professional and human qualities.

- A. Knowledge and understanding of
 1. Mechanism of body in health and disease.
 2. Knowledge of relevant behaviour he has to display with patients, families and society.
- B. Professional and communication skills
 1. To diagnose and manage diseases.
 2. To develop excellent communication skills with colleagues doctors, nurses, paramedical staff and public.
 3. To have developed conditioned sympathetic attitude towards ailing humanity.
- C. Clinical Skills

He/She should have acquired a desired theoretical and practical level of competence according to the goals set up by the medical college.

Note: (Each medical college should have mission statement that the medical graduate passing out from the medical college has actually acquired those theoretical and practical competence including human qualities and that he can play the role of a community leader in practical life as a doctor.

TEACHING HOSPITAL AND COMMUNITY BASED ATTACHMENTS

Students shall spend allocated days a week on hospital attachment AS MENTIONED ABOVE. The community attachment gives the student an opportunity to experience community based clinical medicine and study determinants of health other than those normally considered within the scope of the high-tech Hospital Health Services. Students shall work in a variety of settings including Rural, Tehsil, District Health Facilities and Community Health Trusts, Statutory and Voluntary organizations in small or larger groups. Teacher one from Medicine, Surgery, ENT, Eye, Paediatrics, Obstetrics and Gynaecology shall accompany along with the teachers from Community Medicine.

CLINICAL TEACHING

A brief sample of distribution of the clinical duty is given below to be modified by the respective units as per their requirements and feasibility.

Students are taught to elicit symptoms and signs in clinical medicine and to interpret them with possible aetiology, Pathophysiology, significance etc where indicated. They have to appear in a comprehensive end-ward test.

The students have 'bed allotment' and write 10 histories and present cases during their stay in the ward. They will perform day duties in the evening hours in turn and observe various activities going on in ward. They are supposed to see and observe various procedures performed in the medical wards (list is given in final year teaching). They will also maintain a clinical card, which show their daily activity and is signed by tutor. The list of teaching schedule is:-

- History taking in general.
- GPE, Pallor, Cyanosis, Jaundice, Clubbing, and Koilonychia.
- Thyroid, Lymph nodes, Dehydration, Nutrition, Decubitus, Edema.
- Pulse.
- Examination of Blood Pressure and JVP.

- History taking in GIT – Vomiting, Diarrhoea, Pain Abdomen, Constipation.
- Haematemesis, Melena, Dyspepsia, Distension.
- Examination of GIT – Inspection, Palpation.
- Percussion, Auscultation.
- Any deficient programme.
- History taking in Respiratory system – Dyspnoea, Cough, Expectorations, Haemoptysis.
- Chest pain, Wheezing.
- Inspection, Palpation, Percussion, Auscultation front of chest.
- Inspection, Palpation, Percussion, Auscultation back of chest.
- Any deficient program.
- 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.
- 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

POST-WARD TEST (Internal assessment)

LECTURES/TUTORIAL/SEMINARS/CLINICO-PATHOLOGICAL CONFERENCES AND OTHER TEACHING METHODOLOGY

There are 03/4 lectures per week to be taken by respective teachers of various medical units. The topic/hours are allocated to each teacher to complete his task. The list of topics is ‘dynamic’ i.e. the teacher can make changes in consultation with head of department but cannot overshoot the time allocated.

THE LOG BOOK/CLINICAL CARD RECORD

The student is expected to make a reflective 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 3rd, 4th & 5th year.

Distribution of subjects

Paper-I All except Paper-II

Paper-II will include

Infectious Diseases

Metabolic Diseases

Immunology

Oncology

Acid and Base

Dermatology

Endocrinology including Diabetes

Genitourinary System

Genetics

Water and Electrolyte

Psychiatry/Behavioural Sciences

PAEDIATRICS

PERFORMANCE OBJECTIVES:

COURSE CONTENT

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: (PCM, Rickets, Vitamin A Deficiency, iodine deficiency, Iron Deficiency).
- Growth and Development.
- Common Paediatric infections: Measles, tetanus, polio, diphtheria, whooping cough, AIDS, Malaria, Enteric Fever, Tuberculosis, Chicken pox, Common Skin infections.
- Expanded Programme of Immunization (EPI). Newer vaccines.
- Diarrhoeal 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 Glomerulonephritis.
- Endocrinology: Hypothyroidism, short stature, Diabetes.
- Pulmonology: Croup, Asthma, Tuberculosis, Pneumonias, Pleural effusions.
- Gastroenterology: Abdominal pain, Malabsorption, Hepatitis, cirrhosis, Acute liver failure, Diarrhoea [acute/chronic] Dysentery, Worm infestations, Giardia, amoebiasis Rectal Polyp.
- Genetics: Patterns of inheritance, Down's syndrome.
- Social Paediatrics: Right of child, child abuse, Enuresis, encopresis, Hyperactivity, Dyslexia, Attention Deficit disorder.
- Miscellaneous: Poisoning, prevention of home accidents, behavioural disorders.
- Paediatric Surgery: Hernia, Intussusception, Intestinal obstruction, Talipes, congenital Dislocation of Hip, Vesico ureteral reflux.

A. KNOWLEDGE AND UNDERSTANDING

1. Student will be able to give description of common paediatric problems and diseases, in children at different ages.
2. Student will show an understanding of national programmes working for health promotion and disease prevention in children e.g. EPI, ARI etc.
3. Student will show an understanding of processes of growth and development in childhood and will be able to describe growth parameters and developmental milestones at different ages.
4. Student will demonstrate understanding of the importance of nutrition in children and be able to describe diets suitable for different ages and in different diseases.
5. Student will show an understanding of the interaction between heredity and environment in the genesis of disease in children.
6. Student will be able to describe care of new-born baby, in health and when suffering from common problems, along with importance of perinatal factors impacting on the well being of the new-born.
7. The Student will show understanding and knowledge about common accidents and poisoning in children and their management.

B. 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 new-born).
3. Student will be able to interpret clinical and laboratory data arriving 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. immunisation 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 new-born.
 - 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:

Lumbar Puncture

Bone marrow aspiration

Supra pubic puncture

Subdural tap

Thoracocentesis

Pericardiocentesis

Liver Biopsy

Renal biopsy

Observe passing of catheter

Observe pericardial tap

9. The Student will show ability to provide general care of sick Paediatric patients and be able to carry out simple diagnostic tests in the side lab.

A curriculum of Paediatrics should be designed based on common problem of Pakistani children which a medical student should at least know.

OBJECTIVES

1. Students acquire the knowledge of health promotion, disease prevention and management of common diseases in children (including new-borns).
2. Students become proficient in basic clinical skills of history taking, physical examination, data interpretation and basic technical procedures as applied to children of different ages.
3. Students develop an attitude of sympathetic care for the child patient and his parents.
4. Students develop a desire for self-learning.
5. Students are able to visualize the impact of the disease on the community as a whole and be able to study the genesis of epidemics and be able to plan prevention of those.
6. The students are equipped with the knowledge and confidence to play the role of a teacher, supervisor and organizer in a primary health care setup.

RADIOLOGY

- The medical graduate should have enough knowledge and exposure to various radiological techniques and be able to interpret radiological findings with accuracy and confidence.
- Different pathologies have characteristics radiological features which are strong basis for diagnosis of different diseases.
- Modern imaging i.e.; Intravenous urography, Ultrasonography, CT and MRI have made diagnosis easy and accurate.
- Interventional Radiology has emerged as rapidly developing sub-specialty and contributes a lot in diagnosis and therapeutic aspect.

OBJECTIVES

The student will be:

- Able to select/advise 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
 - Pulmonary oedema
 - Fractures
 - Surgical emphysema
 - Neoplastic Diseases
 - Chronic inflammatory disease (TB)
- **Plain Radiograph**
 - **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
 - Fluid levels (intestinal obstruction)
 - Free gas under Diaphragm, (perforation)
 - Enlarged liver and spleen
- **Plain Radiograph**
 - **Spine**
 - Normal anatomy and various 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**
- **Echocardiogram**
 - Be able to interpret the report
- **CT Scanning**
 - Be able to interpret the report
- **MRI**
 - **Basic principles.**

There may be 10 to 12 lectures. The best student will learn during the clinical rotations.

OUTLINE OF SYLLABUS CONTENTS

BEHAVIOURAL SCIENCE

1. Introduction to Behavioural Sciences

SOCIAL INFLUENCES ON BEHAVIOUR

2. Communication: Verbal & Non-verbal
3. Stigma; reactions to Illness
4. Death, Dying & Bereavement
5. Social Support
6. Roles
7. The Family
8. Illness behaviour
9. Culture, Race and Ethnicity

INDIVIDUAL INFLUENCES ON BEHAVIOUR

10. Learning & Behaviour Change
11. Memory
12. Emotion
13. Stress & Coping
14. Intelligence
15. Cognition, Thinking & Beliefs
16. Personality
17. Child development: including cognitive, emotional and psychosexual development
18. Adolescence
19. Aging

BIOLOGICAL INFLUENCES ON BEHAVIOUR

20. Sensation & Perception

21. Pain
22. Motivation
23. Sleep
24. Genetics

PSYCHO-SOCIAL ASPECTS OF PHYSICAL ILLNESS

25. Illness and Hospitalization
26. Common medical and surgical conditions
27. Coronary Care Unit
28. Renal/Dialysis Unit
29. Intensive Care Unit
30. Oncology service
31. Paediatric unit
32. Women's Health

PSYCHIATRY AND MEDICAL PRACTICE

33. Psychopathology
34. Prevention of mental illnesses
35. Suicide and Parasuicide
36. Smoking
37. Non Pharmacological interventions
38. Improving compliance
39. Informational care
40. Ethical aspects including rights of the patients

Academic Councils should decide when the above topics will be addressed and by which department in their institutions. The Council will also ensure implementation. This aspect of the curriculum should be related to the teaching of Islam.

TABLE OF SPACING AND HOURS OF SUBJECTS IN MBBS COURSE

SUBJECT	1 st year	2 nd year	3 rd year	4 th year	5 th year	Total Hours
BEHAVIOURAL SCIENCES	5 Hrs.	5 Hrs.	5 Hrs.	5 Hrs.	5 Hrs.	25 Hrs.
ISLAMIC & PAKISTAN STUDIES	15 Hrs.	15 Hrs.	10 Hrs.	10 Hrs.	-	50 Hrs.
ANATOMY	250 Hrs.	250 Hrs.	-	-	-	500 Hrs.
PHYSIOLOGY	250 Hrs.	250 Hrs.	-	-	-	500 Hrs.
BIOCHEMISTRY	100 Hrs.	100 Hrs.	-	-	-	200 Hrs.
PHARMACOLOGY	-	-	300 Hrs.	-	-	300 Hrs.
PATHOLOGY	15 Hrs.	25 Hrs.	260 Hrs.	200 Hrs.	-	500 Hrs.
* FORENSIC MEDICINE	-	-	100 Hrs.	-	-	100 Hrs.
** COMMUNITY MEDICINE	25 Hrs.	25 Hrs.	50 Hrs.	150 Hrs.	-	250 Hrs.
MEDICINE & Allied NUCLEAR MEDICINE	25 Hrs.	30 Hrs.	120 Hrs.	265 Hrs.	360 Hrs.	800 Hrs.
EMERGENCY MEDICINE, MEDICINE ELECTIVE, *** PSYCHIATRY, DERMATOLOGY AND GENERAL PRACTICE	-	10 Hrs.	-	10 Hrs.	-	20 Hrs.
PAEDIATRIC MEDICINE	5 Hrs.	10 Hrs.	15 Hrs.	50 Hrs.	70 Hrs.	150 Hrs.
SURGERY & ALLIED	25 Hrs.	30 Hrs.	120 Hrs.	265 Hrs.	360 Hrs.	800 Hrs.
**** RADIOLOGY ORTHOPAEDICS, PAED.SURGERY, NEUROSURGERY, SURGERY ELECTIVE, EMERGENCY SURGERY & ANAESTHESIA	5 Hrs.	10 Hrs.	-	10 Hrs.	15 Hrs.	40 Hrs.
OBSTETRICS & GYNAECOLOGY	10 Hrs.	10 Hrs.	50 Hrs.	100 Hrs.	130 Hrs.	300 Hrs.
OPHTHALMOLOGY	5 Hrs.	10 Hrs.	15 Hrs.	70 Hrs.	-	100 Hrs.
OTORHINOLARYNGOLOGY(E.N.T.)	5 Hrs.	10 Hrs.	15 Hrs.	70 Hrs.	-	100 Hrs.
CLINICO-PATHOLOGICAL CONFERENCE	-	-	-	60 Hrs.	-	60 Hrs.

Total 740 Hrs 790 Hrs 1060 Hrs 1265Hrs 940Hrs 4795Hrs

- * **Bioethics will be taught in the Forensic Medicine.**
- ** **Biostatistics will be taught in Community Medicine.**
- *** **Behavioral Sciences will be taught in Psychiatry.**
- **** **Biophysics will be taught in Radiology.**

Distribution of subjects Instructional contents into Theory and Practical learning.

Type of subject	Theory Content	Practical Skills Content
All Basic Sciences	50%	50%
Pre-Clinical Sciences (Pharmacology and Therapeutics, Forensic Medicine, Community Medicine, Pathology)	40%	60%
Clinical Sciences	30%	70%
Internship/House Job	0%	100%

Time Allocation To Curriculum Content

Subject specified competencies	General competencies
80%	20%
5184	1296

Time Allocation To the Study Design(5184)

Instructions	Self Study
80%	20%
4147	1036

Time Allocation to Site of Study(4147)

Institution Based	Community Oriented
80%	20%
3317	829

Distribution of Marks in Evaluation

University Examination	Internal Assessments
80%	20%

Examination of Subject Based MBBS Curriculum

Total 100%

Internal Assessment 20%

University Examination 80%

Internal Assessment Theory	Internal Assessment Practical	University Assessment Theory	University Assessment Practical	Total
10%	10%	40%	40%	100%

Generic Competencies

Total Hours = 1296

Compulsory

- Pakistan Studies
- Islamiyat

Optional

- Excursion Trips
- Field Visits
- Sports
- Philosophy
- Literature
- Culture
- History
- Computer Skills and Information Technologies
- Languages