M.B.B.S. CURRICULUM
Anatomy

AIMS

The goal of undergraduates Course in Anatomy is to produce a medical Student who has requisite knowledge of all aspects of anatomy (Gross, Microscopic, and Development & Clinical Applications)

OBJECTIVES

a) Knowledge

To make the Students understand anatomy to an extent that they are able to know the structure of human body in detail.

The knowledge of this subject both at macro & micro anatomical level will help the students to co relate the other medical subjects in a better way especially after understanding the applied part of anatomy.

b) Skills

At the end of the course the students shall be able to:
1. Identify and locate all the structures of the body and mark.
2. Identify the organs and tissues under the microscope.
3. Understand principles of karyotyping and identify gross congenital anomalies.
4. Understand principles of newer imaging techniques
5. Understand clinical basis of some common clinical procedures i.e. intramuscular and intraveneous injection, lumbar puncture and kidney biopsy etc.

c). Integration

From the integrated teaching of other basic sciences, students shall be able to comprehend and regulation and integration of various organs and system in the body and thus interpret the anatomical basis of disease process.

Syllabus

Theory Syllabus - **Total Duration - 240 hours**

1. Gross Anatomy and Applied Anatomy of

1. Head and Neck	32hrs
2. Brain & Neuroanatomy	25hrs
3. Upper Limb	20hrs
4. Thorax	15hrs
5. Abdomen	32hrs
6. Lower Limb.	20hrs
2. General Embryology	10hrs
3. Systemic Embryology	28hrs
4. Human genetics	8hrs
5. General Anatomy	18hrs
6. Histology	32hrs

Practical syllabus **Total Duration - 480 hrs**

1. Dissection & osteology of

Head and Neck	8weeks
Brain	4weeks
Upper Limb	4weeks
Thorax	2weeks
Abdomen	8weeks
Lower Limb.	4 weeks

2. Microscopic Anatomy (Histology): 6weeks

DETAILED SYLLABUS

1. Gross Anatomy-

A) Head & neck-

- ***Myolog*y-**Triangles of Neck, Deep fascia sternocleidomastoid, Trapezius, digastric, Mylohyoid, Hyoglossus, Facial muscles, muscles of mastication. Laryngeal & pharyngel Musculature,muscles of tongue & palate, extra & intraoccular muscles, Layers of muscles of Back.

- ***Gland***-Thyroid, parathyroid, parotid, submandibular sublingual pituitary, Lacrimal gland.
- ***Viscera***-Scalp, palate, tongue, pharynx, Larynx, orbit, Lacrimal apparatus, eye ball, nasal cavity, paransal air sinuses, palatine tonsil, Ear- Middle ear, part of external and internal ear, Meninges.
- ***Osteology***- Skull , mandible, Hyoid, cervical vertebrae & Fetal skull.
- ***Arthrology***-T.M. Joint, Atlanto axial Joints, Sutural Joints
- ***Angiology***-Subclavian, Carotid system, Ext. & internal, Jugular veins, venous sinuses, Lymphatic drainage of head &neck.
- ***Neurology***-Cranial Nerves, brachial & cervical plexus. Parasymp & symp. Ganglion.

B) Brain & Neuroanatomy-

- Nervous tissue
- Organization of the nervous system
- Spinal cord
- Medulla oblongata
- Pons
- Cerebellum
- Midbrain
- Cerebrum
- Diencephalon
- limbic system
- Reticular system
- Autonomic nervous system
- Meninges
- blood vessels of the nervous system
- Applied Anatomy.

C) Upper limb-

- ***Osteology***- Clavicle, Scapula, Humerus, Radius, Ulna & Hand articulated
- ***Arthrology***-Shoulder girdle, Elbow, Radioulnar & wrist Joints.
  1st carpometacarpal Joint.
- ***Myology***-Muscles with origin,insertion, Nerve supply , And Action,
- ***Angiology***-Axillary, Brachial, Ulnar, Radial & Palmar arches, veins,
- ***Neurology***-Brachial Plexus, Radial, Median, Ulnar, Axillary & Musculocutaneous Nerve.
- ***Miscellaneous***-Mammary gland, clavipectoral fascia, Interosseous membrane. Axilla boundaries.

D) Thorax-

- ***Thoracic wall***-Thoracic inlet, Intercostal space
- ***Mediastinum***-Definition, divisions, boundaries & Contents.
- **Pleura and Lungs**-Pleural reflections, recesses, Morphology of lung, bronchpulmonary segments, root &Hilum.
- ***Pericardium and Heart***-Divisions of pericardium with sinuses. Anatomical position Heart, dimensions Surfaces & borders, interior of all chambers, Vessels of Heart
- ***Osteology***-Sternum, ribs, thoracic vertebra.

E) Abdomen-

- ***Abdominal Wall*** - Anterior and posterior-Rectus_sheath, Inguinal Canal, Thoracolumbar fascia, psoas Major, quadrates lumborum, Thoraco abdominal diaphragm
- ***Peritoneum-***Greater & lesser, omentum, epiploic foramen, Pouch of Douglas, paracolic gutter lesser sac
- ***Abdominal Organs-***Stomach, spleen liver, billiary apparatus, pancreas, small & large Intestine, vermiform appendix, kidneys, ureters, suprarenal glands.
- ***Pelvic Viscera-***Urinary bladder, Urethra, Prostate, Uterus, Ovaries. Uterine tubes, Rectum & Anal anal.
- ***Perineum-***Scrotum, Testes, Epididymis, Spermatic cord, Ischiorectal fossa Pudendal canal,perineal spaces, penis, vagina, urogenital & Pelvic diaphragm, perineal muscles.
- ***Osteology-***Lumbar vertebra, sacrum, bony pelvis
- ***Arthrology-*** ntervertebral Joints, Lumbosacral, sacroiliac, sacrococcygeal & Symphysis pubis.
- ***Angiology-***Portal vein, Inferior vena cava, Abdominal arota.
- ***Neurology-***Lumbar & sacral plexus.

F) Lower limb-

- ***Osteology-***Hip bone, Femur, Patella, Tibia, Fibula, Articulated foot
- ***Arthrology-***Hip Joint, knee joint Ankle Joint, subtalar & talocalcaneo navicular Joints.
- ***Myology-***Compartments with muscle display.
- ***Angiology-***Femoral, popliteal anterior and posterior tibial. Common peroneal, plantar arch,dorsalis pedis artery Superficial and deep veins, perforators. Inginal group of Lymph nodes.
- ***Neurology-***Lumbar & Sacral plexus formation sciatic, femoral, obturator, tibial and common peroneal Nerve.
- ***Miscellaneous-***Femoral Triangle - contents, Sheath, Canal, Ring. iliotibial tract, Saphenous opening,Adductor Canal Arches of foot- Talipus - Equinovarus, Clawing of Toes.

2. General Embryology:

- Gross and microscopic anatomy of male and female genital organs.
- Menstrual cycle.
- Spermatogenesis, spermeogenesis and oogenesis.
- Fertilization of ovum.
- Early embryogenesis.
- Tissues and organ changes in mother during pregnancy.
- Placenta and fetal membranes.
- Mitochondrial DNA

3. Systemic Embryology:

- Development of the individual organs of digestive system, genital system, urinary system,, respiratory system, cardiovascular system. Nervous system, special sensory organs, endocrine glands and mammary gland.

- Developmental abnormalities of individual organs/systems, pathogenesis of the anomalies
- Development of skeletal system, muscular system and derivatives of coelomic cavities.
- Development of face and the pharyngeal arches and the associated congenital anomalies.

4. Human genetics:

- Cytogenetics: chromosomal study- classification, methods to study chromosomes, behavior of chromosomes during cell division, mutations and abnormal chromosomes.
- Molecular genetics
- Eugenetics
- Population genetics
- Clinical genetics
- Karyotyping- autosomal dominance, autosomal recessive, X-linked recessive. X-linked dominance, Y-linked inheritance, polygenic inheritance.
- Prenatal and post natal diagnosis of genetic disorders.
- Gene Therapy
- Genetic counseling

5. General Anatomy:

- Skin
- Superficial fascia
- deep fascia
- cartilage
- Bone
- Joints
- Muscle
- Blood and Lymphatic vessels
- Nervous Tissue.

6. Histology -Study of tissues and organs of the body

a) General histology

- Cell: detailed structure of cell and its components and their functional mechanisms.
- Primary tissues- Epithelium, Connective tissue, Cartilage, bone, Muscle, Circulatory Sytem & lymphatic vessels, Nervous tissue.

b) Systemic histology

- ***Oral Cavity***-Lip, Tongue, Salivary Glands.
- ***Gastrointestinal Tract***-Oesophagus, stomach, duodenum, jejunum , ilium, vermiform Appendix, Colon

- ***Glands***-Liver, Gall bladder, pancreas
- ***Respiratory System***-Epiglottis, Trachea, Lung
- ***Urinary System***-Kidney, Ureter, Urinary Bladder.
- ***Male reproductive system***-Testis, epididymis, vas deferens, Prostate, Penis.
- ***Female Reproductive System***-Ovary, Uterine tube, Uterus, mammary gland, vagina, umbilical cord
- ***Endocrine system***-Pituitary, Thyroid, Parathyroid, Adrenal
- ***Lymphatic system***- Lymph nodes,Spleen,Thymus and tonsil
- ***Nervous system***- Spinal Cord, Cerebellum,Cerebrumand special senses.
- ***Integumentary system***-Skin and its appendages

PRACTICAL SYLLABUS

1. Dissection & Osteology of –

a)Head and Neck, Upper Limb, Thorax, Abdomen and Lower Limb.

b) Neuro Anatomy

- Gross specimen of full brain, meninges, spinal cord, prosected specimens to demonstrate visual system,auditory and vesibular pathways and major functional areas.
- Stained sections of brain and spinal cord at various levels to demonstrate cranial nerve nuclei, ascending and descending tracts, thalamic nuclei and important functional areas.

2. Developmental Anatomy-

Models to demonstrate various stages of early foetus and different organ development.

3. Microscopic Anatomy (Histology):

- Use of microscope and study of common objects.
- Study of Tissues.
- Circulatory system- Heart, Arteries and Veins.
- Lymphatic system- Lymph Node, Spleen, Thyroid and Tonsil.
- Respiratory System- Epiglottis, trachea and lungs.
- Digestive System-Tongue, Salivary Glands, Esophagus, Stomach, Small and large intestine, vermiform appendix, pancreas, liver, gall bladder.
- Excretory system-Kidney, Ureter and Urinary bladder.
- Skin
- Male and Female reproductive system- Testis, Epididymis, Vas deferens, Urethra, prostate, Penis, Ovary, Fallopian Tube, Uterus, Vagina and Mammary glands.
- Nervous system- spinal cord, cerebrum and cerebellum and special senses.
- Endocrine Glands-Thyroid, Parathyroid, Supra renal and pituitary.

4. Surface Anatomy- In cadavers, in the living.

5. Radiological Anatomy, Cross sectional anatomy and Sonography.

4. Teaching Programme

Lectures- 7 hrs/ Week

Practicals- 12 hrs/ Week

Tutorials/ Seminars - 2 hr/Week(during practical hours)

LIST OF TOPICS FOR INTEGRATION

A) HORIZONTAL INTEGRATION

1. Anatomy And Functioning Of Cerebrum: Physiology department

2. Motor Tracts: Physiology department

3. Kidney: Physiology & Biochemistry department

4. Liver: Biochemistry department

B) VERTICAL INTEGRATION

1. Endocrine system :ObS & Gyane and Medicine department
2. Clinical Disorders of CNS: Neurology and Medicine department
3. Nerve plexus: Nerve blocks in anesthesia department
4. Abdomen: Radiodiagnosis department
5. Types of pelvis: obstetrics department

BOOKS FOR FURTHER REFERENCE

1. Gray's Anatomy for students
2. Tissues of the body –Le Gross Clarke
3. Text Book of Human Anatomy, Vol of 3 – A. K Datta
4. Anatomy –Regional and applied- R.J.Last
5. Synopsis of Surgical Anatomy by Mcgregor
6. Human Embryology by Hamilton Boyd & Mossman
7. Text Book of Histology – Wheater`s
8. Neuroanatomy- Ranson & Clark
9. Genetics-Thompson & Thompson
10. Gross Sectional Human Anatomy –Dean
11. Text Book of Histology -GP Pal
12. Medical dictionary

BOOKS RECOMMENDED

1. Cunningham's Manual of practical Anatomy- Vol-1,2,3
2. Human Anatomy by Chaurasia, 4th Edition,Vol. 1- 3 – B .D.Chaurasia
3. Clinical Anatomy for Medical Student, 6th Edition- R.S. Snell
4. Text Book of Human Embryology - Inderbir Singh.
5. Text Book of Neuroanatomy -Vishram Singh
6. Text Book of General Anatomy - S.Rawlani & S. Rawlani
7. Text Book of Histology - Inderbir Singh
8. Atlas of Human Histology by Di-Fiore
9. Osteology- Inderbir Singh
10. Text Book of Human Genetics- Gangane S.D.
11. Atlas of Surface & Radiological anatomy-A Halim.

FORMAT OF THEORY QUESTION PAPER:

1. Each question paper will consist of six questions.
2. Question may be divided in the form of short notes, enumerations and diagrams, marks for each part indicated separately.
3. Question on applied Anatomy should be included in each paper.

EVALUATION:

THEORY: **TOTAL Marks** – 100

Two papers (A & B) of 50 marks each and of 3 hrs duration.
(Applied Antomy of 10 marks in each paper.)

SYLLABUS FOR EACH PAPER

THEORY PAPER- A M.Marks: 50

- Head and Neck 30%
- Brain and Neuroanatomy 20%
- Upper Limb. 20%
- Basic Anatomy 10%
- Special Embryology, 10%
- Special Histology of the related parts. 10%

THEORY PAPER- B **M. Marks: 50**

- Abdomen 30%
- Thorax 20%
- Lower Limb. 20%
- Genetics. 10%
- General & Special Embryology, 10%
- Special Histology of the related parts. 10%

Each paper has two parts

Part I – 25 Marks

Part II – 25 Marks

Each part contains three questions which may be full or divided into smaller parts

- Theory (Paper –A & B) 100 Marks
- Grand viva 20 marks
- Internal Assessment: 20marks
- Total Theory 140 Marks

COMPONENTS OF PRACTICAL EXAMINATION

Total Marks-60

Marks

- Dissection Viva - 10
- Histology - 10
- Embryology - 5
- Radiology - 5
- Surface Marking - 5
- Spotting - 5
- Internal Assessment - 20
- Viva voce - 20 (to be included in theory)

MODEL QUESTION PAPER M.B.B.S. [1st Prof.]

Anatomy-A

Max Time-3 hrs **MM: 50**

Note: Attempt **ALL** Questions. Illustrate your answers with suitable DIAGRAMS Use **SEPARATE** answer sheet for each part.

PART-1

1) **Describe parotid gland. Under the following headings-**
   a) Gross features [4]
   b) Nerve Supply [3]
   c) Applied anatomy [2]
2) **Write short notes on:**
   a) Ossification of Bone. [4]
   b) Development of Tongue. [4]

3) **Draw well labeled diagrams of:**
   a) Histology of THYROID GLAND. [2]
   b) Transverse section of PONS at Upper Level. [2]
   c) Arterial anastomoses around Scapula. [2]
   d) Cutaneous innervations of face. [2]

PART-2

4. Describe PALMAR SPACES' under the following headings:

a) Relations [4]
b) Boundaries [3]
c) Applied anatomy [2]

5. Discuss in brief Applied Anatomy of:

a) Facial nerve [4]
b) Lateral spinothalamic tract [4]

6. Enumerate the following:

a) Write any 4 salient features of microanatomy of bone [2]
b) Derivatives of 3rd Pharyngeal arch. [2]
c) Components of Inferior Cerebellar peduncle. [2]
d) Branches of basilar artery. [2]

MODEL QUESTION PAPER M.B.B.S. [1st Prof.]

Anatomy-B

Max Time-3 hrs **MM: 50**

Note: Attempt **ALL** Questions. Illustrate your answers with suitable DIAGRAMS Use **SEPARATE** answer sheet for each part.

PART-1

1. **Describe stomach. Under the following headings-**
   - **a.** Gross features [4]
   - **b.** Blood supply [3]
   - **c.** Lymphatic drainage [2]
2. **Write short notes on:**
   - **a.** Karyotyping [4]
   - **b.** Development of interatrial septum. [4]

3. **Draw well labeled diagrams of:**
   - a. Anterior relations of RIGHT KIDNEY [2]
   - b. Histology of LIVER [2]
   - c. Microanatomy of OVARY [2]
   - d. TS at the level of 4^{th} thoracic vertebrae [2]

PART-2

4. **Describe KNEE JOINT under the following headings:**
   - **a.** Articulation and type [4]
   - **b.** Ligaments [3]
   - **c.** Applied anatomy [2]
5. **Discuss in brief Applied Anatomy of:**
   - **a.** Appendix [4]
   - **b.** Middle lobe syndrome [4]
6. **Enumerate the following:**
   - **a.** Branches of internal thoracic artery [2]
   - **b.** Tributaries of coronary sinus. [2]
   - **c.** Hamstring muscles and their nerve supply . [2]
   - **d.** Branches of dorsalis pedis artery [2]

PHYSIOLOGY

AIMS

The broad goal of the teaching of undergraduate students in Physiology aims at providing the student comprehensive knowledge of the normal functions of the organ systems of the body to facilitate an understanding of the physiological basis of health and disease.

OBJECTIVES

a) KNOWLEDGE

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

1. Explain the normal functioning of all the organ systems and their interactions for well coordinated total body function.
2. Assess the relative contribution of each organ system to the maintenance of the milieu interior.
3. Elucidate the physiological aspects of normal growth and development.
4. Describe the physiological response and adaptations to environmental stresses.
5. List the physiological principles underlying pathogenesis and treatment of disease.

b) SKILLS

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

1. Conduct experiments designed for study of physiological phenomena.
2. Interpret experimental/investigative data.
3. Distinguish between normal and abnormal data derived as a result of tests which he/she has performed and observed in the laboratory.

c) INTEGRATION

At the end of the integrated teaching the student should acquire an integrated knowledge of organ structure and function and its regulatory mechanisms.

THEORY SYLLABUS: **DURATION: Total 220 hours**

1.	GENERAL PHYSIOLOGY	12
2.	BODY FLUIDS AND BLOOD	22
3.	NERVE AND MUSCLE	16
4.	GIT AND NUTRITION	20
5.	EXCRETORY SYSTEM	15
6.	SKIN AND BODY TEMPERATURE	05
7.	RESPIRATORY SYSTEM	20
8.	CARDIOVASCULAR SYSTEM	28
9.	ENDOCRINE GLANDS	26
10.	REPRODUCTIVE SYSTEM	12
11.	NERVOUS SYSTEM	32
12.	SPECIAL SENSES:	12
	TOTAL	220 hours

PRACTICAL **DURATION: 260 hours**

TUTORIAL/SEMINAR **DURATION: 80 hours**

DETAILED SYLLABUS (THEORY)

1. GENERAL PHYSIOLOGY 12 hours

- Definition of Physiology
- Structure and function of cell membrane and organelles
- Concept of cell, tissue, organs and systems
- Cellular inclusions and their functions
- Homeostasis
- Cell membrane: Detailed structure and functions
- Transport across membranes
- Cell Receptors: Surface and Intracellular
- Intercellular communications

2. BODY FLUIDS AND BLOOD 22 hours

- Body fluid compartments: Composition and principals of estimation and its applied physiology
- Plasma proteins types and functions
- Cellular elements of blood, their formation and regulation (erythropoiesis and leucopoiesis)
- Haemoglobin synthesis, functions , types and fate; Jaundice
- Anaemias: Classification
- Haemostatic mechanism: Intrinsic and extrinsic mechanism of coagulation. Anticoagulants; Platelets and their functions
- Blood groups: ABO and Rh system. Blood transfusion and Rh incompatibility
- Leucocytes, their functions and basic mechanisms of immunity with respect to lymphocytes: B and T lymphocytes
- Humoral and cell mediated immunity
- Lymph: Composition, formation and function.

3. NERVE AND MUSCLE 16 hours

- Nerve cells: Neurons and Glial cells
- Structure and function of neurons
- Types of neurons
- Neuronal transmission: Resting membrane potential and Action potential; Properties
- Mixed nerve, Compound action potential
- Nerve degeneration: Wallarian degeneration and regeneration
- Chronaxie and Rheoase
- Skeletal muscle: Structure- macro, micro and electron microscopic. Mechanism of muscle contraction and its molecular basis: Excitation contraction coupling
- Neuromuscular Transmission: Receptors, blockers and its applied physiology,
- Neuromuscular disorders: Myasthenia Gravis, Lambert-Eaton syndrome
- Denervation of skeletal muscle
- Electromyography (EMG)
- Smooth and Cardiac muscle. Structure and their properties

4. GIT AND NUTRITION 20 hours

- General organization of GIT and its innervations
- Mastication and digestion in mouth
- Composition and regulation of secretions of GIT - salivary, gastric, intestinal.
- Pancreatic and bile secretion , composition, function and regulation
- GIT movements: Types and their regulation including deglutition and defecation
- Physiological basis of vomiting, diarrhea, constipation, achalasia, peptic ulcer
- Liver and gall bladder: Function and physiological importance
- GIT hormones: Site of production and actions
- Nutrition: Balanced diet, diet in pregnancy and lactation, Vitamins A, D, E and water soluble; Importance of dietary fibre.

5. EXCRETORY SYSTEM 15 hours

- Physiological anatomy of kidney and urinary tract
- Structure and function of different parts of nephron; Juxta-glomerular apparatus, rennin angiotensin system
- Mechanism of urine formation
- Role of kidney in water and electrolyte balance and acidification of urine
- Renal blood flow, its regulation and autoregulation
- Glomerular filtration rate (GFR): Measurement and regulation
- Urinary bladder: Innervation, micturition and cystometrogram
- Artificial kidney, dialysis and renal failure
- Renal function tests

6. SKIN AND BODY TEMPERATURE 5 hours

- Skin structure, functions of epidermis and dermis and role of skin in temperature regulation
- Heat gain and loss mechanism
- Regulation of internal body temperature: Neural and aminergic regulation of internal body temperature, Hyperthermia and hypothermia.

7. RESPIRATORY SYSTEM 20 hours

- Functional anatomy of Respiratory system
- Mechanism of normal respiration
- Lung compliance, work of breathing, surfactant, alveolar ventilation and ventilation perfusion ratio
- Lung volumes and capacities, dead space and its measurement
- Oxygen and carbon dioxide transport. Diffusion capacity
- Pulmonary function tests
- Regulation of respiration: Neural, chemical and non chemical
- Respiratory acidosis and alkalosis. Pulmonary blood flow
- Hypoxia, cyanosis, asphyxia and dyspnoea
- Respiratory adjustments during exercise at high altitude and hyperbaric conditions, Decompression sickness.
- Pathophysiology of obstructive and restrictive disorders. Hyaline membrane disease. Pulmonary oedema, hyperbaric oxygen therapy and toxicity
- Non-respiratory function of respiratory system.

8. CARDIOVASCULAR SYSTEM 28 hours

- Functional anatomy of heart
- Properties of cardiac muscle
- Cardiac cycle. Mechanical and electrical changes during cardiac cycle
- Heart sounds
- Innervations of heart and normal ECG, variation in ischaemia and heart block. Other cardiac abnormalities
- Cardiac output: Measurements in man and animals. Physiological variations. Regulatory mechanisms of heart rate, cardiac output and blood pressure
- Pathophysiology of hypertension , shock and cardiac failure
- Regional circulation: Coronary, cerebral, cutaneous, pulmonary and foetal circulation
- Cardiovascular changes during muscular exercise, postural variations, hypovolemia and arrhythmias.
- Echocardiography, colour doppler
- Angioplasty and stents

9. ENDOCRINE GLANDS 26 hours

- Definition of endocrine glands with general principles of mechanism of action, regulation of secretion
- Anterior, posterior pituitary hormones with clinical disorders
- Thyroid, parathyroid with calcium homeostasis and clinical disorders
- Adrenal cortex, adrenal medulla.
- Endocrine pancreas, diabetes mellitus, endocrine functions of other organs and local hormones with clinical abnormalities
- Stress and hormones
- Physiology of growth

10. REPRODUCTIVE SYSTEM 12 hours

- General physiology of sex determination and differentiation and their clinical disorders

MALE REPRODUCTIVE SYSTEM:

- Physiological anatomy
- Spermatogenesis and its regulation.
- Endocrine functions of testis
- Puberty
- Physiology of coitus
- Composition of semen, male infertility

FEMALE REPRODUCTIVE SYSTEM

- Physiological anatomy
- Menstrual cycle – its basis and regulation.
- Fertilization and implantation
- Pregnancy – Endocrinal, systemic and metabolic changes
- Parturition
- Lactation

CONTRACEPTION

- Temporary and Permanent methods

11. NERVOUS SYSTEM 32 hours

- Organization of central, peripheral and autonomic nervous system
- Synaptic transmission
- Reflexes: Monosynaptic (stretch reflex) and polysynaptic
- Motor and sensory systems and their lesions, clinical lesions and experimental sections at spinal cord, brainstem, cortex and subcortical levels
- Physiology of basal ganglia and cerebellum. Maintenance of muscle tone, posture and equilibrium
- Physiology of thalamus, hypothalamus, limbic system and cerebral cortex
- Reticular formation, EEG, sleep and physiological changes in EEG pattern during wakefulness and sleep
- Physiology of speech and its disorders, learning and memory
- Composition and function of CSF, blood brain barrier, central neurotransmitters
- Physiological basis of CNS disorders like Parkinsonism, Alzheimer's disease,
- Evoked potential: BERA, VEP, SEP
- Brain mapping

12. SPECIAL SENSES: 12 hours

EYE

- Physiological anatomy, image formation on retina, errors of refraction, mechanism of accommodation, light and dark adaptation, papillary reflexes, optic pathway and lesions.
- Cataract and intraocular lens implant
- Intraocular tension and glaucoma
- Colour vision
- Structure and function of rods and cones with electrical changes, electroretinogram, neurophysiology of vision.

EAR

- Functional anatomy of ear
- Functions of tympanic membrane, middle ear and cochlea for auditory conduction, auditory receptors and pathways, deafness and its causes.
- Endolymphatic potential and cochlear microphonics
- Theories of hearing and audiometry.

- Functions, connections and lesions of vestibular apparatus, nystagmus,
- Barany's test

TASTE AND SMELL

- Receptors and pathways
- Cortical and limbic area associated with taste and smell
- Disorders of taste and smell

DETAILED SYLLABUS (PRACTICALS)

The following list of experiments and demonstrations is not exhaustive additional experiments can be included as and when feasible and required.

1. EXPERIMENTS ON HAEMATOLOGY

MUST KNOW:

- Principles of microscopy and method of using microscope
- General examination of blood under microscope; enumeration of red blood cells
- Estimation of haemoglobin; laboratory classification of anaemias and determination of absolute indices like MCH, MCHC, MCV, colour index
- Blood grouping
- Bleeding and clotting time
- Enumeration of white blood cells
- Preparation and staining of blood films; identification of blood cells in a stained film
- Differential leucocyte count;
- Eosinophil count
- Fragility of red blood cell
- Erythrocyte sedimentation rate; haematocrit value

DESIRABLE TO KNOW:

- Methods of blood collection
- Arneth count
- Enumeration of reticulocyte and platelets (demonstration)
- Viscosity of blood (demonstration)
- Blood volume estimation (demonstration): bone marrow smear (demonstration).

- Specific gravity of blood
- Study of cell counter report

2. NEURO-MUSCULAR PHYSIOLOGY

DESIRABLE TO KNOW:

- Study of laboratory appliances in experimental-physiology
- Dissection of frogs gastrocnemius - sciatic muscle nerve preparation
- Simple muscle curve
- Effects of increasing strength of stimuli
- Effects of temperature
- Genesis of fatigue
- Effects of two successive stimuli
- Genesis of tetanus
- Effects of after load and free load on muscle contraction and calculation of work done
- Velocity of nerve impulse in sciatic nerve of the frog
- Isometric contraction and determination of resting length.

3. SMOOTH MUSCLE EXPERIMENTS

DESIRABLE TO KNOW:

- Recording of contraction of frog's rectum
- Recording of movements of small intestine (rabbit) and effects of ions, drugs, temperature.

4. HUMAN NEURO-MUSCULAR PHYSIOLOGY

MUST KNOW:

- Mosso's ergography; effects of prolonged voluntary activity, rest motivation, fatigue on human muscle contractions and calculation of work done
- Bicycle ergometry and treadmill
- Mechanical efficiency of human body

DESIRABLE TO KNOW:

- Demonstration of electromyography and velocity of nerve impulse

5. EXPERIMENTS ON METABOLISM, BODY TEMPERATURE AND KIDNEY

MUST KNOW:

- Recording of body temperature and effects of exercise on body temperature.

DESIRABLE TO KNOW:

- Basal metabolic rate in humans, water excretion test.

6. EXPERIMENTS ON ENDOCRINES AND REPRODUCTIVE SYSTEM

DESIRABLE TO KNOW:

- Pregnancy diagnostic tests; effects of adrenaline and acetylcholine on uterine muscle
- Examination of semen - sperm count, sperm motility (demonstration)
- Demonstration of slides showing the proliferative and secretory changes in the endometrium.

7. CARDIOVASCULAR SYSTEM

MUST KNOW:

- Clinical examination of cardiovascular system
- Sphygmomanometry and effect of exercise on blood pressure
- Effect of posture on B.P.
- Radial pulse
- Cold-pressor test
- ECG

DESIRABLE TO KNOW:

- Normal cardiogram of frog
- Effect of warmth and cold on cardiogram
- Extra systole and compensatory pause
- Stannius ligatures; properties of cardiac muscle
- Effect of acetylcholine, adrenaline, nicotine and atropine on frog heart

(DEMONSTRATIONS):

- Echocardiography
- Phonocardiogram;
- Effect of passive tilt on B.P.
- Effect of exercise on heme-cardio-respiratory system
- Cardiac function tests
- Perfusion of blood vessels of frog

- Perfusion of mammalian heart and effect of drugs on it; perfusion of frog's heart and effect of ions on it

8. RESPIRATORY SYSTEM

MUST KNOW:

- Pulmonary function tests - Spirometry
- Clinical examinations of respiratory system
- Stethography
- Cardiopulmonary resuscitation
- Effect of exercise on respiratory parameters

DESIRABLE TO KNOW:

(DEMONSTRATIONS):

- PEFR: Wright’s Peak Flow Meter
- Valsalva and Muller's maneuver
- Collection and analysis of respiratory gases
- Uses of Douglas bag for measuring M.V.V.

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9. NERVOUS SYSTEM

MUST KNOW:

- Examination of motor functions
- Sensory functions
- Cranial nerves examination
- Examination of reflexes of normal subject.

DESIRABLE TO KNOW:

(DEMONSTRATIONS):

- E.E.G.
- E.M.G.
- nerve conduction studies; sensory and motor
- Examination of autonomic functions.
- Sleep lab.

10. SPECIAL SENSES

MUST KNOW:

- To study the model of eye
- Perimetry
- Acuity of vision - distant and near
- Colour vision
- Examination of papillary reflexes
- Accommodation
- Tests on smell and taste
- Tuning fork tests

DESIRABLE TO KNOW:

(DEMONSTRATIONS):

- Ophthalmoscopy and retinoscopy
- Audiometry
- Brainstem audiotory evoked potentials
- Visual evoked potentials

LIST OF TOPICS FOR INTEGRATION

A) HORIZONTAL INTEGRATION
1. Anatomy and functions of cerebrum and cerebellum: Anatomy department
2. Motor system: Anatomy department
3. Renal function: Anatomy and Biochemistry department
4. Hepatic functions: Anatomy and Biochemistry department

B) VERTICAL INTEGRATION
1. Endocrine glands : Biochemistry and Obstetrics & Gynaecology
2. Family Planning & Welfare : Anatomy and Obstetrics & Gynaecology
3. Echocardiography : Cardiology
4. Cardiac Physiology and hypertension: Medicine
5. Clinical Disorders of CNS : Neurology and Medicine
6. Intraocular tension and Retinoscopy : Ophthalmology
7. Audiometry and Vestibular tests : Oto-rhino-laryngology (ENT)

BOOKS RECOMMENDED

THEORY

1. Textbook of Medical Physiology by Guyton and Hall - Elsevier
2. Review of Medical Physiology by Ganong – Tata McGraw Hill
3. Textbook of Physiology (Vol 1 & 2) by Dr. A K Jain – Arya Publications
4. Understanding medical Physiology by R L Bijlani – Jaypee Publishers
5. Essentials of Medical Physiology by Indu Khurana - Elsevier
6. Best and Taylor Medical Physiology – Lippincott

PRACTICAL

1. A textbook of Practical Physiology by Dr. CL Ghai – Jaypee Publishers
2. Manual of Practical Physiology by Dr. A K Jain - Arya Publications

DISTRIBUTION OF MARKS

THEORY

Two papers of 50 marks each, and of 3 hours duration

(One applied question of 10 marks in each paper)

PAPER A:

- General Physiology and Biophysics = 10% (5)
- Nerve and Muscle Physiology = 16% (8)
- Nervous System = 30% (15)
- Special Senses = 10% (5)
- Endocrines = 24% (12)
- Reproduction including Growth and senility = 10% (5)

PAPER-B: ·

- Body fluids and Blood = 18% (9)
- Cardiovascular system = 30% (15)
- Digestion & Nutrition = 16% (8)
- Respiration = 20% (10)
- Kidney (Excretion) = 10% (5)
- Skin and body temperature = 06% (3)

Theory Paper = 100

Internal Assessment Theory	=	20
Total of Theory + Viva Voce + Internal Assessment	=	140

PRACTICAL

• Haematology experiments	=	15
• Human experiments	=	15
• Amphibian experiments	=	10
Total Practical	=	40
Internal Assessment Practical	=	20
Viva Voce (To be included in Theory marks)	=	20
Total of Practical + Internal Assessment	=	60
GRAND TOTAL	=	200

SPECIAL NOTE:

- There shall be four examiners (Two Internals and Two Externals).
- Oral and Practical Examination shall be conducted by all the four examiners.

MODEL QUESTION PAPER

PAPER – A

All questions are compulsory TIME: 3 hours

i. Answer should be to the point M.M. 50
ii. Use separate answer books for Part – I and Part II

PART - I

1. Describe cerebellum under following subheadings
    a. Connections 3
    b. Functions 3
    c. Disorders 3
2. Write notes on the following
    a. Errors of refraction 4
    b. Mechanism of skeletal muscle contraction 4
3. Write short notes on
    a. Facilitated diffusion 2
    b. Oxytocin 2
    c. Generator potential 2
    d. Acromegaly 2

PART - II

4. Describe thryoid hormone under following subheadings
    a. Secretion 3
    b. Actions 3
    c. Thyrotoxicosis 3
5. Write notes on the following
    a. Stretch reflex 4
    b. Parkinsonism 4
6. Write short notes on
    a. Acoustic reflex 2
    b. All or none law 2
    c. Spermatogenesis 2
    d. HCG 2

MODEL QUESTION PAPER

PAPER – B

All questions are compulsory TIME: 3 hours

iii. Answer should be to the point M.M. 50
iv. Use separate answer books for Part – I and Part II

PART - I

1. Describe the mechanics of respiration under following subheadings
    a. Inspiratory and expiratory muscles 3
    b. Rib and diaphragmatic movements 3
    c. Pressure volume changes 3
2. Write notes on the following with the help of diagram
    a. Juxtaglomerular apparatus 4
    b. Normal ECG 4
3. Write short notes on
    a. T-lymphocytes 2
    b. Carotid bodies 2
    c. Cystometrogram 2
    d. Functions of saliva 2

PART - II

4. Describe the blood pressure under following subheadings
    a. Regulation by baroreceptors 3
    b. Factors affecting it 3
    c. Hypertension 3
5. Write notes on
    a. Digestion and absorption of fats 4
    b. Regulation of body temperature 4
6. Write notes on
    a. Erythroblastosis foetalis 2
    b. Structure of neutrophil 2
    c. Immunoglobulins 2
    d. Functions of bile 2

BIOCHEMISTRY

AIM

The goal of undergraduates Course in Biochemistry is to produce a medical Student who has requisite knowledge of all aspects of Biochemistry (chemistry and metabolism, molecular biology, enzymology & Clinical Applications)

OBJECTIVES

Knowledge:

At the end of the course the student will be able to -

1) Describe the molecular and functional organization of a cell and list its subcellular components.

2) Delineate structure , function and interrelationship of biomolecules and consequences of deviation from the normal.

3) Summarize the fundamental aspects of enzymology and clinical application wherein regulation of enzyme activity is altered

4) Describe digestion and assimilation of nutrients and consequently or malnutrition consequences of malnutrition.

5) Integrate the various aspects of metabolism and their regulatory pathways.

6) Explain the biochemical basis of inherited disorders with their associated sequelae.

7) Describe mechanisms involved in maintainance of body fluids and p H homeostasis.

8) Outline the molecular mechanisms of gene expression and regulations of the principles of genetic engineering and their application in medicine

9) Summerise molecular concept of body defences and their applicaton in medicine

10) Outline the biochemical basis of environmental health hazards, biochemical basis of cancer and carcinogenesis

11) Familiarize with the principles of various conventional and specialized laboratory investigations and interpretation of a given data.

12) Suggest experiments to support theoretical concepts and clinical diagnosis.

Skills

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

1. make use of conventional techniques/ instruments to perform biochemical analysis relevant to clinical screening and diagnosis
2. analyze and interpret investigative data
3. demonstrate the skills of solving clinical problems and decision making.

DISTRIBUTION OF COURSE

PAPER A:	**TEACHING (HRS)**	**TUTORIAL (HRS)**	**Marks (approx.)**
Chemistry and metabolism of carbohydrates	18	12	14
Chemistry and metabolism of lipids	14	10	12
Enzymes and coenzymes	08	05	07
Minerals	06	04	05
Biological Oxidation	05	03	04
Signal Transduction	03	02	03
Acid base Balance, water and electrolyte balance	05	03	04
Detoxification	01	01	01
TOTAL TEACHING HRS./MARKS =	**60**	**40**	**50**
PAPER B:			
Molecular Biology	12	08	10
Chemistry and metabolism of Amino acids and proteins	18	12	14
Chemistry and metabolism of Nucleic acids	08	05	07
Vitamins	12	09	10
Organ function tests	05	03	04
Membrane Transport	04	02	03
Radioisotopes	01	01	02
TOTAL TEACHING HRS. /MARKS =	**60**	**40**	**50**
Grand Total =	**120**	**80**	**100**

TUTORIALS : 80hrs
PRACTICALS:80 hrs.
Total hrs: 280

DISTRIBUTION OF MARKS

THEORY:	**Paper A**	**= 50**
	Paper B	**= 50**
	Viva Voce	**= 20**
	Internal Assessment	**= 20**
	Total	**=140**

PRACTICAL:	**Practicals**	**= 40**
	Internal Assessment	**= 20**
	Total	**= 60**

GRAND TOTAL = 200

Theory Syllabus:	**120 hrs**
Chemistry of carbohydrates	06
Chemistry of lipids	06
Chemistry of amino acids and proteins	08
Chemistry of nucleic acids	04
Enzymes and coenzymes	08
Vitamins	12
Biological Oxidation	05
Membrane transport	04
Signal Transduction	03
Carbohydrate metabolism	12
Lipid metabolism	08
Protein and amino acids metabolism	10
Nucleic acid metabolism	04
Molecular Biology	12
Minerals	06
Acid base Balance, water and electrolyte balance	05
Organ function tests	05
Detoxification	01
Radioisotopes	01

DETAILED SYLLABUS

01. CHEMISTRY OF CARBOHYDRATES: (6 Hrs)

- Mono-, di- and poly-saccharides chemistry;
- Isomerism in carbohydrates (stereo-/spatial-isomerism, anomerism, epimerism, optical-isomerism and mutarotation);
- Sugar derivatives, e.g., amino-sugars, sugar alcohols, acids and deoxy-sugars;
- Concept of proteoglycans, glycoproteins, glycolipids, glycosaminglycans and glycosides (without any structures).

02. CHEMISTRY OF LIPIDS: (6 Hrs)

- Classification and biomedical importance of lipids;
- Functions of saturated-, un-saturated- and essential fatty acids;
- Triacylglycerols, phospholipids;
- Glycolipids, sulfolipids and lipoproteins;
- Structure and functions of cholesterol and its derivatives;
- Prostaglandins, their derivatives (prostacyclins, leukotrienes and thromboxanes) and functions.

03. CHEMISTRY OF AMINO-ACIDS AND PROTEINS: (8 Hrs)

- Classification and structure of α-amino acids found in proteins;
- properties of Amino Acid, , zwitter-ions, pKa and iso-electric pH;
- Essential amino acids and peptides of biological importance, e.g., glutathione, insulin;
- Protein structure and classification of proteins;
- Functions of plasma proteins;
- Protein structure-function interrelationship with emphasis on hemoglobin and myoglobin;
- Structure, types and functions of Immunoglobulins.

04. CHEMISTRY OF NUCLEIC ACIDS: (4 Hrs)

- Basic concepts of nucleosides, Nucleotides, their di- and tri-phosphate derivatives;
- Involvement of purines and pyrimidines in Co-enzymes (e.g., FMN, FAD, NAD^+, $NADP^+$, Co-Enzyme A, active sulfate, etc.);
- Structure and Types of DNA (A, B and Z);
- RNA and its types (sn-RNA, hn-RNA, m-RNA, r-RNA and t-RNA and Ribozymes).

05. ENZYMES & COENZYMES: (8 Hrs)

- Definition and types of bio-catalysts;
- classification of enzymes;
- co-enzymes, holo-enzymes, apo-enzymes, iso-enzymes and metallo-enzymes;
- catalytic site and mechanism of enzyme action;
- Factors influencing enzyme activity, e.g., pH, temperature, Coenzyme and Substrate concentration;
- concept of Km and K_i: enzyme inhibition and their types (no derivations of equations);
- Regulation of enzyme activity (Induction, zymogenicity, product-/feed-back inhibition, allosteric and post-translational modifications (e.g., phosphorylation/de-phosphorylation, γ-carboxylation of Glutamate residue, etc.));
- Use of enzymes in therapeutics, diagnosis of diseases and diagnostic reagent-kits.

06. VITAMINS: (12 Hrs)

- Water-soluble vitamins;
- their physiological and biochemical roles as coenzymes, e.g., FMN, FAD, NAD^+, $NADP^+$, CoA-SH, Lipoic acid, TPP, PALPO, Folic acid, Biotin, B_{12} and ascorbic acid (only general concepts and involvement in biochemical reactions without structures);
- Clinical aspects including deficiency symptoms;
- Fat-soluble vitamins, A, D, E and K;
- their physiological and biochemical roles and clinical aspects including hyper-vitaminosis.

07. BIOLOGICAL OXIDATION: (4Hrs)

- Electron Transport Chain and oxidative phosphorylation;
- un-couplers and inhibitors of ETC;
- ATP-synthase complex;
- high-energy compounds and substrate-level phosphorylation.

08. MEMBRANE TRANSPORT: (4 Hrs)

- **T**ransport: Passive, facilitated and active;
- Uni-port, anti-port and sym-port systems;
- Glucose transporters;
- Mitochondrial membrane transporters (ATP/ADP; α–KG/ aspartate/pyruvate/Citrate, etc.);
- Shuttle pathways (aspartate-malate, α-glycero-phosphate and carnitine:CoA-SH).

09. SIGNAL TRANSDUCTION: (4Hrs)

- Signaling by Insulin and Glucagon: Introduction to G-Proteins and Tyrosine kinases;
- Signal-mediated generation of second messengers (Ca^{++}, c-AMP, c-GMP, DAG, IP_3 etc.);
- Introduction to calmodulin, GPI anchors, protein kinases and phosphoprotein-phosphatases.

10. CARBOHYDRATE METABOLISM: (12 Hrs)

- Digestion and absorption of dietary carbohydrates;
- Inter-conversion of sugars;
- Glycolysis;
- TCA cycle and bio-energetics;
- HMP-Shunt;
- uronic acid pathway;
- Glycogenesis, glycogenolysis;
- Lactose biosynthesis;
- Gluconeogenesis;
- Regulation of blood glucose;
- Fructose and galactose metabolism and related diseases;
- Glycogen storage diseases;
- Diabetes mellitus, GTT and latent diabetes;
- Mechanism of action of oral hypo-glycemic agents.

11. LIPID METABOLISM: (8 Hrs)

- Digestion, absorption and transport of lipids;
- Fatty acids biosynthesis, elongation;
- Oxidation of fatty acids;
- Ketosis;
- Lipid-storage diseases (lipidosis);
- Lipid peroxidation and role of biological anti-oxidants;
- Metabolism of eicosanoids and generation of hormones;
- Importance of liposomes;
- Cholesterol biogenesis, its regulationand the role of Statins in therapeutics;
- Catabolism of cholesterol;
- Fatty liver and Lipotropic agents;
- Concept of apo-proteins/docking proteins and lipoproteins involved in the transport and organ-specific uptake/delivery of lipids;
- Hyperlipidemias and atherosclerosis.

12. PROTEIN AND AMINO ACIDS METABOLISM: (10 Hrs)

- Digestion of proteins and Absorption and Transport of amino acids;
- General reactions of amino acids, e.g., oxidative- and non-oxidative deamination, transamination, transamidation, decarboxylation;
- Formation of NH_3; Urea Cycle and associated genetic aberrations;
- Catabolism of amino acids;
- Formation of special products from amino acids, such as, hormones (5-HT, GABA, T_3, T_4, adrenalin, nor-adrenalin, etc.);
- Inborn errors of metabolism of glycine, phenyl-alanine, tyrosine, tryptophan, methionine, cysteine and histidine;
- Metabolism of branched chain and Sulfur-containing Amino Acid;
- Metabolism of Creatine.

13. NUCLEIC ACID METABOLISM: (4 Hrs)

- Biosynthesis and regulation of purine and pyrimidine nucleotides;
- Salvage pathway and uric acid formation. Gout.

14. MOLECULAR BIOLOGY: (12 Hrs)

- DNA replication;
- Genetic Code, Transcription and Translation;
- Definition and types of mutations (Point-, Frameshift- and Missense/silent-mutations);
- Concept of Recombinant DNA Technology;
- Gene regulation (e.g., Lac Operon);
- Definitions of: Introns and Exons, Clone, Library, Genome, Plasmid, Fingerprinting, Foot-printing, Vector, Probe, Ligation and Splicing;
- Western-, Northern- and Southern-Blot.

15. MINERALS: (6 Hrs)

- Biochemical role of minerals:Na^{+}, K^{+}, Cl^{-};
- Ca^{++} andPi^{3-};
- $Cu^{+/2+}$ and $Fe^{2+/3+}$;
- F^{-} andI^{-};
- Se^{+},$Zn^{++}$and Mg^{++};
- Common clinical disorders associated with mineral metabolism.

16. ACID BASE BALANCE, WATER AND ELECTROLYTE BALANCE: (5 Hrs)

- Definition of pH and a Buffer;
- Henderson-Hasselbach equation (Excluding derivation);
- Blood buffers;
- common causes of metabolic- and respiratory- acidosis and alkalosis;
- Role of lungs and kidneys in the maintenance of blood pH;
- Water and electrolyte balance/imbalance.

17. ORGAN FUNCTION TESTS: (5 Hrs)

- **Thyroid Function Tests**: General concept of plasma levels of T3, T4 and TSH and Radioactive Iodine uptake;
- **Liver Function Tests:** General concepts and Clinical importance of plasma/serum levels of SGOT, SGPT, LDH, alkaline phosphatase, Gamma-GT, Total Protein, Albumin, A:G ratio and Bilirubin (Total and Conjugated) level. Causes of bile salts and bile pigments in urine;
- **Cardiac Function Tests:** Serial determination of serum CK-MB, GOT, GPT, LDH and Trop-T;
- **Renal Function Tests:** Significance of renal clearance tests (urea, creatinine, inulin, etc.). Pancreatic and Gonads Function tests.

18. DETOXICATION: (1 Hrs)

- Mechanisms of detoxication (conjugations, Cytochrome P-450-mediated reactions, etc.).

19. RADIO-ISOTOPES: (1 Hrs)

- Diagnostic and therapeutic importance of radio-isotopes (Iodine, Cobalt, Technetium, Thallium).

LIST OF TOPICS FOR INTEGRATION

A) HORIZONTAL INTEGRATION

1. Thyroid function tests: anatomy and physiology department.
2. Liver function tests: anatomy and physiology department.
3. Renal function tests: anatomy and physiology department.

B). VERTICAL INTEGRATION

1. Fertility profile: Obstetrics and Gyanecology department.
2. Anaemia profile: Medicine department.
3. Ttg and malabsorption: Medicine and Paediatrics department.
4. Diabetic profile: medicine department.

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DETAILED SYLLABUS FOR PRACTICALS:

(TOTAL=80 hrs; Demonstartion=30 Hrs and On Bench=50 hrs)

01. Safety measures in clinical Biochemistry.
02. Color reactions of Select Sugars and Proteins.
03. Qualitative analysis of Normal and Abnormal constituents of urine (Protein, Sugar, Bile salts, Bile Pigments, Blood and Ketone Bodies) and interpretation of results of each analysis.
04. Principles of Colorimetry and Spectrophotometry.
05. Quantitative Estimations of:
    (a) Serum/Plasma: glucose, urea, bilirubin (total and conjugated), Total Protein, Albumin (and Calculation of A: G Ratio), Cholesterol, Uric acid and interpretation of results.
    (b) Estimation of serum and urinary creatinine and determination of Creatinine clearance value.
    (c) CSF: Estimation of glucose, protein and chloride in the fluid.
06. Demonstration of Enzyme Estimations: ALP, SGOT, SGPT, Amylase, Lipase and interpretation of results.
07. Case Study and interpretation of Laboratory Investigations data.
08. Demonstration of chromatographic and electrophoretic techniques; separation of amino acids and serum proteins and the interpretation of results.
09. Demonstration of spectroscopy of Hemoglobin and its derivatives.
10. Demonstration of semi- and auto-analyzers, Flame photometer/Ion-Selective Electrolyte Analyzer and pH meter.
11. Introduction to ELISA and specialized diagnostic tests.(T_3/T_4 or TSH)

Teaching Programme

Lectures- 3 hrs/ Week
Practicals- 2 hrs/ Week
Tutorials/ Seminars - 2 hr/Week

Books recommended:

Theory:

1. Text Book of Biochemistry – Satyanarayan
2. Lippinncotts Biochemistry
3. Harper's Review of Biochemistry (latest)
4. Text Book of Biochemistry by Vasudevan / Shiv Kumari

Practical:

1. Manual of Practical Biochemistry by Ranjna Chawla
2. Manual of Practical Biocemistry for MBBS students by Gupta / Gahlaut / Anuj Jain
3. Practical Manual by A.C. Deb

M.B.B.S. [1st Prof.]

AU/20__/0_

BIOCHEMISTRY-A

(MODEL QUESTION PAPER)

Time allowed: 3 hrs. **Max. Marks 50**

Note: Attempt all Questions.

Use separate answer books for Part – I and Part II

PART-I

Q-1 Briefly explain:

1. Hyaluronic acid. (2)
2. Essential fatty acids . (2)
3. Active site of an enzyme. (2)
4. Co-enzyme functions of Niacin. (2)

Q-2 Discuss:

a. Ketogenesis & Ketosis. (4)
b. Important features of HMP shunt pathway. (3)
c. Absorption, storage and transport of iron. (4)

Q-3 Write short notes on:

a. Plasma Apo-proteins involved in lipid transport. (3)
b. Functions of phospholipids. (3)

PART-II

Q-4 Describe:

a. Kreb's TCA cycle and the steps at which it is regulated. (4)
b. Chemiosmotic theory for oxidative Phosphorylation. (4)

Q-5 Write short note on:

a. Glycogen storage diseases. (4)
b. Km and its biological significance. (3)

Q-6 Discuss:

a. G-Proteins. (3)
b. Mixed function oxidases. (3)
c. Physiological role of Carbonic anhydrase in kidney and lungs. (4)

M.B.B.S. [1st Prof.]

AU/20__/0_

BIOCHEMISTRY-B

(MODEL QUESTION PAPER)

Time allowed: 3 hrs. **Max. Marks 50**

Note: Attempt all Questions.

Use separate answer books for Part – I and Part II

PART-I

Q-1 Discuss the Watson-Crick Model of structure of B-DNA (7)

Q-2 Write short notes on:

a. PCR and its applications. (4)
b. Hormones derived from amino acids (4)
c. Transamination reactions (2)

Q-3 Write about the:

a. Differences in structure and function of hemoglobin and myoglobin. (4)
b. Abnormal electrophoretic pattern of serum proteins in various diseases. (4)

PART-II

Q-4 Write short notes on:

a. ρ-dependent termination of 'transcription'. (3)
b. Inhibitors of 'translation'. (3)

Q-5 Explain:

a. Active hormone from Vitamin-D (4)
b. Pellagra. (3)

Q-6 Describe briefly:

a. Biochemical functions of thiamine. (3)

b. Thyroid function tests. (4)

c. S-GLUT (3)

d. Therapeutic importance of Iodine. (2)