CURRICULUM

I MBBS

ANATOMY

HUMAN ANATOMY

(i) GOAL:

The broad goal of the teaching of undergraduate students in Anatomy aims at providing comprehensive knowledge of the gross and microscopic structure and development of human body to provide a basis for understanding the clinical correlation of organs of structures involved and the anatomical basis for the disease presentations.

(ii) OBJECTIVES:

(A) KNOWLEDGE:

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

(a) Comprehend the normal disposition, clinically relevant interrelationships, functional and cross sectional anatomy of the various structures in the body;

(b) Identify the microscopic structure and correlate elementary ultra structure of various organs and tissues and correlate the structure with the functions as a prerequisite for understanding the altered state in various disease processes;

(c) Comprehend the basic structure and connections of the central nervous system to analyze the integrative and regulative functions of the organs and systems. He/She shall be able to locate the site of gross lesions according to the deficits encountered.

(d) Demonstrate knowledge of the basic principles and sequential development of the organs and systems; recognize the clinical stages of development and the effects of common teratogens. He/She shall be able to explain the developmental basis of the major variations and abnormalities.

(B) SKILLS:

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

a) Identify and locate all the structures of the body and mark the topography of the living anatomy.

b) Identify the organs and tissues under the microscope;

c) Understand the principles of karyotyping and identify the gross congenital anomalies;
d) Understand the principles of newer imaging techniques like Ultrasound, Computerised Tomography Scan, Interpretation of plain and contrast X-rays.

e) Understand clinical basis of some common clinical procedures i.e. intramuscular and intravenous injection, lumbar puncture, kidney biopsy etc.

**B) INTEGRATION:**

From the integrated teaching of other basic sciences, student shall be able to comprehend the regulation and integration of the functions of the organs and systems in the body and thus interpret the anatomical basis of disease processes.

**SYLLABUS – PAPER – I**

The course in Human Anatomy is to provide an understanding of the structure of the human body as a foundation for the scientific study and practice of medicine.

**GENERAL ANATOMY:** The word “Anatomy” denotes “Applied Anatomy”

- Descriptive terms
- General features and classification of bones
- General features and classification of joints
- General features and classification of tissues
- General features of muscle and fascia
- General features of nerves and Organisation of nervous tissue

**GROSS ANATOMY**

Dissections of important areas to be done; Prosected specimens could replace the rest of the dissections.

Detailed origin and insertion of muscles to be replaced by essential attachments and emphasis to be placed on the understanding of the function.

**Upper and Lower Extremities**

<table>
<thead>
<tr>
<th>Muscles</th>
<th>Names; Location; Essential attachments; important Relations, Blood supply; Nerve supply and Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joints</td>
<td>Names; Types of joints; Movements; Muscles Responsible</td>
</tr>
</tbody>
</table>

**Equal emphasis for all joints of the extremities**

<table>
<thead>
<tr>
<th>Vessels and Nerves</th>
<th>Commencement, Course and Termination of vessels important relations and distribution.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Commencement, Course and Termination of nerves</td>
</tr>
<tr>
<td></td>
<td>Root value, relations and distribution.</td>
</tr>
</tbody>
</table>

| Lymphatics         | Knowledge of lymphnodes; areas of drainage                                               |
**Emphasis on important areas of venous and lymphatic drainage**

**Osteology**
Names of bones and side identification; parts and attachments; Growing ends. Important centres of ossification.

**In all areas, relevant and necessary applied and clinical aspects to be told and emphasized upon**

**ABDOMEN AND PELVIS**

**Abdominal wall viscera**
Anterior Abdominal wall; Inguinal canal; Posterior Abdominal wall; Peritoneal cavity – Greater and lesser sacs Peritoneal ligaments; Sub-diaphragmatic spaced pelvic floor and Ischiorectal fossa Basic knowledge of perineal spaces Name; Position; Important peritoneal and other Relations; Blood supply; Nerve supply; Histology and Microstructure portal vein and porta-systemic Anastomosis Important arteries; Inferior venacava.

**OSTEOLOGY**
Sacrum and Coccyx Features of Typical and Atypical lumbar vertebra Bony pelvis – sex determination & diameters

**PAPER II**

**THORAX:**

**Thoracic cage**
Walls of thorax; Names and Types of joints of Thorax; Mediastium – sub divisions, boundaries and Contents (including Heart and Pericardium)
Lungs and Pleura
Diaphragm

**Osteology**
Features of typical and atypical thoracic vertebrae
Features of typical and atypical ribs
Features of sternum

**HEAD AND NECK:**

**Scalp & Neck**
Scalp Face Sub- occipital triangle Anterior & Posterior triangles of neck. Structures in the neck

**Cranial cavity**
Cranial fossae and structures related Duramater and dural venous sinuses Parotid region Temporal and Infra-temporal fossae Submandibular region Mouth;
Tongue; Palate; Pharynx; Larynx; Nose and nasal cavity; Para-nasal air sinuses; Orbit; Eyeball; Organs of Hearing & Equilibrium

**Vessels and Lymphatics**
The blood vessels and lymphatics of Head and Neck

**Autonomic Nervous System**
Nerves—Cranial nerves and plexuses

**Osteology**
Names & Location of bones of skull; Bony cranial cavity sub divisions; foraminae; Bony fossae, Features of typical & atypical cervical vertebrae

**BRAIN AND SPINAL CORD:**

**Spinal cord**
Spinal cord & Meninges
Parts & Tracts of spinal cord, blood supply
Brain & Meninges, blood supply
Parts of brain and functional components
Base of brain; hind brain; mid brain;
Diencephalon; Cerebrum; Cerebellum.

**EMBRYOLOGY:**

**General Embryology**
Oogenesis; Spermatogenesis; Fertilization Bilaminar and Trilaminar germ discs; Embryonic period;
Placenta; Amnion; Umbilical cord Organogenesis;
Basic teratology; Twinnings

**Special Embryology**
Gastro-intestinal system and spleen Urinary and genital systems Diaphragm Heart & Aortic arch derivatives Respiratory system Face; Palate; Tongue;
Brachial apparatus, Endocrine system, Vertebra column, Parts of neural tube & derivatives, Visual and auditory apparatuses. Outline of development of limbs

**HISTOLOGY:**

**General Histology**
Cell; Epithelia; Glands; Connective tissue; Cartilage;
Bone; Muscle; Nervous tissue Lymphoid tissue; Skin and its appendages

**Special Histology**
Respiratory system; Vascular system; Salivary glands & Gastro-intestinal system Urinary system
Reproductive system (male & female) Endocrine system; Muco-cutaneous junctions; Eye lid and parts of eyeball; Olfactory epithelium; Taste buds; Internal ear; CNS – Medulla, Pons, Mid brain, Cerebellum, Cerebrum, Spinal cord, Nerve ganglia.

**GENETICS:**
Structure of chromosome; Karyotyping; Chromosomal aberrations (Numerical & Structural); Structure of gene; Mutation; Single gene inheritance; Autosomal Inheritance; Sex linked inheritance.

**SURFACE ANATOMY:**

<table>
<thead>
<tr>
<th>Extremities</th>
<th>Bony landmarks, SM of important vessels and nerves.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdomen</td>
<td>Regions and Planes of Abdomen. SM of superficial and deep inguinal rings SM of Stomach, Liver fundus of Gallbladder, Spleen, Duodenum Pancreas, IC junction, Base of Appendix, Kidneys and Abdominal part of ureter, Root of mesentery, Abdominalaorta and Inferior venacava</td>
</tr>
<tr>
<td>Thorax</td>
<td>Borders of Hear, Valves Pleura Pleura and Lungs Major vessels</td>
</tr>
<tr>
<td>Head &amp; Neck</td>
<td>Vertebrall levels of Hyoid bone, Thyroid cartilage, Cricoid Cartilage Thyroid gland; Larynx; SM of Common carotid artery, Internal jugular vein, Facial artery Parotid gland and duct Palatine tonsil Inion, Nasion, Pterion, Important dural venous sinuses</td>
</tr>
<tr>
<td>Brain</td>
<td>Central sulcus, Sylvian sulcus</td>
</tr>
</tbody>
</table>

**RADIOLOGICAL ANATOMY**

X- rays – Principle pf X- ray- Pain and Contrast X-rays- Principles of Ultrasound and CT scan – CT scan at T3, T4 and L1 levels.
TEACHING SCHEDULE: Teaching Hours – 650 Hrs.

Introduction 1 week
General Anatomy
General Embryology
General Histology
Upper extremity 6 weeks
Lower extremity 5 weeks
Abdomen and Pelvis 10 weeks
Thorax 3 weeks
Head and Neck 11 weeks
Brain & Spinal cord 4 weeks
TOTAL 40 weeks

HORIZONTAL INTEGRATION:
The preclinical departments together plan the Horizontal Integration.

To stress the importance of clinical and applied Anatomy.

a) Display study questions on the notice board weekly, pertaining to the region covered.

b) At the end of a region students be given cases of that region for study, presentation, analysis and discussion, Example: Leprosy patients with nerve lesions of the Upper Extremity at the end of the study of Upper Extremity.

c) Invite clinicians to give guest lectures and demonstrations to highlight the anatomical basis of the clinical conditions. Example:
   a. Importance of the venous drainage of Lower Extremity and varicose veins.
   b. Anatomical basis of transplant.
   c. Anatomical basis of hernia and repair.

UNIVERSITY EXAMINATION PATTERN

PAPER I:  General/Applied Anatomy
          General Embryology
          General Histology
          Upper and Lower extremities
          Abdomen and Pelvis
          (along with essential Embryology and Special Histology)

PAPER II:  Thorax
          Head and Neck
          Brain (along with Essential embryology and Special Histology)
RECOMMENDED BOOKS:

2. Human Anatomy – B.D. Chaurasia
3. Human Anatomy – T. S. Ranganathan
4. Human Anatomy – I. B. Singh
5. Human Anatomy – Datta
6. Clinically Oriented Anatomy – Keith L moore
7. A textbook of Human neuroanatomy – Inderbir Singh
10. Medical Embroyology – Langman
11. Human Embroyology – Inderbir Singh
12. Essentials of Human Genetics – Bhatnagar, Kothari (or) Metha

REFERENCE BOOKS:

1. Grays Anatomy
2. Clinical Anatomy – Snell
3. Clinical Neuro Anatomy – Snell
4. Grant’s Atlas – Gross Anatomy
5. Atlas of Human Anatomy – Sobotta (vol I & II)
6. Last’s anatomy – R.J Last
7. Surgical Anatomy – McGregor
8. Surface and Radiological anatomy – A.Halim
(i) Goal

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 facilitate an understanding of the physiology basic of health of disease.

(ii) 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 shall 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 shall acquire an integrated knowledge of organ structure and function and its regulatory mechanisms.

(B) Biophysics

(a) Goal and Objectives

The broad goal of teaching Biophysics to undergraduate students is that they should understand basic physical principles involved in the functioning of body organs in normal and diseased conditions.

Total time for teaching Biophysics = 5 hours
Out of which:
1. Didactic lectures = 3 hours
2. Tutorial / group discussion = 1 hour
3. Practical = 1 hour
(b) Topic distribution
(1) Lectures
   (i) Physical principles of transport across cell membranes and across capillary wall.
   (ii) Biopotentials
   (iii) Physical principles governing flow of blood in heart and blood vessels.
   (iv) Also physical principles governing flow of air in air passages.

(2) Tutorial / group discussion
   On the topic covered in didactic lectures

(3) Practicals Demonstration of
   (a) Biopotential on oscilloscope
   (b) Electro Encephalogram (E.E.G.)
   (c) Electro Myelogram (E.M.G.)
   (d) Electro Cardiogram (E.C.G.)

SYLLABUS OF PHYSIOLOGY
Theory

GENERAL PHYSIOLOGY
CELL FUNCTION: Morphology of cell components & Functions
BODY FLUIDS: Compartments – volume and composition Units for measuring concentration of solutes

TRANSPORT ACROSS
   The cell Membrane: Homeostasis – Intra cellular communication

TISSUE (HISTOPHYSIOLOGY)

BLOOD
3. W. B. C: Morphology, Function, Leucopoiesis, Immune Mechanism
4. Platelets: Morphology, Function, Formation
5. Blood Types: ABO system Rh system Blood transfusion
6. Haemostasis: Antocoagulants
7. Lymph, Reticulo Endothelial system
DIGESTION
1. Salivary digestion – deglutition
2. Digestion in stomach, Movements, Vomiting
3. Pancreatic Juice
4. Bile – Liver and gall bladder
5. Succus Entericus
6. Motility of small intestine
7. Digestion and Absorption of various food stuffs – Carbohydrate, Protein and fat, mineral and vitamin absorption.
8. Large Intestine – Secretion and Motility – Dietary Fibre – Defaecation
9. Gastro – Intestinal Hormones

EXCRETION
1. Functional anatomy of Excretory System : Nephron in detail
2. Renal Circulation : Auto regulation, Renal function Tests
4. Acidification of urine, bicarbonate excretion regulation of Na+, K+, Cl, H+ Ions.
5. Innervation and Function of bladder, micturition: Filling and emptying, diuretics.

ENDOCRINE GLANDS
Introduction – Hormonal regulation
Receptors – Second messengers

1. PITUITARY GLAND

2. HYPOTHALAMUS – HORMONES – FUNCTIONAL ANATOMY
   Interrelationship between Hypothalamus, Anterior & Posterior Pituitary and target organs, Clinical correlation – Hypo & Hypersecretion.

3. THYROID GLAND – PHYSIOLOGICAL ANATOMY
   Formation, secretion, Transport and metabolism of T3 & T4 – Effects of thyroid hormone & Regulation of its secretion – Hypo & Hypersecretion – clinical correlation calcitonin.

4. PARATHYROID GLANDS
5. **Pancreas**

6. **Adrenal Glands**

7. **Minor Endocrine Glands**: Kidney, Pineal body, Thymus, Atrium of heart

8. **Local Hormones** – bradykinin, substance P, Prostaglandin, Histamin, Serotonin, etc.

**Reproduction**
1. Introduction – Sex differentiation and chromosomal sex in brief factors influencing differentiation of genitalia.
3. Female gonads and genitalia – ovarian function – menstrual cycle hypothalamus, Pituitary, Ovary, Uterus, Vagina cyclic changes Biosynthesis, secretion and actions of oestrogens and progesterone.

**Respiration**
1. Introduction – Functional Anatomy of Respiratory system.
3. Regulation of respiration, Neural and Chemical.
4. Pulmonary circulation.
5. Respiratory adjustments in Health and Disease.
6. Hypoxia – types, Oxygen therapy, periodic breathing Asphyxia,
7. Dysbarism, Cyanosis, effect of exercise, high altitude Physiology – Mountain sickness – Space Physiology.
8. Artificial respiration.
**CARDIO VASCULAR SYSTEM**

**Introduction**

1. Structure and properties of cardiac muscle – Action potential
2. Origin and spread of cardiac impulse. Sinus arrhythmia.
4. Cardiac Cycle – mechanical events - JVP and radial arterial pulse tracing.
5. Cardiac output – Measurement – Factors affecting
6. Haemodynamics – pressure at different segments of vasculature.
8. Starling forces – Formation and reabsorption of tissue fluid. Patho Physiology of shock.
10. Cardio Vascular changes during exercise

**SPECIAL SENSES**

**Introduction**


**CENTRAL NERVOUS SYSTEM**

**General Neurophysiology**

2. Sensory Receptors – classification and function. Electrical and Ionic events in receptors – Receptor potential.
7. Descending tracts – pyramidal and extra pyramidal tracts, compete section and hemisection of spinal cord

Special Neurophysiology
1. Cerebral cortex – layers, lobes, methods of study, function of each lobe.
2. Thalamus – Thalamic nuclei, connections, functions, thalamic syndrome.
5. Reticular formation – Ascending and Descending Pathways, ARAS & EEG.
10. Autonomic Nervous system – Organisation, division with examples of autonomic reflexes, chemical transmission.
11. Limbic system – parts, circuits, functions.
13. C.S.F. formation, circulation, absorption, function, lumbar puncture.

SYSTEMS COVERED

PAPER – I
1) Muscles and Nerve
2) Blood, Spleen and Lymph
3) Digestive system
4) Excretory system, Acid base balance and fluid compartments
5) Endocrinology
6) Reproductive system

PAPER – II
1) Respiratory System
2) Cardiovascular system
3) C.N.S
4) Special Senses
MAJOR EXPERIMENTS

I. HAEMATOLOGY

1. R. B. C. Count
2. Total (WBC) Count
3. Differential (WBC) Count
4. Absolute Eosinophil Count
5. Platelet Count

II. CLINICAL EXAMINATION

1. Recording of Blood Pressure
2. Examination of Respiratory System
3. Examination of Cardiovascular system
4. Examination of Cranial Nerves
5. Examination of sensory and motor system
6. Examination of superficial and deep reflexes

MAJOR EXPERIMENTS

I. HAEMATOLOGY

1. Estimation of Haemoglobin
2. ABO Blood Grouping
3. Rh typing
4. Bleeding time and clotting time

II. CLINICAL EXAMINATION

1. Determination of timed vital capacity and tidal volume
2. Determination of Respiratory rate
3. Recording of ECG

CLINICAL EXAMINATION

MINOR EXPERIMENTS

SKILLS

1. Demonstration of Tracheal Position
2. Outlining the cardiac borders by percussion
3. Cardiac Auscultatory Area
4. Demonstration of Plantar Reflex
5. Demonstration of Knee Jerk
6. Demonstration of Light Reflex
7. Demonstration of Accomodation Reflex
8. Evaluation of Colour vision
9. Evaluation of Refractory erros
CHARTS
1. Simple Muscle Twitch
2. Beneficial Effect
3. Load and After Load
4. Effect pf Temperature
5. Genesis of Tetanus
6. Fatigue
7. Properties of Cardiac Muscle
8. Effect of Stimulation of Vagus Nerve
9. Action of Acetylcholine and Adrenaline on Heart
10. Action of Ions on Heart
11. Gigantism
12. Dwarfism
13. Acromegaly
14. Cushing’s Syndrome
15. Myxoedema
16. Cretin
17. E.S.R. Reading and interpretation
18. P.C.V. Reading and interpretation
19. Specific Gravity of Blood Reading and interpretation
20. Osmotic Fragility Test and interpretation

CALCULATION
1. Blood Indices
2. Lung Volumes
3. Renal Function Tests

TEXT BOOKS RECOMMENDED FOR THE I MBBS

REFERENCE BOOKS

PRACTICAL BOOKS
1. Manual of Practical Physiology
BIOCHEMSITRY

Biochemistry Including Medical Physics and Molecular Biology

(i) Goal:
The broad goal of the teaching of undergraduate students in biochemistry is to make them understand the scientific basis of the life processes at the molecular level and to orient them towards the application of the knowledge acquired in solving clinical problems.

(ii) Objectives:
(a) Knowledge:

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

(1) Describe the molecular and functional organization of a cell and list its subcellular components;
(2) Delineate structure, function and inter-relationships of bimolecular and consequences of deviation from normal;
(3) Summarize the fundamental aspects of enzymologist and clinical application wherein regulation of enzymatic activity is altered;
(4) Describe digestion and assimilation of nutrients and 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 squeal;
(7) Describe mechanisms involved in maintenance of body fluid and BH homeostasis;
(8) Outline the molecular mechanisms of gene expression and regulation, the principles of genetic engineering and their application in medicine;
(9) Summarize the molecular concept of body defenses and their application 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 instrumentation analysis and interpretation of a given data;
(12) Suggest experiments to support theoretical concepts and clinical diagnosis.

(b) Skills:

At the end of the course, the student shall 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 scientific and clinical problems and decision making

(c) Integration:
The knowledge acquired in biochemistry shall help the students to integrate molecular events with structure and function of the human body in health and disease.

SYLLABUS

1. Cell

Sub cellular components – Molecular and functional organization.
   Plasma membrane, cytoplasm, Nucleus and sub cellular components like Mitochondria, Endoplasmic reticulum, Lysosomes, Peroxisomes, Cytoskeleton, Golgi apparatus etc.

II. Biomolecules
   Introduction
   a) Chemistry of carbohydrates – Monosaccharides, disaccharides – homo an hetero polysaccharides.
      Triglyceride, Phospholipids, Cholesterol and lipoprotein
   d) Nucleic acid: Nucleotides – DNA and RNA structure, nucleic acid analogous of medical importance.
   e) Structure of Haemoglobin, Myoglobin – structural relationship with the function. Abnormal Haemoglobin – congenital and acquired.
   f) Vitamins and minerals – (in brief details in Nutrition)

III. Enzymes

IV. Nutrition
   Digestion and assimilation of Nutrients
   - Carbohydrates, Proteins, Lipids, Vitamins and Minerals.
   - Nutritional requirements – RDA, SDA, Balanced diet and limiting amino acids
   - Vegetarianism
   - Consequences of Malnutrition of Marasmus, Kwashiorkor, over nutrition.
V. Metabolism and Regulatory pathways

1) Introduction to metabolism
   a) emphasize the purpose of metabolism like energy production, interconversion and synthesis of important biomolecules etc.
   b) High energy compounds

2) Metabolic pathways, regulation and metabolic errors

Carbohydrates

Lipid Metabolism:

Protein metabolism
   Dynamic state of body proteins – interorgan transport of amino acids – Ammonia production – Transport and body amino acids pool – its disposal Urea cycle. Metabolism of individual amino acids. Biologically important compounds obtained from amino acids including gamma aminobutyric acid and polyamines.

Integration of Metabolism
   Main control sites of metabolic pathways and key and enzymes.
   Metabolic adaptation during fed state and starvation
   Metabolism in Principal organs like liver, RBC, adipose tissue, muscle, kidney, heart & brain.

Nucleic acid metabolism
   Purine and pyrimidine synthesis and degradation – salvage pathways abnormalities of nucleic acid metabolism.
Metabolism of Haemoglobin, Prophyrias and Bilirubin
Prophyrias, Abnormal haemoglobin and jaundice and investigations pertaining to these disorders.

VI. Gene expression and regulation
1) Principles of genetic Engineering and their application in Medicine.
Basics of Genetics – Chromosomal structure – arrangement of coding sequence and genetic code.
Biosynthesis of proteins with posttranslational modification.

2) Cell Cycle
DNA replication and its repair – RNA synthesis and processing – Mutation.

3) Gene Expression and Regulation.

Genetic engineering techniques and their application in medicine. Restriction enzymes, Vectors genome library – DNA probes – Blot transfer techniques.

Recombinant DNA technology, PCR – Polymerase Chain Reaction – Clinical application of genetic engineering.

VII. Inborn errors:
Biochemical basis of inherited disorders with their associated sequelae.
Introduction to various types of inheritance and types of mutation defect in relation to various inherited disorders.

b) Lipids:--Disorders of FA Oxidation, Sphingolipidosis, Dyslipoproteinaemias,
c) Protein:-- Urea cycle disorders, inborn errors associated with each aminoacid.
d) Porphyrias, hyper bilirubinemia (congenital and acquired)
e) Hyperuricaemia, gout, Orotic Aciduria, Lesch Nyhan Syndrome
f) Neonatal screening for and prenatal diagnosis of inborn errors.

VIII. Homoeostasis:
Mechanisms involved in the maintenance of body fluids and ph homeostasis.
Metabolism of water and electrolytes homeostasis of PH – buffer system, Role of kidney and Lungs – Acids base disorders.
Bloods gas analysis and its interpretation and correlation to acid base disorders.

IX. Immunity
Molecular concept of body defence and application in medicine.
Immunoglobin structure, type, synthesis and function – Antigen binding – monoclonal antibodies – Hyper and hypogamma globulinaemia immuno
deficiency and AIDS – biochemical methods of assessing the Immunoglobulin RIA, ELISA.

X. Environmental Hazards and Cancer
1. Biochemical basis of Environmental Hazards – occupational hazards (lead, organo phosphorus compounds etc.) Hazards due to modern industrialization (HS) and traffic pollution (CO) Xenobiotics.
2. Biochemical basis of cancer and carcinogenesis – Timour markers.

XI. Laboratory Investigations
Principles of various conventional and specialized Laboratory Investigations and instrumentation analysis and interpretation of data.

1. Principles of conventional and specialized lab investigation including instrumentation analysis.
a) Conventional : manual colorimetric methods for biochemical parameter (dealt with in practical classes)  
   Flame photometer  
   Spectroscopy  
2. Interpretation of data  
   Normal ranges of biochemical parameters – causes for deviation from normal.

XII. Clinical Chemistry
Experiments to support theoretical concept and clinical diagnosis.

   Biochemical tests to determine the functional ability of an organ – liver function test – Renal function test, Pancreatic function test.

   Investigation pertaining to hormones – Mode of action of hormone and its function –Thyroid function test- Para thyroid function tests – Adrenal function tests.


   Metabolic acidosis alkalosis  
   Respiratory acidosis Alkalosis

   Both uncompensated and compensated.
BIOCHEMISTRY PRACTICAL SYLLABUS
Spotters and Clinical Exercises

(I) SPOTTERS

The student must identify the spotter and write some important uses of the spotter.

1. pH meter
2. Colorimeter
3. Centrifuge
4. Ryles tubes
5. Urino meter
6. Copper sulphate
7. Spectroscope
8. Electrophoresis apparatus
9. Oxyhaemoglobin
10. Methaemoglobin
11. Corboxyhaemoglobin
12. Glucosazone / Fructosazone
13. Lactosazone
14. Maltosazone
15. Haemin crystals
16. Electrophoresis paper – normal pattern
17. Electrophoresis paper – nephritic syndrome
18. Electrophoresis paper – multiple myeloma
19. Chromatography paper
20. Picric acid
21. Benedict’s qualitative reagent
22. Structure of RNA
23. Structure of cholesterol
24. Structure of fructose

(ii) Suggest investigations for a case of

1. Jaundice
2. Diabetes mellitus
3. Acute renal failure
4. Proteinuria
5. Oedoma
6. Rickets
7. Myocardial infraction
8. Alkalosis
9. Acidosis
10. Glycosuria
11. Aminoaciduria
12. Hyper and Hypo Parathyroidism
13. Hyper and Hypothyroidism
(iii) Calculate
1. Albumin Globulin ratio with total protein and albumin values.
2. Calculate minute volume from 24 hour urine volume
3. Calculate Creatinine clearance with required parameters given.

(iv) Interpret
1. Electrophoresis patterns normal, cirrhosis liver, Hepatic syndrome
2. Normal GTT and diabetes mellitus glycosurias
3. Acute pancreatitis
4. Myocardial infraction
5. Acute renal failure and nephritic syndrome
6. Acidoses, Alkaloses
7. Hype and hype thyroidsm
8. Hype and hypr parathyroidism
9. Rickets
10. Jaundice

UNIVERSITY EXAMINATION PATTERN
The following topics shall be covered in each question paper.

Paper - I
1. Molecular and functional organization
2. Chemistry, Digestion, Absorption and Metabolism of carbohydrate and Metabolic errors
3. Chemistry, Digestion, Absorption and Metabolism of lipids and Metabolic errors
4. Enzymes
5. Vitamines
6. Electron transport chain and biological oxidation
7. TCA Cycle an integration of metabolism
8. Nutrition
9. Porphyriins, Haemoglobin and Bilirubin metabolism

Paper - II
1. Chemistry, digestion, absorption and metabolism of protein and Inborn errors of metabolism
2. Chemistry and metabolism of nucleic acids and errors of metabolism
3. Molecular biology
4. Water, Electrolytes
5. pH and its regulation
6. Cancer and Xenobiotics
7. Minerals
8. Hormones
9. Laboratory Instrumentation, investigation and interpretation