

1.2.2 SYLLABUS (Including Teaching Hours)

A. GENERAL PHYSIOLOGY

MUST KNOW- 100HRS

1. HOMEOSTASIS:

Basic concept, Feedback mechanisms
Structure of cell membrane, transport across cell membrane Membrane potentials

2. BLOOD:

Composition & functions of blood.
Specific gravity, Packed cell volume, factors affecting & methods of determination.

Plasma proteins - Types, concentration, functions & variations.

Erythrocyte - Morphology, functions & variations. Erythropoiesis & factors affecting erythropoiesis.

ESR- Methods of estimation, factors affecting, variations & significance.

Haemoglobin - Normal concentration, method of determination & variation in concentration.

Anaemia - Definition, classification, life span of RBC's destruction of RBCs , formation & fate of bile pigments, Jaundice - types.

Leucocytes : Classification, number, percentage, distribution morphology, properties, functions & variation. Role of lymphocytes in immunity, leucopoiesis life span & fate of leucocytes.

Thrombocytes - Morphology, number, variations, function & thrombopoiesis.

Haemostasis - Role of vasoconstriction, platelet plug formation in haemostasis, coagulation factors, intrinsic & extrinsic pathways of coagulation, clot retraction.

Tests of haemostatic function, platelet count, clotting time, bleeding time, prothrombin time – normal values, method & variations. Anticoagulants - mechanism of action. Bleeding disorders. Blood groups: ABO & Rh system, method of determination, importance, indications & dangers of blood transfusion, blood substitutes.

Blood volume: Normal values, variations.

3. MUSCLE AND NERVE:

Classification of nerves, structure of skeletal muscle – Molecular mechanism of muscle contraction, neuromuscular transmission. Properties of skeletal muscle.

Structure and properties of cardiac muscle & smooth muscle.

4. DIGESTIVE SYSTEM:

Introduction to digestion: General structure of G.I. tract, Innervation.

Salivary glands: Structure of salivary glands, composition, regulation of secretion & functions of saliva.

Stomach: Composition and functions of gastric juice, mechanism and regulation of gastric secretion.

Exocrine Pancreas - Structure, composition of pancreatic juice, functions of each component, regulation of pancreatic secretion.

Liver : structure , composition of bile, functions of bile, regulation of secretion

Gall bladder : structure, functions.

Small intestine - Composition, functions & regulation of secretion of intestinal juice.

Large intestine - Functions.

Motor functions of GIT: Mastication, deglutition, gastric filling & emptying, movements of small and large intestine, defecation.

5. EXCRETORY SYSTEM :

Structure & functions of kidney, functional unit of kidney & functions of different parts.

Juxta glomerular apparatus, renal blood flow.

Formation of Urine : Glomerular filtration rate - definition, determination , normal values, factors influencing G.F.R. Tubular reabsorption - Reabsorption of sodium, glucose, water & other substances.

Tubular secretion - secretion of urea, hydrogen and other substances. Mechanism of concentration & dilution of urine.

Role of kidney in the regulation of pH of the blood.

Micturition, anatomy & innervation of Urinary bladder mechanism of micturition & abnormalities.

6. BODY TEMPERATURE

7. ENDOCRINOLOGY

General endocrinology - Enumeration of endocrine glands & hormones - General functions of endocrine system, chemistry, mechanism of secretion, transport, metabolism, regulation of secretion of hormones.

Hormones of anterior pituitary & their actions, hypothalamic regulation of anterior pituitary function.

Disorders of secretion of anterior pituitary hormones.

Posterior pituitary : Functions, regulation & disorders of secretion.

Thyroid: Histology, synthesis, secretion & transport of hormones, actions of hormones, regulation of secretion & disorders, Thyroid function tests.

Adrenal cortex & Medulla -synthesis, secretion, action, metabolism, regulation of secretion of hormones & disorders.

8. REPRODUCTION

Sex differentiation, Physiological anatomy of male and female sex organs,

Female reproductive system : Menstrual cycle, functions of ovary, actions of oestrogen & Progesterone, control of secretion of ovarian hormones, tests for ovulation, fertilisation, implantation, maternal changes during pregnancy, pregnancy tests & parturition.

Lactation, composition of milk, factors controlling lactation, milk ejection, reflex, Male reproductive system :spermatogenesis, semen and contraception.

9. CARDIO VASCULAR SYSTEM

Functional anatomy and innervation of heart Properties of cardiac Muscle Origin & propagation of cardiac impulse and heart block.

Electrocardiogram - Normal electrocardiogram. Two changes in ECG in myocardial infarction.

Cardiac cycle - Phases, Pressure changes in atria, ventricles & aorta.
Volume changes in ventricles. arterial pulse.

Heart sounds: Mention of murmurs.

Heart rate: Normal value, variation & regulation.

Cardiac output: Definition, normal values, one method of determination, variation, factors affecting heart rate and stroke volume.

Arterial blood pressure: Definition, normal values & variations,determinants, regulation & measurement of blood pressure.

10. RESPIRATORY SYSTEM

Physiology of Respiration : External & internal respiration.

Functional anatomy of respiratory passage & lungs.

Respiratory movements: Muscles of respiration, Mechanism of inflation & deflation of lungs.

Intra pleural & intra pulmonary pressures & their changes during the phases of respiration.

Mechanics of breathing - surfactant, compliance & work of breathing.

Spirometry: Lung volumes & capacities definition, normal values, significance, factors affecting vital

capacity, variations in vital capacity, FEV & its variations.

Pulmonary ventilation - alveolar ventilation & dead space – ventilation.

Exchange of gases: Diffusing capacity, factors affecting it.

Transport of Oxygen & carbon dioxide in the blood.

Regulation of respiration – neural & chemical.

Hypoxia, cyanosis, dyspnoea, periodic breathing.

11. CENTRAL NERVOUS SYSTEM

Organisation of central nervous system

Neuronal organisation at spinal cord level

Synapse receptors, reflexes, sensations and tracts

Physiology of pain

Functions of cerebellum, thalamus, hypothalamus and cerebral cortex.

Formation and functions of CSF

Autonomic nervous system

12. SPECIAL SENSES

Fundamental knowledge of vision, hearing, taste and smell.

EXPECTED TO KNOW- 20 HRS

Blood Indices - MCV, MCH, MCHC - definition, normal values, variation.

Body fluids : distribution of total body water, intracellular & extracellular compartments, major anions & cations in intra and extra cellular fluid.

Tissue fluids & lymph : Formation of tissue fluid, composition, circulation & functions of lymph.

Oedema - causes.

Functions of reticulo endothelial system.

Functions Of Skin.

Other hormones - Angiotensin, A.N.F.

Coronary circulation.

Cardio vascular homeostasis - Exercise & posture

Jugular venous pulse

Artificial respiration, pulmonary function tests.

Composition of inspired air, alveolar air and expired air.

HUMAN BIOCHEMISTRY , NUTRITION & DIETETICS

MUST KNOW

50HRS

A) Chemistry of Carbohydrates:

Definition, Classification & Functions of Carbohydrates

Biological importance of Monosaccharides

Chemical properties of Monosaccharides

Osazone Formation of Monosaccharides

Derivatives of Monosaccharides

Structure of maltose, sucrose & Lactose,

Structure of starch & Glycogen & their functions.

Structure and functions of glycosaminoglycans.

B) Chemistry of Lipids

Definition, Classification & Functions of Lipids

Fatty acids and their classification & functions.

Essential fatty acids and its functions.
Phospholipids and their Functions.
Glycolipids and its functions
Prostaglandins and its functions
Steroids, Bile salts, micelle
Cholesterol and its functions
Lipoproteins and its classification.
Lipoproteins and their site of synthesis and functions.

C) Chemistry of Proteins

Structure of Aminoacids found in protein, classification,
Nutritional classification of amino acids.
Importance of Amino Acids
Biologically important compounds formed by amino acids.
Properties of amino acids
Biologically important Peptides
Structure of proteins
Primary, secondary, tertiary And quaternary
Zwitter ion, isoelectric PH
Definition, classification (functional) of proteins
Classification based on physical & chemical properties.
Functions of Albumin

D) Enzymes

Definition, zymogen or Proenzyme
Co-factors,
Mechanism of enzyme action
Classification of enzymes
Specificity factors affecting enzymes activity.
Enzyme inhibition, types of Inhibitors.
Types, composition, location and diagnostic importance of lactate dehydrogenase, creatine kinase.
Isoenzymes.
Diagnostic importance of different enzymes

E) Vitamins (Micronutrients):

Definition, Classification, Sources, Daily Requirement, Functions & deficiencies of
Vit. B1 & B2
Vit B3 & B5
Vit B6 & B7
Folic acid (Vit B9)
Cynocobalmin (Vit B12)
Ascorbic acid with functions, sources, daily requirement
Functions, sources, daily requirement of Vit.A with its deficiencies including visual process.
Vit D & its role in calcium Metabolism
Vit. E & Vit K.

F) Hemoglobins (Haemoglobin):

Bilirubin.
Chemistry & Functions of Haemoglobin.
Introduction to hemesynthesis
Heme degradation and types of normal and abnormal haemoglobin.

Types of Jaundice

G) Nucleic Acids

Introduction of nucleic acids

Building units Nucleotides

Types of RNA

Outline structure & functions of DNA & RNA

H) Biological Oxidations

Introduction, Enzymes & Coenzymes of Biological Oxidation.

ETC(Electron Transport Chain) Or Respiratory Chain

Reactions of electron transport chain.

Oxidative Phosphorylation, Inhibitors & uncouplers of oxidative phosphorylation

I) Nutrition:

Energy needs: Basal metabolic rate, dietary carbohydrates Fibres, dietary lipids, essential fatty acids.

Nitrogen Balance, essential amino acids, protein quality and requirement.

Protein Calorie Malnutrition

Kwashiorkar's disease

Marasmus

Balance Diet

J) Energy Metabolism:

Enzymatic hydrolysis of dietary carbohydrates, mechanism of uptake of monosaccharides

Synthesis and breakdown of Glycogen (glycogenesis & Glycogenolysis)

Outline of glycolysis,

Rapaport Luebering cycle,

lactate metabolism.

Glucogenic & Ketogenic amino Acids.

Pyruvate oxidation & citric acid cycle.

Oral GTT & glycosuria, diabetes mellitus and related disorder.

Blood glucose level & its regulation.

Gluconeogenesis

Digestion and Absorption of

Triglycerols.

Metabolism of Ketone bodies:

a) Ketogenesis

b) Ketolysis

c) Ketosis

Functions of Cholesterol

Adipose tissue metabolism

Lipolysis, Lipogenesis

Digestion and Absorption of Proteins

Amino acid pool

Nitrogen Balance

a) Transamination

b) Deamination

c) Transmethylation

Fate & Formation of ammonia Urea cycle

K) Mineral Metabolism:

Definition, Classification and Daily Requirement of Calcium, Phosphorus sources, uptake, excretion and function.

Trace Elements Def. eg. Copper, zinc, magnesium, Chromium, Cobalt, Manganese, Molybdenum, Selenium

Serum Calcium regulation, iron sources, uptake, transport.

Iodine: Brief introduction to Thyroxine synthesis, general functions of thyroxine .

Fluoride:- Functions, deficiency & excess.

Role of other minerals Sodium, Potassium, Chloride.

L) Metabolic Regulation:

Hormones: Definition, General characteristics, Classification.

Mechanism action of steroid Hormones.

Epinephrine, glucagone & insulin in brief.

Acid base regulation.

Water and electrolyte balance

Detoxification Mechanism.

M) Structural components & blood proteins:

Connective tissue, collagen & Elastin, Structure of bone and membranes.

Myofibrils & Muscle Contraction.

N) Medical Biochemistry:

Blood sugar level and its regulation.

Oral GTT & glycosuria

Diabetes mellitus & related disorders.

Jaundice: Classification & evaluation.

Liver Function tests:-

Kidney Function tests

Gastric Function tests

Gout; Lesch Nyhanes Syndrome,

O) Genetics:

DNA as genetic material

Replication & Transcription

Genetic code & mutations

Translation process

Introduction to cancer, viruses Oncogenes.

PCR Recombinant DNA Technology Applications.

DESIRED TO KNOW

20HRS

Structure of glucose, Isomerism, Epimerism, Anomerism, Mutarotation

Prostaglandins and its functions

Steroids, Bile salts, micelle

Properties of proteins

Denaturation, denaturing agents

Significance of denaturation.

Coagulation of proteins.

Plasma proteins, Separation of plasma proteins.

Immunoglobulins: Structure Types and their functions.
Michaelis – Menton Equation and its significance.

Allosteric Enzymes

Active forms of all water soluble vitamins and Vit A & Vit D.
To know the absorption, transportation and storage of
Vit A,D, E & K

Direct bilirubin & indirect

Haemoglobin derivatives.
Difference between DNA & RNA
Nucleotides, Biologically important free nucleotides

Substrate level phosphorylation
S.D.A (Specific dynamic action)

HMP shunt pathway and its significance.
Glucuronic acid formation.
Hyperglycemia & Hypoglycemia
-Outline of Cholesterol biosynthesis & breakdown
-Fatty acid synthesis
Fatty liver, Lipotropic factor
Atherosclerosis

Metabolism of glycine
a) Synthesis
b) degradation.
Metabolism of sulphur containing aminoacids
Eg. Methionine, cysteine, Cystine one carbon metabolism
Heme & non-heme iron & its functions, deficiency.
Second messenger
CAmp, Calcium ion
Inositol triphosphate

Hyperglycemia
Hypoglycemia
Hyperlipoproteinemia

1.2.3 EXAMINATION PATTERN

Name of the exercise	Time Allotted	Marks Allotted
Haematology	1Hr 20Min	25
Clinical Physiology	40 Min.	15

Biochemistry Experiment-A	60 Mins.	20
Biochemistry Experiment -B	55 Mins.	15
Spot-C	05 Mins.	05
Journal Record-	N.A	
(a)Physiology		5
(b)Biochemistry		5