

GARDEN CITY UNIVERSITY

SEMESTER- I

Bachelor of Physiotherapy

Title of the course: Human Anatomy I

COURSE CODE: 06ABPTR17111

**CREDITS: THEORY: 04
PRACTICAL:02**

Unit 1. Introduction

1.1 Histology: General, Histology study of the basic tissues of the body.

1.2 Microscope, Cell, Epithelium, Connective Tissue, Cartilage, Bone, Muscular tissue, Nerve Tissue – TS & LS.

1.3 Circulatory system – large sized artery, medium sized artery, large sized vein, lymphoid tissue.

1.4 Skin and its appendages.

Unit 2. Tissues, Bones, Muscles & Joints

2.1 Connective tissue classification.

2.2 Bones: composition, function, classification and types according to morphology and development.

2.3 Muscles: origin, insertion, action, nerve supply.

2.4 Joints: definition, classification, structure of fibrous joints, cartilaginous joints and synovial joints, blood supply and nerve supply of joints.

2.5 Musculoskeletal anatomy: Anatomical positions of body, axes, planes, common anatomical terminologies (Groove, tuberosity, trochanters).

Unit 3. Upper Extremity

3.1 Osteology: clavicle, scapula, Humerus, Radius, Ulna, Carpals, Meta carpals, Phalanges .

3.2 Joints: Shoulder girdle, shoulder joint, elbow joints, radio ulnar joint, wrist joint and joints of the hand. Arches of hand, skin of the palm and dorsum of hand.

3.3 Soft parts: Breast, pectoral region, axilla, front of arm, back of arm, cubital fossa, front of fore arm, back of fore arm, palm, dorsum of hand, muscles, nerves, blood vessels and lymphatic drainage of upper extremity.

Unit 4. Regional Anatomy – Thorax

4.1 Cardio – Vascular System Mediastinum: Divisions and contents Pericardium : Thoracic Wall: position, shape and parts of the heart; conducting System; blood Supply and nerve supply of the heart; names of blood vessels and their distribution in the – Region wise.

4.2 Respiratory system - Outline of respiratory passages: Pleura and lungs: position, parts, relations, blood supply and nerve supply; Lungs – emphasize on Broncho Pulmonary Segments.

4.3 Diaphragm: Origin, insertion, nerve supply and action, openings in the diaphragm.

4.4 Intercostal muscles and Accessory muscles of respiration: Origin, insertion, nerve supply and action.

Unit 5. Regional Anatomy – Abdomen

5.1 Peritoneum: Parietal peritoneum visceral peritoneum, , folds of peritoneum, Functions of peritoneum .

5.2 Large blood vessels of the gut.

5.3 Location, size, shape, features, blood supply, nerve supply and functions of the following: stomach, liver, spleen, pancreas, kidney, urinary bladder, intestines, gall bladder.

5.4 Pelvis: Position, shape, size, features, blood supply and nerve supply of the male and female reproductive system.

Title of the course: Human Physiology I

COURSE CODE: 06ABPTR17112

**CREDITS: THEORY: 04
PRACTICAL : 01**

Unit 1. General Physiology

1.1 Cell: Morphology. Organelles: their structure and functions. Transport mechanisms across the cell membrane, Body fluids: distribution, composition.

Unit 2. Blood

2.1 Introduction: Composition and functions of blood. Plasma: Composition, formation, functions. Plasma proteins.

2.2 RBC: count and its variations. Erythropoiesis- stages, factors regulating. Reticulo-endothelial system (in brief). Hemoglobin –structure, function and derivatives. Anemia (in detail), types of Jaundice. Blood indices, PCV, ESR. WBC: Classification. Morphology, functions, count, its variation of each. Immunity. Platelets: Morphology, functions, count, its variations.

2.3 Blood Groups: Landsteiner's law. Types, significance, determination, Erythroblastosis foetalis.

2.4 Blood Transfusion: Cross matching. Indications and complications. Hemostatic mechanisms: Blood coagulation–factors, mechanisms. Their disorders. Anticoagulants. Lymph: Composition, formation, circulation and functions.

Unit 3. Cardiovascular System

3.1 Introduction: Physiological anatomy and nerve supply of the heart and blood vessels. Organization of CVS. Cardiac muscles: structure. Ionic basis of action potential and pacemaker potential. Properties, conducting system: Components. Impulse conduction Cardiac Cycle: definition. Phases of cardiac cycle. Pressure and volume curves. Cardiac Output: definition. Normal value. Determinants. Stroke volume and its regulation. Regional Circulation: Coronary, Cerebral and Cutaneous circulation.

3.2 Heart sounds – causes, character. ECG: Definition. Different types of leads. Waves and their causes. P-R interval. Heart block. Heart rate and its regulation, variations.

3.3 Arterial Blood Pressure: definition. Normal values and its variations. Determinants. Peripheral resistance. Regulation of BP.

3.4 Arterial pulse. Shock: definition. Classification—causes and features.

Unit 4. Respiratory System

4.1 Introduction: Physiological anatomy – Pleura, tracheo-bronchial tree, alveolus, respiratory membrane and their nerve supply. Functions of respiratory system. Respiratory muscles.

4.2 Mechanics of breathing: Intrapleural and Intrapulmonary pressure changes during respiration. Chest expansion. Lung compliance: Normal value, pressure-volume curve, factors affecting compliance and its variations. Surfactant – Composition, production, functions, RDS. Spirometry: Lung volumes and capacities. Timed vital capacity and its clinical significance. Maximum ventilation volume. Respiratory minute volume. Dead Space: definition and types

4.3 Pulmonary Circulation. Ventilation-perfusion ratio and its importance.

4.4 Transport of respiratory gases: Diffusion across the respiratory membrane. Oxygen transport – different forms, oxygen-hemoglobin dissociation curve. Factors affecting it, P50. Carbon dioxide transport: Different forms, chloride shift, Haldane effect. Regulation of Respiration: Neural Regulation. Hering-breuer's reflex. Voluntary control. Chemical Regulation.

4.5 Disorders of Respiration: Dyspnoea, Orthopnoea, Hyperpnoea, hyperventilation, apnoea, tachypnea. Periodic breathing – types Artificial respiration. Hypoxia: Effects of hypoxia. Types of hypoxia. Hyperbaric oxygen therapy. Acclimatization Hypercapnoea. Asphyxia. Cyanosis – types and features. Dysbarism.

Unit 5: Nerve Muscle Physiology

5.1 Introduction: Resting membrane potential. Action potential – ionic basis and properties. Nerve: Structure and functions of neurons. Classification, Properties and impulse transmission of nerve fibers. Nerve injury – degeneration and regeneration. Neuroglia: types and functions.

5.2 Muscle: classification. Skeletal muscle: Structure. Neuromuscular junction: Structure. Neuromuscular transmission, myasthenia gravis. Excitation- Contraction coupling. Rigor mortis.

Unit 6. Digestive System

6.1 Introduction: Physiological anatomy and nerve supply of alimentary canal. Enteric nervous system. Salivary Secretion: Saliva: composition, functions, regulation. Mastication (in brief). Swallowing: definition, different stages, function.

6.2 Stomach: functions. Gastric juice: composition, function, regulation. Gastrin: production, function and regulation. Gastric motility. Gastric emptying. Vomiting.

Pancreatic Secretion: composition, function, regulation.

Liver: Functions of liver. Bile secretion: Composition, functions and regulation. Gall bladder functions.

Intestine: Succusentericus: Composition, function and regulation of secretion. Intestinal motility and its function and regulation.

6.3 Mechanism of Defecation.

Unit 7. Applied Physiology

More detailed study of the physiology and practical applications of the following selected topics with emphasis on aspects, which should help in understanding the nature and treatment of common clinical situations of interest in Physiotherapy.

7.1 Pulmonary Functions: introduction to chronic obstructive pulmonary disease and restrictive disease. Pulmonary function tests. Breath sounds.

7.2 Cardio Vascular Functions

- a) Blood flow through arteries, arterioles, capillaries, veins and venules.
- b) Circulation of Lymph, Oedema.
- c) Pathophysiology of syncope and heart failure.

7.3 Blood Functions

- a) Thalassemia Syndrome, Hemophilia, VWF.
- b) Anemia, Leukemia.
- c) Bone marrow transplant.

Title of the course: Biochemistry

COURSE CODE: 06ABPTR19113

CREDITS: Theory: 04

Unit 1. Nutrition

1.1 Introduction, importance of nutrition, calorific values, respiratory quotient – definition, and its significance, energy requirement of a person - basal metabolic rate: definition, normal values, factor affecting BMR, special dynamic action of food. Physical activities - energy expenditure for various activities. Calculation of energy requirement of a person. Balanced diet, recommended dietary allowance.

1.2 Role of carbohydrate in diet: Digestible carbohydrates and dietary fibers. Role of lipids in diet. Role of proteins in diet: Quality of proteins - biological value, net protein utilization, Nutritional aspects of proteins-essential and non- essential amino acids. Nitrogen balance .

1.3 Nutritional disorders.

Unit 2. Chemistry, metabolism, digestion and absorption of carbohydrate, lipid, protein

2.1 Carbohydrate: Definition, general classification with examples, glycosidic bond. Structures, composition, sources, properties and functions of monosaccharides, disaccharides, oligosaccharides and polysaccharides. Glycosaminoglycan (mucopolysaccharides) .

2.2 Introduction to glycolysis – aerobic and anaerobic, citric acid cycle, substrate level phosphorylation .Glycogen metabolism – glycogenesis, glycogenolysis, metabolic disorders of glycogen. Gluconeogenesis, Cori cycle, hormonal regulation of glucose .

2.3 Lipid: Definition, classification, properties and functions of fatty acids, triacylglycerol, phospholipids, cholesterol essential fatty acids and their importance. Lipoproteins: definition, classification, properties, sources and function, ketone bodies. Introduction to lipid metabolism, lipolysis, oxidation of fatty acids.

2.4 Lipogenesis - Denovo synthesis of fatty acids, chain elongation, desaturation, triacylglycerol synthesis, fat metabolism in adipose tissues. Ketone body metabolism: ketone body formation (ketogenesis), utilization (ketolysis), ketosis, Rothera's test .

2.5 Cholesterol metabolism: synthesis, degradation, cholesterol transport. Hypercholesterolemia and its effects (atherosclerosis and coronary heart diseases) hypocholesterolemic agents, common hyperlipoproteinemia, fatty liver .

2.6 Amino acid chemistry: definition, classification, peptide bonds. Peptides: definition,

biologically important peptides. Protein chemistry: definition, classification, functions of proteins. Catabolism of amino acids - introduction, transamination, deamination, fate of ammonia, transport of ammonia, urea cycle. Specialized products formed from amino acids - from glycine, arginine, methionine, phenylalanine and tyrosine.

2.7 General characteristics of digestion and absorption. Digestion and absorption of carbohydrates, proteins and lipids. Disorders of digestion and absorption – Lactose intolerance.

Unit 3. Nucleotide and nucleic acid chemistry

3.1 Nucleotide chemistry: nucleotide composition, functions of free nucleotides in body. Nucleic acid (DNA and RNA) chemistry: difference between DNA and RNA. Structure of DNA (Watson and Crick model), functions of DNA. Structure and functions of tRNA, rRNA, mRNA.

Unit 4. Vitamins and minerals

4.1 Vitamins: Definition, classification according to solubility. Individual vitamins – sources, coenzyme forms, functions, RDA, digestion, absorption and transport, deficiency and toxicity.

4.2 Minerals: Definition, sources, RDA, digestion, absorption, transport, excretion, functions, disorder of individual minerals - calcium, phosphate, iron, magnesium, fluoride, selenium, molybdenum, copper. Phosphate, calcium and iron in detail.

Unit 5. Cell biology, biochemistry of connective tissue and body fluid balance

5.1 Introduction to cell biology, cell structure, cell membrane structure and function, various types of absorption. Intracellular organelles and their functions, briefly on cytoskeleton.

5.2 Introduction to biochemistry of connective tissue, various connective tissue proteins: collagen, elastin - structure and associated disorders. Glycoproteins, proteoglycans.

5.3 Acid-base balance: acids, bases and buffers, pH. Buffer systems of the body, bicarbonate buffer system. Role of lungs and kidneys in acid base balance, acid base imbalance. Water balance: water distribution in the body, body water, water turnover, regulation of water balance: role of ADH and thirst centre. Electrolyte balance: osmolarity. Distribution of electrolytes, role of aldosterone, rennin angiotensin system and ANF.

Unit 6. Enzymes and Hormone action

6.1 Enzymes: Definition, active site, cofactor (coenzyme, activator), proenzyme. Classification

with examples, factors effecting enzyme activity, enzyme inhibition and significance, isoenzymes, diagnostic enzymology (clinical significance of enzymes).

6.2 Hormones: Definition, classification, mechanism of hormone action. Receptors, signal transduction, second messengers and cell function.

Unit 7. Clinical and applied biochemistry

7.1 Normal levels of blood and urine constituents, relevance of blood and urine levels of glucose, urea, uric acid, creatinine, calcium, phosphates, pH and bicarbonate. Liver function tests, renal function tests.

7.2 Interpret reports of various conditions including diabetic profile, cardiac profile, uric acid and gout.

Title of the course: Basic Principles of Biomechanics

COURSE CODE: 06ABPTR17114

**CREDITS: THEORY: 03
PRACTICAL: 01**

Unit 1. Concepts in Biomechanics: Kinematics and Kinetics

- 1.1 Types of Motion and Location of Motion.
- 1.2 Direction of Motion and Magnitude of Motion.
- 1.3 Definition of Forces and Force of Gravity and Reaction forces.
- 1.4 Equilibrium, Objects in Motion, Force of friction.
- 1.5 Concurrent force systems, Parallel force system.
- 1.6 Work and Moment arm of force.
- 1.7 Force components, Equilibrium of levers.

Unit 2. Joint Structure and Function

- 2.1 Joint design.
- 2.2 Materials used in human joints.
- 2.3 General properties of connective tissues.
- 2.4 Joint function.
- 2.5 Joint motion.

Unit 3. Muscle Structure and Function

- 3.1 Mobility and stability functions of muscles.
- 3.2 Elements of muscle structure.
- 3.3 Muscle function.
- 3.4 Effects of immobilization, injury and aging.

Unit 4. Biomechanics of Thorax, Chest wall, Temporo mandibular joint

- 4.1 General structure and function of Rib cage and the muscles associated with the rib cage.
- 4.2 Ventilatory motions: coordination and integration.

4.3 Developmental aspects of structure and function.

4.4 Changes in normal structure and function in relation to pregnancy, scoliosis and COPD.

4.5 General features, structure, function and dysfunction of Temporo Mandibular Joint.