INSTITUTE	**FACULTY OF PHYSIOTHERAPY**
PROGRAM	**BACHELOR OF PHYSIOTHERAPY**
SEMESTER	**1**
COURSE TITLE	**HUMAN PHYSIOLOGY**
COURSE CODE	**BPT-102**
COURSE CREDITS	**12**

Objective:

1. Describe key physiological terms, homeostasis, and normal transport functions of the cell membrane including membrane excitability.
2. Discuss the structure and functions of cells, tissues, and mechanisms of skeletal muscle contraction.
3. Explain the physiology and regulatory mechanisms of cardiovascular, respiratory, musculoskeletal, and nervous systems, including deviations relevant to physiotherapy.
4. Describe the physiological functions of digestive, renal, and reproductive systems.
5. Explain normal physiological changes and adaptations during exercise.
6. Demonstrate competencies in performing common physiological and anthropometric measurements.

Course Outcomes: After completion of this course, student will be able to:

1. Describe key physiological terms, homeostasis, and normal transport functions of the cell membrane including membrane excitability.
2. Discuss the structure and functions of cells, tissues, and mechanisms of skeletal muscle contraction.
3. Explain the physiology and regulatory mechanisms of cardiovascular, respiratory, musculoskeletal, and nervous systems, including deviations relevant to physiotherapy.
4. Describe the physiological functions of digestive, renal, and reproductive systems.
5. Explain normal physiological changes and adaptations during exercise.
6. Demonstrate competencies in performing common physiological and anthropometric measurements.

Pre-requisite of course:A basic understanding of human biology and functioning of systems is often a fundamental prerequisite.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
180	0	120	50	30	20	50	50

DR. ASHISH DHIRAJLAL KAKKAD (PT)
Digitally signed by (Name of HOD)

DR. ASHISH DHIRAJLAL KAKKAD (PT)
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Contents : Unit	Topics	Contact Hours
1	**General Physiology** Discuss Cell: Morphology. Organelles: their structure and functions And Transport Mechanisms across the cell membrane, Discuss Body fluids: Distribution, composition.	16
2	**Blood** Explain Composition and functions of blood and Plasma: , Describe RBC: count and its variations. Erythropoiesis- stages, factors regulating. Reticulo-endothelial system (in brief) , Describe Hemoglobin –structure, function and derivatives Anemia (in detail), types of Jaundice. Blood indices, PCV, ESR., Discuss WBC. Morphology, functions, count, its variation of each. Immunity, Describe Platelets: Morphology, functions, count, its variations , Discuss Hemostatic mechanisms: Blood coagulation–factors, mechanisms. Their disorders. Anticoagulants., Describe Blood Groups , Describe Cross matching. Indications and complications of Blood Transfusion, Discuss Composition, formation, circulation and functions of Lymph	16
3	**Cardiovascular system** Describe: Physiological anatomy and nerve supply of the heart and blood vessels. Organisation of CVS. Cardiac muscles: Structure. Ionic basis of action potential and pacemaker potential. Properties. , Explain Conducting system in terms of Components. Impulse conduction Cardiac Cycle: Definition. Phases of cardiac cycle. Pressure and volume curves. Heart sounds – causes, character. ECG: Definition. Different types of leads. Waves and their causes. P-R interval. Heart block. , Discuss Normal value. Determinants. Stroke volume and regulation of Cardiac Output: Heart rate and its regulation. Their variations , Describe Definition Normal values and its variations. Determinants. Peripheral resistance of Arterial Blood Pressure Regulation of BP Arterial Pulse, Discuss the causes and features of Shock, Discuss Regional Circulations such as Coronary, Cerebral and Cutaneous circulation., Discuss cardiovascular changes during exercise.	16

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Contents : Unit	Topics	Contact Hours
4	**Respiratory System** Discuss the functions of – Pleura, tracheo-bronchial tree, alveolus, respiratory membrane and their nerve supply. Functions of respiratory system. Respiratory muscles. , Explain the Mechanics of breathing in terms of Intra pleural and intrapulmonary pressure changes during respiration. Chest expansion. , Discuss Spirometry-Lung volumes and capacities. Timed vital capacity and its clinical significance. Maximum ventilation volume. Respiratory minute volume , Discuss Pulmonary Circulation. Ventilation-perfusion ratio and its importance, Explain Transport of respiratory gases: Diffusion across the respiratory membrane. Oxygen transport – Different forms, oxygen- hemoglobin dissociation curve. Factors affecting it. P50, Haldane and Bohr effect. Carbon dioxide transport: Different forms, chloride shift. , Explain Regulation of Respiration: Neural Regulation. Hering-breuer's reflex. Voluntary control. Chemical Regulation. , Discuss Hypoxia: Effects of hypoxia. Types of hypoxia. Hyperbaric oxygen therapy. Acclimatization Hypercapnia. Asphyxia. Cyanosis – types and features. Dysbarism, Explain Respiratory changes during exercise.	16
5	**Digestive System** Describe the functions of digestive system, Describe Salivary Secretion: Saliva: Composition. Functions. Regulation. Mastication, Discuss the stages and Function of Swallowing, Describe Stomach in terms of Functions. Gastric juice: Gland, composition, function, regulation. Gastrin: Production, function and regulation. Peptic ulcer. Gastric motility. Gastric emptying. Vomiting., Describe Pancreatic Secretion: Composition, production, function. Regulation. , Discuss the Functions of liver, Gall bladder And Composition, functions of bile.	16
6	**Renal System** Describe the functions of renal system. Nephrons – cortical and juxtamedullary. Juxta glomerular apparatus. Glomerular mem-brane. Renal blood flow and its regulation. Functions of kidneys. , Discuss the Mechanism of Urine Formation: Glomerular Filtration: Mechanism of glomerular filtration. GFR – normal value and factors affecting. Renal clearance. Inulin clearance. Creatinine clearance., Explain Tubular Reabsorption: Reabsorption of Na+, glucose, HCO3-, urea and water. Filtered load. Renal tubular transport maxi- mum. Glucose clearance: TmG. Renal threshold for glucose. , Discuss the Mechanism of concentrating and diluting the Urine: Counter-current mechanism. Regulation of water excretion. Diuresis. Diuretics. , Describe Mechanism of micturition. Cystometrogram. Atonic bladder, automatic bladder. , Describe Acid-Base balance	16

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Contents : Unit	Topics	Contact Hours
7	**Reproductive System** Discuss the physiology of reproductive organs. Sex determination. Sex differentiation. Disorder , Describe Male Reproductive System: Functions of testes. Pubertal changes in males. Spermatogenesis. Testosterone: action. Regulation of secretion. Semen., Describe Female Reproductive System: Functions of ovaries and uterus. Pubertal changes in females. Oogenesis. , Hormones: estrogen and progesterone-action. Regulation of secretion. , Describe Menstrual Cycle: Phases. Ovarian cycle. Uterine cycle. Hormonal basis. Menarche. Menopause. , Describe Pregnancy: Pregnancy tests. Physiological changes during pregnancy. Functions of placenta. Lactation. Contraception methods	16
8	**Endocrine System** Enumerate Major endocrine glands., Describe classification, mechanism of action and Functions of hormones, Describe Pituitary hormones: Secretory cells, action on target cells, and regulation of secretion of each hormone. , Describe Thyroid hormone and calcitonin: secretory cells, synthesis, storage, action and regulation of secretion. Disorders: Myxedema, Cretinism, Grave's disease, Describe Parathyroid hormones: secretory cell, action, regulation of secretion. Disorders: Hypoparathyroidism. Hyperthyroidism. Calcium metabolism and its regulation. , Describe Adrenal Medulla: Secretory cells, action, regulation of secretion of adrenaline and noradrenaline. Disorders: Phoechromocytoma. , Describe Endocrine Pancreas: Secretory cells, action, regulation secretion of insulin and glucagon. Glucose metabolism and its regulation. Disorder: Diabetes mellitus.	16
9	**Nerve Muscle Physiology** Discuss Resting membrane potential. Action potential – ionic basis and properties., Describe Structure and functions of neurons. Classification, Properties and impulse transmission of nerve fibers. Nerve injury – degeneration and regeneration., Describe Neuroglia: Types and functions, Classify Skeletal muscle Structure., Discuss the physiology of neuromuscular transmission , Discuss the applied aspects of neuromuscular disorders.	16

Contents : Unit	Topics	Contact Hours
10	**Nervous System** Describe Organisation of CNS – central and peripheral nervous system., Describe Functions of nervous system. Synapse: Functional anatomy, classification, Synaptic transmission. Properties , Discuss Sensory Mechanism: Sensory receptors: function, classification and properties. Sensory pathway: The ascending tracts, Posterior column tracts, lateral spinothalamic tract and the anterior spinothalamic tract – their origin, course, termination and functions. The trigeminal pathway, Discuss Sensory cortex. Somatic sensations: crude touch, fine touch tactile localization, tactile discrimination, stereo gnosis vibration sense,, Describe kinesthetic sensations. Pain sensation: mechanism of pain. Cutaneous pain slow and fast pain, hyperalgesia. Deep pain. Visceral pain – referred pain. , Describe Motor Cortex. Motor pathway: The descending tracts – pyramidal tracts, extrapyramidal tracts – origin, course, termination and functions. Upper motor neuron and lower motor neuron. Paralysis, monoplegia, paraplegia, hemiplegia and quadriplegia. , Describe Muscle tone – definition, and properties hypotonia, atonia and hypertonia. UMNL and LMNL , Discuss Spinal cord Lesions: Complete transection and Hemi section of the spinal cord., Describe Cerebellum: Functions. Cerebellar ataxia., Describe Posture and Equilibrium: Postural reflexes – spinal, medullary, midbrain and cerebral reflexes. , Describe Functions of Thalamus and Hypothalamus: Nuclei. Thalamic syndrome, Describe Reticular Formation and Limbic System: Components and Functions. , Describe Structures and functions of Basal Ganglia: Parkinson's disease , Describe Cerebral Cortex: Lobes. Brodmann's areas and their functions. Higher functions of cerebral cortex – learning, memory and speech., Describe Formation, composition, circulation and functions of CSF Lumbar puncture and its significance. Blood brain barrier. Hydrocephalus., Describe Features and actions of parasympathetic and sympathetic nervous system	18
11	**Physiology of Exercise – Explain the Effects of acute and chronic exercise on** Respiratory , Cardio vascular , Musculoskeletal system	18
Total Hours		**180**

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Practical** Practical classes include Hematology experiments, Clinical examinations, Amphibian chart, and Recommended demonstrations. , Recommended demonstrations include but are not limited to: Differentiate Blood cells Determine the blood cell counts,Determine Blood groups Calculate bleeding and clotting time Observe the procedures of common blood investigations Elicit superficial and deep tendon reflexes vii. Determine muscle tone viii. Interpret normal ECG wave pattern, Identify normal breath sound Differentiate Heart sounds including murmurs , Perform the following clinical examination procedure Body Temperature measurement Pulse rate Blood Pressure Oxygen saturation Respiratory rate	120
Total Hours		**120**

Textbook :

1 Textbook of Physiology, B.B. Anand and S.K. Manchanda, Tata McGraw-Hill Publishing Company Ltd., 1979

2 Human Physiology, Volume 1 & 2, C.C. Chatterjee, CBS Publishers & Distributors, 2022

3 Concise Medical Physiology, Sujit K. Chaudhuri, New Central Book Agency (P) Ltd., Calcutta, 2017

4 Principles of Anatomy and Physiology, Gerard J. Tortora and Sandra Reynolds Grabowski, HarperCollins College Publishers, 1993

5 Ghai's Textbook of Practical Physiology, C.L. Ghai, aypee Brothers Medical Publishers, 2024

References:

1 Textbook of Medical Physiology, Textbook of Medical Physiology, Arthur C. Guyton, W.B. Saunders (Mosby), 1956

2 Best & Taylor's Physiological Basis of Medical Practice, Best & Taylor's Physiological Basis of Medical Practice, Charles Herbert Best, Norman Burke Taylor, Williams & Wilkins, 1991

3 West's Respiratory Physiology: The Essentials, West's Respiratory Physiology: The Essentials, John B. West, Andrew M. Luks, Wolters Kluwer Health, 2020

4 Nunn and Lumb's Applied Respiratory Physiology, Nunn and Lumb's Applied Respiratory Physiology, Andrew B. Lumb, Caroline R. Thomas, Elsevier, 2021

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
0.00	0.00	35.00	35.00	30.00	0.00

Instructional Method:

1 Lecture
2 Tutorial
3 Demonstration using models including digital tools
4 Flipped class

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