COURSE	**FACULTY OF PHYSIOTHERAPY**
PROGRAM	**BACHELOR OF PHYSIOTHERAPY**
SEMESTER	**1**
COURSE TITLE	**PHYSIOLOGY**
COURSE CODE	**17PT0102**
COURSE CREDITS	**9**

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

1. Understand the contribution of various organs & systems in maintaining homeostasis and body functions.
2. To involve a detailed study of the physiology of the various systems of the body including functional physiology of the cell, blood, neuro-muscular, cardiovascular, and pulmonary systems, nervous system, special senses, excretory system, digestive system, reproductive system, and endocrine system at a microscopic and macroscopic level.
3. Understand the role of hormones, enzymes, and other different types of cells in the human body.
4. Understand how these separate systems interact to yield integrated physiological responses to challenges such as exercise, fasting, and ascent to high altitude, and how they can sometimes fail.
5. To relate the concept of human physiology in physiotherapy application including exercise physiology.

Pre-requisite of course:TO LEARN THE PHYSIOLOGY OF DIFFERENT SYSTEM

Teaching and Examination Scheme

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

Contents : Unit	Topics	Contact Hours
1	**GENERAL PHYSIOLOGY** cell: morphology , organelles: their structures and functions, transport mchanism across cell membrane, body fluids:distribution and composition	10
2	**BLOOD** Introduction: Composition and functions of blood., Plasma: Composition, formation, functions. Plasma proteins., RBC: count and its variations. Erythropoiesis-stages, factors regulating. Reticulo-endothelial system (in brief). Haemoglobin–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. Hemostatic mechanisms: Blood coagulation–factors, mechanisms. Their disorders Anticoagulants, Blood Groups: Landsteiner's law. Types,	10

	significance, determination, Erythroblastosis foetalis., Blood Transfusion: Cross matching. Indications and complications., Lymph: Composition, formation, circulation and functions.	
3	**CARDIOVASCULAR SYSTEM** 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. Heart sounds–causes, character. ECG: Definition, Different types of leads. Waves and their causes. P-R interval. Heart block., Cardiac Output: Definition. Normal value. Determinants. Stroke volume and its regulation. Heart rate and its regulation. Their variations. Cardiovascular reflex., Arterial Blood Pressure: Definition. Normal values and its variations. Determinants., Peripheral resistance. Regulation of BP., Hemorrhage and shock., Regional Circulation: Coronary, Cerebral and Cutaneous circulation., Cardio-vascular changes during exercise.	10
4	**RESPIRATORY SYSTEM** Introduction: Physiological anatomy–Pleura, tracheo-bronchial tree, alveolus, Respiratory membrane and their nerve supply. Dead Space: Types and their definition. Functions of respiratory system. Respiratory muscles., Mechanics of breathing: Intra-pleural and Intra-pulmonary 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, PEFR, Maximum ventilation volume, Respiratory minute volume., Pulmonary Circulation. Ventilation-perfusion ratio and its importance., Transport of respiratory gases: Diffusion across the respiratory membrane. Oxygen transport– Different forms, oxygen –haemoglobin dissociation curve. Factors affecting it., Regulation of Respiration: Neural Regulation. Hering-breuer's reflex. Voluntary control. Chemical Regulation., Hypoxia: Effects of hypoxia. Types of hypoxia. Hyperbaric oxygen therapy. Acclimatization Hype-rcapnoea, Asphyxia, Cyanosis–types and features., Disorders of Respiration: Dyspnoea, Orthopnoea. Hy, Respiratory changes during exercise.	10
5	**DIGESTIVE SYSTEM** 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., Stomach: Functions. Gastric juice: Gland, composition, function, regulation. Gastrin: Production, function and regulation. Peptic ulcer. Gastric motility. Gastric emptying. Vomiting. Pancreatic Secretion: Composition, production, function. Regulation., Stomach: Functions. Gastric juice: Gland, composition, function, regulation. Gastrin: Production, function and regulation. Peptic ulcer. Gastric motility. Gastric emptying. Vomiting. Pancreatic Secretion: Composition, production, function. Regulation., Liver: Functions of liver. Bile secretion: Composition, functions and regulation. Gall bladder: Functions., Intestine: Succus entericus: Composition, function and regulation of secretion. Intestinal motility and its function and regulation., Mechanism of Defecation.	10

6	**NUTRITION** Digestion, absorption and metabolism of carbohydrates., Digestion, absorption and metabolism of fats., Digestion, absorption and metabolism of proteins., Vitamins, sources, functions and resources., Balanced diet in different age groups and occupation.	10
7	**ENDOCRINE SYSTEM** Introduction: Hormone. Classification, mechanism of action, function of hormones., Pituitary Gland: Anterior Pituitary and Posterior Pituitary hormones: Secretory cells action on target cells, regulation of each hormone. Disorders: gigantism, acromegaly, dwarfism, diabetes insipidus. Physiology of growth and development hormonal and other influences. Pituitary-hypothalamus relationship., Thyroid Gland: Thyroid hormone and calcitonin: secretory cells, synthesis, storage action and regulation iof secretion. Disorders- myxedema, cretinism, grave's disease., Parathyroid hormones: secretory cell, regulation of secretion. Disorders- hypothyroidism and hyperthyroidism., Adrenal Medulla: Secretory cells, action, regulation of secretion of adrenaline and noradrenaline., Adrenal Gland: Adrenal Cortex: Secretory cells, synthesis, action, regulation of secretion of aldosterone, cortisol and androgens., Endocrine Pancreas: Secretory cells, action, regulation of secretion of insulin and glucagon. Glucose metabolism and its regulation. Disorders- diabetes mellitus., Calcitrol, thymus and pineal gland (in brief)	10
8	**REPRODUCTIVE SYSTEM** Introduction: Physiological anatomy reproductive organs. Sex determination. Sex differentiation. Disorder, Male Reproductive System: Functions of testes. Pubertal changes in males. Spermatogenesis. Testosterone: action. Regulation of secretion. Semen., Female Reproductive System: Functions of ovaries and uterus. Pubertal changes in females. Oogenesis. Hormones: estrogen and progesterone-action, Menstrual Cycle: Phases. Ovarian cycle. Uterine cycle. Hormonal basis. Menarche. Menopause., Pregnancy: Pregnancy tests. Physiological changes during pregnancy. Functions of placenta. Lactation. Contraception method.	10
9	**EXCRETORY SYSTEM** introduction: Physiological anatomy. Nephrons–cortical and juxtamedullary. Juxtaglomerular apparatus. Renal blood flow and its regulation. Functions of kidneys., Mechanism of Urine Formation: Glomerular Filtration: Mechanism of glomerular filtration. GFR–normal value and factors affecting. Renal clearance. Creatinine clearance., Mechanism of concentrating and diluting the Urine: Counter-current mechanism. Regulation of water excretion. Diuresis. Diuretics., Mechanism of concentrating and diluting the Urine: Counter-current mechanism. Regulation of water excretion. Diuresis. Diuretics., Acid-Base balance (very brief), Artificial Kidney: Principle of hemodialysis., Skin and temperature regulation	10
10	**NEUROMUSCULAR PHYSIOLOGY** Structure of neuron, membrane potential and generation of action potential, nerve impulse conduction, saltatory conduction., Neuromuscular junction and drugs affecting on it, myasthenia gravis, lambert eaton syndrome., Degeneration and regeneration., Types of muscles and their gross structures., Strength duration curve, stimulus and chronaxie rheobase., Structure of sarcomere-basis of muscle contraction, starlings law, changes during muscle	10

	contraction., Electrical- biphasic and mono-phasic action potential., Isometric and isotonic contractions. Chemical, thermal and physical changes., Motor unit and its properties, Nature of voluntary contraction. Fatigue.	
11	**NERVOUS SYSTEM** Introduction: Organization of CNS–central and peripheral nervous system. Functions of nervous system., Synapse: Functional anatomy, classification, Synaptic transmission., Sensory Mechanism: Sensory receptors: function, classification and properties. Sensory pathway: The ascending tracts–Posterior column tracts, lateral spino-thalamic tract and the anterior spino- thalamic tract–their origin, course, termination and functions. The trigeminal pathway.Sensory cortex.Somatic sensations: crude touch, fine touch, tactile localization, tactile discrimination, stereognosis, vibration sense, kinesthetic sensations.Pain sensation: mechanism of pain. Cutaneous pain–slow and fast pain, hyperalgesia, deep pain, Visceral pain, referred pain. Gate control theory of pain. Tabes dorsalis, sensoryataxia, Motor Mechanism: Motor Cortex. Motor pathway: The descending tracts– pyramidal tracts, extrapyramidal tracts–origin, course, termination and functions. Upper motor neuron and lower motor neuron, Reflex Action: Monosynaptic and polysynaptic reflexes, superficial reflexes, deep reflexes. Stretch reflex–structure of muscle spindle, pathway, higher control and functions. Inverse stretch reflex. Muscle tone–definition, and properties hypotonia, atonia and hypertonia. UMNL and LMNL., Spinal cord Lesions: Complete transaction and Hemisection of the spinalcord., Cerebellum: Functions. Cerebellar ataxia., Posture and Equilibrium: Postural reflexes–spinal, medullary, midbrain and cerebral reflexes, Thalamus and Hypothalamus: Nuclei, functions. Thalamic syndrome., Reticular Formation and Limbic System: Components and Functions. Basal Ganglia: Structures included and functions. Parkinson's disease.	10
12	**SPECIAL SENSES** Vision: Introduction: Functional anatomy of eyeball. Functions of cornea, iris, Pupil, aqueous humor–glaucoma, lens–cataract, vitreous humor, rods and cones. Photopic vision. Scotopic vision., Visual Pathway and the effects of lesions., Refractive Errors: myopia, hypermetropia, presbyopia and astigmatism, Visual Reflexes: Accommodation, Pupillary and Light. Visual acuity and Visual field, Light adaptation. Dark adaptation. Color vision–color blindness. Nyctalopia, Audition: Physiological anatomy of the ear. Functions of external ear, middle ear and inner ear. Structure of Cochlea and organ of corti. Auditory pathway. Types of Deafness. Tests for hearing. Audiometry., Taste: Taste buds. Primary tastes. Gustatory pathway., Smell: Olfactory membrane. Olfactory pathway, Vestibular Apparatus: Crista ampullaris and macula. Functions. Disorders.	10
Total Hours		120

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**NERVE MUSCLE PHYSIOLOGY** nerve muscle physiology, gastro-cnemius muscle sciatic nerve prep,	20

	action potential etc, effect of temperature on s.m.c, Effect of Load on Skeletal Muscle Contraction	
2	**CARDIO-VASCULAR SYSTEM** ECG, BP, radial pulse, Spirometry/Respiratory Efficiency Test, Examination of CVS and Respiratory system	30
3	**INSTRUMENTS** recording body temperature	10
4	**HAEMATOLOGY** Total red Cell Count, Total red Cell Count, Cells in Peripheral blood film, Differential WBC count, arneth count, absolute count, blood grouping, bleeding time/clotting time, blood PCV,ESR	30
5	**CENTRAL NERVOUS SYSTEM** Sensory examination, motor examination, cranial nerve examination	30
Total Hours		120

References:

Textbooks:

1. Human Physiology, Sembulingam: 4th Edition, Jaypee Brothers.

Reference books:

1. Concise Medical Physiology by Chaudhari, 4thEdition: New Central Book Agency.
2. Textbook of Medical Physiology by Guyton &Hall, 11thedition; Elsevier Publication.
3. Human Physiology, Chatterjee. Vol: 1 & 2: 10th Edition: Medical & Allied Agency.
4. Practical Physiology by Vijaya Joshi: Vora Medical Publication.
5. A Textbook of Practical Physiology, Ghai C L, Jaypee Brothers.
6. Medical Physiology for undergraduate student: Indu Khurana Elsevier Publication