

Course Outcome (CO) and Program Outcome (PO) Theory

Course Outcome (CO)		Programme Outcome (PO)						
Topics	Lectures	PO1 Clinician	PO2 Leader and member	PO3 Commu nicator	PO4 Lifelong learner	PO5 Professional	PO6 Critical Thinker	PO7 Researcher
General Physiology (02 hours)	Introduction to general physiology. Functional organization of the human body, cell physiology, Homeostasis. (External and internal environment)	1	1	2	3	2	3	3
	Transport across the cell membrane	3	1	2	3	3	3	3
Heamtology (04 hours)	Blood: Composition, Function Plasma: composition, formation, functions Plasma proteins Lymph: Composition, formation, circulation and functions	3	1	2	3	2	3	3
	Immunity : antibody structure & types ,antigen antibody reactions.							
	W.B.C.: Types, Morphology, Function, Normal count and Differential W.B.C count, Physiological variations	3	1	2	3	2	3	3
	Blood Groups: Landsteiner's law. Types, significance, determination, (Rh system, Blood Transfusion, Indications storage of blood and changes during storage , transfusion reactions)	3	1	2	3	2	3	3

	Erythrocytes: Morphology functions, Normal count, Physiological variations in normal count and Anaemia and Polycythemia, Erythropoiesis, (Types of Jaundice) Haemoglobin: Functions, normal values, Anemia	3	1	2	3	2	3	3
	Platelets & Haemostatic mechanisms, anticoagulants	3	1	2	3	2	3	3
Nerve Muscle Physiology (08 hours)	Introduction to nerve muscle physiology, resting membrane potential: Definition, production and maintenance , method of measurement , significance	3	2	2	3	2	3	3
	Action potential: Definition, phases, depolarization, repolarization ,ionic basis depolarization, and repolarization, production and propagation of A.P, [Compound action potential]	3	2	1	3	2	3	3
	Nerve: Structure and functions of neurons, Classification, Properties and impulse transmission of nerve fibers, properties of nerve fibers,	3	2	1	3	2	3	3
	Classification and structure of Skeletal muscle, Electron microscopic Structure, muscles proteins, sarcoplasmic tubular system : concept of sarcoplasmic triads and their function, Properties of skeletal muscles, Energetics : fuel used by skeletal muscles at rest & in exercise, metabolic pathways involved to yield ATP	3	2	2	3	2	3	3

	[Motor unit: Factors affecting development of tension in the muscle number of motor units contracting ,type of muscle , number of muscle fibers in each unit activated, supraspinal influences , length tension relationship frequency of stimulation , duration of summation ,load ,type of contraction chemical composition of muscle fibers]	3	2	2	3	3	3	3
	Smooth muscle –structure , distribution, types molecular mechanism of contraction properties , regulation & disorders	3	2	2	3	3	3	3
	Neuromuscular transmission: Physiologic anatomy Neuromuscular blocking, clinical significance - myasthenia gravis,	3	2	2	3	3	3	3
	Molecular basis of skeletal muscles: contraction, Excitation- Contraction coupling. (Strength duration curve – chronaxie & factors affecting it)	3	2	2	3	3	3	3
	Wallerian degeneration and regeneration of nerve fibers, (Oxygen debt: definition, types (lactic, alactic) incurring of debt repaying the debt, significance)	3	2	2	3	1	3	3
Respiratory system (07 Hours)	Introduction and functions of respiratory system: Physiological anatomy & Functions of respiratory system	3	2	2	3	3	3	3

<p>Mechanics of breathing: Mechanics of respiration: Ventilation: Inspiratory & expiratory Muscles, Intrapleural pressure.</p> <p>Lung and thoracic compliance, factors affecting compliance, work of breathing, surface tension forces and role of Surfactant. Airway resistance & elastic resistance.</p>	3	2	2	3	3	3	3
<p>Spirometry: Lung volumes and capacities: measurement & physiological significance. Tidal volume, vital capacity, forced vital capacity.</p> <p>Pulmonary ventilation, alveolar ventilation, alveolar dead space. – applied aspect, maximum breathing capacity and breathing reserve. (Method of determination of dead space, residual volume, functional residual capacity)</p>	3	2	2	3	3	3	3
<p>Pulmonary circulation and V/P/ ratio Transport of gases across respiratory membrane and O₂ dissociation curve : Diffusion of gases, structure of alveolo-capillary membrane, exchange of respiratory gases at alveolo- capillary membrane, factors affecting diffusion</p> <p>Transport of oxygen & carbon Dioxide, [Hypoxia: Effects of hypoxia. Types of hypoxia.</p> <p>Pulmonary circulation –</p>	3	2	2	3	3	3	3

	characteristics , ventilation perfusion ratio, respiratory adjustment in exercise], (Oxygen therapy : indication , hazards of hyperbaric oxygen and use)							
	Regulation of respiration: Control of breathing: neural control & chemical control, [Artificial respirations], (Acclimatization at high altitudes)	3	2	2	3	3	3	3
Cardiovascular System (09 Hours)	General organization and Introduction function and importance of system, Structure of heart ,nerve supply, histology, contractile and conductive fibers ,	3	2	2	3	3	3	3
	Action Potential and pace maker potential: Properties of cardiac muscle: excitability contractility, conductivity, autorhythmicity, all or none law, long refractory period. Generation and conduction of cardiac impulse, (Pacemaker potential , action potential of cardiac muscle)	3	2	2	3	3	3	3
	Cardiac cycle: pressure–volume changes, heart sound and their clinical significance, correlation of pressure, volume, ECG, heart sound in cardiac cycle	3	2	2	3	3	3	3

<p>Definition. Lead arrangement & normal waves & their significance with reference to lead II</p> <p>Definition. ECG: Lead arrangement & normal waves & their significance with Reference to lead II, (physiological, pharmacological and clinical significance)</p> <p>E.C.G. - electrical axis of heart, heart blocks and arrhythmias, ischemia, infarctions</p>	3	2	2	3	3	3	3
<p>Cardiac output: Definition. Normal value. Determinants. Stroke volume and its regulation.</p> <p>Factor affecting cardiac output details measurement - principles.</p>	3	2	2	3	3	3	3
<p>Arterial Blood pressure: Blood Pressure: Definition. Normal values and its variations. Determinants. Short term and long term Regulation of BP in detail.</p> <p>Adaptation of cardiopulmonary system to various grades of exercise. Heart rate & its regulation</p>	3	2	2	3	3	3	3
<p>Haemodynamics – definition. Blood flow, resistance</p> <p>Lymphatic system: anatomy, formation and composition of lymph, function of lymphatic system, lymph flow and factors affecting it. Patho physiology of oedema</p>	3	2	2	3	3	3	3

	Shock: Hemorrhagic shock – stage and compensatory mechanisms , effect on body, physiological basis of treatment in brief	3	2	2	3	3	3	3
Exercise Physiology (01 hours)	Effects of acute and chronic exercise: Effects of acute and chronic exercise on - Muscle strength, power and endurance - Basal Metabolic Rate/Respiratory Quotient - Cardio Vascular System - Respiratory System - Body fluids and electrolytes, [Effect of gravity,altitude,acceleration,presure on physical parameters], (Effects of acute and chronic exercise on Oxygen transport Hormonal and metabolic effect)	3	2	2	3	3	3	3
Central Nervous System (15 Hours)	Introduction, Organization of CNS: Organization of CNS, PNS, Functions of nervous system, [Neurotransmitters – details]	3	2	2	3	3	3	3
	Synapse: Definition, physiological anatomy, sequence of events of synaptic transmission, properties, (state the property & its significance), significance of synaptic transmission, applied aspect, [susceptibility of synapse to hypoxia drugs etc]	3	2	2	3	3	3	3
	Sensations: different modalities, classification with examples and significance - sensation of touch, pain proprioception: details of each,	3	2	2	3	3	3	3

Receptors: Definition, classification (basis of each classification with Example), properties (state each property with underlying mechanism & significance	3	2	2	3	3	3	3
Reflexes: definition, classification (basis of classification with example), reflex arc & its components, properties (state each property with basis & importance) Stretch reflex – definition, muscle spindle (details with innervations, role of gamma motor neurons) role of supra spinal control – in brief, functions of stretch reflex (regulation of muscle tone) inverse stretch reflex. Polysynaptic reflexes: withdrawal reflex.	3	2	2	3	3	3	3
Tracts: Ascending & descending tracts: details of each tracts – (situation & extent in spinal cord, origin, course & termination, collaterals, somatotopic arrangement, functions, applied aspect, tests) Ascending tracts: Basic plan of somatosensory pathway for conscious Sensation, pathway from head, face region.	3	2	2	3	3	3	3
Tracts: Descending tracts: Pyramidal tracts – details., extra pyramidal tracts, Differences between UMN & LMN lesions	3	2	2	3	3	3	3

<p>[Physiology of pain: Mechanisms of referred pain, differences between superficial & deep pain, central analgesia system, supraspinal control of stretch reflex – details.]</p>	3	2	2	3	3	3	3
<p>Sections at various levels in CNS: Spinal transection – spinal animal. Complete – 3 stages – spinal shock, stage of recovery, stage of reflex failure – details of each stage. Incomplete transection, Hemisection, [Thalamus - applied aspects – effects of lesions. Hypothalamus - applied aspects – effects of lesions] Low midbrain section – decerebrate animal: Decerebrate rigidity. (Classical & ischemic with mechanisms, characteristics features, physiological significance) High midbrain section – High decerebrate animal. Thalamic or Decorticate animal.]</p>	3	2	2	3	3	3	3
<p>Reticular formation: Introduction, anatomy in brief, functional divisions, [Effects of lesion]</p>	3	2	2	3	3	3	3
<p>Tone posture & equilibrium: Definition, classification of postural reflexes, Details of each reflex and its function. Regulation of posture integrating centers at various levels of</p>	3	2	2	3	3	3	3

CNS								
Vestibular apparatus: Physiologic anatomy, mode of function of utricle & saccule and semicircular canals, vestibulo-ocular & vestibulo-spinal reflexes	3	2	2	3	3	3	3	
Cerebellum: Introduction, functional classification, intracortical circuit, deep cerebellar nuclei, connections of different lobes, functions of cerebellum, cerebellar function tests, effects of lesion in brief, (Cerebellum – Embryology, evolution, effects of stimulation & ablation. Ataxias Speech – aphasias. Experimental studies – effects of stimulation & ablation. Sleep, wakefulness – effects of sleep deprivation, disorders. EEG – Method of recording, abnormal patterns.)	3	2	2	3	3	3	3	
Basal ganglia: Introduction, classification of nuclei, connections, intracortical circuits, functions, lesions - Parkinsonism	3	2	2	3	3	3	3	
Cerebral cortex: Gross anatomy & divisions, concept of Brodmann's mapping with diagram. Higher functions of cerebral cortex-learning, memory and speech., (Cerebral cortex – effects of stimulation & ablation in	3	2	2	3	3	3	3	

	different regions)							
	CSF: Introduction, composition, normal CSF pressure, formation & circulation, functions, applied aspect – brief, blood brain barrier, blood CSF barrier	3	2	2	3	3	3	3
	Autonomic Nervous System: Organization and functions of Parasympathetic & Sympathetic and their control.	3	2	2	3	3	3	3
Special Senses (03Hours)	Eye: Functional anatomy of eye ball. visual pathway, movements Of eyeball, [Refractive Errors], (Optics of eye)							
	Ear, Taste and Smell: Ear:. Functions of external ear, middle ear and inner ear. Physiology of hearing with auditory pathway. Taste: functional anatomy of taste buds, different taste modalities , pathway, factors affecting taste sensation Smell: function anatomy of receptors, primary olfactory sensations. Olfactory Pathway, factors affecting smell sensation, [Disorders of hearing , taste, Smell							
	Theories and electrophysiology of hearing], (Types of deafness)	3	2	2	3	3	3	3
	Vestibular apparatus : [Disorders of Vestibular apparatus]	3	2	2	3	3	3	3

Endocrine System (08 Hours)	Introduction, classification, mechanism of action And function: Introduction: Major endocrine glands							
	Anterior Pituitary and Posterior Pituitary hormones: Function, regulation, disorders. (ADH, Oxytocin) , [Hormones: classification, mechanism of action and function of hormones, endocrine function of hypothalamus- releasing hormones, mechanism of hormone action]	3	2	2	3	3	3	3
	Adrenal Gland and cortex : Adrenal Cortex & Adrenal Medulla: hormone secretion functions regulation , disorders	3	2	2	3	3	3	3
	Thyroid Gland: Thyroid Gland: Thyroid hormone synthesis, fate, function regulation, disorder Calcium metabolism and its regulation.	3	2	2	3	3	3	3
	Parathyroid gland and Calcium metabolism regulation : Parathyroid hormones: synthesis, function regulation, disorder-tetany, secretory cell, action	3	2	2	3	3	3	3
	Pancreas: Pancreas: : hormone secretion functions regulation , disorders,	3	2	2	3	3	3	3
	Glucose metabolism and Diabetes: Glucose metabolism and its regulation. Disorder: Diabetes mellitus, (Glucose metabolism and regulation, radio immune assays.)	3	2	2	3	3	3	3

	Introduction and male Reproductive system : Introduction and male Reproductive system, (Sex chromosomes, sex determination, sex differentiation, development of genitals and gonads)	3	2	2	3	3	3	3
	Female Reproductive system Oogenesis Menstrual Cycle Pregnancy and Contraception: Female Reproductive system [Puberty and menopause, family planning]	3	2	2	3	3	3	3
Renal System (05 Hours)	Introduction, Renal blood flow and functions of kidneys, Nephrons and JGA , [Concept of clearance]	3	2	2	3	3	3	3
	Mechanism of urine formation,	3	2	2	3	3	3	3
	Micturition, [perineal muscles], (Disorders of micturition, artificial kidney)	3	2	2	3	3	3	3
	Skin and temperature regulation	3	2	2	3	3	3	3
Digestive System (04Hours)	General Introduction: and organizational plan, innervations and blood supply	3	2	2	3	3	3	3
	Saliva and deglutition, Salivary Secretion: Saliva: Composition. Functions. Regulation	3	2	2	3	3	3	3
	Stomach and its functions: Gastric secretion: functional anatomy, function of stomach, composition of gastric juice cellular mechanism of gastric secretion, phases and regulation of gastric secretion., [Gastrointestinal hormones, digestion	3	2	2	3	3	3	3

	and absorption] Gastrointestinal motility: mastication & deglutition, gastric motility,							
	Functions of intestines and pancreas: Pancreatic Secretion: Composition, production, functions. Intestinal secretions: Structure innervations Composition, mechanism of secretion of small intestinal juice & regulation of secretion, (Path physiology of GIT, effects of vagotomy, abnormal gastric motility, vomiting.)	3	2	2	3	3	3	3
	Liver and Gall bladder: microscopic structure , functions of liver , composition of bile , cellular mechanism of bile formation , enterohepatic circulation of bile salts	3	2	2	3	3	3	3
	Mechanism of defaecation: intestinal motility and defecation	3	2	2	3	3	3	3
	Concept of balanced diet Factors affecting caloric requirements Requirements of various nutrients, sources, daily needs.							
Nutrition (01 Hour)	Nutrition under special conditions – pregnancy, lactation, growing child	3	2	2	3	3	3	3
Physiology of Ageing (01 Hour)	Physiology of Ageing with respect to all systems	3	2	2	3	3	3	3