FACULTY OF PHYSIOTHERAPY

First Year Bachelor of Physiotherapy

In Effect from Academic Year 2023-24

Branch Name:	**BACHELOR OF PHYSIOTHERAPY**
Program Code:	**PT101**
Course Title:	**HUMAN PHYSIOLOGY & BIOCHEMISTRY**
Course Code:	**2PT1010102**
Pre-requisite Course:	**- NONE -**

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)			Credit	Evaluation Scheme (Marks)					
				Theory(T)		Practical(P)		Total Marks	
Lecture	Tutorial	Practical		University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	Theory	Practical
5 (4+1)	-	4*	14 (12+2)	80 (55+25)	20 (15+ 5)	80*	20*	100	100*

*Practical only for Human Physiology

HUMAN PHYSIOLOGY

COURSE OUTCOMES:

At the end of the course the candidate will be able to

1. Acquire the knowledge of functions of various systems of human body.
2. Understand the role of hormones, enzymes, and other different types of cells of Human body.

Subject Contents:

Sr. No.	Topic	Total Hours
1	**General Physiology:** a) General Principles of Biophysics b) Body Fluid compartments.	20
2	**Blood:** a) Composition of blood, Plasma, protein formation and their function. b) Structure, formation and functions of R.B.C c) Structure, formation and functions W.B.Cs. and Platelets. d) Coagulation and its effects on bleeding, clotting time. e) Blood groups and their significance, Rh. factor. f) Reticulo-Endothelial system, jaundice, structure and functions of spleen. g) Hemoglobin and E.S.R	30
3	**Cardiovascular System:** a) Structure, properties of heart muscle and nerve supply of heart, Structure and function of arteries, arterioles, capillaries and veins b) Cardiac cycle and heart sounds. c) Cardiac output measurement & affecting factors d) Heart rate and its regulation, cardio vascular reflexes. e) Blood pressure, its regulations and physiological variations. f) Peripheral resistance, Factors controlling, Role in B.P. g) Hemorrhage. h) Changes in muscular exercise.	30

4	**Respiratory System:** a) Mechanism of respiration, Intra-pleural and intra pulmonary pressure. b) Lung volumes and capacities. c) O2 and CO2 carriage and their exchange in tissues and lungs. d) Nervous chemical regulation of respiration - Respiratory Centres. Respiratory states - anoxia, asphyxia, Cyanosis, Acclimatization	30
5	**Digestive System:** a) General outline and salivary digestion b) Gastric secretion and its mechanism of secretion and functions. c) Digestion, absorption and metabolism of proteins. d) Structure, Secretions and Functions of Livers.	10
6	**Nutrition:** a) Digestion, absorption and metabolism of carbohydrates. b) Digestion, absorption and metabolism of fats. c) Digestion, absorption and metabolism of proteins. d) Vitamins, sources, functions and resources. e) Balanced diet in different age groups and occupation.	10
7	**Endocrines:** a) Anterior Pituitary. b) Posterior Pituitary and parathyroid. c) Thyroid. d) Adrenal Cortex e) Adrenal Medulla, thymus. f) Pancreas and Blood sugar regulation.	10
8	**Reproductive System:** a) Sex determination and development, puberty, b) Male sex hormones and their functions, spermatogenesis. c) Female sex hormones and formation of urine, G.F.R. and Tubular functions. d) Pregnancy, functions of placenta and lactation	10
9	**Excretory System:** a) Gross and minute structure of kidney and features of renal circulation. b) Mechanism of formation of urine, G.F.R. and Tubular function. c) Renal function tests. d) Physiology of micturition	10
10	**Neuro Muscular Physiology:** **10.1 Muscle and Nerve:** a) Structure of neurones, membrane potential and generation of action potential. b) Nerve impulse conduction, saltatory conduction. c) Nerve muscular junction and drugs acting on it - Myasthenia. d) Degeneration and regeneration in peripheral nerves including Wallerian degeneration **10.2 Muscle:** a) Type of muscles and their gross structure, stimulus, chronaxie, strength duration curve. b) Structure of Sarcomere - basis of muscle contraction, Starlings law, changes during muscle contraction. c) Electrical - Biphasic and monophasic action potentials. d) Chemical, Thermal and Physical changes, isometric and isotonic contraction. e) Motor units and its properties, clonus, tetanus, all or none law, beneficial effect.	69

	f) Nature of voluntary contraction, fatigue.	
11	**Nervous System:** a) Types and properties of receptors, types of sensations b) Structure of synapse, reflex arc and its properties, occlusion, summation, sub minimal fringe etc. c) Tracts of spinal cord. d) Descending tracts, Pyramidal and Extrapyramidal. e) Hemi section and complete section of spinal cord. Upper and lower motor neuron paralysis. f) Cerebral cortex, areas and functions - E.E.G. g) Structure - connections and function of cerebellum. h) Basal ganglia and thalamus, connections and functions. i) Reticular formation, tone, posture and equilibrium. j) Autonomic Nervous system.	65
12	**Special Senses**: a) Broad features of eye, errors of refraction, lesions of visual pathways. b) Speech and its disorders. c) Ear and vestibular apparatus.	10

Practical & Demonstrations:

Sr.No.	**Topic**
Nerve Muscle physiology	
1	Gastrocnemius Muscle-Sciatic Nerve Prep
2	Action Potential etc.
3	Effect of Temperature on S.M.C
4	Effect of Load on Skeletal Muscle Contraction
Cardio-Vascular System	
5	Graph
6	BP
7	Radial Pulse
8	Spirometry/Respiratory Efficiency Test
Instruments	
Recording Body Temperature	
Haematology	
9	Total red Cell Count
10	Total White Blood Count
11	Cells in Peripheral blood film
12	Differential WBC count
13	Absolute count, Arneth count
14	Blood grouping Bleeding time/Clotting Time, Blood ,PCV, ESR
Central Nervous System	
15	Examination of sensory function
16	Examination of motor functions
17	Examination of reflexes
18	Cranial nerves I, III, IV, V, VI
19	Cranial nerve II
20	Cranial nerves VII, VIII, IX, X, XII

List of References:

Text Books:

1. K Sembulingam - Essentials of Medical Physiology- 8th Edition.
2. Ross & Wilson -Anatomy & Physiology- 14th Edition.

Reference Books:

1. Guyton and Hall Textbook of Medical Physiology, South Asian - Edition.
2. Lange Ganong's Review of Medical Physiology, Barrett, Kim - 25th Edition.
3. Textbook of Medical Physiology, Khurana, Indu - 2nd Edition.
4. Manual of Practical Physiology for MBBS, A.K. Jain - 5th & 6th Edition.

List of Open Source Software/learning website:

- k-hub.in e library|A single platform for all e resources (K-hub, E- Resource)
  - User Name- KB4605VNG
  - Password- BL@69BX!
- knowledgegainer.delnet.in (Delnet , E-Resource)
  - User Name- gjspum
  - Password- spu10924

BIOCHEMISTRY

COURSE OUTCOMES:

At the end of the course the candidate will be able to

1. Describe the structure and function of the cell in brief.
2. Describe basal metabolic rate and factors affecting basal metabolic rate.
3. Describe nutritional aspects of carbohydrates, lipids, proteins, vitamins, and minerals and their metabolism.
4. Understand the basics and clinical aspects of enzymes and regulation of enzymatic activity and diagnostic use of enzymes.
5. Describe in detail the biochemical aspects of muscle contraction.
6. Understand to apply clinical biochemistry tests like blood, liver, and renal functions and their importance in body functions.

Subject Contents:

Sr. No.	Topic	Total Hours
1	**Cell Biology** a) Membrane structure and function. b) Function of intracellular organs in brief	03
2	**Carbohydrates** a) Chemistry, definition, classification with examples b) Function of mucopolysaccharide (in detail) c) Reducing properties of sugars of clinical and diagnostic importance (e.g. Benedict's test, Barfoed's test, etc) d) Metabolism, digestion and absorption of carbohydrates, glycosis – aerobic and anaerobic, energetics and regulation. e) Kerbs's cycle, its energetics regulation and role of TCA cycle	05

	f) Glycogenesis, Glycogenolysis, their regulation and the role of liver and muscle glycogen g) Significance of HMP shunt and gluconeogenesis h) Hormonal regulation of blood sugar level, important metabolic disorders of glycogen, lactose intolerance, diabetes mellitus.	
3	**Proteins** a) Chemistry, definition, classification of amino – acids, protein structure, effect of temperature on proteins, denaturation, coagulation, isoelectric pH and its importance. b) Metabolism, digestion and absorption, decarboxylation, deamination, transmethylation, transamination and their importance and detoxification of ammonia including urea cycle. c) Special products of amino acids, example: phenylalanine, glycine, methionine d) Neurotransmitters e) Plasma proteins including immunoglobulins f) Hemoglobin, Myoglobin, their functions, haemoglobinopathies, thalassemias g) Structural proteins: Collagen, Elastin	04
4	**Lipids** a) Chemistry, definition, classification and function b) Metabolism, digestion and absorption of lipids, beta oxidation of fatty acids and its energetics, regulation of fat metabolism in adipose tissue, ketone bodies formation and its utilization, cholesterol and importance of lipoproteins, lipoproteinemia with atherosclerosis – causes and prevention, fatty acid synthesis, fatty liver and obesity.	04
5	**Nucleic Acids** a) DNA, RNA – definition, structure and function, types, genetic code, catabolism of purines – gout.	03
6	**Enzymes** a) Definition, classification, factors b) Coenzymes. c) Inhibition and type of inhibitors d) Isoenzymes e) Clinical and therapeutic uses of enzymes	03
7	**Vitamins** a) Definition, classification, functions b) Deficiency symptoms, RDA	04
8	**Biological Oxidation** a) Oxidative Phosphorylation, ETC	02
9	**Minerals** a) Phosphate, calcium and iron (in details) b) Magnesium fluoride, Zinc, Copper, Selenium, Molybdenum c) RDA, iodine sources, absorption, transport, excretion, function and disorders d) Acid – base balance, water and electrolyte balance	03
10	**Connective tissue** a) Biochemistry of connective tissue – Collagen, Glycoprotein, Proteoglycans	03
11	**Nutrition and BMR, PEM, Balance diet.**	04

List of References:
Text Books:
1. U. Satyanarayana Biochemistry - 6th Edition.

Reference Books:

1. Laboratory Manual of Physiology and Biochemistry, Kaur,Amrit- 1st Edition.
2. Tom Brody- Nutritional biochemistry- 2nd Edition.

List of Open Source Software/learning website:

- k-hub.in e library|A single platform for all e resources (K-hub, E-Resource)
  - User Name- KB4605VNG
  - Password- BL@69BX!
- knowledgegainer.delnet.in (Delnet, E-Resource)
  - User Name-gjspum
  - Password- spu10924

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Discuss internal structures & Function of the cell, different tissues and systems of the human body.	1 Remembering 2 Understanding
CLO2	Acquire knowledge about different organ systems.	1 Remembering
CLO3	Discuss nutritional aspects of carbohydrates, lipids, proteins, vitamins and minerals and their metabolism.	2 Understanding
CLO4	Describe the effects of enzymes, vitamins and minerals on body processes and their metabolism.	3 Applying 2 Understanding
CLO5	Acquire knowledge about Nutrition, balanced diet and biological oxidation.	2 Understanding, 3 Applying
CLO6	Elaborate the Physiological and biochemical aspect of Muscular system.	1 Remembering 2 Understanding 3 Applying

Mapping of CLOs with Pos &PSOs

Course Learning Outcomes	Program Outcomes (POs)								Program Specific Outcomes (PSOs)							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO 8
CLO1	H		H		M				H	H						
CLO2		M							M		M	M				
CLO3		M	M	M									M	M		
CLO4		M			M	L	M								M	
CLO5	M		M				M		M	M						L
CLO6			M				M	L					M	M		L

H= High M=Medium L=Low