JYOTI NIVAS COLLEGE AUTONOMOUS BANGALORE – 560 095
DEPARTMENT OF BIOCHEMISTRY
B.Sc. V SEMESTER BIOCHEMISTRY PAPER VI SYLLABUS (2021 NEP BATCH)
HUMAN PHYSIOLOGY

COURSE TITLE	**HUMAN PHYSIOLOGY**
COURSE CODE	**21VBC6 (T)**
COURSE CREDITS	**04**
TOTAL CONTACT HOURS	**60 Hours**
DURATION OF ESE	**2 ½ Hours**
CONTINUOUS INTERNAL ASSESSMENT (CIA)	**40 Marks**
END SEMESTER EXAMINATION (ESE)	**60 Marks**

Course objectives:

1. Physiology involves the study of how living systems function, from the molecular and cellular level to the system level
2. Forum for many areas of physiology, such as nervous system, respiration, cardiovascular system, excretory system, hepatic system, digestive system, endocrine system.
3. Emphasizes an integrative approach to study the biological functions of the endocrine glands and its secretion
4. Importance of nutritional aspects of carbohydrates, proteins, and lipids.

Course Learning Outcomes:

On completion of this course, the student should be able to:

1. Understand how the human body works, including how organ systems function and integrate, and how the body maintains homeostasis.
2. Identify the different levels of structural organization that make up the human body, and explain their relationships.
3. Gain knowledge about the process of endocrine system and the functions of various hormones.

4. Imply concepts that are important for biomedical research and diagnosing diseases.
5. Understand the nutritional aspects of carbohydrates, proteins, and lipids

CO NO.	Course outcomes statement	Knowledge level
1	Understand how the human body works, including how organ systems function and integrate, and how the body maintains homeostasis	K1, K2, K4 and K5
2	Identify the different levels of structural organization that make up the human body, and explain their relationships.	K1 & K2
3	Gain knowledge about the process of endocrine system and the functions of various hormones.	K1, K2, K4 & K5
4	Imply concepts that are important for biomedical research and diagnosing diseases.	K2, K3 & K4
5	Understand the nutritional aspects of carbohydrates, proteins, and lipids.	K2, K4, K5 & K6

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6- Create

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	√	√					√			√
CO2	√	√					√			√
CO3	√	√				√	√		√	√
CO4	√	√	√	√		√	√		√	√
CO5	√	√	√			√	√	√	√	√

Programme Objectives aligned with Graduate attributes

PO1- Knowledge
PO2- Scientific thinking
PO3- Entrepreneurial skills
PO4- Analytical skills
PO5- Communication skills
PO6- Social commitment
PO7- Research and Inquiry
PO8- Conservation of Environment

PO9- Employability
PO10- Academic orientation

UNIT I – HUMAN PHYSIOLOGY- I **15 hours**

Basic body plan in humans & Location of organs.

Nervous System: Brief outline of nervous system, Neurons – types, the structure of multipolar neuron, mechanism of nerve impulse transmission- along the axon, across synapse. Action potential & resting potential. Neurotransmitters – Excitatory & Inhibitory with examples.

Respiratory system: Anatomy, structure, and functions of lungs, mechanism of respiration (pulmonary ventilation), gas exchange mechanism, biochemical events in the transport of gases & factors affecting, the role of lungs in acid-base balance. Hypoxia, emphysema.

Cardio-vascular system: Structure and functions of the heart. Blood vessels – types Overview & functions: Cardiac cycle, cardiac output, regulation of CVS, blood pressure, heart rate, ECG. Body fluids – blood (composition, structure & functionsof blood cells), blood clotting mechanism, Lymph, and CSF.

Muscular System: Types of muscles and their structure. Ultrastructure of skeletal muscle. Contractile & regulatory proteins of muscle. Sliding filament model of skeletal muscle contraction.

UNIT II: HUMAN PHYSIOLOGY – II **15 hours**

Bone and Cartilage: Structure and types of bone and cartilage. Long bone – Composition, structure, growth & remodeling, factors affecting.

Digestive System and GIT: Anatomy of GIT and accessory organs, Digestion, absorption & transport of carbohydrates, lipids and proteins. Role of various enzymes and hormones involved in digestive process.

Hepatic System: Structure of a liver lobule. Role of liver in metabolic, storage and detoxification.

Excretory System: Brief outline of excretory system, formation of urine – Glomerular filtration, tubular reabsorption & secretions. Role of kidney in acid-base balance. Regulation of kidney function.

UNIT III ENDOCRINE SYSTEM 15 hours

Brief outline of various endocrine glands and their secretions. Dynamic balance and regulation of hormonal secretions. Classification of hormonesbased on structure and site of production. The physiological role of hormones of hypothalamus, pituitary, adrenal, thyroid, pancreas and gonads. Regulation of their secretion. General mechanism of hormone action in brief - peptide and steroid hormones. membrane receptors and secondary messengers (cAMP, cGMP, DAG, IP3, Calcium). Signal transduction pathway for steroidal and non-steroidal hormones.

UNIT IV NUTRITIONAL ASPECTS OF CARBOHYDRATES, PROTEINS & FATS 15 hours

Concept of nutrition, calorific value of foods and its determination (Bomb calorimeter), different components of energy expenditure, energy expenditure at rest and work, respiratory quotient. Basal metabolic rate (BMR), determination of BMR by indirect calorimetric method (Benedict's Roth apparatus), factors affecting BMR. Specific dynamic action of foods.

Carbohydrates: Dietary sources of carbohydrates, dietary fibers (types, beneficial & adverse effects), protein sparing action, Glycemic index- importance with examples, lactose intolerance.

Proteins: Dietary sources of proteins, Essential amino acids, nutritional classification, nutritive value of proteins- Protein Efficiency Ratio (PER) and biological value (BV). Nitrogen balance, mutual Supplementation of proteins. Malnutrition - Kwashiorkar and Marasmus.

Fats: Dietary sources of fats, visible and invisible fat, trans fats, essential and omega fatty acids and their biological importance, role of DHA and EPA.

REFERENCES

1. Chatterjee C C, Human physiology, Medical allied Agency. New Delhi 2020
2. Gerard J Tortora, Bryan H Derrickson. Principles of anatomy and physiology, 13th edition, John Wiley & Sons 2000
3. Gyton and Hall, Textbook of medical physiology, 10th edition, Elsevier Health Sciences 2015

4. Sembulingam K & Prema Sembulingam, Essentials of medical physiology, 3rd edition, Jaypee Brothers, 2019
5. Thomas D. Pollard, William C. Earnshaw, Jennifer Lippincott-Schwartz and Graham T. Johnson, Cell Biology, 3rd edition, Elsevier 2017
6. Lodish, Berk, Kaiser, Krieger et al, Molecular Cell Biology, 6th edition, 2010
7. Bruce Alberts, Hopkin, Johnson Morgan, Raff, Roberts, and Walter, Essential Cell Biology, 5th edition, W.W. Norton & Company, 2019

BIOCHEMISTRY PRACTICAL PAPER 6

COURSE TITLE	**HUMAN PHYSIOLOGY**
COURSE CODE	**21VBC6 (P)**
COURSE CREDITS	**02**
TOTAL CONTACT HOURS	**4 hours/week**
DURATION OF ESE	**03 hours**
CONTINUOUS INTERNAL ASSESSMENT (CIA)	**25**
END SEMESTER EXAMINATION (ESE)	**25**

EXPERIMENTS:

1. Estimation of hemoglobin content in the blood
2. Determination of Blood clotting time
3. Study of pulmonary function test using a spirometer- Demo experiment
4. Determination of blood pressure- Demo experiment
5. Determination of respiration rate by respirometers - Demo experiment
6. Understanding principle, working & handling of simple microscope
7. Examination of prokaryotic & eukaryotic cells
8. Study of different stages of mitosis & meiosis in onion root tip-squash preparation n method
9. Demonstration of biosafety & sterilization techniques
10. Qualitative analysis of urine (normal constituents).

11. Determination of titratable acidity in urine.
12. Assay of Aspartate transaminase (AST).
13. Assay of Alanine transaminase (ALT).
14. Quantification of pancreatic lipase / amylase.

REFERENCES

1. Essentials of Medical Physiology , K. Sembulingam and P. Sembulingam. Jaypee brothers medical publishers, New Delhi., 2019
2. Text book of Medical Physiology- C,Guyton and John.E. Hall. Miamisburg, OH, U.S.A, 12th edition 2011
3. Textbook of Practical Physiology, C.L. Ghai, Jaypee brother's medical publishers, New Delhi, 10th edition 2022
4. A Hand book of practical Microbiology, R. Saravanan , D. Dhachinamoorthi , CH. MM. Prasada Rao , 2011