



TRIPURA UNIVERSITY

(A Central University)

Suryamaninagar

SYLLABUS

OF

Human Physiology

(Hons.)

Semester- I

UNDERGRADUATE

HUMAN PHYSIOLOGY (HONOURS)

Semester 01

Paper 01 (H1)

Total Marks — 100

Unit I: Structural Units of Human System (25)

1. General concept of structure and function of cell organelles of Eukaryotic cell: Endoplasmic reticulum, Golgi body, Mitochondria, Nucleus, Lysosomes, Peroxisomes, Ribosomes, Cytoskeletal system, Cell junction, Cell inclusions.
2. Modern concept of membrane structure models, membrane transport: Active and passive transport. carrier proteins, ion-channels, ion-pumps, symport, antiport.
3. Ultra-structure of mitochondria: Inner and outer membrane, mitochondrial transport.
4. Nucleus: nucleolus, nuclear membrane. pores, transport. chromosome.
5. Cytoskeleton: Classification, physiological functions.
6. Concept of cell cycle: Phases of cell cycle, phases and differences between mitosis and meiosis.
7. Concept and differences of necrosis and apoptosis.
8. General structure and Function of different Types of tissues.
9. Musculo-skeletal system:
 - a. Smooth, skeletal and cardiac muscle structure (macromolecular), movements of skeletal muscle, Flexion, extension, abduction, adduction.
 - b. Skeletal system: Bones, structure and types, Cartilage and Ligament, Joints- types, description and function, Arthritis, Osteoporosis.

Unit II : Biophysical and Biochemical Principle (25)

1. Biophysical processes- Osmosis, diffusion, surface tension and viscosity- definition, biological significance. basic concept of homeostasis: Factors influencing.
2. Donnan membrane equilibrium- its biological applications and relation with osmotic pressure and pH.
3. Acid bases, pH, Buffers: Definition, biological significance, Henderson-Hasselbach equation, mathematical problems on pH and buffers.
4. Colloids- Classification, properties: Protective colloids and biological importance of colloids.
5. Dialysis and ultra-filtration: definition, biological significance.

6. Radioactivity- Isotopes and their major biological applications. Radiation hazards on human.
7. Fundamental idea of subcellular fractionation: use of centrifugation; principles of chromatography and electrophoresis, paper chromatography, polyacrylamide gel electrophoresis.

Unit III: Blood, Other Body Fluids and Clinical Hematology (25)

1. Composition and general functions of blood. Plasma proteins: types and Functions.
2. Bone marrow: general structure and functions. Hemopoetic stem cells
3. Erythropoiesis and its factors influencing. Leucopoiesis, Thrombopoiesis.
4. Blood volume: Hypervolemia, hypovolemia factors affecting blood volume.
5. Structure, Synthesis, function and degradation of hemoglobin.
- 6 Hemostasis, blood coagulation mechanisms.
7. Lymph and tissue fluid: Composition, Origin, formation, circulation and functions.
Oedema: types and causes, Compartmentation of fluid in the body.
8. Blood indices: TC, DC, PCV, MCV, MCHC, Colour Index, Arneth and Schilling Index, ESR- their determination and significances.
9. Anemia: types, causes and preventive measures, Thalassemia, Hemoglobinopathies, Leucocytosis, Leucopenia, Leukemia, Purpura- basic concept.
10. Concept of Jaundice and its types, features.
11. Disorder of coagulation, hemophilia, types and reasons, BT, CT and PT, Anticoagulants and their mode of action, prevention of intravascular coagulation.
12. Blood groups: Biochemical characteristics of ABO and Rh system- their determination, transfusion hazards and precautionary measures.

Unit IV: Biochemistry and Enzymology (25)

1. Definition, chemistry and classification of carbohydrate, protein, lipids and amino acids- physiological significance and functions.
2. Properties of carbohydrates: isomerism -types, functional groups, osazone reaction, polarimeter.
3. Polysaccharides (starch, glycogen, dextrin, cellulose): Their structure, occurrence and

physiological significance.

4. Mucopolysaccharides, glycosides- structure and function.
5. Amino acids, peptides and protein: effect of pH, Zwitterion; primary, Secondary (alpha helix, beta sheet, globular structure), tertiary, quaternary structures of proteins; coagulation, denaturation, salting in, setting out.
6. Fats and fatty acids: properties, hydrolysis, hydrogenation, saponification number, iodine number, rancidity, mono and poly unsaturated fatty acids and their significance.
7. Sterols: chemical nature, structure, classification and physiological importance.
8. Enzymology: Enzyme-definition, classification, activation energy, mechanism and enzyme action.
9. Definition and significance of K_m value, effect of temperature, pH on enzyme action.
10. Enzyme regulation: Allosteric regulation and covalent modifications, regulation of Enzyme synthesis.
11. Enzyme inhibition: their types, mechanism.

Add on topics:

1. Cell Signaling mechanism and techniques- basic idea.
2. Agarose gel electrophoresis.
3. Allosteric enzyme.
4. Wound Healing-general Idea
5. Cell Cycle regulation
6. Ramachandran plot
7. Ordered Bi-Bi reaction mechanism of enzyme action.

Suggested Readings:

- i. The Cell – Cooper.
- ii. Medical physiology – Guyton & Hall.
- iii. Text Book of Physiology – A. K. Jain.
- iv. Essentials of medical physiology – K. Sembulingam; Prema Sembulingam.
- v. Biochemistry – U. Satyanarayan and U. Chakrapani
- vi. Principles of Biochemistry- D. Das
- vii. Principles of Biophysics- D. Das