

2025

M.Sc. 3rd Semester Examination

HUMAN PHYSIOLOGY

Paper : PHY - 306-A/B/C/D

Full Marks : 25

Time : One Hour

*The figures in the margin indicate full marks.  
Candidates are required to give their answers  
in their own words as far as practicable.*

Sp. Paper : Microbiology and Immunology

PHY - 306A

(Advanced Studies in Microbiology)

Group - A

Answer any *two* questions :  $2 \times 2 = 4$

1. What are meant by xenobiotic compounds? Give one example. 1+1
2. Name the leading acid found in a leaching environment. 2
3. Name one non-legume that establishes symbiotic relationship with nitrogen-fixing bacteria. 2
4. Name some bio-insecticides and discuss their beneficial roles. 2

P.T.O.

( 2 )

**Group - B**

Answer any *two* questions :  $4 \times 2 = 8$

5. What is commensalism? Why certain infections are called opportunistic infections?  $2+2$
6. What is meant by 'recalcitrant nature'? Describe the underlying mechanisms.  $1+3$
7. What is bioremediation? How does biodegradation serve the purpose of bioremediation?  $2+2$
8. What is meant by Biomining? Describe the process of first level of bacterial attachment on the mineral surface.  $1+3$

**Group - C**

Answer any *one* question :  $8 \times 1 = 8$

9. Write notes on :
    - (a) Infection
    - (b) Bacterial adherence to mucosal surface
    - (c) Microbiome  $3+3+2$
  10. What is biological nitrogen fixation? Give an account of structural and functional modality of nitrogen fixing enzyme studied.  $2+6$
-

( 3 )

**Sp. Paper : Biochemistry, Molecular  
Endocrinology and Reproductive Physiology**

**PHY - 306B**

**(Advanced Studies in Biochemistry)**

**Group - A**

Answer any *two* questions :  $2 \times 2 = 4$

1. What is the transverse diffusion of the cell membrane? 2
2. What is Tandem Repeat Polymorphism? 2
3. What makes a cell decide to commit suicide? 2
4. Write down the specific attributes of cancer cells. 2

**Group - B**

Answer any *two* questions :  $4 \times 2 = 8$

5. Describe the structural conformation of transmembrane proteins. 4
6. Mention the hallmark of apoptosis. Describe the intrinsic pathway of apoptosis. 1+3
7. Write down the use and importance of Single Nucleotide Polymorphism (SNP). Write a brief note on Structural Polymorphism of DNA. 2+2
8. What are oncogenes? State the role of viral oncogenes in carcinogenesis. 1+3

P.T.O.

( 4 )

**Group - C**

Answer any *one* question :  $8 \times 1 = 8$

9. State the contributions of protein and lipid in maintaining the heterogeneity and asymmetry of the cell membrane. How can FRAP track lateral diffusion?  $(3+3)+2$
10. Mention the name of the trypsin family of serine proteases. State critically the mechanism of serine proteases. What is zymogen activation?  $2+4+2$
-

( 5 )

Sp. Paper : Biophysics and Elecl.

PHY - 306C (New)

(Biophysical Principles, Molecular Biophysics and  
Advanced Methods in Biology)

Group - A

Answer any *two* questions :  $2 \times 2 = 4$

1. How do you quantify the rate of diffusion? 2
2. Describe the reaction rate in terms of concentration and time. 2
3. What is partition coefficient? 2
4. What is electronegativity and electron affinity? 2

Group - B

Answer any *two* questions :  $4 \times 2 = 8$

5. Express the equation of Fick's second law of diffusion.  
Mention the physics of osmosis. 2+2
6. With an example, state the nature of 2<sup>nd</sup> order of reaction. Write down the differences between osmotic pressure and oncotic pressure. 2+2
7. What are the differences between stacking gel and separation gel in SDS-PAGE? Why is the protein heated for 5 mins before loading into a gel? 2+2
8. What are the main components of a UV-Vis spectrophotometer? Name any two solvents used in UV visible spectroscopy. 2+2

P.T.O.

( 6 )

**Group - C**

Answer any *one* question :

8×1=8

9. Write a short note on protein folding with suitable diagram. Write down the principles of 'Ramachandran Plot' for explaining protein structure. 4+4
10. What is chirality? Give an example. Write the principle of pulsed field gel electrophoresis. Mention its applications. 2+2+2+2
-

( 7 )

**Sp. Paper : Neurophysiology**

**PHY - 306D**

**(Physiology of Neuron and Evolution of Brain)**

**Group - A**

Answer any *two* questions :  $2 \times 2 = 4$

1. What are central beams and ribs in active zone of synapse? 2
2. Name neuroglial cells in CNS and PNS. 2
3. In terms of making neuron to neuron contacts, categorize neurons. 2
4. What does synaptic plasticity mean? 2

**Group - B**

Answer any *two* questions :  $4 \times 2 = 8$

5. Compare the properties of different types of cytoskeletal proteins. 4
6. What do you mean by —
  - (a) cephalization of the nervous system,
  - (b) convolution of the brain?  $2+2$
7. What is meant by gyrogenesis? Describe the mechanism of human brain cortical folding.  $1+3$

P.T.O.

( 8 )

8. How do the barbiturates and bicuculline act differently?  
How are the following receptors related to each other :

(a) glycine receptors and GABA<sub>A</sub> receptors, and

(b) nACh receptors and GABA<sub>A</sub> receptors? 2+(1+1)

**Group - C**

Answer any *one* question : 8×1=8

9. Elaborate on the mechanism of axoplasmic flow. Name the proteins involved in the recycling of synaptic vesicular membrane. 6+2

10. Discuss the role of Netrin, Semaphorins, What and Robos in axonal growth cone progression. 2+2+2+2

**Internal Assessment : 5 marks**

---