(2024 Batch Onwards)

LS2HPHC500 Reg. No.: | | | | | | | | |

St Aloysius (Deemed to be University)

Mangaluru

School of Life Sciences (PG Programme)

M.Sc. Biochemistry Semester I – PG Examination

October/November - 2025

FUNDAMENTALS OF BIOCHEMISTRY

Time: $2\frac{1}{2}$ Hours **Max Marks: 60**

Note: Draw neat, labelled diagrams /schematic sketeches/structures wherever necessary

SECTION – A

Write Short note on any FIVE of the following. **(5x2=10)**

1. What is Zwitter ion?
2. Differentiate between homopolysaccharides and heteropolysaccharides with suitable examples.
3. Differentiate between the structures of phosphatidylcholine and sphingomyelin.
4. Explain why RNA is less stable than DNA.
5. Which forces or interactions are primarily responsible for maintaining the three-dimensional structure of proteins?
6. What are phytosterols? How are they different from cholesterol?

SECTION - B

Write Explanatory notes on any SIX of the following. **(6x5=30)**

7. Explain the concept of partial double bond nature of a peptide bond.
8. Compare O-linked and N-linked glycoproteins.
9. What are cis and trans fatty acids? Explain with an example. Are both equally good?
10. Compare and contrast the structural differences between a nucleoside and a nucleotide by giving one example with structure.
11. Are Raffinose and Stachyose Reducing or Non-Reducing Sugars? Justify your answer with relevant structure.
12. Taking PGE2 as an example explain the naming of prostaglandins.
13. Describe Sanger and Coulson's method of DNA sequencing.

SECTION – C

Answer any TWO of the following. **(2x10=20)**

14. Describe the forces that stabilize the quaternary structure of proteins. Provide an example of a protein with a quaternary structure, and explain how the interactions between its subunits contribute to its overall function.
15. Explain how monosaccharides give rise to different derivatives by discussing the reactions involved in their formation.
16. Explain the process of denaturation in nucleic acids, including the factors that can induce denaturation. Describe the hypochromic and hyperchromic effects observed during the denaturation process and how they can be measured.

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(2024 Batch Onwards)

LS2HPHC501 Reg. No.: | | | | | | | | |

St Aloysius (Deemed to be University)

Mangaluru

School of Life Sciences (PG Programme)

M.Sc. Biochemistry Semester I – PG Examination

October/November - 2025

BIOCHEMICAL TECHNIQUES

Time: $2^1/_2$ Hours **Max Marks: 60**

Note: Draw neat, labelled diagrams /schematic sketeches/structures wherever necessary

SECTION – A

Write Short note on any FIVE of the following. **(5x2=10)**

1. You are given a mixture of 3 proteins: Fatty acid binding protein (MW 15 kDa); Lysozyme (MW 14 kDa); and Glutathione oxidase (MW 16 kDa). Analyze why is it not possible to use gel filtration to separate these proteins?
2. Describe how Schlieren optics help visualize particle movement during centrifugation.
3. Write the principle of X-ray crystallography.
4. Recall the mathematical formula of the Beer-Lambert Law.
5. Define plane polarized light and mention its applications.
6. Name the common adsorbents used in TLC plates.

SECTION - B

Write Explanatory notes on any SIX of the following. **(6x5=30)**

7. Describe the principle of ultrafiltration and its applications in bioprocessing.
8. List some applications of agarose gel electrophoresis.
9. Describe process of sample preparation in TEM and mention its principle.
10. Discuss the principle and applications of NMR.
11. Analyze the advantage of AAS over flame photometry.
12. Describe how GC-MS separates and identifies compounds in a complex mixture.
13. Discuss the principle and applications of ESR.

SECTION – C

Answer any TWO of the following. **(2x10=20)**

14. Describe non-mechanical methods of cell disruption.
15. Describe the various techniques used to visualise biomolecules in gels.
16. Explain the concept of confocal and scanning electron microscopy.

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(2024 Batch Onwards)

LS2HPSC521 Reg. No.: | | | | | | | | |

St Aloysius (Deemed to be University)

Mangaluru

School of Life Sciences (PG Programme)

M.Sc. Biochemistry Semester I – PG Examination

October/November - 2025

CHEMICAL PRINCIPLES OF BIOLOGY

Time: $2^1/_2$ Hours **Max Marks: 60**

Note: Draw neat, labelled diagrams /schematic sketeches/structures wherever necessary

SECTION – A

Write Short note on any FIVE of the following. **(5x2=10)**

1. Illustrate the cis and trans forms of any one molecule from organic chemistry.
2. Compare and contrast the harmful and beneficial effects of free radicals in biological systems.
3. A chemist wants to prepare a buffer solution with a pH of 7.4. She has 0.1 M acetic acid (pKa = 4.75) and 0.1 M sodium acetate. What ratio of acetic acid to sodium acetate should she use?
4. Define an isolated system and provide an example.
5. Define ionizing radiation and non-ionizing radiation, and provide examples of each.
6. What is radioactivity, and who is credited with its discovery?

SECTION - B

Write Explanatory notes on any SIX of the following. **(6x5=30)**

7. Compare covalent and ionic bonds based on electron sharing, bond strength, and examples
8. Discuss the structure aromaticity and biological importance of pyrrole.
9. Evaluate the importance of maintaining proper pH levels in the human body. What could be the consequences of pH imbalance?
10. Identify the type of weak interaction involved in the following processes: Self-assembly of nanoparticles; Protein-ligand binding; Ice formation; Enzyme-substrate reaction; Antigen-Antibody interaction.
11. Explain the principle and applications of Solid scintillation counter.
12. Analyse the methods of In-vitro radioisotope labeling techniques
13. Explain about various types of radiations.

SECTION – C

Answer any TWO of the following. **(2x10=20)**

14. Analyse the role of condensation reactions in the biosynthesis of macromolecules.
15. Explain the fundamental characteristics of redox reactions, including electron transfer, changes in oxidation states, and energy transformations. Evaluate how these principles are applied in biological systems.
16. Discuss about effects of radiation and add a note on its safety precautions.

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(2024 Batch Onwards)

LS2HPSC522 Reg. No.: | | | | | | | | |

St Aloysius (Deemed to be University)

Mangaluru

School of Life Sciences (PG Programme)

M.Sc. Biochemistry Semester I – PG Examination

October/November - 2025

HUMAN PHYSIOLOGY

Time: $2^1/_2$ Hours **Max Marks: 60**

Note: Draw neat, labelled diagrams /schematic sketeches/structures wherever necessary

SECTION – A

Write Short note on any FIVE of the following. **(5x2=10)**

1. Do all amino acids have similar buffering capacity? Provide a rationale for your response.
2. Define glomeluar filtration and glomeluar filtration rate.
3. Name the hormones secreted from adrenal cortex and adrenal medulla.
4. Diiferentiate between autocrine and paracrine signalling.
5. What are the functions of Astrocytes?
6. What happens to the sarcomere during muscle contraction?

SECTION - B

Write Explanatory notes on any SIX of the following. **(6x5=30)**

7. Draw a normal ECG pattern with labelled deflection waves and evaluate the significance of ECG in diagnosing cardiac abnormalities.
8. What is hemostasis? Illustrate the mechanism of hemostasis.
9. Describe the anatomical relationship between hypothalamus and anterior pituitary gland.
10. Explain the role of LH and FSH in ovarian follicular development.
11. Describe how troponin C and tropomyosin regulate actin–myosin interaction.
12. Compare voluntary and involuntary muscles with examples.
13. Explain how thyroid hormone levels are regulated via the hypothalamic–pituitary–thyroid axis.

SECTION – C

Answer any TWO of the following. **(2x10=20)**

14. Explain the concept of entrohepatic circulation and how it contributes to recycling of bile.
15. Compare and contrast the synthesis, receptors, and physiological effects of endorphins and enkephalins.
16. Describe the events in conducting a nerve impulse along an axon and across a synapse.

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