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**St Aloysius (Deemed To Be University)**

**Mangaluru**

**Semester I- P.G. Examination - M.Sc. Biochemistry**

**November - 2024**

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**FUNDAMENTALS OF BIOCHEMISTRY** MANGALORE-575 003

Time: 2½ Hours

Max Marks: 60

**SECTION - A**

**I. Define/Answer any TEN of the following:** (10x2=20)

1. What is the primary function of the peptide glutathione in the body?
2. What was the primary objective of Anfinsen's experiment, and which protein did he specifically study?
3. Which amino acid residue is responsible for forming disulfide bonds, and illustrate the formation of disulfide bonds?
4. Analyze the structural differences between ribose and deoxyribose, and explain their specific roles in nucleic acids.
5. What are glycoconjugates? Identify the different types of glycoconjugates providing suitable examples
6. Can galactooligosaccharides (GOS) be enzymatically prepared from lactose? Justify your answer
7. What is the difference between GM and GD series of Gangliosides??
8. Distinguish between bacterial lipopolysaccharides and Bacterial lipoproteins.
9. In DNA, what type of sugar is present in nucleotides? Draw its structure.
10. Compare and contrast the stability of a DNA molecule with a high GC content to one with a high AT content, taking into account hydrogen bonding and base composition
11. Define the hyperchromic effect in the context of DNA.
12. How does the structure of Z-DNA differ from that of B-DNA?

**SECTION - B**

**II. Answer any FOUR of the following:** (4x5=20)

13. Describe the formation and characteristics of alpha-helices and beta-sheets, two common motifs in the secondary structure of proteins.
14. Design a hypothetical dipeptide by combining any two amino acids. Provide the chemical structure of the dipeptide.
15. How do glycogen and starch differ from each other? Explain providing details of structure and composition.
16. What are PUFA? Are all the PUFA the same? Explain

Contd...2

17. Explain the chemical basis of DNA and RNA base pairing. How does the complementarity of bases contribute to the stability of the double-stranded structure in DNA?
18. Compare and contrast the structural features and functions of supercoiled DNA, bent DNA, cruciform DNA, triplex DNA and G-DNA.

### SECTION - C

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

19. Compare and contrast the structural and functional differences between  $\alpha$ -helix,  $3_{10}$ -helix, and  $\beta$ -pleated sheets in proteins.
20. Categorize monosaccharides based on the number of carbon atoms and functional groups. Provide relevant examples and structures
21. Give an account of the physical properties of fats and oils
22. Compare and contrast the structural features of mRNA, rRNA, tRNA, and snRNA, including their sizes, secondary structures, and conserved motifs. Explain how these features are related to their functions.

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**St Aloysius (Deemed To Be University)**

**Mangaluru**

**Semester I - P.G. Examination - M.Sc. Biochemistry**

**November - 2024**

**BIOCHEMICAL TECHNIQUES**

**Time: 2½ Hours**

**Max Marks: 60**

**SECTION - A**

**I. Define/Answer any TEN of the following: (10x2=20)**

1. Assess the potential applications of lyophilization in biotechnology and the pharmaceutical industry.
2. Assess the role of a guard column in HPLC.
3. Critically assess the role of pH in ion exchange chromatography and its effect on the separation of charged molecules.
4. Illustrate with a flowchart how cell organelles can be separated from a given mixture of cells using preparative ultracentrifugation.
5. Explain the difference between Pulsed Field Electrophoresis and agarose gel Electrophoresis in terms of their applications and underlying principles.
6. List the applications of NMR.
7. Explain how SEM generates images of a specimen's surface.
8. Analyse the concept of peak intensity in a mass spectrum. What information does peak intensity provide about a molecule.
9. Explain the Bragg's law.
10. List the applications of ORD.
11. Assess the potential sources of error in platelet aggregation tests.
12. Briefly describe the principle of IR spectroscopy.

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**SECTION - B**

**II. Answer any FOUR of the following: (4x5=20)**

13. List the characteristics of an ideal detector in the context of gas chromatography.
14. Analyse the factors that may affect the separation of samples by TLC.
15. Describe the various factors that influence the migration of DNA through an agarose gel.
16. List the components of a typical Native PAGE gel and their functions.
17. Explain the fundamental principles of both gas chromatography and mass spectrometry in the context of GC-MS.
18. Define Raman spectroscopy and briefly explain its principle.

**Contd...2**

## SECTION - C

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

19. Describe the different types of structural isomerisms that exist in organic molecules.
20. Describe the steps involved in lipid peroxidation in cell membranes.
21. Discuss types and mechanisms of substitution reactions.
22. Analyze the advantages and limitations of scintillation counters as compared to other radiation detection methods, such as Geiger-Muller counters.

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**Semester I- P.G. Examination- M.Sc. Biochemistry**

**November - 2024**

**HUMAN PHYSIOLOGY**

Time: 2½ Hours

Max Marks: 60

**SECTION - A**

**I. Define/Answer any TEN of the following:** (10x2=20)

1. What is the difference between external respiration and internal respiration?
2. What do lacteals absorb? Where does this travel to?
3. Justify how chronic liver failure leads to the occurrence of anemia.
4. What are the structural part of pancreas that contribute for its endocrine and exocrine secretions?
5. What are kupfer cells? What are their primary functions?
6. What are lipotropins? Give examples.
7. Define target cell concept of hormone function with an example.
8. Explain how adrenaline affects the body during the "fight or flight" response.
9. What are the functions of Astrocytes?
10. Differentiate the roles of calcium ion and nitric oxide in regulation of muscle movement.
11. Distinguish between sensory and motor neurons.
12. Describe the role of neurons in muscle contraction.

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**SECTION - B**

**II. Answer any FOUR of the following:** (4x5=20)

13. Explain in detail the process of hydrochloric acid (HCl).
14. What is the importance of Net Filtration Pressure (NFR)? Calculate net filtration pressure given the following values: glomerular hydrostatic pressure = 50 mm Hg, blood colloid osmotic pressure = 25 mm Hg, capsular hydrostatic pressure = 20 mm Hg.
15. Create a flowchart illustrating the feedback loop that regulates thyroid hormone levels in the body.
16. Enlist the hormones secreted from adrenal gland. Add a note on their biological functions.
17. Describe the structure of actin filaments, the formation of the thin filaments, and how actin interacts with myosin during muscle contraction.
18. Explain the importance of Glial cells.

**Contd...2**

## SECTION - C

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

19. What is plasma? Discuss the composition and function of plasma.
20. Describe the intrinsic conduction system of the heart and provide a correlation between the sequence of depolarization and repolarization of the heart and deflection waves of ECG tracing.
21. Describe the anatomy and functions of hypothalamus. Add a note how is arterial pituitary land regulated.
22. Explain the structure of myofibrils within muscle cells and their importance in muscle contraction. How do myofibrils contribute to the overall contractile function of the muscle fiber?

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