PH 511.1   Reg No: ☐☐☐☐☐☐

St. Aloysius College (Autonomous)
Mangaluru
Semester I – P.G. Examination – M.Sc. Biochemistry
February 2021

BIOMOLECULES

Time: 3 hrs
Max Marks: 70

SECTION A

Answer any TEN of the following   (2×10=20)

1. Differentiate homopolysaccharides and heteropolysaccharides. Give examples.
2. What is melting temperature of DNA? How is it determined?
3. What are non-protein amino acids? Give examples.
4. Describe N-linked glycosylation.
5. Name any four factors that can cause denaturation of protein.
6. What are essential and non-essential fatty acids? Cite examples.
7. What is a zwitter ion? Give two examples.
8. List the important classes of accessory proteins in protein folding.
9. Elaborate Chargaff's rule.
10. What is 3_{10}-helix?
11. What is chitin? Write its function.
12. What are steroids? List its important biological functions.

SECTION B

Answer any SIX of the following   (5×6=30)

13. What is Ramachandran plot? Explain the quadrants and its role in protein conformation.
14. Describe phospholipids. Explain their structure and function briefly.
15. Explain in detail different forms of DNA.
16. Write note on glycosaminoglycans.
17. Discuss the thermodynamics of protein folding. Add a note on molten globule model.
18. Describe the classification and functions of monosaccharides.
19. Explain different methods for determining the amino acid sequence of polypeptide chains.
20. Briefly describe chemical synthesis of peptides.

SECTION C

Answer any TWO of the following   (10×2=20)

21. Briefly describe Sanger and Coulson's method of DNA sequencing. Add a note on advantages and limitations.
22. Elaborate on different types of RNA and their functions.
23. How are lipids classified? Explain two methods for isolation and analysis of lipids.
24. Explain protein structure. Which are the main factors that affect the stability of a protein?

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BIOCHEMICAL TECHNIQUES

Time: 3 hrs.

Max Marks: 70

I. Answer any TEN of the following: (10×2=20)

1. Name the ion source and mass analyser in MALDI TOF Mass Spectrometry.
2. Give any two reasons why ammonium sulphate is the most preferred salt for carrying out precipitation of proteins.
3. What is the principle of fluorescence spectroscopy?
4. Compare and contrast between Native PAGE and SDS PAGE.
5. What are the applications of ultrafiltration?
6. Expand the abbreviation NMR spectroscopy. Mention its application.
7. What are the ideal properties of the mobile phase used for Gas Liquid chromatography?
8. What are the applications of analytical centrifugation?
9. Name the commonly used PAGE gel staining techniques.
10. What is CD/ORD spectroscopy?
11. How could you use turbidimetry to access bacterial growth?
12. What is the principle of cytophotometry?

II. Answer any SIX of the following: (6×5=30)

13. What is lyophilization? Mention its advantages and disadvantages.
14. Derive Beer-Lambert's Law. What are its limitations?
15. What is the purpose of using stacking and resolving gel in SDS PAGE? Mention the differences in the properties of the two gels.
16. Write a note on the principle and applications of Electron Spin Resonance.
17. Explain the principle and write a brief note on Atomic spectroscopy.
18. Write a note on X-ray Crystallography.
19. Describe the mechanical and non-mechanical methods of cell disruption.
20. What is the principle of GC-MS?

III. Answer any TWO of the following: (2×10=20)

21. Explain, in detail the two types of electron microscopy techniques.
22. Elaborate on the principles of sedimentation. Add a note on Svedberg constant.
23. Discuss the principle, applications and instrumentation of UV spectroscopy.
24. Give a detailed description, with the help of diagrams, on the process of purification of biomolecules using Affinity Chromatography and size exclusion chromatography.

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ORGANIC AND PHYSICAL BIOCHEMISTRY

Max Marks: 70

Time: 3 hrs

SECTION A
(2×10=20)

Answer any TEN of the following

1. What is chirality? Give an example.
2. Distinguish between anomers and epimers.
3. How are Furan and Purine rings numbered?
4. Define open and closed system with examples.
5. What is buffer capccity? Mention its significance.
6. Define gray (Gy) and sivert (Si).
7. What is absolute configuration?
8. What are free radicals? Mention their importance.
9. What is geometrical isomerism? Give an example.
10. How D-glucose is different from d-glucose?
11. What is free energy? What is $\Delta G^0{}'$?
12. Define half life of a radioisotope. Mention its importance.

SECTION B
(5×6=30)

Answer any SIX of the following

13. Write an account on optical isomerism.
14. State and explain second law of thermodynamics.
15. Explain the stereochemistry of SN2 reactions.
16. Discuss the concept of resonance by taking benzene as an example.
17. Write a note on the role of vitamin C and glutathinone as antioxidants.
18. Derive Handerson-Hasselbalch equation.
19. Enlist the safety measures while handling the redioisotopes.
20. Write a note on isotopes used in biochemical studies.

SECTION C
(10×2=20)

Answer any TWO of the following

21. Explain in detail about the mechanism of addition and condensation reactions.
22. Give a detailed account on the structure and properties of water. Add a note on hydrophobic interactions.
23. Describe the solid and liquid scintillation counters in detail.
24. Explain DL, RS and threo-erythro notation by taking erythrose as an example

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PHYSIOLOGY AND NUTRITION   Max Marks: 70

Time: 3 hrs

SECTION A

(2×10=20)

Answer any TEN of the following

1. List any two functions of White blood cells.
2. Define cardiac cycle. Give the normal value of Blood pressure.
3. Define glomerular filtration rate.
4. List any four functions of liver.
5. Explain the term protein efficiency ratio.
6. Explain hemostasis.
7. Define specific dynamic action.
8. Define balanced diet.
9. Name the posterior pituitary hormones. Mention one function of each.
10. Explain protein calorie malnutrition.
11. Comment on the physiological role of Magnesium and sodium.
12. List any two endocrine functions of testosterone.

SECTION B   (5×6=30)

Answer any SIX of the following

13. Describe the digestion and absorption of carbohydrates.
14. Discuss the intrinsic pathway of blood coagulation.
15. Explain the mechanism of HCl production in stomach.
16. Comment on the nutritional and food requirement for an expectant mother.
17. Brief note on ANF and its physiological functions.
18. Discuss the hormonal regulation of normal menstrual cycle.
19. Explain the conductive pathway in the human heart with the help of neat diagram.
20. Define fat soluble vitamins. Discuss the daily human requirement, sources and deficiency of these vitamins.

SECTION C   (10×2=20)

Answer any TWO of the following

21. Explain the role of hemoglobin in gas exchange. Write a note on factors affecting oxygenation.
22. Discuss erythropoesis and life cycle of RBC.
23. Explain Renin-angiotensin system in detail. Discuss the functions of Renal hormones.
24. What is BMR? How is it measured? Discuss in detail the various factors effecting BMR.

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