

PH 511.1

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St Aloysius College (Autonomous)
Mangalore
Semester I- P.G. Examination- M.Sc. Biochemistry
January - 2023

BIOMOLECULES

Time: 3 hours

Max Marks: 70

I. Answer any TEN of the following;

(10X2=20)

1. Give the dihedral angles of peptide bond which result in α -helix.
2. Give the structure and occurrence of a nonstandard amino acid.
3. What is the isoprene rule.
4. How are reverse turns formed in proteins?
5. What are O-linked glycoproteins?
6. What is glycosidic bond? What type of glycosidic bond is in Lactose?.
7. Give the structure of any two acidic amino acids?
8. What are naturally occurring peptides? Give their significance.
9. What is sphingosine?
10. What are purines and pyrimidines? Give examples.
11. What are unsaturated fatty acids? What is their significance?
12. Give the basis for hyperchromic effect exhibited by DNA.

II. Answer any SIX of the following;

(6x5=30)

13. Describe Sanger's method of DNA sequencing. Comment on automated DNA sequencing.
14. Describe Christian Anfinsen's experiment using ribonuclease. Comment on molten globule model.
15. Describe the properties of peptide bond. Add a note on Ramachandran's Plot.
16. What are glycosaminoglycans. Explain with examples.
17. Outline the steps involved in isolation and analysis of lipids.
18. Explain unusual structures of DNA and comment on forces stabilizing the DNA structures.
19. Discuss the Merrifield synthesis of peptides. State its advantage over solution phase synthesis.
20. Describe the classification of proteins based on solubility, and function.

III. Answer any TWO of the following;

(2x10=20)

21. Write short notes on the different sugar derivatives.
22. Describe the hierarchical protein structures. Add a note on forces stabilizing tertiary and quaternary structures.
23. Explain the chemical difference between DNA and RNA. Describe Sanger and Coulson's method of DNA sequencing.
24. Discuss classification of lipids. Add a note on the functions of glycolipids and phospholipids.

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

January - 2023

BIOCHEMICAL TECHNIQUES

Time: 3 hrs

Max.Marks:70

I. Answer any TEN of the following;

(10x2=20)

1. What is the purpose of dialysis?
2. How does salting out precipitate proteins?
3. What is chromatofocusing?
4. What is RCF and RPM in centrifugation. How are they related?
5. What are ampholytes and why are they used in capillary electrophoresis?
6. Why chemical shift is important in NMR and which chemical is used as a reference to measure it?
7. Between ESI and MALDI-TOF, which is the one preferred for biological macro molecules? Why?
8. What is isomorphous replacement?
9. What are the limitations of fluorescence microscope?
10. Define molar extinction coefficient.
11. State any two differences between IR and Raman Spectroscopy.
12. What is the difference between plane polarised light and circularly polarised light?

II. Answer any SIX of the following:

(6x5= 30)

13. What is lyophilization and what is its purpose?
14. Discuss mechanical and non-mechanical methods of cell disruption.
15. What is the difference between NMR and ESR spectroscopy?
16. Describe isoelectric point. What is isoelectric focusing?
17. Discuss the principle of light microscopy. Add a note on applications of different stains.
18. Discuss Flow cytometry. What is SSC and FSC in flow cytometry?
19. What is Beer-Lambert's law and what are its limitations?
20. What is the principle of circular dichroism (CD)?

III. Answer any TWO of the following;

(2x10= 20)

21. Discuss the principle and instrumentation of HPLC. Add a note on columns and detectors.
22. Explain in detail how SDS PAGE is performed.
23. What are matter waves and what is de Broglie wavelength? Explain with suitable diagram the working principle of a transmission electron microscope.
24. Explain the principle and applications of IR spectroscopy. Discuss the characteristic IR absorptions of some functional groups.

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

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ORGANIC AND PHYSICAL BIOCHEMISTRY

Time: 3 Hours

Max. Marks: 70

I. Answer any TEN of the following:

(10×2=20)

1. Differentiate between covalent and coordinate bond.
2. What are enantiomers? Give examples.
3. Define mutarotation. Name two biomolecules which exhibit mutarotation.
4. Differentiate between condensation and self-condensation reactions.
5. What are cis and trans isomers? Give examples.
6. Mention the biological significance of quinone.
7. Write the boat and chair form of glucose.
8. Why hydrogen bonds in water are polar in nature?
9. Define buffer capacity. Mention its importance.
10. What is β radioactive emission?
11. Differentiate between nuclear fission and fusion.
12. What are radiopharmaceuticals? Give examples.

II. Answer any SIX of the following:

(6×5=30)

13. What is covalent bond? Describe the characteristic features of Sigma and Pi bonds.
14. What are oxidation-reduction reactions? Give their biological importance.
15. Write a note on optical isomerism.
16. With an example, illustrate the substitution reaction of benzene.
17. Describe the anti-oxidant activity of glutathione and vitamin-A
18. Discuss sp^2 and sp^3 hybridization.
19. How does Henderson-Hasselbalch equation relate pH and pKa?
20. Write a note on autoradiography.

III Answer any TWO of the following:

(2×10=20)

21. a) Discuss the role of nucleophiles and electrophiles in biological systems.
b) Describe the mechanism of SN_2 reaction.
22. a) Discuss the structure of purines with suitable examples.
b) What is keto-enol tautomerism? Explain.
23. Explain the first, second and third law of thermodynamics. Add a note on their application in biological systems.
24. Discuss the isotopes commonly used in biochemical studies.

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PHYSIOLOGY AND NUTRITION

Time: 3 Hours

Max. Marks: 70

I. Answer any TEN of the following:

(10x2=20)

1. What are dietary fibers? Give examples.
2. What is Atrial Natriuretic Factor? What is its function?
3. What are hepatocytes and Kupffer cells?
4. Name two hormones produced in the hypothalamus with their function.
5. What is Kwashiorkor and Marasmus?
6. Name two gastrointestinal hormones with their function.
7. What is the physiological fuel value of food? How do we determine it?
8. What are the functions of insulin and glucagon?
9. What is the composition and function of the Cerebrospinal fluid?
10. What is total and differential blood count?
11. What are the different types of kidney function tests?
12. What is Basal Metabolic Rate?

II. Answer any SIX of the following:

(6x5=30)

13. Explain in brief oxygen binding by haemoglobin.
14. Write the extrinsic pathway of blood coagulation.
15. Explain the steps in the formation of urine.
16. Explain the formation, and secretion of bile.
17. Write a brief note on oral contraceptives.
18. Give a brief account on hypothalamic-pituitary axis.
19. What are FAD diets? Write a brief note on Atkins diet.
20. Write a brief note on micro and macro minerals with function and deficiency symptoms.

III. Answer any TWO of the following:

(2x10=20)

21. Explain the cardiac cycle. Add a note on cardiac output.
22. Name the hormones secreted from kidney. Describe renin-angiotensin system in detail.
23. Give a detailed account on the stages of Erythropoiesis and life cycle of RBC.
24. Explain in detail water-soluble vitamins.
