

Ex/SC/BT/PG/CORE/TH/132/2023

**M. Sc. (BIOTECHNOLOGY) EXAMINATION, 2023**

( 1st Year, 1st Semester )

**BIOCHEMISTRY**

**PAPER – CORE/TH/132**

Time : Two hours

Full Marks : 50 (40+10)

(Use a separate Answer script for each Group)

**Group – A**

Answer any **five** questions. 5×4=20

1. Explain how the different properties of an aqueous system makes it suitable for life on Earth.
2. Explain briefly the Urey-Miller experiment and its implications.
3. Explain the role of chaperons in protein folding with example.
4. Explain all the stabilizing forces involved in the tertiary structure of protein.
5. Explain the essential features of fluid mosaic model of membrane structure. Why not all fatty acids of any chain length do appear in the cell membrane? What is the major difference between the fatty acids in terrestrial organisms and marine organisms? 2+1+1
6. Explain the pH scale. Could it vary in some other situation? Calculate the final pH of a solution of pH 5 after a thousand-fold dilution with pure water. 2+1+1

[ Turn over

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7. Explain why humans cannot digest cellulose while cows can. What are the nature of the following sugars: monosaccharides, disaccharides, polysaccharides – Glycogen, Glucose, Lactose and Ribose? 2+2
8. Explain the major differences between hemoglobin and myoglobin. Explain the evolutionary significance of Fetal hemoglobin. 2+2
9. Explain the experiment leading to the Anfinsen's dogma of protein folding.
10. Explain briefly the degradation of protein by ubiquitin-proteasome pathway.

### Group – B

Answer any **one** question. 1×10=10

1. What are the primary catalytic strategies of enzymes? What is catalytic triad for serine proteases and how does it function? Name any protease inhibitor used against angiotensin-converting enzyme (ACE). Which metallic ion is essential for the promotion of catalytic activity of Carbonic Anhydrase? How magnesium ion regulates catalytic activity of restriction enzymes? What is the basic feature of NMP kinase-mediated catalytic activity? 2+3+1+1+2+1=10

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2. Define Zymogens. How Chymotrypsinogen acts as a Zymogen? How does cleavage of a single peptide bond activate the zymogen? Briefly describe the cooperative oxygen binding of hemoglobin. What is the relation between  $K_M$  value and catalytic activity of an enzyme? What is the ping pong mechanism in enzyme kinetics? 1+2+2+3+1+1=10

### Group – C

Answer any **one** question. 1×10=10

1. What do you mean by sugar pucker? Write the importance of C3 endo and C2 endo pucker in DNA structure. Show with diagram how phosphodiester bond forms during nucleic acid polymerization. Differentiate between Galactolipids and Sulfolipids. What is Spectrin and Glycophorin A? 2+2+2+2+2=10
2. What are ribozymes? What do you mean by denaturation and renaturation of DNA? Write four differences between B DNA and Z DNA. Give a brief description about how proteins are anchored in the plasma membrane by lipids and prenyl group. 2+2+2+4=10