

(4)
Group – C

Ex/SC/BT/PG/132T/2025

5. Answer *any four* questions : 2×4 =8

- (a) Differentiate between Galactolipids and Sulfolipids.
- (b) Write four differences between B DNA and Z DNA.
- (c) What do you mean by integral polytopic and integral monotopic protein?
- (d) Write the importance of C3 endo and C2 endo puckering in DNA structure.
- (e) Write briefly about the effect of different factors on denaturation and renaturation of DNA.
- (f) “The two major integral membrane proteins of red blood cells, glycophorin and band 3, provide well-studied examples of transmembrane protein structure.” Write briefly about the structure of glycophorin.
- (g) With diagram show the different types of GPI anchored proteins.
- (h) What are gangliosides? Where they are found in human?

★ ★ ★

MASTER OF SCIENCE EXAMINATION, 2025

(1st Year, 1st Semester)

BIOTECHNOLOGY

Paper : BT/PG/132T

(Biochemistry)

Time : 2 Hours

Full Marks : 40

Group – A

Answer all questions.

1. Answer *any four* from the following : 1×4 = 4

- (i) Is Cyanide ion a ligands of hemoglobin? Answer yes/no with logic. **(CO2)**
- (ii) What will be the concentration of acetate ion containing 50 mM acetic acid at pH 5.1? [given that pKa of acetic acid is 4.8] **(CO2)**
- (iii) What is the important property of proteins for their isoelectric focusing? **(CO1)**
- (iv) How many amino acids could be there, approximately, in a 55 KDa protein? Explain your answer. **(CO2)**
- (v) How can cow digest cellulose while humans cannot digest cellulose? **(CO2)**

(2)

(vi) What would be the final pH of a solution of pH 5 after a thousand-fold dilution with pure water? (CO2)

(vii) Which amino acid is the source of urea? (CO2)

2. Answer *any ten* questions : $2 \times 10 = 20$

(i) What is Henderson-Hasselbalch equation? And its use. (CO1)

(ii) What are the implications of the results obtained from the Urey- Miller experiment? (CO2)

(iii) Which bonds are involved in the primary, secondary, tertiary and quaternary structures of a protein? (CO2)

(iv) DNA binding proteins would be rich in which amino acids? And why?

(v) What are the structures and functions of glutathione? (CO1)

(vi) How aromatic amino acids contribute in protein estimation using spectrophotometry? (CO2)

(vii) How Proteins could be denatured? (CO1)

(viii) How hemoglobin and myoglobin could be separated from a mixture? (CO2)

(ix) Why life is not possible to exist without water? (CO1)

(x) What are the special characteristics of peptide bonds? (CO2)

(xi) How Proteins are degraded by ubiquitin pathway? (CO2)

(xii) What are the essential features of Fluid Mosaic Model of membrane structure? (CO1)

BIOTECH-1350

[Continued]

(3)

(xiii) How is it similar or different with micelle and liposome? (CO1)

(xiv) *E coli* bacteria grown on suitable medium at 18°C. What kinds of fatty acids would be more in the cell membrane of *E coli* compared to *E coli* grown at 37°C? Why? (CO2)

(xv) Ribonuclease A has four disulfide bonds, which are unique for its function. Theoretically how many different ways eight different cysteine could form four disulfide bonds? Explain your answer. (CO2)

Group – B

Answer *any one* question : $1 \times 8 = 8$

3. What is metal-ion catalysis? Name a Zinc protease of bacterial origin. Which metallic ion is essential for the promotion of catalytic activity of restriction enzymes? How Zinc ion facilitates catalytic activity of carbonic anhydrases? What is the importance of a *two-fold rotational symmetry* at the recognition site of a restriction enzyme? What is the major catalytic function of NMP kinase? CO3
(2+1+1+2+1+1=8)

4. Why the oxyanion hole is incomplete in the Chymotrypsinogen? How the intrinsic clotting pathway is activated for blood clotting? How a protofibril is formed during blood clotting? Which functional groups are attached with the tetrapyrrole ring of Haemoglobin? Why the iron ion lies approximately 0.4 Å outside the porphyrin plane? What is the change in amino acid sequence of fetal hemoglobin relative to that of the maternal (adult) hemoglobin? CO3
(1+1+2+2+1+1=8)

BIOTECH-1350

[Turn Over]