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(July)

BIOTECHNOLOGY

(Honours)

(Biological Chemistry)

Marks : 56

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

Answer Question No. **1** which is compulsory and
any **four** from the rest

1. (a) Write the structure and single letter codes of the three standard α -amino acids that have aromatic *R* groups. 3
- (b) Calculate the pH of a mixture of 0.2 *M* acetic acid and 0.5 *M* sodium acetate. Given that the pK_a of acetic acid is 4.76. 3
- (c) Why are polypeptide bonds rigid? 2
- (d) Hydrocarbon chains are constituents of fats. How do their length and extent of saturation affect the properties of fats? 4

2. (a) Does dihydroxyacetone have stereoisomers? Give reasons for your answer. 2
- (b) How many stereoisomers will an aldohexose have? 2
- (c) Distinguish among enantiomers, diastereoisomers and epimers with suitable examples. 7
3. (a) Describe the steps in the pentose phosphate pathway that generates NADPH. 3
- (b) Why is the activity of the pentose phosphate pathway very high in adipose tissue? 2
- (c) Explain why gluconeogenesis is not the reversal of glycolysis. 6
4. (a) What is photorespiration? 3
- (b) How do C_4 plants minimize photorespiration? 6
- (c) How do CAM plants differ from C_4 plants? 2
5. How is the proton gradient created across the inner mitochondrial membrane? How is this gradient utilized in the biosynthesis of ATP from ADP and P_i ? 5+6=11

(3)

6. Derive the Lineweaver-Burk plot and explain its utility in estimating the values of $V_{\max}$ and K_m . What do these values signify? 8+3=11
7. (a) Write briefly about the levels of protein structure. 8
- (b) Describe the steps in glycolysis where substrate-level phosphorylation occurs. 3
8. (a) Derive the ion-product of water and explain how the concept of pH is based on it. 9
- (b) An aqueous solution has a pH of 9. What are the concentrations of H^+ and OH^- ions in that solution? 2

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