C 3083

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Second Semester

Biotechnology

BT 1151 — BIOCHEMISTRY — I

(Regulation 2004)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define mutarotation with an example.

2. You've just made a solution of combining 150 mL of a 1.0 M sodium acetate solution with 50 mL of 0.1 M acetic acid (pKa = 4.8). What is the pH of this solution?

3. Sketch the titration curve of Histidine. Explain how it can act as buffer at pH 6.0?

4. Give the structure and functions of Cholesterol.

5. Explain why enzymes are the major and more versatile biological catalysts.

6. Outline the role of transaminases in amino acid metabolism.

7. List the primary precursors of gluconeogenesis and outline briefly the reciprocal regulation of glycolysis and gluconeogenesis.

8. Outline the reactions of pyruvate dehydrogenase complex.

9. What are uncouplers and inhibitors of oxidative phosphorylation? Give one example.

10. Draw the structure of ATP and mention its important biological functions.

PART B — (5 × 16 = 80 marks)

11. (a) Briefly describe the following :

(i) Properties of water relevant to biomolecular interaction. (4)

(ii) Biological buffers. (4)

(iii) Fluid mosaic model of biomembranes. (4)

(iv) Isoelectric precipitation. (4)

Or

(b) Compare and contrast between the following in terms of structure and function :

(i) Glycoproteins and lipoprotiens. (4)

(ii) Homo and heteropolysaccharides. (4)

(iii) Sphingolipids and Glycolipids. (4)

(iv) DNA and RNA. (4)

12. (a) (i) Given a peptide with following amino acid sequence :

Val-Met-Ser-Ile-Phe-Arg-Cys-Tyr

(1) Identify polar, aromatic and sulfur containing amino acids. (3)

(2) Identify the charged groups in the peptide at pH 1 and pH 7. (2)

(3) What is the net charge of this peptide at these two pH values? (2)

(ii) Describe between the secondary structures of proteins. Describe the pattern of hydrogen bonding, the shapes and dimension of these structures. (9)

Or

(b) (i) Explain the features of DNA double helix structure. (8)

(ii) Mention the different types of RNA and their biological functions. (8)

13. (a) Explain the different modes of regulations of metabolic pathways with examples.

Or

(b) Outline the regulation of purine and pyrimidine biosynthesis and its biological significance.

14. (a) (i) Describe TCA cycle and state its significance in central metabolism. (12)

(ii) Show where the carbon skeletons of the amino acids enter the TCA cycle. (4)

Or

(b) (i) Outline the steps involved in β – oxidation of fatty acids. (12)

(ii) Give the role of Carnitine. (4)

15. (a) (i) Describe mitochondrial electron transport complexes and oxidative phosphorylation in detail. (12)

(ii) Explain the role of uncouplers in electron transport with special reference to uncoupling in brown adipose tissue. (4)

Or

(b) (i) Calculate the net ATP production for the complete oxidation of glucose. (4)

(ii) What are energy rich compounds? Mention their biological significance. (12)