

Q. C.

D 110

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2005.

Second Semester

Biotechnology

BT 1151 — BIOCHEMISTRY — I

(Regulations 2004)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the three kinds of non covalent bonds that mediate interaction of biomolecules and briefly describe their characteristics.
2. Calculate the pH of a buffer by mixing 75 ml of 1 M lactic acid and 25 ml of 1 M sodium lactate. pK_a of lactic acid is 3.86.
3. Describe the additivity of ΔG values for coupled reactions and the ability of thermodynamically favorable reaction to drive an unfavorable one.
4. Explain why enzymes are the major and more versatile biological catalysts.
5. Define coenzymes and give any four water soluble vitamins and their coenzyme form.
6. Sketch the titration curve of any one basic and acidic amino acids.
7. Write the structure of phosphoacyl glycerol and indicate the hydrophobic and hydrophilic components in it.
8. The composition (in mole fraction) of one of the strands of a double helical DNA is $[G] = 0.35$ and $[A] = 0.15$. What can you say about the $[C]$ and $[T]$ for the same strand? What can you say about the $[G]$ $[C]$ $[A]$ and $[T]$ of the complementary strand?
9. Write the pyranose structure of lactose.
10. Explain glucose alanine cycle and its importance.

PART B — (5 × 16 = 80 marks)

11. (i) Outline the reactions involved in glycolysis and gluconeogenesis. Explain the reciprocal regulation of glycolysis and gluconeogenesis. (12)
- (ii) Calculate the yield of ATP production from complete oxidation of glucose to CO₂ and H₂O. (4)
12. (a) (i) Give the structure and function of storage polysaccharides and glycosaminoglycans.
- (ii) Explain the important features of Watson–Crick DNA double helix and draw the structure of purines and pyrimidines.

Or

- (b) (i) Differentiate between the two major periodic secondary structures of proteins.
- (ii) Briefly describe the fluid mosaic model of biological membranes.
13. (a) Explain the regulation of metabolic pathways in biological systems giving suitable examples.

Or

- (b) Outline the reactions of HMP shunt. Mention its significance.
14. (a) Compare and contrast between fatty acid oxidation and biosynthesis.

Or

- (b) Describe urea cycle and explain how it is interconnected to TCA cycle.
15. (a) Describe the mitochondrial electron transport complexes and oxidative phosphorylation in detail.

Or

- (b) (i) What are high energy compounds? Rationalize the energy in high energy compounds with suitable example.
- (ii) Explain the salvage pathway of purine biosynthesis.