

Total number of printed pages – 6

B. Tech
CPBM 8201

Fourth Semester Examination – 2008

BIOCHEMISTRY

Full Marks – 70

Time : 3 Hours

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

*The figures in the right-hand margin
indicate marks.*



1. Answer the following questions : 2×10
- (a) What forces hold protein subunits in the secondary and quaternary structure of proteins ?
- (b) What is the fate of radio active label “C¹⁴” labeled at C-2 positions of Glucose-6-phosphate added to a cell extract contain-

ing all the enzymes and cofactors of TCA cycle ?

- (c) Predict the migration direction (Anodal, Cathodal or Stationary) during separation of following peptide at pH 6.0 : ‘Lys-Trp-Cys-Gly-Ala-Glu’.
- (d) Justify the role of heamoglobin as buffering agent in blood.
- (e) Define isoelectric point. Calculate the isoelectric point of Cysteine if pKa (α -COOH), pKa (α -NH₃⁺) and pKa R(side chain) values are 1.7, 10.8 and 8.3 respectively.
- (f) Why do differences in melting point exist between fatty acids containing same number of carbon atoms ?
- (g) Differentiate between peptide bond and phosphodiester bond with neat and labeled diagram.

P.T.O.

CPBM 8201

2

Contd.

- (h) What do you mean by redox potential ? Calculate redox potential of half reaction—
 $\frac{1}{2} \text{O}_2 + 2\text{H}^+ + 2 \text{e}^- \rightarrow \text{H}_2\text{O}$ at temperature 25 °C and pH 7.0 ?
- (i) The normal concentration of glucose-6-phosphate (G-6-P) and fructose-6-phosphate (F-6-P) in human erythrocytes are $1 \times 10^{-5} \text{ M}$ and $1 \times 10^{-6} \text{ M}$, respectively. If the standard free energy change (ΔG^0) for the reaction G-6-P to F-6-P is 0.4 Kcal/mol. Calculate the free energy change (ΔG) for the conversion of G-6-P to F-6-P.
- (j) What is the significance of hexose monophosphate (HMP) shunt in RBC from clinical point of view ?
2. What is fluid mosaic model of biological membrane ? Describe various transport systems that move molecules across the cell membrane with note on Na-K pump. 10

3. (a) Explain the methods used for isolation, purification and quantification of protein molecules. 5
- (b) Explain the diagnostic assay for Renal function assessment. 5
4. Explain the various level of organization of protein structure with emphasis on various bonds and chemical interaction on protein function. 10
5. (a) One molecule of Lactic acid ($\text{CH}_3\text{CHOHCO}_2\text{H}$) is oxidized completely to CO_2 and H_2O . Calculate the number of energy rich phosphate bonds that should be produced when each compound is oxidized, accounting for the consumption of energy rich phosphate if any. 4
- (b) Briefly explain the carriers of Electron transport system involved in the oxidative

phosphorylation of NADH_2 with a note on its ATP generation. 6

6. Define liver dysfunction. Briefly explain the various kinds of liver function tests based upon different functions of liver in human ? 10

7. Write short notes : 2.5 × 4

(a) α -Oxidation

(b) Gluconeogenesis

(c) Acid-base balance concept

(d) Z-DNA.

8. (a) Define Isotachopheresis. What is its significance ? 3

(b) The absorptivity of the copper (II)-protein complex which is formed in the biuret reaction is $0.05 \text{ cm}^2\text{mg}^{-1}$ at 545 nm. Calculate the protein concentration if the absorbance is 0.42. 3

(c) Define radioactive decay. What are the units of measurement of radioactive decay. An experimental sample of ^3H on filter paper in scintillation fluid gave count rate of 1450 cpm in liquid scintillation counter. The filter was removed and 5064 dpm added to it. On recounting, the filter gave a reading of 2878 cpm. What is the dpm of the experimental sample. 4