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 "C^{14}" labeled at C-2 positions of Glucose-6-phosphate added to a cell extract containing 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-NH_3^+) 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.

(h) What do you mean by redox potential ? Calculate redox potential of half reaction– "$^{1}/_{2}\ O^{2} + 2H^{+} + 2\ e^{-} \rightarrow H_2O$" 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 1×10^{-5} M and 1×10^{-6} M, respectively. If the standard free energy change ($\Delta G^{0'}$) 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 ($CH_3CHOHCO_2H$) 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 Isotachophoresisis. What is its significance ? 3

   (b) The absorptivity of the copper (II)-protein complex which is formed in the biuret reaction is 0.05 cm^2mg^{-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

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