

5. (a) Write the mechanism for the denaturation of proteins by each of the following reagents or conditions.

- (i) Urea
- (ii) High temperature
- (iii) Detergent
- (iv) Low pH

- (b) Explain the energy – entropy diagram for protein folding. Explain how chaperones assist in protein folding. (8,7)

6. Write short notes on the following :

- (a) Ramachandran plot
- (b) Prion diseases
- (c) Protein structure prediction tools (5,5,5)

**Your Roll No.....**

**Sr. No. of Question Paper : 1034      D**

**Unique Paper Code : 2492011102**

**Name of the Paper : Proteins (DSC-2)**

**Name of the Course : B.Sc. (Hons.) Biochemistry**

**Semester : I**

**Duration : 2 Hours      Maximum Marks : 60**

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. There are 6 questions.
3. Attempt any 4 questions. All questions carry equal marks.
4. Question no. 1 is compulsory.

1. A. Choose the best choice :

- (a) Which of the following pairs of bonds within a peptide backbone show free rotation around both bonds?

- (i)  $C\alpha-C$  and  $N-C\alpha$
  - (ii)  $C=O$  and  $N-C\alpha$
  - (iii)  $C=O$  and  $N-C$
  - (iv)  $N-C$  and  $C-C\alpha$
  - (v)  $N-C\alpha$  and  $N-C$
- (b) A bond generally absent in cytosolic proteins but present in extracellular proteins is known as –
- (i) Hydrogen bond
  - (ii) Disulfide bond
  - (iii) Ionic bond
  - (iv) Hydrophilic bond
  - (v) Van der Waal interactions
- (c) An integral membrane protein can be solubilized by extraction with :
- (i) A buffer of alkaline or acid pH.

- (c) Give an account of  $\alpha$ -Keratin structure and what makes them mechanically durable? (4,6,5)
4. (a) Explain the Bohr Effect and give its physiological relevance?
- (b) The following steps were performed on a peptide using enzyme cleavage. Determine the amino acid sequence of the peptide.
- (i) Step 1. Treatment with trypsin yields three fragments with the following sequences  
WGA, AGTK, YLDR.
  - (ii) Step 2. Treatment with chymotrypsin gave the following three peptide fragments: GA, LDRW, AGTKY.
- (c) Give the basis of the following statements :
- (i) Fetal hemoglobin has higher affinity for oxygen
  - (ii) Hemoglobin S homozygous individuals are anemic
  - (iii) Hemoglobin Hill plots give variable Hills coefficient (5,2,5,7,5)

- (ii) A solution of high ionic strength.
- (iii) A chelating agent that removes divalent cations.
- (iv) A detergent solution
- (v) An organic solvent
- (d) A repeating structural unit in a multimeric protein is known as a(n) :
  - (i) Domain
  - (ii) Motif
  - (iii) Oligomer
  - (iv) Protomer
  - (v) Subunit

B. Write an example and one function of the following:

- (a) Tripeptide
- (b) Glycoproteins
- (c) Metalloprotein

C. Give reasons for the following :

- (a) The peptide bond is a semi-rigid bond
  - (b) CO is a silent killer.
  - (c) Alzheimer's disease is a proteopathy.
  - (d) Collagen possess very high tensile strength  
(4,3,8)
2. (a) Differentiate between the following :
- (i) Fibrous and Globular proteins
  - (ii) Motifs and domains
  - (iii) Parallel and Anti-parallel  $\beta$  strand
  - (iv) Tertiary and Quaternary structure  
(4,4,4,3)
3. (a) Calculate the length of a linear peptide in nm having 200 amino acids, out of which 60% of residues are in  $\alpha$ -helix and rest are in  $\beta$ -pleated sheets.
- (b) Describe Edman degradation method of protein sequencing in detail. What are its advantages over Sanger's method?