Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech/BT/(NEW)/SEM-6/BT-604C/2013

2013

BIOPHYSICS OF MACROMOLECULES

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

   i) Positively charged aromatic amino acid at physiological pH is

      a) glutamic acid b) lysine

      c) histidine d) proline.

   ii) Amino acids of central two residues frequently occurring in β turn are

      a) histidine and proline

      b) glycine and proline

      c) glycine and cysteine

      d) none of these.

iii) The number of amino acid residues per turn of a π helix is

a) 4·4 b) 3

c) 2·2 d) 3·6 .

iv) The length of the peptide bond is

a) 1·53 b) 1·47

c) 1·24 d) 1·32 .

v) Amino acid residue that is called helix breaker is

a) proline b) glycine

c) leucine d) phenyl alanine.

vi) Number of hydrogen bonds per molecule of water in liquid state is

a) 4·0 b) 3·6

c) 3·4 d) 2·0 .

vii) Wavelength of visible range is

a) 200 - 2000 nm b) 400 - 800 nm

c) 200 - 500 nm d) 120 - 1000 nm.

viii) The term 'sequential model' is associated with

a) melting alpha helix

b) melting of DNA

c) allosteric protein

d) protein-lipid interaction.

ix) Which one is not a weak force ?

a) Hydrophobic interaction

b) Ionic interaction

c) Hydrogen bond

d) Disulphide linkage.

x) Example of a hydrophobic amino acid residue is

a) phenyl alanine b) tyrosine

c) serine d) threonine.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Describe the structure of *t*RNA.

3. Compare the three forms of DNA.

4. Write notes on the supersecondary structure of protein.

5. What is fluoroscence ? Discuss the process in brief. 1 + 4

6. Explain why short proteins containing disulphide linkages are exceptionally stable.

GROUP – C
(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) What is an electron microscope ?

b) What are the different types of electron microscope ?

c) Describe any one of them.

d) State the advantages of electron microscope over light microscope.

e) Why is it not possible to view live samples using electron microscope ? 1 + 2 + 7 + 3 + 2

8. a) Amino acid sequence affects a helix stability. Explain.
   b) Briefly describe the β sheet.
   c) The properties of nucleotide bases affect the three dimensional structure of nucleic acid. Explain.

5 + 5 + 5

9. a) Ionic interactions are strong but do not greatly stabilize proteins. Explain.
   b) What is omega loop ?
   c) Why does polyproline not form a helix ?
   d) Amino acids are ampholytes. Explain. 5 + 2 + 3 + 5

10. State with explanation where the following amino acids are likely to be found in proteins — in the core or on the surface : 5 × 3
   a) Serine
   b) Valine
   c) Glutamic acid
   d) Lysine
   e) Leucine.

11. a) What are chaperons ? Discuss the role of Hsp 70 in protein folding.
   b) Folding of newly synthesized protein in a cell usually needs different processes. Justify the statement.

2 + 7 + 6

12. a) Define Tm of a DNA molecule. Describe a process for determination of Tm of a DNA.
   b) Derive the equation showing relation between Tm, ΔG and ΔS.
   c) Melting of DNA is a cooperative process. Justify the statement. 2 + 5 + 3 + 5