

Name :

Roll No. :

Invigilator's Signature :

CS/B.TECH /BT/SEM-7/BT-703A/2012-13

2012

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 any *ten* of the following :

10 × 1 = 10

- i) The secondary amino acid present in protein is
 - a) glycine
 - b) proline
 - c) lysine
 - d) histidine.
- ii) The unit of extinction coefficient is
 - a) $M^{-1}cm^{-1}$
 - b) $M cm^{-1}$
 - c) $M cm$
 - d) $M^{-1}cm$.
- iii) Which pair of amino acids will have the highest absorbance at 280 nm ? (Assume equimolar concentrations)
 - a) Thr & His
 - b) Phe & Pro
 - c) Trp & Tyr
 - d) Phe & His.
- iv) The optically inactive amino acid found in protein is
 - a) glycine
 - b) aspartic acid
 - c) lysine
 - d) histidine.



- xi) Molecular weight of an unknown protein can be found out by
- electrophoresis
 - ion exchange chromatography
 - affinity chromatography
 - none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following $3 \times 5 = 15$

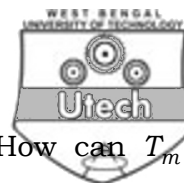
- What is the effect of following amino acids on protein structure ?
 - Proline
 - Glycine
 - Aspartate
 - Glutamine
 - Methionine.
 - Compare A, B and Z forms of DNA.
 - What is NMR ? Briefly describe the basic principle of NMR.
- 1 + 4
- What is the difference between conformation and configuration ? Describe with example.
 - Discuss the role of IR spectroscopy in determination of molecular structure.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

- What do you mean by denaturation of a protein ? Derive the equation based on two-state model for melting of an alpha-helix. Discuss how the kinetic constant can be measured with the help of absorbance.
- 2 + 8 + 5



8. What is melting point (T_m) of a DNA ? How can T_m be determined with the help of absorbance of a DNA molecule ? Discuss the factors that affect T_m of a DNA molecule. Derive the relation between H and T_m of a DNA molecule.

2 + 4 + 5 + 4

9. a) State the working principle of X-ray crystallography and cite an example of its application.

- b) State Beer-Lambert law. When the Beer-Lambert law is not followed ?

8 + 4 + 3

10. Describe the main advantages and disadvantages of fluorescence over the optical spectroscopic techniques with suitable examples. What are Stokes and anti-Stokes shift in fluorescence ? What are intrinsic and extrinsic fluorphores that are used in our biological studies ? Write a short note on FRET.

4 + 2 + 4 + 5

11. a) How many types of weak interactions are there in biomolecules ? Describe each of them with example.

- b) What do you mean by stereoisomers ? Define enantiomers and diastereomers.

10 + (1 + 2 + 2)

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