

2056
M.Sc. Applied Chemistry (Pharmaceutical) Second Semester
Paper – 204: Biophysical Chemistry

Time allowed: 3 Hours

Max. Marks: 60

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting one question from each Unit.

x-x-x

I. Attempt the following:-

- (a) Compare α -helix and β -sheet structures with suitable diagrams?
- (b) Discuss the role of actin in muscle contraction?
- (c) Explain moving boundary and zonal electrophoresis in detail?
- (d) Discuss the formation and characteristics of micelles and reverse micelles? (4x3)

UNIT - I

- II. (a) Describe the process of synthesis of polypeptides in living cells and explain the role of ribosomes and messenger RNA in protein biosynthesis.
- (b) Discuss the concept of Gibbs free energy and explain its importance in biochemical reactions.
- (c) Discuss the applications of chain configuration studies in polymer engineering and the statistical distribution of polymer chain end-to-end distances. (3,3,6)

- III. (a) Explain the role of ATP in signal transduction, biosynthesis, and membrane transport?
- (b) Explain the significance of protein folding pathways and folding intermediates in achieving stable protein conformations?
- (c) Explain Gaussian chain statistics and their applications in polymer science? (6,3,3)

UNIT - II

- IV. (a) Define osmotic pressure with detail discussion on the various factors affecting osmotic pressure in polymer solutions and its biological significance?
- (b) Explain the role of Na^+/K^+ ATPase pump in ion transport.
- (c) Discuss the significance of irreversible thermodynamics in understanding biological systems? (5,4,3)

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(2)

- V. (a) Discuss the mechanism of nerve impulse conduction?
(b) Explain mechanochemical systems and their importance in biological processes?
(c) Analyze how thermodynamic principles govern biological membrane transport?

(3,6,3)

UNIT - III

- VI. (a) Explain how diffusion measurements help in determining molecular weight and conformation of macromolecules.
(b) Explain the principle of sedimentation and its significance in determining the molecular characteristics of biopolymers.
- VII. (a) Define hydrodynamic properties and explain their significance in macromolecular characterization?
(b) Explain how the second virial coefficient provides information about intermolecular interactions?
(c) Discuss the applications of Donnan membrane equilibrium in biological and pharmaceutical sciences?
(d) Define drug adsorption and discuss its importance in pharmaceutical sciences?

(4,4,2,2)

UNIT - IV

- VIII. (a) Define scattering by large particles and compare it with Rayleigh scattering?
(b) Evaluate the applicability of Debye-Hückel theory in explaining the properties of polyelectrolyte systems, highlighting its assumptions and limitations?
- IX. (a) Write a detailed note on the denaturation of biomolecules and the factors influencing it?
(b) Write a descriptive note on Rayleigh scattering?
(c) Describe the strategies adopted for the stabilization of biomolecular systems in solution?

(3x4)