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| IV Year B.Tech. Biotechnology | I - Semester | L | T | P | To | C |
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BT 407 BIOPHYSICS (ELECTIVE - III)**Course Description & Objectives:**

The course helps in understanding physical principles that governs the resulting structures. It helps in familiarizing with different types of spectroscopy and analyzing various types of structures. It enables to determine higher order structures of proteins, nucleic acids and carbohydrates and provided understanding of transport mechanism of organisms.

Course Outcomes:

Students will be able to

1. Understand basic principles of physics, biology and chemistry that will govern cell structures.
2. Get familiarized with working principle of different spectroscopy.
3. Analyze various types of structures.
4. Determine higher order structures of proteins, nucleic acids and carbohydrates.
5. Understand various transport mechanisms of organisms.
6. Compare different types of transport systems across membranes.

UNIT-I : Basic thermodynamics Ligand binding and co-operativity in biological systems, kinetics, diffusion and sedimentation.

UNIT-II : Principles and biological applications of UV-Vis, fluorescence, vibrational and circular dichroism spectroscopy. Mass spectrometry and basics of one- and two-dimensional NMR spectroscopy with applications to peptide and protein structure determination.

UNIT-III : Crystal morphology and symmetry :

Symmetry elements and symmetry operations, point groups, lattice space groups. Production and properties of X-rays, diffraction of X-rays by crystals, Laue equations, Bragg's Law, Fourier transformation and structure factor, reciprocal lattice, experimental techniques, rotating crystals and moving film methods. Basic ideas of structure determination, Patterson and Fourier methods, chemical crystallography, structures of organic, inorganic compounds and minerals, powder diffraction.

UNIT-IV : Basic ideas on structure and conformation of simple molecules structural features of proteins, nucleic acids and carbohydrates, aspects of biomolecular forces. Higher order structural organisation of proteins and nucleic acid.

UNIT-V : Membrane Biology : Lipid structure and their organization, comparison of different membrane models, diffusion and permeability, different types of transport systems across membranes, liposome and its applications

TEXT BOOKS:

1. Tinoco, I, Sauer K, Wang J C. Physical Chemistry, Principles and Applications in Biological Sciences Prentice Hall, New Jersey, USA, 978.
2. Horst Friebolin, Basic One-and Two-Dimensional NMR Spectroscopy (Fourth Edition), Wiley-VCH.

REFERENCE BOOKS:

1. Cantor, C.R., and Schimmel P.R., Biophysical Chemistry, Vols. I-III, W.H. Freeman and Co., San Francisco, USA, 1980.
2. Buerger M.J., Elementary Crystallography Woolfson M.M., An Introduction to X-ray Crystallography. Stout H. and Jenson L.H., X-ray Structure Determination, Macmillan, 1968.
3. A.R. Leach, Molecular Modelling : Principles and Applications, Prentice Hall (2001).
4. Schulz and Schirmer, Principles of Protein Structure, Springer-Verlag (1979).

