19BSP505T					Introduction to Biophysics					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory MS	ES	Internal	Team Work	Practical/ Viva	Total Marks
3	0	0	3	3	25	50	25	-	-	100

COURSE OBJECTIVES

- To give knowledge about theories and methods of physics to understand working of biological system.
- To provide them knowledge of different biophysical instruments and how they are useful in different branches of science.
- To learn basic unit of life (cell) and physical principles underlying cell function.
- To learn physical aspects of DNA to unfold large number of human diseases.

UNIT I INTRODUCTORY BIOPHYSICS **9 Hrs.**

General biophysics, Prerequisites of biophysics, History of biophysics, Applications of biophysics. Water as a universal solvent. Biomolecules: Carbohydrate, Protein- protein structure, forces stabilizing protein structure, isoelectric point, zwitter ion, Lipid, Nucleic acid -DNA, RNA.

UNIT II CELLULAR AND MEMBRANE BIOPHYSICS **10 Hrs.**

Cell as the basic structural unit, Kinetics of cell growth, cell cycle, cell signalling-endocrine, paracrine and synaptic. Biological Membrane: membrane architecture, membrane permeability, membrane potential, membrane properties, membrane transport- osmosis, simple and facilitated diffusion, active transport.

UNIT III TECHNIQUES OF BIOPHYSICS-I **12 Hrs.**

Measurement of pH using pH meter, preparation of buffer, Viscometer, Colorimeter, Microscopy: principle, instrumentation, types of microscopy, light, bright-field, dark-field, phase contrast, fluorescence, electron microscopy (Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM)), applications of microscopy.

UNIT IV TECHNIQUES IF BIOPHYSICS-II **14 Hrs.**

Chromatography: principle, types of chromatography, applications of chromatography. Electrophoresis: principle, electrophoretic mobility (EPM), types of electrophoresis: paper, cellulose acetate, gel electrophoresis, isoelectric focusing, 2D-PAGE electrophoresis, applications of electrophoresis. Spectroscopy: principle, instrumentation, types of spectra, types of spectroscopy, application of spectroscopy.

Max 45 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 - Understand the dependence of physics and biology.
CO2 - Analyze different biophysical techniques used in diagnosis of different diseases.
CO3 - Identify different biomolecules present in biological system.
CO4 - Identify and differentiate working principle, instrumentation and applications of various biophysical instruments.
CO5 - Compare absorption and emission spectra. Identify the application of each region of EM spectrum for spectroscopy.
CO6 - Describe the structure of cell membrane, membrane transport systems and membrane potential.

TEXT/REFERENCE BOOKS

1. An introduction of Biophysics, Moganty R. Rajeshwari.
2. Biophysics, MA. Subramanian.
3. Applied Biophysics, A Molecular Approach for Physical Scientist, Tom A Weigh.
4. Biophysics: Tools and techniques, Mark C. Leake.
5. Biophysics, Vasntha Pattabhai N. Gautham.
6. Biophysics, Demystifield, Daniel Goldfarb.
7. Cell and Molecular Biology, D Roberties.
8. Molecular Cell Biology, Lodish.
9. Biomembrane structure and function, Chapman D.
10. The Cell: A Molecular Approach. Textbook by Geoffrey M. Cooper.
11. Biophysical aspects of transmembrane, Damjanovich.
12. Thermal Biophysics of Membranes, Thomas Heimburg.
13. Introduction of Biological Membrane, Jain RK.
14. Biochemistry: “The Molecular basis of cell structure and function”, A.L. Lehninger.