

Part A: Introduction			
Program: <b>Degree Course</b>		Class: <b>B.Sc.</b>	Semester: <b>Fifth</b> Session: <b>2024-2025</b>
1	Course Code	<b>PSE – 04T</b>	
2	Course Title	<b>BIO-PHYSICS</b>	
3	Course Type	<b>Theory</b>	
4	Pre-requisite (if any)	As per norms	
5	Course Learning Outcomes (CLO)	<b>After completion of the course students will be able to –</b> <ul style="list-style-type: none"> <li>• Gain of advanced theoretical knowledge of building blocks and structure of living things</li> <li>• Understand the basic of thermodynamics of living state.</li> <li>• Gain knowledge about diffusion and transport phenomenon</li> <li>• Understand open system and thermodynamics</li> <li>• Gain knowledge about bioenergetics and molecular motors.</li> </ul>	
6	Credit Value	<b>Theory : 3</b>	
7	Total Marks	<b>Max. Marks: 100</b>	<b>Min Passing Marks : 40</b>
Part B: Content of the Course			
Total Hours: 45			
Unit	Topic		Number of Hours
<b>I</b>	<b>Building Blocks and Structure of Living State:</b> Atoms and ions, molecules essential for life, what is life. <b>Living state interactions:</b> Forces and molecular bonds, electric & thermal interactions, electric dipoles, Casimir interactions, domains of physics in biology.		<b>12</b>
<b>II</b>	<b>Living State Thermodynamics:</b> Thermodynamic equilibrium, first law of thermodynamics and conservation of energy. Entropy and second law of thermodynamics, Physics of many particle systems, Two state systems, continuous energy distribution, Composite systems, Casimir contribution of free energy, Protein folding and unfolding.		<b>11</b>
<b>III</b>	<b>Open systems and thermodynamics:</b> Enthalpy, Gibbs Free Energy and chemical potential, activation energy and rate constants, enzymatic reactions, ATP hydrolysis & synthesis, Entropy of mixing, The grand canonical ensemble, Hemoglobin. <b>Diffusion and transport:</b> Fick's law of diffusion, Sedimentation of Cell Cultures, diffusion in a centrifuge, diffusion in an electric field, Lateral diffusion in membranes, Navier Stokes equation.		<b>11</b>
<b>IV</b>	<b>Fluids:</b> Laminar and turbulent fluid flow, Bernoulli's equation, equation of continuity, venturi effect, Fluid dynamics of circulatory systems, capillary action. <b>Bioenergetics and Molecular motors:</b> Kinesins, Dyneins, and microtubule dynamics, Brownian motion, ATP synthesis in Mitochondria, Photosynthesis in Chloroplasts, Light absorption in bio-molecules, vibrational spectra of bio-molecules.		<b>11</b>