| Part A: Introduction | | | | |
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| Program: **Degree Course** | | Class: **B.Sc.** | Semester: **Fifth** | Session:**2024-2025** |
| 1 | Course Code | **PSE – 03T** | | |
| 2 | Course Title | **Classical Mechanics** | | |
| 3 | Course Type | **Theory** | | |
| 4 | Pre-requisite (if any) | NO | | |
| 5 | Course Learning Outcomes (CLO) | **After completion of the course students will be able to –**<br>• The Idea and concepts in classical physics<br>• Basic concepts in Variational principle and Principle of Least Actions<br>• Derivations, necessity and applications of Lagrangian and Hamiltonian formulations<br>• Central force problems, theory of small oscillations and its applications | | |
| 6 | **Credit Value** | **Theory :3** | | |
| 7 | **Total Marks** | **Max. Marks:100** | **Min Passing Marks : 40** | |

| Part B: Content of the Course | | |
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| **Total Hours: 45** | | |
| **Unit** | **Topic** | **Number of Hours** |
| I | **Preliminaries of classical mechanics:** Newtonian mechanics - one and many particle systems; Conservation laws; Work energy theorem; Open system (with variable system) constraints and their classification; D'Alembert principle; Generalized coordinates. | **12** |
| II | **Central Forces:** Reduction to one body problem; equation of motion and first integral; one dimensional problem and classification of orbits; Kepler"s laws and planetary motion; Scattering in central force field; Transformation to laboratory frames. | **11** |
| III | **Rigid Body and Vibrating System:** Euler angles; Tensor of inertia; Kinetic energy of a rotating body; Symmetric top and Applications; Vibrating string; Solution wave equation; Normal vibrations; Dispersion; Coupled vibrating system. Hamiltonian Formulation: Legendre transformation; Hamiltonian equation of motion; cyclic coordinates; Phase space and Liouville"s theorem; Poisson bracket. | **11** |
| IV | **Relativistic mechanics:** Four-dimensional formulation- four-vectors, four-velocity and four-acceleration. Lerentz co-variant form of equation of motion. Continuum mechanics Basic concepts, equations of continuity and motion; Simple applications. | **11** |