**CURRICULUM DEVELOPMENT PLAN: Pooja Devi**

**B.Sc.(H) Physics VIIth Semester (Odd Semester, 2025-2026)**

**Paper: Classical Mechanics; UPC:; Credits: 03 (Lecture-03, Tut.-01)**

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| **Content** | **Allocation of Lectures** | **Month-wise Schedule followed** | **Tutorial**  **Assignment/**  **presentation etc** |
| **Unit 1: *Variational Principle and Lagrangian Formulation***  Calculus of Variation with applications. Generalized coordinates. Lagrangian, Hamilton's Principle, Euler-Lagrange equations of motion.  Constrained systems. Cyclic coordinates and conserved quantities. Applications to physical systems. | 04 | August | * Syllabus Overview * Reference Books * Problem-solving |
| **Unit 2: *Hamiltonian Formulation and Phase Space***  Legendre transformation, Hamilton’s equations of motion. Phase space, phase trajectories, Phase portraits.  Canonical transformations, Poisson brackets, Liouville’s theorem and conservation of phase space volume.  Applications to Physical Systems**.** | 07 | September | * Derivations * Problem-solving * Students’ difficulties |
| **Unit 3: *Rigid Body Dynamics***  Rotation Matrices, Euler Angles. Angular momentum and kinetic energy of rigid bodies, The Inertia Tensor,  Principal Axis Transformation. Euler’s equations of motion for rigid body. Torque-free motion.  The symmetrical top with one point fixed | 08 | October | * Derivations * Problem-solving * Students’ difficulties * Assignments |
| **Unit 4: *Central Force and Orbital Mechanics***  Equation of motion under central force, Classification and Stability of orbits. Virial Theorem.  Conditions for Closed Orbits (Bertrand's Theorem). The Kepler Problem. Scattering in central force field.  Rutherford scattering as an application.of mass  ***Theory of small oscillations***  Linearization of equations of motion. The Eigenvalue Equation and the Principal Axis Transformation,  Normal coordinates and normal frequencies of oscillations. Damped and forced oscillations, Coupled oscillators. | 08 | November | * Derivations * Problem-solving * Students’ difficulties * Previous year's Question Papers |