

**Third year of Five Years integrated M.Sc (Physics)
M.Sc. – III, Semester –V**

MP 301 :	Classical Mechanics	L	T	P	C
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- **TWO-BODY CENTRAL FORCE PROBLEM** (08 Hours)
Reduced mass, Planet orbits, Virial theorem.
- **COLLISIONS AND SCATTERING** (06 Hours)
Centre of mass and lab frames, Scattering cross section
- **RIGID BODY DYNAMICS** (06 Hours)
Euler equations, Euler angles, The inertia tensor, Poinsot solutions, Motion of the symmetric top.
- **MOTION IN NON-INERTIAL FRAMES** (04 Hours)
Coriolis Force
- **PRINCIPLE OF VIRTUAL WORK** (02 Hours)
Constraints, Generalised Coordinates, Velocities And Momenta, D'Alembert's Principle
- **LAGRANGE'S FORMULATION** (06 Hours)
Calculus of variations, Variational technique for many independent variables, Euler Lagrangian differential equation, Hamilton principle, Deduction of Lagrange's equation of motion from Hamilton's principle, Application of Lagrange's equation of motion.
- **HAMILTON'S EQUATIONS; POISSON BRACKETS** (04 Hours)
Phase space and motion of the system, Hamilton's canonical equation of motion, Physical significance of H, Advantage of Hamilton approach, Invariance of Poisson bracket with respect to canonical transformation, Equation of motion in Poisson bracket form.
- **HARMONIC OSCILLATOR; NONLINEAR OSCILLATOR; INTRODUCTION TO CHAOS** (06 Hours)

(Total Contact Time (Theory) : 42 Hours)

BOOKS RECOMMENDED :

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|---|--|------------------------|------|
| 1. Taylor, J., | <i>Classical Mechanics</i> | Palgrave Macmillan | 2004 |
| 2. Kibble, T. W. B. & Berkshire, F. H., | <i>Classical Mechanics</i> | Imperial College Press | 2004 |
| 3. Rana, N. C & Joag P.S. | <i>Classical Mechanics</i> | Tata McGraw Hill | 1991 |
| 4. Goldstein H., Poole C. P. and Saffko J.L., | <i>Classical Mechanics</i> | Addison Wesley | 2001 |
| 5. Takwale, R.; Puranik, P., | <i>Introduction to Classical Mechanics</i> | Tata McGraw Hill | 1978 |