Course Objective:

1. To demonstrate knowledge and understanding of the following fundamental concepts in: the dynamics of system of particles, motion of rigid body, Lagrangian and Hamiltonian formulation of mechanics
2. How to represent the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulations of classical mechanics.
3. To represent the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulation of classical mechanics.
4. To develop math skills as applied to physics.

Classical Mechanics (18BSM 602)										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	--	4	4	25	50	25	--	--	100

UNIT I **10 hours**

Holonomic and non-holonomic constraints, D'Alembert's principle, generalized coordinates. Lagarngian, Lagrange's equation and its applications, velocity dependent, potential in Lagrangian formulation, generalized momentum, Legendre transformation.

UNIT II **10 hours**

Hamiltonian, Hamilton's Canonical equation, calculus of variation and its application to simple problems, Hamilton's variational principle. Derivation of Lagrange's and Hamilton's canonical equations from Hamilton's variational principle.

UNIT III **10 hours**

method of Lagrange's multipliers, conservation principle, conservation of energy, linear momentum and angular momentum as a consequence of homogeneity of time and space and isotropy of space respectively.

UNIT IV **9 hours**

Canonical transformation, Integral invariants of Poincare, Lagrange's and Poisson brackets as canonical invariants, Equation of motion in Poisson bracket formulation, Infinitesimal canonical transformation and generators of symmetry, Liouville's theorem, Hamilton Jacobi equation and its applications.

APPROXIMATE TOTAL 39 Hours

Text and Reference books

1. H. Goldstein, C. Poole, J. Safko, Classical Mechanics, 3rd Ed., Addision Wesley,
2. L.D. Landau and E.M. Lifshitz, Mechanics, (Volume 1 of A Course of Theoretical Physics) Pergamon Press 1969

3. MG Calkin, Lagrangian and Hamiltonian Mechanics, World Scientific Publishing, (1996)

Course Outcomes:

1. Define and understand basic mechanical concepts related to discrete and continuous mechanical systems,
2. Describe and understand the vibrations of discrete and continuous mechanical systems,
3. Describe and understand planar and spatial motion of a rigid body,
4. Describe and understand the motion of a mechanical system using Lagrange-Hamilton formalism.