B.Sc. Forensic Science: Semester-V FST504: Physics - V	
Teaching Scheme	**Examination Scheme**
Lectures: 3 hrs/Week	Class Test – 12 Marks
Tutorials: 1 hr/Week	Teachers Assessment – 6 Marks
Credits: 4	Attendance – 12 Marks
	End Semester Exam – 70 marks

Course outcomes:

- Understand the concepts of generalized coordinates and D'Alembert's principle.
- Understand the Lagrangian dynamics and the importance of cyclic coordinates.
- Comprehend the difference between Lagrangian and Hamiltonian dynamics.
- Study the important features of central force and its application in Kepler's problem.
- Recognize the difference between macrostate and microstate.
- Comprehend the concept of ensembles.
- Understand the classical and quantum statistical distribution laws.
- Study the applications of statistical distribution laws.

Unit I – Constrained Motion

- Constraints - Definition, Classification and Examples. Degrees of Freedom and Configuration space. Constrained system, Forces of constraint and Constrained motion. Generalised coordinates. Transformation equations and Generalised notations & relations. Principle of Virtual work and D'Alembert's principle.

Unit II – Lagrangian Formalism

- Lagrangian for conservative & non-conservative systems, Lagrange's equation of motion (no derivation), Comparison of Newtonian & Lagrangian formulations, Cyclic coordinates, and Conservation laws (with proofs and properties of kinetic energy function included). Simple examples based on Lagrangian formulation.

Unit III – Hamiltonian Formalism

- Phase space, Hamiltonian for conservative & non-conservative system, Physical significance of Hamiltonian, Hamilton's equation of motion (no derivation), Comparison of Lagrangian & Hamiltonian formulations, Cyclic coordinates, and Construction of Hamiltonian from Lagrangian. Simple examples based on Hamiltonian formulation.

Unit IV – Central Force

- Macrostate & Microstate: Definition and properties (with prove) of central force. Equation of motion and differential equation of orbit. Bound & unbound orbits, stable & non-stable orbits, closed & open orbits and Bertrand's theorem. Motion under inverse square law of force and derivation of Kepler's laws. Laplace-Runge- Lenz vector (Runge-Lenz vector) and its applications.

Unit V – Macrostate & Microstate

- Macrostate, Microstate, Number of accessible microstates and Postulate of equal a priori. Phase space, Phase trajectory, Volume element in phase space. Quantisation of phase space and number of accessible microstates for free particle in 1D, free particle in 3D & harmonic oscillator in 1D.

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