

Syllabus of Scheme III

T. Y. B. Sc. Physics

(Semester- VI)

Name of the Course: Physics Major Course 10
MJ - 10: Classical Physics (2 Credits)

Sr. No.	Heading	Particulars
1	Description the course (Including but Not limited to)	: Introduction, relevance, Usefulness, Application, interest, connection with other courses, demand in the industry, job prospects etc.
2	Vertical	: Major/Minor/Open Electives /Skill Enhancement / Ability Enhancement/Indian Knowledge System
3	Type	: Theory
4	Credits	: 2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
5	Hours Allotted	: 30 Hours
6	Marks Allotted	: 50 Marks
7	Course Objectives (CO): The students are expected to:	
	CO 1.	learn different aspects of classical mechanics.
	CO 2.	understand the kinds of motions that can occur under a central potential and their applications to planetary orbits.
	CO 3.	learn the moving coordinate system, rectilinear as well as rotating.
	CO 4.	learn the concepts needed for the important formalism of Lagrange's equations and derive the equations using D'Alembert's principle.
	CO 5.	learn to solve simple examples using this formalism.
8	Course Outcomes (OC): After successful completion of the course, the student will be able to	
	OC 1.	demonstrate an understanding of the fundamental concepts and various aspects of classical mechanics
	OC 2.	apply the principles of rotating and moving co-ordinate systems to explain motion on the rotating Earth, the Foucault pendulum and Larmor's theorem.
	OC 3.	explain the kinematics and dynamic of ideal fluids and use conservation laws to analyze fluid motion.
	OC 4.	explain the formalism on Lagrange's equation and derive them using D'Alembert's principle.
	OC 5.	describe the basic concepts of nonlinear dynamics and chaos, including bifurcation and logistic map
9	Modules / Units: - There will be One Module / Unit Per Credit	
	Module I / Unit I: Central Force Fluid Motion and Rigid body rotation (15 Hours)	
	Motion under a central force, the central force inversely proportional to the square of the distance, Elliptic orbits, The Kepler problem.	
	KRS:3.13-3.15	
	Moving origin of coordinates, Rotating coordinate systems, Laws of motion on the rotating earth, The Foucault pendulum, Larmor's theorem.	

	KRS: 7.1-7.5 Kinematics of moving fluids, Equation of motion for an ideal fluid, Conservation laws for fluid motion. KSR :8.6 to 8.8 Module II / Unit II: Lagrange's equations and Non-Linear Mechanics (15 Hours) D'Alembert's principle, Constraints, Examples of holonomic constraints, examples of nonholonomic constraints, degrees of freedom and generalized coordinates, illustrative problems. Lagrange's equation in one dimension, Lagrange's equation in three dimensions, Lagrange's equations using D'Alembert's principle, Examples, Systems subject to constraints, Constants of motion and ignorable coordinates. HG:1.4 PVP: 4.2 to 4.9, 5.2 to 5.4,7.2 ,7.3 KRS: 9.1 to 9.6 Transition to chaos: Bifurcations and strange attractors, Aspects of chaotic behavior (Logistic map). BO: 11.4,11.5 A GA:12.2, 12.3,12.4		
10	Reference Books: 1. KRS: Mechanics: Keith R. Symon (Addison Wesley, 3rd Ed.) 2. HG: Classical Mechanics: Herbert Goldstein, (Narosa 2nd Ed.) 3. BO: Classical Mechanics- a Modern Perspective: V. D. Barger and M. G. Olsson. (Mc Graw Hill International 1995 Ed.) 4. PVP: Classical Mechanics, P. V. Panat (Narosa) ?? 5. GA: Classical Mechanics by G.Aruldas PHI Learning Private Limited Additional Reference Books: 1. An Introduction to Mechanics: Daniel Kleppner & Robert Kolenkow, Tata Mc Graw Hill (Indian Ed. 2007). 2. Classical Mechanics – System of Particles and Hamiltonian Dynamics: Walter Greiner (Springer). 3. Introduction to Classical Mechanics: P. S. Puranik and R. G. Takwale (Tata McGraw-Hill).		
11	Internal Continuous Assessment: 40% (20 Marks)	External Assessment: (60%) (30 Marks)	
12	Continuous Evaluation through: Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc. (at least 3)	Evaluation: through Exam at the End of the Semester / Term.	
13	Format of Question Paper for Semester End Examination Total Marks: 30 Marks Duration: One Hour		
	Module I / Unit-I 15 Marks	Q.1 A) Attempt any Two (Each carry 05 Marks) i) Theory ii) Theory iii) Theory iv) Theory	10 Marks

		Q.1 B) Attempt any One (Each carry 05 Marks) i) Problem / Theory ii) Problem	05 Marks
	Module II / Unit-II 15 Marks	Q.2 A) Attempt any Two (Each carry 05 Marks) i) Theory ii) Theory iii) Theory iv) Theory	10 Marks
		Q.2 B) Attempt any One (Each carry 05 Marks) i) Problem / Theory ii) Problem	05 Marks