BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE-PILANI, HYDERABAD CAMPUS
FIRST SEMESTER 2019-2020

01 –08 - 2019

Course Handout (Part II)

In addition to part-I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course No. : PHY F211
Course Title : Classical Mechanics
Instructor-in-Charge : Rahul Nigan

Course Description: The course begins with Lagrangian dynamics which is subsequently applied to two-body central force motion, rigid-body motion and oscillations. It also covers Hamilton's equations of motion.

Scope & Objectives: This is an advanced course on classical mechanics which deals with some advanced techniques for solving problems of mechanics. It also deals with formulations of classical mechanics that find their use in quantum mechanics as well as classical statistical mechanics.

Learning Objectives: 1) Calculus of Variation. 2) Lagrangian formulation of Physical Theories. 3) Legendre Transformations. 4) Hamiltonian Formulation. 5) Solving first order Partial Differential Equations. 6) Phase space description of dynamics. 6) Poisson brackets and interpretations. 7) Basic Group Theory. 8) Rotation Description.

Text Book: H. Goldstein, C. Poole & J. Safko, Classical Mechanics, Third Edition, Pearson Education, Inc., 2002

Reference Books: 1) N. C. Rana and P S Joag, Classical Mechanics, Mc Graw Hill, 2006
2) Analytical Mechanics by Hand and Finch, Cambridge University Press, 1998.

Course Plan:

Lecture No.	Learning Objectives	Topics to be covered	Chapter in the Text Book
1-2	Calculus Of Variation	Introduction to Variational Calculus	Differential Equations by G. F Simmons
3-5	Failure of Newtonian	De Alembert's principle	1.3

	Mechanics		
6-9	Generalized Coordinates	Lagrange's equation	1.4
10-11	Illustration of the applications of Lagrange's equations.	Simple applications of Lagrangian formulation.	1.5 – 1.6
12	Conservation theorems.	Cyclic coordinates and conservation theorems.	Class Notes or 8.2
13-18	To state the two-body central force problem.	Two-body central-force motion and equivalent one-body problem.	3.1-3.7
19-20	Hamiltonian	The Hamilton's equations of motion.	8.1,2.1
21-23	Canonical Transformations	Canonical Transformations and Generating functions	9.1,9.2,9.3, 9.4
24-27	The Poisson Brackets	Symplectic Approach	9.5
28 – 29	To study rotation of coordinate systems and orthogonal transformations in order to understand kinematics of rigid bodies.	Orthogonal transformations and their properties	4.1 – 4.3
30-35	Hamilton Jacobi Equations, Canonical Transformations	Computation of Hamilton Principle function, Interpretation and Connection with Quantum Mechanics.	10
38-42	Theory of small oscillations.	Oscillation, eigenvalue equation.	6.1 – 6.2

Evaluation Scheme:

EC No.	Evaluation Component.	Duration.	Weigh tage	Date, Time & Venue.	Nature of Component.
1	Mid-semester test	90 min	30%	4/10, 11.00 -- 12.30 PM	Open Book
2	Quiz 1/2	50 min	30%		Closed Book
3	Comprehensive Examination	3 Hours	40%	11/12 AN	Closed Book

Chamber Consultation Hour: To be announced in the class.

Notices: Notices concerning the course will be put up on the **PHYSICS** notice board.

Make-up Policy: Make-up for the tests will be granted only for genuine cases of health problems or urgency for going out of town.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-charge