

Branch Specific Courses for Applied Physics Department

Introduction to Classical Mechanics

PHPH 102 S1

Scheme

L	T	P	Credit
3	0	2	04

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- **VECTORS FUNDAMENTALS AND DIFFERENT CO-ORDINATE SYSTEM (08 hours)**
Unit vectors, Vector operations, Tripple products, Vector algebra in component form, ifferential calculus, Cartesian coordinate system, Spherical coordinate system, Cylindrical coordinate system.
 - **NEWTON'S LAWS OF MOTION, CONSERVATION LAWS, MOMENTS OF INERTIA (08 hours)**
Mechanics of the particle, Equation of motion, Different conservation laws, Moments of inertia, Motion in central force field.
 - **RIGID BODY MOTION (06 hours)**
Euler's theorem, Angular momentum and kinetic energy, Euler's quation of motion, Euler's angles.
 - **ELASTICITY & HYDRODYNAMICS (08 hours)**
Stress and Strain, Young's modulus, Shear modulus and Bulk Modulus, Buoyancy, Types of fluid flow, Bernoulli's equations.
Viscosity, Terminal Velocity.
 - **SIMPLE HARMONIC MOTION (04 hours)**
Restoring force, Elastic potential energy, Period and frequency, Energy, Pendulums, Applications of SHM.
 - **OSCILLATIONS (08 hours)**
Damped oscillations, forced oscillations, coupled oscillations & resonance.

(Total Lecture Hours: 42 Hours)

BOOKS RECOMMENDED:

1. Mathur D. S., Mechanics, S. Chand & Company, 2000.
2. Takwale R. G. & Puranik P.S., Introduction to Classical Mechanics, TMH, 1997.
3. Feymann R. P., Lighton R. B. and Sands M., The Feynman Lectures in Physics Vol. 1, Narosa Publishers, 2008.
4. Verma H. C., Concepts of Physics, Vol. 1 & 2, Bharati Bhavan, 2007.
5. Landau L. D. & Lifshitz E M, Course on Theoretical Physics, Vol. 1: Mechanics, Addison-Wesley, 2002

Kinetic Theory and Thermodynamics

PHPH 113 S2

Scheme

L	T	P	Credit
3	1	2	05

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- **KINETIC THEORY OF GASES** (04 Hours)
Postulates of kinetic theory of gases, Velocity of gas molecules, Molecular energy, Kinetic-molecular model of an ideal-gas, Kinetic interpretation of temperature, Degree of freedom of gas molecules, Maxwell's law of equipartition of energy.
 - **INTERMOLECULAR FORCES & TRANSPORT PHENOMENA** (04 Hours)
Viscosity of a gas, Thermal conductivity of gases, Van der Waals's equation of state, Brownian motion.
 - **LAWS OF THERMODYNAMICS** (12 Hours)
Zeroth law of Thermodynamics, First and Second laws of Thermodynamics, Concepts of temperature, Internal energy and entropy, Calculations of change of internal energy and entropy in various thermodynamic processes.
 - **THERMODYNAMIC POTENTIALS, HELMHOLTZ & GIBBS FUNCTIONS, MAXWELL RELATIONS** (10 Hours)
Gibbs and Helmholtz energy, Gibbs paradox, Enthalpy, Maxwell's thermodynamic relations.
 - **ELEMENTS OF STATISTICAL PHYSICS** (08 Hours)
Fermi Dirac, Maxwell Boltzmann and Bose Einstein distributions.
 - **THERMODYNAMICS OF BLACK BODIES** (04 Hours)
Black body and characteristics, Radiation principles like Rayleigh Jeans, Wien's and Planck's law of black body radiation.

(Total Lecture Hours: 42)

BOOKS RECOMMENDED:

1. Sears F.W. & Salinger, Thermodynamics, Kinetic theory and Statistical Thermodynamics, 3rd Ed. Addison-Wesley/Pearson, 1975.
2. Young & Freedman, Sears and Zemansky's University Physics, Pearson Education, Singapore, 2004.
3. Feynman R. P., Leighton R. B. and Sands M., The Feynman Lectures in Physics, Vol. 1 Narosa Publishers, 2008.
4. Zemansky M. W., Heat and Thermodynamics, (McGraw Hill), 1957
5. Carter A., Classical and Statistical Thermodynamics, Pearson Education, 1999.