

PH1010: PHYSICS I

Course Content:

Use of vectors in practical mechanics. Unit vectors in spherical and cylindrical polar coordinates. Conservative vector fields and their potential functions -gravitational and electrostatic examples. Gradient of a scalar field. Equipotentials, states of equilibrium. Work and energy, conservation of energy. Motion in a central force and conservation of angular momentum. Physics concepts in vector fields, Continuity equations and conservation principles for matter, energy and electrical charge. Flux, divergence of a vector. Gauss' theorem, physical applications in gravitation and electrostatics. Irrotational versus rotational vector fields. Physical significance of circulation, curl of a vector field. Stokes' theorem, physical applications. Oscillatory motion, Wave motion in one dimension. Wave equation and travelling wave solutions. Wave velocity, group velocity and dispersion. Shallow water waves. Wave equation in three dimensions, spherical waves.

Text Books

Reference Books:

1. **Kittel C., Knight W.O. and Ruderman M.A.**, Mechanics - Berkeley Physics Course, Vol. 1, Tata McGraw-Hill
2. **Purcell E.M. Electricity and Magnetism** - Berkeley Physics Course, Vol.2, Tata McGraw-Hill
3. **Crawford F.S. - Waves and Oscillations**, Berkeley Physics Course, Vol. 3, McGraw-Hill
4. **Feynman R.P., Leighton R.B. and Sands M. (Narosa)** The Feynman Lectures on Physics, Vol. 1
5. **Feynman R.P., Leighton R.B. and Sands M. (Narosa)** The Feynman Lectures on Physics, Vol. 26. Davis D. (Academic) - Classical Mechanics

Prerequisite: