

PH 102 Physics - II (2-1-0-6)

Vector Calculus: Gradient, Divergence and Curl, Line, Surface, and Volume integrals, Gauss's divergence theorem and Stokes' theorem in Cartesian, Spherical polar, and Cylindrical polar coordinates, Dirac Delta function.

Electrostatics: Gauss's law and its applications, Divergence and Curl of Electrostatic fields, Electrostatic Potential, Boundary conditions, Work and Energy, Conductors, Capacitors, Laplace's equation, Method of images, Boundary value problems in Cartesian Coordinate Systems, Dielectrics, Polarization, Bound Charges, Electric displacement, Boundary conditions in dielectrics, Energy in dielectrics, Forces on dielectrics.

Magnetostatics: Lorentz force, Biot-Savart and Ampere's laws and their applications, Divergence and Curl of Magnetostatic fields, Magnetic vector Potential, Force and torque on a magnetic dipole, Magnetic materials, Magnetization, Bound currents, Boundary conditions.

Electrodynamics: Ohm's law, Motional EMF, Faraday's law, Lenz's law, Self and Mutual inductance, Energy stored in magnetic field, Maxwell's equations, Continuity Equation, Poynting Theorem, Wave solution of Maxwell Equations.

Electromagnetic waves: Polarization, reflection & transmission at oblique incidences.

Texts:

- [1] D. J. Griffiths, Introduction to Electrodynamics, 3rd Ed., Prentice-Hall of India, 2005.
- [2] A.K.Ghatak, Optics, Tata Mcgraw Hill, 2007.

References:

- [1] N. Ida, Engineering Electromagnetics, Springer, 2005.
- [2] M. N. O. Sadiku, Elements of Electromagnetics, Oxford, 2006.
- [3] R. P. Feynman, R. B. Leighton and M. Sands, The Feynman Lectures on Physics, Vol.II, Norosa Publishing House, 1998.
- [4] I. S. Grant and W. R. Phillips, Electromagnetism, John Wiley, 1990.