

Syllabus

Paper-C : ELECTRICITY AND MAGNETISM-I

UNIT-I

Basic ideas of Vector Calculus, Gradient, Divergence, curl in Cartesian coordinates and their useful relations, physical significance and applications, Conservative field, Greens's theorem in a plane, Laplacian in Rectangular coordinates. Stoke's theorem, Gauss's divergence theorem, Coulomb's Law for point charges and continuous distribution of charges, electric field due to dipole, line charge, charged ring, circular disc and sheet of charge, Gauss's Law and its differential form.

UNIT-II

Work and potential difference, Potential difference as line integral of field, Electric potential due to dipole and quadrupole and its applications in Electrostatic field, Electric field as gradient of scalar potential, curl $E = 0$. Calculation of E due to a point charge and dipole from potential. Poisson and Laplace's equation, Concept of electrical images. Calculation of electric potential and field due to a point charge placed near an infinitely conducting sheet.

Polarisation of matter, atomic and molecular dipoles, induced dipole moment and atomic polarizability. Electric susceptibility and polarization vector. Relation $K = 1 + \chi$, Gauss's law for dielectrics. Displacement vector, Div. $D = 0$, Energy stored in dielectric medium.