EE-305 Electromagnetic Field Theory

Credit	L	T	P
4	**3**	**1**	**-**

UNIT-1
Vector Analysis, coordinate systems, vector operator, curl, divergence theorem, Stoke's theorem, Coulomb's law, electric field intensity, field due to continuous volume charge distribution, field of a line charge, field of a sheet of charge.

UNIT-II
Electric flux density, Gauss's law, symmetrical charge distributions, differential volume element, divergence, Maxwell's first equation, energy expended in moving a point charge in an electrostatic field, line integral, definition of potential; and potential difference, potential field of a charge, potential field of a system of charges, potential gradient, the dipole, energy density in electric field.

UNIT-III
Current and current density, continuity of current, metallic conductors, conductor properties and boundary conditions, semiconductors, nature of dielectric materials, boundary conditions for perfect dielectric materials, capacitance, several capacitance examples, capacitance of two wire line, Poisson's and Laplace's equations, unique Theorem, examples of the solution of Laplace's and Poisson's equations, product solution of Laplace equation.

UNIT-IV
Boit Savart law, Ampere's circuital law, magnetic flux and magnetic flux density, scalar and vector magnetic potentials, derivations of steady magnetic field laws, force on a moving charge, force on differential current element, force between differential current elements, force and torque on a closed circuit.

UNIT-V
Faraday's law, displacement current, Maxwell's equations in point forms and in integral forms, Application of Maxwell's equations, EM waves and propagation of energy. Wave equation for free space. Plane and uniform plane wave. Poynting vector and power, Intrinsic impendance of media for uniform plane wave.

TEXT/REFERENCE BOOKS.

1. William H. Hayt (Jr.), "Engineering Electromagnetics", McGraw Hill Book Co., New Delhi.
2. N.Narayana Rao, "Elements of Engineering Electromagnetics", Prentice Hall of India Pvt. Ltd., New Delhi.
3. Joseph A. Edminister, "Electromagnetics", Schaum's Outline Series in Engineering, McGraw Hill Co., New Delhi.
4. David K. Cheng, "Field and Wave Electromagnetics", Second Latest Edition, Addison Wesley Publishing Company Inc. Reading, Massachusetts, U.S.A.