



STANLEY
COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN
(Approved by AICTE , New Delhi | Affiliated to Osmania University ,Hyderabad)
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EE 252

ELECTROMAGNETIC THEORY

Unit-I

Electrostatic fields: Brief review of vector analysis- Introduction to different coordinate systems- Coulomb's law (point charges and charge distribution) - Electric field and flux density- Gauss law- Gauss divergence theorem-Potential Energy and Electrical Potential- Relationship between E and V- Dielectric Materials- Capacitance (Parallel plate, Two wire transmission line) - Electric and Equipotential plots- Integral and Point form of Maxwell's Electrostatic Equation.

Unit-II

Magneto static Fields : Electrical Currents(Conduction and Convection)- Calculations of Magnetic fields using Biot-Savart's law and Amperes law- Magnetic scalar and Vector Potentials-Magnetic Materials- Forces in Magnetic fields- Lorentz force equation- Force between parallel conductors- Magnetic Torque and Dipole Moment- Inductance Calculations(Solenoid, Toroid, Parallel transmission line)- Mutual Inductance- Integral and Point forms of Maxwell's Magneto static equation.

Unit-III

Boundary Value Problems and Numerical Methods : Boundary conditions for Electric and Magnetic Fields- Poisson's and Laplace equations- Analytical solutions- By direct Integration(One Dimensional)- Numerical solution of One dimensional by Finite Difference method- Analytical solutions(Variable & separable) two dimensions- Numerical Solutions of two dimensional by finite difference method- Introduction to Finite Element and Method of Moments.

Unit-IV

Time Varying Electromagnetic fields and Wave Propagation: Faraday's law of Induction- Equation of continuity- Displacement current- Final forms

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of Maxwell's Equations- Power and Poynting theorem- Time- Harmonic Electromagnetic fields- Wave equations (One dimension) - Plane Wave Propagation in perfect and Lossy Dielectric.

Unit-V

Electromagnetic Interference and Compatibility(Theoretical Aspects only): Introduction to Electromagnetic Interference and Electromagnetic Compatibility (EMI & EMC)- Sources and Characteristics of EMI- Control Techniques of EMI- Grounding- Shielding- Filtering.

Suggested Reading:

- 1.Hayt, W.H and J.A Buck, *Engineering Electromagnetics*, 7th Edition, Mc Graw Hill, 2006.
- 2.Sadiku, M.N.O, *Elements of Electromagnetics*, 4th edition, Oxford University press, 2007.
- 3.Karl E. Lonngren, Sava V.Savov, Randy J.Jost, *Fundamentals of Electromagnetics*, With MATLAB, PHI, NewDelhi.