

PCEC4205 **Electromagnetic Fields and Waves**

MODULE – I

(11 Hours)

7. **Vectors and Fields:** Vector Algebra, Cartesian Coordinate System, Scalar and Vector Fields, Sinusoidally Time-Varying Fields, Electric Field, Magnetic Field.
8. **Maxwell's Equations in Integral Form:** Line Integral, Surface Integral, Faradays Law, Ampere's Circuital Law, Gauss's Law for Electric Field, Gauss's Law for Magnetic Field.
9. **Maxwell's Equations in Differential Form:** Faradays Law, Ampere's Circuital Law, Curl and Stoke's Theorem, Gauss's Law for Electric Field, Gauss's Law for Magnetic Field, Divergence and Divergence Theorem.

MODULE – II

(11 Hours)

10. **Wave Propagation in Free Space:** Infinite Plane Current Sheet, Magnetic Field Adjacent to the Current Sheet, Successive Solution of Maxwells's Equations, Wave Equation and Solution, Uniform Plane Waves, Poynting Vector and Energy Storage.
11. **Wave Propagation in Material Media:** Conductors and Dielectrics, Magnetic Materials, Wave Equation and Solution, Uniform Plane Waves in Dielectrics and Conductors, Boundary Conditions, Reflection and Transmission of Uniform Plane Waves.

MODULE – III

(10 Hours)

12. **Transmission Line Analysis:** Gradient and Electric Potential, Poisson's and Laplace's Equations, Low Frequency Behavior via Quasistatics, Short Circuited Line and Frequency Behavior.
13. **Wave Guide Principles:** Uniform Plane Wave Propagation in an Arbitrary Direction, Transverse Electric Waves in a Parallel-Plate Waveguide, Dispersion and Group Velocity, Rectangular Waveguide and Cavity Resonator, Reflection and Refraction of Plane Waves, Dielectric Slab Guide.

Text Book(s):

9. Fundamentals of Electromagnetics for Engineering, First Impression – 2009, N. N. Rao, Pearson Education, New Delhi.
10. Introduction to Electromagnetic Fields, 3rd Edition, Clayton R. Paul, Keith W. Whites and Syed A. Nasar, Tata McGraw Hill Publishing Company Ltd., New Delhi.
11. Electromagnetics, 2nd Edition, Joseph A. Edminister, adapted by Vishnu Priye, Tata McGraw Hill Publishing Company Ltd., New Delhi. (*For Problem Solving*)

Reference Book(s):

1. Elements of Engineering Electromagnetics, 6th Edition, N. N. Rao, Pearson Education, New Delhi.
2. Electromagnetic Waves and Radiating Systems, 2nd Edition, E.C. Jordan and K.G. Balman, Pearson Education, New Delhi.
3. Engineering Electromagnetics, 7th Edition, William H. Hayt, Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. Electromagnetic Field Theory Fundamentals, B.S. Guru and H.R. Hiziroglu, PWS Publishing Company, a division of Thomson Learning Inc.
5. Elements of Electromagnetics, Mathew N.O. Sadiku, Oxford University Press, New Delhi.