PEI3I001   ELECTROMAGNETIC FIELD THEORY

MODULE – I (13 Hours)
1. Vectors and Fields: Cartesian Coordinate System, Cylindrical and Spherical coordinate system, Vector Algebra, Scalar and Vector Fields, gradient, divergence, curl operations, The Laplacian, Divergence Theorem, Stoke's Theorem ,Useful vector identities and their derivations. (selected portions from 1.01 to 1.05 of TB-1)
2.: Electric and Magnetic fields: Field due to a line/sheet/volume charge, Biot _Savart Law,Gauss's Law for Electric Field and Magnetic Field, Fields of electric and magnetic dipoles, Applications of electrostatics and magnetostatics, Faraday's Law, Ampere's Circuital Law. (portions 3.4.to 3.6, 4.4.3,4.6, 4.8,4.9, 8.3 to 8.8 and 9.2 of TB-2)
3. Maxwell's Equations: Divergence and Differential Form, Line Integral, Surface Integral and Integral form, Faradays Law, Ampere's Circuital Law, Gauss's Law for Electric Field and Magnetic Field. (portions 4.01 to 4.03 of TB-1)

MODULE – II (13 Hours) (Portions 5.01 to 5.13 of TB-1)
4. Wave Propagation in Free Space: The electromagnetic wave equation and its solution, Uniform Plane Waves, Direction cosines, Concept on TEM mode, Poynting Vector and Power density
5. Wave Propagation in Material Media: Conductors and Dielectrics, Magnetic Materials, Wave Equation and Solution, Uniform Plane Waves in Dielectrics and Conductors, Polarization, Boundary Conditions, Reflection and Transmission of Uniform Plane Waves at the boundary of two media for normal and oblique incidence, Brewster's angle.

MODULE – III (10 Hours)
6. Transmission Line Analysis: Transmission lines, Circuit representation of a parallel plane transmission line, Parallel plane transmission lines with loss, E and H about long parallel cylindrical conductors of arbitrary cross section, Transmission line theory, UHF lines as circuit elements (portions 7.10 to 7.16 of TB-1)
7. Wave Guide Principles: Rectangular guides, TM waves in rectangular guides, TE waves in rectangular guides, Impossibility of TEM wave in wave guides, wave impedance and characteristic impedances, Attenuation factor and Q of wave guides, Dielectric Slab Guide ,(portions 8.01 to 8.04, 8.08,8.10,8.11 of TB-1).

Text Book(s):
1. *Electromagnetic Waves and Radiating Systems, 2nd Edition, E.C. Jordan and K.G. Balmain, Pearson Education, New Delhi.*
2. *Engineering Electromagnetic, 2nd Edition, Nathan Ida, Springer*
3. *Electromagnetic, 2nd Edition, Joseph A. Edminister, adapted by Vishnu Priye, Tata McGraw Hill Publishing Company Ltd., New Delhi. (For ProblemSolving)*

Reference Book(s):
1. *Fundamentals of Electromagnetic for Engineering, First Impression – 2009, N. N. Rao, Pearson Education, New Delhi.*
2. *Engineering Electromagnetic, 7th Edition, William H. Hyat, Tata McGraw Hill Publishing Company Ltd., New Delhi.*
3. *Elements of Electromagnetic, Mathew N.O. Sadiku, Oxford University Press, New Delhi.*
4. *Electromagnetic Field Theory Fundamentals, B.S. Guru and H.R. Hiziroglu, PWS Publishing Company, a division of Thomson Learning Inc*