PCEE 4302 **ELECTROMAGNETIC THEORY** (3-0-0)

Module – I (15 hours)
Co-ordinate systems & Transformation:
Cortesian, co-ordinates, circular cylindrical co-ordinates, spherical co-ordinates
Vector Calculus: Differential length, Area & volume, Line surface and volume Integrals, Del operator, Gradient of a scalar, Divergence of a vector & divergence theorem, curl of a vector & Stoke's theorem, laplaciar of a scalar
Electrostatic Fields: Coulomb's Law and Field Intensity Electric Fields due to continuous charge distributions, Electric Flux Density.Gauss's Law – Maxwell's Equation, Applications of Gauss's Law, Electric Potential, Relationship between E and V – Maxwell's Equation An Electric Dipole & Flux Lines, Energy Density in Electrostatic Fields.
Book1:Ch.1.1 to 1.4, Ch.2.1 to 2.8, Ch. 3.1 to 3.10

Module – II (15 hours)
Electrostatic Boundary – Value Problems:
Possion's & Laplace's Equations, Uniqueness theorem, General procedures for solving possion's or Laplace's Equation, Resistance, Capacitance, Method of Images.
Magnatostatic Fields:
Biot-Savart's Law, Ampere's circuit law-Maxwell Equation, applications of Ampere's law, Magnatic Flux Density-Maxwell's equations. Maxwell's equation for static fields, Magnetic Scalar and Vector potentials Derivation of Biot-Savart's Law Ampere's Law.
Book1:Ch.4.8, Ch. 5.1 to 5.6 Ch. 6.1 to 6.8

Module – III (10 hours)
Maxwell's Equations:
Faradey's Law, Transformer & Motional Electromagnetic Forces, Displacement Current, Maxwell's Equation in Final forms, Time Varying Potentials, Time-Harmonic Field
Electromagnetic Wave Propagation:
Wave Propagation in lossy Dielectrics, Plane Waves in loss less Dielectrics, Power & pointing vector.
Numerical Methods: Finite element, Finite Difference & moment methods – some applications.
Book1:Ch.8.1 to 8.7, Ch.9.1 to 9.3 & 9.6, Ch. 13.1 to 13.5

Text Book:

1. Matthew N. O. Sadiku, Principles of Electromagnetics, 4th Ed., Oxford Intl. Student Edition.

Reference Book:

1. C. R. Paul, K. W. Whites, S. A. Nasor, Introduction to Electromagnetic Fields, 3rd,TMH.
2. Electromagnetic Field Theory, W.H. Hyat, TMH, 7th Ed.
3. Engineering Electromagnetics by Shen, Kong, Patnaik, CENGAGE Learning.