PEL3I001 ELECTROMAGNETIC THEORY

Module – I **(8 hours)**

University Portion (80%):

Co-ordinate systems & Transformation: Cartesian 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, laplacian of a scalar (Text Book 1: Chapter- 1, Chapter-2)

College/Institute Portion (20%):

Field: Scalar Field and Vector Field. Or related advanced topics as decided by the concerned faculty teaching the subject.

Module – II **(11 hours)**

University Portion (80%):

Electrostatic Fields: Coulomb's Law, Electric Field Intensity, Electric Fields due to point, line, surface and volume charge, 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., Electrostatic Boundary – Value Problems: Possion's & Laplace's Equations, Uniqueness theorem, General procedures for solving possion's or Laplace's Equation. (Textbook-1: Chapter- 3, 4, 5.1 to 5.5)

College/Institute Portion (20%):

Nature of current and current density, the equation of continuity. Or related advanced topics as decided by the concerned faculty teaching the subject.

Module – III **(8 hours)**

University Portion (80%):

Magnatostatic Fields: Magnetic Field Intensity, Biot-Savart's Law, Ampere's circuit law-Maxwell Equation, applications of Ampere's law, Magnetic Flux Density-Maxwell's equations. Maxwell's equation for static fields, Magnetic Scalar and Vector potentials. (Textbook-1:
Chapter- 6.1 to 6.8)

College/Institute Portion (20%): (2 hours)

Energy in Magnetic Field Or related advanced topics as decided by the concerned faculty teaching the subject.

Module – IV **(7 hours)**

University Portion (80%):

Electromagnetic Fields and Wave Propagation: Faraday'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. (Textbook-1: Chapter-8.1 to 8.7, Ch.9.1 to 9.3 & 9.6)

College/Institute Portion (20%):

General Wave Equation, Plane wave in dielectric medium, free space, a conducting medium, a good conductor and good dielectric, Polarization of wave. Or related advanced topics as decided by the concerned faculty teaching the subject.

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. *W.H. Hyat, Electromagnetic Field Theory, 7th Ed, TMH.*