

Approval: 1st Convocation Adhoc Meeting

Course Name : **Electromagnetic Fields**
Course Code : **EE 310**
Credits : **3-0-0-3**
Prerequisites :

Course Contents:

Review: Electrostatics, Magnetostatics, Ampere's Law, Faraday's Law, Electromagnetic Energy. (Topics covered in PH 102) - Solution Techniques Laplace/Poisson's equation with Dirchlet/ Neumann boundary conditions. Method of images, separation of variables, finite difference schemes – Time varying fields Maxwell's equations, wave equation, Poynting theorem, phasor notation - Plane Waves: Solution of the wave equation in vacuum. Wave velocity and impedance. Normal and Oblique incidence at interfaces. Penetration into conducting surfaces - skin effect. Reflection off dielectric layers - Introduction to waveguides: Guided waves. Interpretation as superposition of obliquely travelling plane waves. Modes and their cutoffs. The TEM wave and the transmission line limit - Transmission Lines: The high-frequency circuit. Time domain reflectometry. LCR ladder model for transmission lines. The transmission line equation. Analogy with wave equation. Solution for lossless lines. Wave velocity and wave impedance. Reflection and Transmission coefficients at junctions. VSWR. Introduction to Smith Chart - Antennas: The free space antenna. The half-wave dipole antenna. Radiation patterns. Antenna gain and directivity - Case studies: Semiconductors, bio-electromagnetics, data storage, RF circuits, optics, telecommunications.

Text books:

- 1.Nannapaneni Narayana Rao, Elements of Engineering Electromagnetics, Prentice Hall of India.
- 2.Hayt, Engineering Electro-magnetics, McGraw-Hill.

References:

- 1.Kraus and Fleisch, Electromagnetics with applications, McGraw-Hill.
- 2.Ramo, Whinnery and Van Duzer, Fields and Waves in Communication Electronics, John Wiley and Sons (Asia)