SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES, CHITTOOR -517127
(AUTONOMOUS)
DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

B.TECH II-II SEM (E.E.E)

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SUB CODE: 16EEE221

ELETROMAGNETIC FIELDS

OBJECTIVES:

- To demonstrate knowledge on static electric fields and magnetic fields
- To analyze the Maxwell's equations for both time variant and time invariant electric and magnetic fields
- To demonstrate knowledge on time varying electric and magnetic fields

UNIT-I ELECTROSTATICS

Electrostatic Fields - Coulomb,s law - Electric Field Intensity (EFI) - EFI due to line and a surface charge - work done in moving a point charge in an electrostatic field - electric potential – potential gradient-Gauss law - application of Gauss law - Maxwell's first law, div(D)= ρ_v

UNIT-II LAPLACE EQUATIONAND CAPACITANCE

Electric dipoles - dipole moment - potential and EFI due to an electric dipole-Behavior of conductors in an electric field - Laplaces and poisons equations-solution of Laplaces equation in one variable- Electric field inside a dielectric material-polarization-dielectric-conductor and dielectric-dielectric boundary conditions, capacitance-capacitance of parallel plate and spherical and coaxial capacitors with composite dielectrics-energy stored and energy density in a static electric field –Mobility of charges-Energy band-Mobility in conductors, semiconductors, insulators-current density-conduction and convection current densities- ohms law in point form-Equation of continuity

UNIT-III MAGNETO STATICS AND AMPERES CIRCUITAL LAW

Magnetic materials - Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole –torque on a current loop placed in a magnetic field - Introduction to permanent magnets their characteristics and applications.-Static magnetic fields- Oesterds experiment -Biot-savarts law –magnetic field intensity (MFI) - MFI due to straight current carrying filament - MFI due to circular square and solenoid current - carrying wire – relation between magnetic flux, magnetic flux density and MFI Maxwell's second equation,div(B)=0.

Ampers circuital law and its applications viz,,MFI due to an infinite sheet of current and a long current carrying filament –point from of Amperes circuital law –Maxwells third equation, curl(H)=jc, field due to a circular loop , rectangular and square loops

UNIT-IV FORCEAND POTENTIALIN MAGNETIC FIELDS, AND INDUCTANCE

Magnetic force moving charges in a magnetic field –Lorentz force equation – Force on a current in a magnetic field -Force on a straight and long current carrying conductor in a magnetic field – force between two straight long and parallel current carrying conductors – Boundary conditions- Scalar magnetic potential and its limitation – vector magnetic potential and its properties - vector magnetic potential due to simple configuration - vector poisons equations. Self and mutual inductance - Neumann's formulae- determination of self - Inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane - Energy stored and density in a magnetic field.

UNIT-V TIME VARYING FIELDS:

Faradays laws of electromagnetic induction - Displacement current density – Maxwell's equations in integral and point forms for static and time varying fields – Poynting theorem and poynting vector.

COURSE OUTCOMES:

on successful completion of the course, student will be able to

1. demonstrate knowledge on:
   - static electric fields due to electric charges
   - static magnetic fields due to steady currents
   - time varying electric and magnetic fields
2. analyze the Maxwell's equations for both time variant and time invariant electric and magnetic fields.
3. evaluate electric field and capacitance by applying Gauss's law.
   Magnetic field and inductance by applying Ampere's circuital law
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TEXT BOOK

1. Engineering Electromagnetics – W H Hayt Jr. & John A Buck – TMH – 7th Edition 2006
2. Elements of Electromagnetics – M O Sadiku – Oxford – 3rd Edition

REFERENCE BOOKS

1. Electromagnetic Fields –Bakshi & Bakshi

University Nominee	**Subject Expert**	**Subject Expert**
Dr.G.V.Marutheswar Professor, EEE Dept. S.V.U CE Tirupathi	Dr.T.Gowri Manohar Professor, EEE Dept. S.V.U.C.E,Tirupathi	Dr. V.Rajnikanth Professor,Dept. of EEE, S.K.I.T, SriKalahasti

Industry Expert	**Alumni Student**	**Dept. BOS Chairman**
Mr. K.Somashekar M.Tech SE in Electrical department	Mr.K. Hemachandra Reddy Assistant Professor,Dept. of	Prof. Ramesh Halakurki HOD EEE

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