ELECTROMAGNETIC FIELD THEORY

Paper Code	**ECS-403**
Course Credits	4
Lectures/ Week	3
Tutorials/ Week	1
Course Description	**UNIT-1VECTOR ANALYSIS, COULOMB'S LAW AND ELECTRIC FIELD INTENSITY**.

Review of scalars and vectors, vector algebra, cartesian co-ordinate system, vector components and unit vectors, vector field, dot product, cylindrical and spherical coordinate systems, experimental law of Coulomb, electric field intensity, field due to a continuous volume charge distribution, field of a line charge, field of a sheet of charge.

UNIT-IIELECTRIC FLUX DENSITY, GAUSS'S LAW, DIVERGENCE, ENERGY AND POTENTIAL.

Electric flux density, Gauss's Law,application of Gauss's Law, some symmetrical charge distributions, differential volume element, divergence, vector operator ∇ and divergence theorem, Energy expended in moving a point charge in an electric field, Line integral, Definition of potential difference and potential, Potential field of a point charge, Potential field of system of charges-conservative property, Potential gradient, Dipole, Energy density in electrostatic field.

UNIT-III CONDUCTORS, DIELECTRICS, CAPACITANCE, POISSON'S AND LAPLACE'S EQUATIONS.

Current and current density, continuity of current, semiconductors, Poisson's and Laplace's equations, product solution of Laplace equation.

UNIT-IV STEADY MAGNETIC FIELD AND AMPERE'S CIRCUITAL LAW.

Biot-Savart's Law, Ampere's circuital Law, Curl, Stoke's theorem, magnetic flux and magnetic flux density.

UNIT-V MAXWELL'S EQUATIONS.

Faraday's Laws, displacement current, Maxwell's equations in point from, Maxwell's equations in integral form

Pre-requisite Course/ Paper

Vector concept

Text Book

W H Hayt, J A Buck and M Jaleel Akhtar, "Engineering Electromagnetics", McGraw Hill Education, 8th edition.

Reference Books

1. Joseph A Edminister, "*Electromagnetics*". Schaum's Outline Series in Engineering. M.c.Graw Hill Book, Co, new Delhi-1986.

2**.** K E Lonngren, S V Savov and R J Jost, "Fundamentals of electromagnetic with MATLAB", PHI, 2nd edition.

3. A Pramanik, "Electromagnetism , Volume 1-(Theory)", PHI, 2014.

4. D K Cheng, "Field and wave electromagnetics", Pearson, 2nd edition.

5. M N O Sadiku, "Principles of electromagnetism", Oxford, 4th edition.

6. S Bhooshan, "Fundamentals of engineering electromagnetics", Oxford, 2013.

Course Outcome

CO1. A thorough understanding of transformations between cartesian, cylindrical and spherical coordinate systems and application of Coulomb's law to compute electric field intensity due to various charge distributions.

CO2. An ability to apply Gauss's law to symmetrical charge distributions, understanding of divergence theorem and potential field computation due to system of charges.

CO3. A thorough understanding of continuity of current and application of Poisson's and Laplace's equations to determine parameters like potential and capacitance.

CO4. A thorough understanding of laws and theorems related to magnetostatics such as Biot-Savart's law, Ampere's circuital law, Stoke's Theorem etc.

CO5. An ability to interpret and identify various EM fields as Maxwellian on the basis of Maxwell's equations.