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| Course No | Course Name | L-T-P-Credits |
| **EE 212** | **Electromagnetic Theory** |  **3-0-0: 3** |
|  Prerequisite: nil; Co requisite: nil |
| **Course Objectives**:1. To understand the fundamental aspects of electromagnetism in electrical system.2. To develop proficiency to analyse electromagnetic field distribution.3. To implement the concepts in practical applications. |
|  **SYLLABUS** |
| **Module** | **Contents** | **Hours** |
| I | **Vector Analysis** Introduction to Electromagnetism; Basic laws of vector algebra; Orthogonal coordinate system and transformation; Vector Calculus; Gradient, Divergence & Curl operator; Divergence theorem & Strokes theorem; Laplacian operator; Classification of vector fields; Maxwell’s Equations. | 07 |
| II | **Electrostatics**Coulomb’s law and electric field intensity; Charge distributions; Maxwell’s electrostatic equations; Gauss’s law; Electric potential and Potential gradient; Electric dipole and concept of polarisation; Electrical properties of materials, conductors and dielectrics; Electrostatic Energy; Boundary conditions; Applications.  | 08 |
| III | **Magnetostatics**Biot- savart law, Magnetic forces and torques; Maxwell’s Magnetostatic equations; Ampere’s circuit law; Magnetic vector & scalar potential, Magnetic dipole and concept of magnetisation; Magnetic properties of materials, Inductors; Magnetostatic Energy; Boundary conditions; Applications.  | 08 |
| IV | **Time Varying Fields** Maxwell’s equations for time varying fields; Faraday’s law; Transformer and motional EMF; Displacement current; Time varying potential; Boundary conditions; Charge – Current continuity relation; Applications.  | 07 |
| V | **Wave Propagation** Introduction to wave propagation; Classification of waves; Time Harmonic Fields; Complex permittivity; Plane wave propagation in free space, lossless dielectrics, lossy dielectrics and good conductors; Electromagnetic power density; Concept of transmission lines; Applications.  | 06 |

**Essential Readings:**

1. F. T. Ulaby, “Electromagnetics for Engineers”, Pearson Education, 1st Edition, 2005.
2. W.H. Hayt & J.A. Buck, “Engineering Electromagnetics”, Tata McGraw Hill, 6th Edition, 2002.
3. Mathew N.O. Sadiku, “Principles of Electromagnetism”, Oxford University Press, 6th Edition, 2015.

**Supplementary Readings:**

1. Joseph A. Edminister, “Theory and problems of Electromagnetics”, Tata McGraw Hill, 2nd Edition, 1992.
2. Ashutosh Pramanik, “Electromagnetism- Theory and Applications”, PHI, 2nd Edition, 2009
3. N.N. Rao, “Elements of Engineering Electromagnetics”, Pearson Education, 6th Edition, 2004