**17EE2201-ELECTROMAGNETIC FIELDS**

**(EEE)**

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| **Course Category:** | Professional core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture-Tutorial-Practical:** | 2-2-0 |
| **Pre-requisite:** | Knowledge of vector analysis, co-ordinate system, vector calculus, differentiation of scalars and vectors. | **Sessional Evaluation:**  **External Exam Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course Objectives:** | 1. Learn Electrostatics and Magneto statics concepts.  2.Learn Maxwell’s equations and EM Wave Characteristics  3. Learn scientific, mathematical and engineering principles that enable them to understand forces, fields and waves. | |
| **Course Outcomes:** | After completing the course the student will be able to | |
| CO1 | Determine electric force and electric field intensity |
| CO2 | Calculate electric field and potential using Gauss’s law. |
| CO3 | Analyse current densities and boundary conditions of dielectrics. |
| CO4 | Find magnetic field intensity due to current, the application of ampere’s law and the Maxwell’s second and third equations. |
| CO5 | Estimate the magnetic forces and torque produced by currents in magnetic field. |
| CO6 | Gain knowledge on time varying fields and get ability to calculate induced EMF. |
| **Course Content:** | **UNIT – I**  **Electrostatic Fields-I:** Vector Analysis-Cartesian-Cylindrical-Spherical Co-Ordinate systems, Coulomb’s law, Electric field Intensity, Electric flux density.  **UNIT – II**  **Electrostatic Fields-II:** Gauss’s law, Gauss’s law in point form, Electrostatic potential, Potential gradient, Energy stored in Electric field, Capacitance.  **UNIT-III**  **Conductors and Dielectrics:** Current and current density, Continuity equation, Conductors – Ohm’s Law, Resistance, Power dissipation and Joule’s Law, Dielectrics, Dipole Moment, Polarization, Bound change densities, Boundary conditions .  **UNIT – IV**  **Magneto Static Fields:** Lorentz force law, Ampere’s circuital law, Ampere’s force Law, Biot Savart law, Ampere’s circuital law in point form, Magnetic vector potential.  **UNIT – V**  **Magnetic Field in Materials:** Dipole moment, Magnetization, Bound current densities, Boundary conditions, Magnetic circuits, Inductance, Energy stored in Magnetic field.  **UNIT –VI**  **Maxwell’s Equations:** Faraday’s law-Motional and transformer induced E.M.F., Maxwell’s equations, Faraday’s law, Faraday’s law in point form, Displacement current, Wave equation and its general solution for free space conditions. | |
| **Text Books & Reference Books:** | **TEXT BOOKS:**   1. “Engineering Electromagnetics” by William H. Hayt & John. A. Buck Mc.Graw-Hill  Companies, 7th Editon.2006 . 2. “Electromagnetic Fields” by Sadiku, Oxford Publications, 3rd Editon.2007. 3. “Field Theory” by K.A.Gangadhar & PM Ramanathan Khanna PublishersNew Delhi, 2005, 5th Edition.   **REFERENCE BOOKS:**   1. “Electromagnetics” by Joseph A.Edminister, McGraw-Hill 4th Edition,2014. 2. “ Electromagnetic waves & Radiating system” by Edward C.Jordan and keith G.Balmain, Prentics-Hall of India Pvt.Ltd. 3. “Engineering electromagnetics:Theory and Problems and Applications” by J.P Tewari, Khanna Publishers,2003. | |
| **E-Resources:** | http://nptel.ac.in/courses  http://iete-elan.ac.in  http://freevideolectures.com/university/iitm | |