E8 201 August 3:0

Electromagentism

Instructor

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Teaching Assistant

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Department: EE

Course Time: Tue., Thu., 10:00 - 11:30 AM

Lecture venue: EE 305

Detailed Course Page:

Announcements

Brief description of the course

This course is intended as a detailed introduction to the principles of electromagnetism for electrical power engineers at post-graduate level.

The course is divided into different sections to emphasise on salient aspects of the subject, as well as, to provide the necessary (minimal) mathematical training. The limitations and applications of the governing laws to the physical world are well discussed. Several examples are provided to fine tune the understanding of the principles.

Prerequisites

Nothing in specific. However, a basic knowledge on the electric circuits and machines would be useful.

Syllabus

Review of basic electrostatics, dielectrics and boundary conditions, systems of charges and conductors, Greenâ€™s reciprocation theorem, elastance and capacitance co-efficient, energy and forces, electric field due to steady currents, introduction to magnetostatics, vector potential, phenomena of induction, self and mutual inductance, time-varying fields, Eddy currents, Continuity Equations, Maxwellâ€™s equations.

Course outcomes

The outcome of the course (as stated by the students) are:

1. It generates real interest in this not so well-perceived subject

2. Clear understanding of the basic principles associated with electromagnetic field theory

3. Comprehend the framework of the governing laws and their applicability

to the electrical engineering problems

4. Able to solve standard problems through acquires basic mathematical skills

Grading policy

Assignments: 30

Class test (two): 20

Final exam: 50

Assignments

One each for the following sections

1. Coulomb's law, Gauss law, Governing equations and boundary conditions, Steady conduction

2. Uniqueness, Green's Reciprocity theorem, Potential and Capacitance coefficients, Energy and Force in electrostatic fields

3. Biot-Savart Law, Ampere's law, Scalar and Vector potentials, Governing equations and boundary conditions

4. Induction, Self and Mutual Inductances, GMD & GMR, Simple eddy current problem

Resources

Kraus J D, Electromagnetics, McGraw Hill International.
Jeans J H, The Mathematical Theory of Electricity and Magnetism, Cambridge University Press.
Smythe W R, Static and Dynamic Electricity, McGraw Hill Book Company, New York.
Class notes