Physics 3(Electricity and Magnetism)

PRE-REQUISITE: FSc Level Physics

CREDITE HOURS: 3

INTRODUCTION:

Understanding electromagnetic fields is essential to our understanding the world around us. The most fundamental processes in nature, from the forces that determine the structure of atoms and molecules to the phenomena of light to nerve impulses in living systems, depend on electric and magnetic fields.

It is fundamental to current and future technologies. Motors, power generation and transmission, electronics, sensors, and communication – both wired and wireless – involve the manipulation of electric or magnetic fields. There are few advances in technology that can be made without the use of electronic circuits or electric and magnetic fields.

COURSE OBJECTIVE:

The objectives of this course are to teach the laws of electromagnetism from our everyday experience by specific examples of how electromagnetic phenomena manifest themselves. We want to be able to:

1. Describe, in words, the ways in which various concepts in electromagnetism come into play in particular situations
2. Represent these electromagnetic phenomena and fields mathematically in those situations
3. Predict outcomes in other similar situations
4. The overall goal is to use the scientific method to come to understand the enormous variety of electromagnetic phenomena in terms of a few relatively simple laws.

COURSE OUTLINE:

Electric field of continuous charge distributions, dipole in an electric field, Applications of Gauss' law, calculating the field from the potential, capacitor with dielectric, electric current density and Ohm's law, semiconductors and superconductors, magnetic force on a charged particle, magnetic force on a current, torque on a current loop, magnetic dipole, Biot-Savart Law, Ampere's law, Faraday's Law, Lenz's Law, motional E.M.F, induced electric fields, Gauss' law for magnetism, origin of atomic and nuclear magnetism, magnetization, magnetic materials, induced magnetic fields and displacement current, Maxwell's equations, generating an electro-

magnetic wave, traveling waves and Maxwell's equations, energy transport and the Poynting vector.

Evaluation Criteria

Examination	Type	Marks
Internal Examination	Sessional Work	15%
	Mid-Semester	25%
External Examination	Final Semester	60%

REFERENCE BOOKS:

1. Physics Vol. II (extended) by Resnick, Halliday and Krane, 4th Edition, John Wiley and Sons Inc, New York, 1992.
2. Physics Vol.II (extended) by Resnick, Halliday and Krane, 5th Edition, John Wiley and Sons Inc, New York, 2002.
3. Fundamental of Physics by Halliday Resnick and Krane, 5th Edition, John Wiley and Sons Inc, New York, 1999.
4. University Physics 8th Edition by Sears, Zemansky and Young, Addison-Wesley, Reading (MA), USA, 2000.
5. Physics by Alonso and Finn: Addison-Wesley, Reading (MA), USA, 1999.
6. David J. Griffiths, "Introduction to Electrodynamics, 3rd Edition",

PHYSICS LAB-III (Electricity and Magnetism)

Credit Hour: 01

Practical Work

1. To find out the equivalent resistance of unknown resistor
2. Low resistance by Carey foster bridge
3. Measurement of resistance using neon flash lamp and capacitor
4. Measurement of capacitance of capacitor using neon flash lamp and resister
5. Conversion of galvanometer into ammeter
6. Conversion of galvanometer into voltmeter
7. Calibration of voltmeter by potentiometer
8. Calibration of ammeter by potentiometer
9. A Study of the Oscilloscope and the Audio Generator
10. To study the BH curve

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