

Subject Code: 02PY0451
Subject Name: Electromagnetic Theory
M.Sc. Year-I, Sem-II

Objective: To interpret and analyze the principles of electrostatics and magnetostatics.

Credits Earned: 4 Credits

Course Outcomes: After completion of this course, post graduate will be able to

- Learn the concepts of electromagnetics and apply it in communication physics.
- Apply knowledge of physics as a basic science in solving real life and scientific problems
- Apply knowledge of physics to become successful in national level examinations like NET, SLAT, GATE etc.
- Engage in research in the field of pure and applied physics and involve in life-long learning

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva (V)	Term work (TW)	
4	0	0	4	50	30	20	25	25	150



Contents:

Unit	Topics	Contact Hours
1	Electric field & Coloumb's law Introduction, Coloumb's law, electric field, continuous charge distribution, superposition, electric dipole, magnetic dipole, radiations, radiation from an arbitrary source, polarization, induced dipoles, bound charges, the field inside dielectric field, Gauss' law, Laplace equation, Poisson equation, Legendre polynomials	15
2	Electric field in a matter Work and energy in electrostatics, point charge distribution, continuous charge distribution – sphere and cylinder, field of polarised object, bound charges, Gauss' law in dielectrics, boundary conditions, dielectric constant, permittivity, susceptibility	12
3	Magnetostics Lorentz force law, magnetic field and force, Biot-Savart law, the magnetic field of a steady current, divergence and curl of B, magnetic vector potential, multipole expansion of vector potential, Ampere's law, diamagnetism and paramagnetism	12
4	Electromagnetics Electromotive force, ohm's law, electromagnetic induction, Faraday's law, induced electric field, inductance, energy in magnetic field, self and mutual inductance, inductance of a solenoid and a cylinder	11
5.	Maxwell equations Electrodynamics before Maxwell, Maxwell fixed Ampere's law, Maxwell's equations, Magnetic charge, Maxwell's equations in matter, boundary conditions	10
	Total Hours	60



References:

1. Introduction to Electrodynamics by David J. Griffiths. Pearson (2013)
2. Electricity and Magnetism by A. S. Mahajan and A. Rangwala. Tata McGraw Hill (1988).

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
10%	20%	25%	25%	10%	10%

Instructional Method:

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.