

Course Title	CLASSICAL ELECTRODYNAMICS-I
Course Code	MPHY-422
Credit Hours	CH3
Pre- requisites	MPHY-221
Learning outcomes	This course gives understanding of the basic concepts of classical electrodynamics.
Contents	<p>Electrostatics: The basic concepts (Electric charge, Coulomb's law, the electric field, the electrostatic potential, Gauss's law, application of Gauss's law etc) , the electric dipole, multipole expansion of electric fields, the Dirac delta function, Poisson's equation, Laplace's equation, Laplace's equation in one independent variable, solution to Laplace's equation, conducting sphere in a uniform electric field, electrostatic images, Polarization in dielectrics, field outside a dielectric medium, the electric field inside a dielectric, Gauss's law in a dielectric: the electric displacement, electric susceptibility and dielectric constant, point charge in a dielectric fluid, boundary conditions on the field vectors, boundary-value problems involving dielectrics, method of images for problems involving dielectrics, Potential energy of a group of point charges, electrostatic energy of a charge distribution, energy density of an electrostatic field, related problems,</p> <p>Electric Current: Electric Current and Magnetostatics, Nature of the current, current density: equation of continuity, Ohm's law: conductivity, steady currents in continuous media, approach to electrostatic equilibrium, the definition of magnetic induction, forces on current-carrying conductors, the law of Biot and Savart, elementary applications of the Biot and Savart law, Ampere's circuital law, the magnetic vector potential, the magnetic field of a distant circuit, the magnetic scalar potential, magnetic flux, related problems.</p>
Teaching-learning Strategies	Classroom teaching / Lecturing
Assignments- Types and Number	Problem sheet: 3-4
Assessment and Examinations	<p>Mid-Term Assessment: 35%</p> <p>Formative Assessment: (25%): It includes classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.</p> <p>Final Term Assessment: 40%</p>
Text Books	<ol style="list-style-type: none"> 1. Foundation of Electromagnetic Theory, Reitz, Milford, (4th Ed), Addison-Wesley (2009). 2. Introduction to Electrodynamics, David J. Griffiths (4th Edition), Prentice Hall (2013). 3. Classical Electrodynamics, J.D. Jackson, third edition, John Wiley (2012). 4. Elements of Electromagnetics by M. N. O. Sadiku (5th Edition), Oxford (2009).