

Course Title	CLASSICAL ELECTRODYNAMICS-II
Course Code	MPHY-423
Credit Hours	CH3
Pre- requisites	MPHY-422
Learning outcomes	The second course provides some further topics of classical electrodynamics
Contents	<p>Magnetic Properties of matter: Magnetization, the magnetic field produced by magnetized material, magnetic scalar potential and magnetic pole density, magnetic intensity, magnetic susceptibility, permittivity and hysteresis, boundary conditions on the field vectors, boundary-value problems involving magnetic materials, related problems.</p> <p>Maxwell Equations: Electromagnetic induction, the generalization of Ampere's law, energy density in the magnetic field, electromagnetic energy, the wave equation, monochromatic waves, boundary conditions, the wave equation with sources, vector and scalar potentials, gauge transformations (Lorentz gauge, coulombs gauge), pressure of radiations, retarded scalar and vector potentials, covariant formulation of electrodynamics, transformation laws of electromagnetic fields, related problems.</p> <p>Propagation of Electromagnetic Waves: Propagation of Electromagnetic Waves, plane monochromatic waves in non-conducting media, polarization of waves, energy density, plane monochromatic waves in conducting media, Reflection and refraction at the boundary of two non-conducting media: normal incidence, reflection and refraction at the boundary of two non-conducting media, oblique incidence, complex Fresnel coefficients: reflection from a conducting plane, waveguides, transverse electric and transverse magnetic waves, parallel-plate waveguide, dielectric waveguides, radiation from an oscillating dipole, related problems, Plasma Physics: introduction, electrical neutrality in a plasma, particle orbits and drift motion in a plasma, magnetic mirrors, the hydromagnetic equations, plasma oscillations and wave motion.</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 by J. R. Reitz, F. J. Milford and R. W. Christy (4thEdition), 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 (5thEdition), Oxford (2009).