

2009-2010

SSP-S 225

DEPARTMENT OF PHYSICS
ANDHRA UNIVERSITY

Common for M.Sc. Physics and M.Sc. (Space Physics)
II Semester

(w.e.f 2009-10 batch)

P201,SP201: ELECTRO DYNAMICS.

UNIT-I: Gauss Theorem, Poisson's equation, Laplace's equation, solution to Laplace's equation in cartesian coordinates, spherical coordinates, cylindrical coordinates, use of Laplace's equation in the solutions of electrostatic problems

Ampere's circuital law, magnetic vector potential, displacement current, Faraday's law of electromagnetic induction,

UNIT-II: Maxwell's equations, differential and integral forms, physical significance of Maxwell's equations.
4 Hrs

Wave equation, plane electromagnetic waves in free space, in nonconducting isotropic medium, in conducting medium, electromagnetic vector and scalar potentials, uniqueness of electromagnetic potentials and concept of gauge, Lorentz gauge, Coulomb gauge,

charged particles in electric and magnetic fields: charged particles in uniform electric field, charged particles in homogeneous magnetic fields, charged particles in simultaneous electric and magnetic fields, charged particles in nonhomogeneous magnetic fields.

UNIT-III: Lienard-Wiechert potentials, electromagnetic fields from Lienard-Wiechert potentials of a moving charge, electromagnetic fields of a uniformly moving charge, radiation due to non-relativistic charges, radiation damping, Abraham-Lorentz formula, Cherenkov radiation, radiation due to an oscillatory electric dipole, radiation due to a small current element. Condition for plasma existence, occurrence of plasma, magneto hydrodynamics, plasma waves

UNIT-IV: Transformation of electromagnetic potentials, Lorentz condition in covariant form, invariance or covariance of Maxwell's field equations in terms of 4 vectors, electromagnetic field tensor, Lorentz transformation of electric and magnetic fields.

Text books:

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| 1. Classical Electrodynamics : | - J.D. Jackson |
| 2. Introduction to Electrodynamics : | - D.R. Griffiths |
| 3. Electromagnetic Theory and Electrodynamics | - Satyaprakash |
| 4. Electrodynamics | - KL Kakani |