

2003-2004

ANDHRA UNIVERSITY
DEPARTMENT OF PHYSICS
M.Sc. MATERIALS SCIENCE
(EFFECTIVE FROM 2003-2004 ADMITTED BATCH)

II SEMESTER SSP.S-212/217

MS 203: ELECTRO DYNAMICS

(Common Paper for M.Sc. MATERIALS SCIENCE M.Sc. PHYSICS,
M.Sc. SPACE PHYSICS & M.Sc. (Tech.) ELECTRONICS

1. 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.

2. Ampere's circuital law, magnetic vector potential, displacement current, Faraday's law of electromagnetic induction, Maxwell's equations, differential and integral forms, physical significance of Maxwell's equations.

3. 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

4. Liénard-Wiechert potentials, electromagnetic fields from Liénard-Wiechert potentials of a moving charge, electromagnetic fields of a uniformly moving charge, radiation damping, Abraham-Lorentz formula, Cherenkov radiation

5. Condition for plasma existence, occurrence of plasma, magnetohydrodynamics, plasma waves, 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.

6. Transformation of electromagnetic potentials, Lorentz condition in covariant form, covariance or covariance of Maxwell field equations in terms of 4 vectors electromagnetic field tensor, Lorentz transformation of electric and magnetic fields

Text books:

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