



M 26587

Reg. No. :

Name :

I Semester M.A./M.Sc./M.Com. Degree
(Regular/Supplementary/Improvement) Examination, November 2014
PHYSICS
(2014 Admn. Under CBSS)
PHY 1C 03 – Electrodynamics

Time : 3 Hours

Max. Marks : 60

SECTION – A

(Answer **both** questions, either (a) or (b)).

1. a) Discuss Poisson's equation and Laplace's equation. Derive the expression of Laplace's equation in spherical coordinate system.

OR

- b) Derive Maxwell's equations in matter. Describe the boundary conditions for B and H.
2. a) Derive Abraham-Lorentz formula for the radiation reaction force and give its significance.

OR

- b) Explain in detail the theory of field tensor. Prove that the symmetry of a tensor is preserved by Lorentz transformation. (2×12=24)

SECTION – B

(Answer **any four**).

3. a) Explain the method of images.
b) Show that electric field is the gradient of a scalar potential.
c) Obtain the values of divergence and curl of electric field.
4. a) Define mean value and maximum value theorem.
b) Calculate the potential function for the region between the parallel circular disc.
c) A point charge +q is placed in front of an infinite conducting plane connected to earth. Derive an expression for the electric field at a point on the plane and the surface density of charge at any point on the plane by the method of images.

$$\sigma(r) = \frac{-q d}{2\pi (r^2 + d^2)^{3/2}}$$

P.T.O.



5. a) Define Biot-Savart Law.
b) State and prove Amperes theorem.
c) Derive an expression for Poynting vector, give its significance.
 6. a) What is skin depth ?
b) Obtain the boundary condition for reflection and transmission.
c) What are monochromatic plane wave ? Show that E and B are in phase and mutually perpendicular.
 7. a) What is Gauge transformation ?
b) What do you meant by retarded potential ? A piece of wire bent into a loop, carries a current which varies with time. Calculate the retarded potential.
c) Discuss the theory of radiation from an arbitrary distribution of charge and currents.
 8. a) What is Lienard-Wiechert potentials for a moving point charge.
b) Justify that magnetism as a relativistic phenomenon.
c) Explain with necessary theory how the fields transform. What is transformation law for the electromagnetic field. (4×9=36)
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