



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – PHYSICS

FIRST SEMESTER – APRIL 2014

PH 1812 - ELECTRODYNAMICS

Date : 29/03/2014

Dept. No.

Max. : 100 Marks

Time : 09:00-12:00

PART A

Answer **ALL** the questions

(10 × 2 = 20)

1. Obtain the differential form of Gauss's law from the integral form
2. Electrostatic energy does not obey superposition principle. Justify.
3. Write Ampere's law in magnetised material.
4. State Faraday's law in the integral and differential form.
5. State the boundary condition on **E** and **B** across a boundary.
6. What is a gauge transformation? Write the equation for Coulomb gauge.
7. Define skin depth.
8. What is meant by anomalous dispersion?
9. What are retarded potentials? What is their use?
10. What is radiation reaction?

PART – B

Answer any **FOUR** questions

(4 × 7.5 = 30)

11. Establish Gauss's law in the presence of a dielectric.
12. Find the magnetic field at the centre of a square loop of side **a**.
13. Establish Neumann's formula for mutual inductance.
14. Explain the phenomena of reflection at a conducting surface.
15. Derive Lienard-Wiechart potentials for a moving point charge.

PART – C

Answer any **FOUR** questions

(4 × 12.5 = 50)

16. Explain the process of multi pole expansion of electric potential and hence derive an expression for the electric field of a dipole.
17. Obtain expressions for divergence and curl of a magnetic field.
18. State and prove Poynting's theorem
19. Derive expressions for reflection and transmission coefficient at normal incidence.
20. Derive an expression for the electric field due to an oscillating magnetic dipole.
