

FACULTY OF SCIENCE

M.Sc. II – Semester (New) (CBCS / Non-CBCS) Examination, April / May 2014

**Subject: Physics & Applied Electronics
Paper – I: Electromagnetic Theory**

Time: 3 Hours

Max.Marks: 80

Note : Answer all questions from Part - A and Part - B. Each question carries 4 marks in Part - A and 12 marks in Part - B.

**PART – A (8 x 4 = 32 Marks)
[Short Answer Type]**

- 1 Explain 'Poynting theorem'.
- 2 Obtain electrostatic potential in two dimensions using Laplace's equation.
- 3 What is skin effect? Explain its significance.
- 4 Explain homogeneous media and anisotropic media.
- 5 Define and explain total internal reflection.
- 6 Distinguish between normal and anomalous dispersions.
- 7 Derive inhomogeneous wave equation for scalar potential.
- 8 Write a short note on retarded potentials.

**PART – B (4 x 12 = 48 Marks)
[Essay Answer Type]**

- 9 (a) State Maxwell's equations in differential form. Derive an expression for poynting vector. Explain its physical significance.
OR
(b) Explain in detail about scalar and vector potentials and obtain the Lorentz condition.
- 10 (a) Derive wave equation for electromagnetic fields in free space and obtain its plane wave solutions. What is the nature of plane electromagnetic waves?
OR
(b) Derive wave equation for electromagnetic fields in a conducting medium and obtain its plane wave solutions.
- 11 (a) Explain the boundary conditions for a dielectric - dielectric plane interface. Obtain Fresnel's relations for the reflection and refraction at this interface.
OR
(b) State and prove the boundary conditions for a dielectric-conducting plane interface. Show that plane polarized light will be elliptically polarized light at metallic reflection.
- 12 (a) State and explain Lienard - Wiechart potentials. Obtain an expression for the electromagnetic field of a charge in uniform motion using these potentials.
OR
(b) Derive an expression for the total power radiated per unit by moving point charge from an arbitrary source.
