

## FACULTY OF SCIENCE

M.Sc. II-Semester (CBCS/NON-CBCS) (New) Examination, May / June 2015

Subject : Physics and 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. What is magnetic vector potential? Obtain an expression for it in terms of current density.
2. State and explain Maxwell's electromagnetic field equations in differential form. What is displacement current?
3. Explain the terms i) attenuation and ii) skin-effect in a conducting medium
4. What is polarized electromagnetic wave? Distinguish between vertical and horizontal polarization these waves.
5. What is Brewster's angle? Obtain Brewster's angle for a plane air-glass interface.
6. Explain the laws of reflection and refraction of electromagnetic waves.
7. Describe the radiation from a center-fed linear antenna with a neat diagram.
8. Explain the concept of retardation. What are retarded potentials?

## PART - B (4 x 12 = 48 Marks)

(Essay Answer Type)

9. a) Describe multi-poles in electrostatics. Obtain an expression for the multi-pole expansion of energy of a system of charges in an electrostatic field.

OR

- b) State and prove Poynting theorem in electrodynamics. Obtain the differential form of Poynting theorem.

10. a) What is an ideal dielectric medium? Obtain wave equation for electric and magnetic fields in this medium. What are plane solutions of these equations?

OR

- b) What is an ideal conducting medium? Obtain electromagnetic wave equation in this medium. What are the characteristics of plane electromagnetic waves in this medium.

11. a) What are the boundary conditions for a dielectric-dielectric plane boundary. Obtain the reflection and transmission coefficients at this boundary for plane electromagnetic waves.

OR

- b) Describe the reflection and refraction of plane electromagnetic waves at a plane interface between non-conducting and conducting medium.

12. a) Describe inhomogeneous wave equation for potentials and obtain retarded potentials.

OR

- b) What are Lienard-Wiechert potentials? Derive an expression for the electromagnetic field due to uniformly moving charge.

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