



Code No. : 645

**FACULTY OF SCIENCE**  
**M.Sc. II Semester Examination, April/May 2013**  
**PHYSICS AND APPLIED ELECTRONICS**  
**Paper – 201 : Electromagnetics Theory**

Time: 3 Hours]

[Max. Marks: 64

**Note : Answer all questions.**

**SECTION – A**

**(8×3=24 Marks)**

1. What are the drawbacks of Ampere's law ? Explain how Maxwell corrected the Ampere's law.
2. Define magnetic vector potential. Obtain a relation between magnetic induction vector and magnetic vector potential.
3. What are the characteristics of plane electromagnetic waves in a dielectric medium ?
4. What is skin-effect ? Explain.
5. Define reflection and transmission coefficients.
6. Explain total internal reflection. Write one of its application.
7. What are the characteristics of electromagnetic radiation from a centered linear antenna ?
8. Distinguish between retarded potentials and Lienard-Wiechert potentials.

**SECTION – B**

**(4×10=40 Marks)**

9. a) Set up Laplace's equation for electrostatic potential in spherical coordinates and obtain its solutions.

**OR**

- b) Discuss the potential formulation of electrodynamics under Lorentz gauge transformation.



10. a) Describe the plane electromagnetic wave propagation in free space and in an ideal dielectric medium. Compare their characteristics.

OR

- b) Explain the propagation of plane electromagnetic waves in a conducting medium. Obtain an expression for the complex wave number.

11. a) Discuss the reflection and refraction of plane electromagnetic waves at a plane interface. Obtain the laws of reflection and refraction.

OR

- b) Explain, in detail, about the metallic reflection. What are its applications ?

12. a) Obtain an expression for the electromagnetic radiation due to an oscillating electric dipole under long wave length approximation.

OR

- b) Describe oscillating magnetic dipole. What is the electromagnetic radiation due to it ? Compare it with that of an oscillating electric dipole.