

**2016**

*Time : 3 hours*

*Full Marks : 80*

*The figures in the right-hand margin indicate marks.*

*Answer from both the Sections as per direction.*

**(CLASSICAL ELECTRODYNAMICS)**

**Section – A**

1. Answer any **four** of the following :  $4 \times 4 = 16$ 
  - (a) Explain radiation field and radiation energy.
  - (b) What is Hertz potential ? Explain.
  - (c) Explain the concept of virtual photon.
  - (d) Explain the radiation from circular orbit.
  - (e) Write a note on Rayleigh's scattering.
  - (f) Explain the scattering by a bound electron.

**OR**

2. Answer **all** questions from the following :

2×8 = 16

- (a) Define Hertz potential.
- (b) What is multiple radiation ?
- (c) Define convection potential.
- (d) What is wave guide ?
- (e) What are L – W potential ?
- (f) Explain Cherenkov radiation.
- (g) Define scattering cross-sections.
- (h) What is Thomson Scattering?

**Section – B**

Answer **all** questions :

16×4 = 64

3. (a) Using Fourier analysis, define the solutions of scalar and vector potentials.

**OR**

- (b) Give Hertz solution of wave equation to obtain the electric and magnetic fields from an oscillating dipole.

4. (a) Explain the solution of wave equation of fields of a charge in uniform motion.

**OR**

- (b) Discuss the propagation of electromagnetic waves in rectangular wave guides.

5. (a) Derive expressions for the field radiated by an accelerated charge at low velocity.

**OR**

- (b) What is Bremsstrahlung radiation ? Obtain the expression for classical cross section for Bremsstrahlung in a coulomb field.

6. (a) Define the scattering cross section for the scattering of a plane monochromatic electromagnetic radiation by a free charged particle.

**OR**

- (b) Give a detailed account of electromagnetic theory of dispersion.

