

6. (a) Define Scattering and explain the scattering by an individual free electron and a bound electron.

Or

- (b) Explain the absorption of radiation by an oscillator and obtain the equilibrium between an oscillator and a radiation field,

2019

Time : 3 hours

Full Marks : 80

Answer from both the Section as per direction

*The figures in the right-hand margin indicate marks  
Candidates are required to answer in their own words  
as far as practicable*

( CLASSICAL ELECTRODYNAMICS )

SECTION—A

1. Answer any *four* of the following : 4 × 4
- (a) Explain about electric dipole radiation and multipole radiation.
  - (b) Write a note on virtual photon concept.
  - (c) Explain Cherenkov radiation.
  - (d) Explain the radiative damping of a charged harmonic oscillator.

( 2 )

- (e) Obtain the dispersion relation.  
(f) Explain the field of a uniformly moving electron.

Or

2. Answer all questions :  $2 \times 8$

- (a) Define radiation energy.  
(b) Explain multipole radiation.  
(c) Define the concept of virtual photon.  
(d) Define convection potential.  
(e) What is classical cross section ? Explain.  
(f) Define Coulomb field.  
(g) Define radiation and scattering  
(h) What is Rayleigh scattering ? Explain.

### SECTION—B

Answer all questions :  $16 \times 4$

3. (a) Obtain the solution of wave equation for potentials by Fourier Analysis.

( 3 )

Or

- (b) Define Hertz potential and computation of radiation fields by Hertz method.

4. (a) Define Lienard-Wiechert potentials and obtain the expression for fields of a charge in uniform motion.

Or

- (b) Define waveguide and explain the propagation of electromagnetic waves in rectangular waveguides.

5. (a) Explain the radiation from an accelerated charge and obtain an expressions for fields of an accelerated charge radiation at low velocity.

Or

- (b) Explain the radiation from circular orbits and obtain an expression for classical cross section for bremsstrahlung in a coulomb field.