B. Tech.
(SEM I) ODD SEMESTER EXAMINATION, 2015-1016
ENGINEERING PHYSICS-I

[*Time: 2 Hours*]   [*Total Marks: 50*]

Note: *Attempt all questions. First question of 14 marks and other three questions of 12 mark each.*

1. Attempt any **two** parts of the following: **(7 x 2 = 14)**

    (a) Describe Michelson-Morley experiment and explain the outcome of experiment.
    (b) What are Lorentz transformations? Prove that no signal can travel faster than the velocity of light.
    (c) (i)The mass of a moving electron is eleven times its rest mass. Find its kinetic energy and momentum.
    (ii) Show that the rest mass of a photon is zero.

2. Attempt any **two** parts of the following: **(6 x 2=12)**

    (a) What are phase and group velocities? Establish a relation between these velocities in dispersive medium.
    (b) A particle of mass m is confined to a one-dimensional box of length L. Derive an expression for wave function.
    (c) Define uncertainty principle. An electron has a speed of 500 m/s with uncertainty of 0.05%. Calculate the uncertainty in locating its position.

3. Attempt any **two** parts of the following: **(6 x 2=12)**

    (a) Explain the interference in thin film due to reflected light with all conditions of constructive and destructive interference.
    (b) Discuss the Fraunhofer diffraction at single slit and show that the intensity of first secondary maximum is 4.5% of principle maximum.
    (c) Explain the construction and working of a Nicol Prism as polarizer and analyzer.

4. Attempt any **two** parts of the following: **(6 x 2=12)**

    (a) Explain the spontaneous and stimulated emission of radiation? What is pumping?
    (b) Describe acceptance angle of an optical fiber. An optical fiber made of silica glass with refractive index of the core as 1.55 and the refractive index of the cladding as 1.51. Find the numerical aperture and the acceptance angle for the fiber.
    (c) What is holography? Explain the construction and reconstruction of image in holography.