BE - 201

B.E. I & II Semester

Examination, June 2014

Engineering Physics

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question partA, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) Show that group velocity less than the phase velocity in dispersive medium. 2

b) What do you understand by normalization and orthogonal wave function. 2

c) Calculate theuncertainly in momentum of a proton which is confined to nucleus of radius 10^{-3} cm. From /this-estimate the kinetic energy of the proton inside the nucleus. 3

d) Derive an expression for compton shift and wave length of scattered photon. Explain why compton shift is not observed with visible light? 7

OR

Obtain energy level and wave function expression for a particle trapped in infinitely deep square well potential.

Unit – II

2. a) Explain the formation of colours when the white light is incident on a transparent thin film. 2

b) Explain how double refraction phenomenon to produce plane polarized light and circularly polarized light. 2

c) In a grating the sodium doublet (5890A°, 5896A°) is viewed in third order at 30° to the normal and is resolved. Determine the grating spacing and the total width of the rulings. 3

d) Describe construction and working of Michelson's interferometer with neat diagram. How it can be used to determine the wavelength of monochromatic light. 7

OR

Derive an expression for intensity distribution due to fraunhofer diffraction at a single slit. Show that the intensity of the first secondary maxima is about 4.5% of that of the principal maxima.

Unit III

3. a) Explain the volume energy and surface energy term of semi empirical mass formula.

b) Write the necessary condition required for operation of linear accelerator.

c) Discuss uses of mass spectrograph. 3

d) Describe construction and working of Betatron with neat diagram. Also derive the relation for Betatron condition. 7

OR

Explain the working of Geiger Muller counter. Estimate the average current in circuit when GM counter collect 10^8 electrons per discharge at the counting rate is 460 counts/min.

Unit - IV

4. a) Explain effect of temperature on Fermi Dirac distribution. 2

b) Explain the zener action of zener diode.

c) Show that Hall coefficient is independent of applied magnetic field and is inversely proportional to the current density and electron charge. 3

d) Describe the behaviour of an electron in periodic potential using final expression of kroning panning model and explain the formation of energy bands. 7

OR

Explain meissner effect of super conductors. Discuss type I and type II super conductor.

Unit - V

5. a) Explain how stimulated emission is essential for lasing action. 2

b) Write the advantage of multimode fibers over the single mode fibers. 2

c) A multimode fiber has a core diameter of 70pm and the relative refractive index difference of 1.5 percent. It operate at the wave length of 0.85mm. The refractive index of the fiber is 1.46. Calculate

i) The refractive index of the cladding

ii) The normalized frequency V-number of the fiber and

iii) The total number of guided modes in the fiber.3

d) Describe the construction and working of He-Ne laser with energy level diagram. 7

OR

Explain inter modal dispersion. Derive expression for the delay difference to estimate the maximum pulse broading in time in step index fibre.