ODD Semester Examination, 2024-25
B.Tech. I Year (I Sem) Computer Science & Engineering
(Engineering Physics)

Time: 3 Hrs.   **MM: 100**

Note: - Attempt all questions. All Questions carry equal marks. In case of any ambiguity or missing data, the same may be assumed and state the assumption made in the answer. The part (a) of each question have two questions with 5 marks each and (b) & (c) parts are of 10 marks each.

1. Answer any two parts of the following.   **[10×2=20]**
   a) (i) Explain Rayleigh criterion of resolution.
     (ii) A monochromatic light of wavelength $\lambda = 5000$ Å is incident on two slits separated by a distance of 5×10^{-4} m. The interference pattern is seen on a screen placed at a distance of 1 m from the slits. A thin glass plate of thickness 1.5×10^{-6} m and refractive index $\mu = 1.5$ is placed between one of the slits and the screen. Find the intensity at the centre of the screen. Also find the lateral shift of the central maximum.
   b) Describe the formation of bright and dark circular fringes by reflected light in the Newton's ring experiment. Show how these rings are used for finding the wavelength of a given light and the refractive index of a given liquid.
   c) Write the construction and theory of plane transmission grating and find the condition for maxima and minima for the formation of spectra by it.

2. Solve any two parts of the following.   **[10×2=20]**
   a) (i) What are retardation plates? Explain half & quarter wave plates.
     (ii) A 5% solution of cane sugar placed in tube of length 40 cm, causes the optical rotation of 20^0. How much length of 10% solution of the same substance will cause 35^0 rotation?
   b) What do you understand by double refraction? Explain the geometry of calcite crystal its optic axis and principal section. Also write the construction, working and use of Nicol prism.
   c) Explain absorption of radiation, spontaneous and stimulated emission of radiation. Explain Einstein's A and B coefficients and establish a relation between them.

3. Answer any two parts of the following.   **[10×2=20]**
   a) (i) Explain dia, para and ferro-magnetism with suitable diagram and examples.
     (ii) If the earth receives 2 cal min^{-1} cm^{-2} solar energy, what are the amplitudes of electric and magnetic fields of radiation?
   b) Write down Maxwell's equations and using these equations show that light is transverse in nature and electric and magnetic fields both are perpendicular to each other.
   c) Describe Langevein's theory of dia-magnetism? Show that the magnetic susceptibility is negative and independent of temperature.

4. Answer any two parts of the following. **[10×2=20]**

    a) (i) What is Heisenberg Uncertainty principle? On the basis of it shows that electron is not a nucleon particle.

      (ii) When X-ray of energy 100 keV strikes a target, they are scattered at an angle 30^0 Find the energy of the recoiled electrons.

    b) Explain the difference between wave velocity and group velocity in wave motion. Obtain an expression for the group velocity in dispersive medium

    c) Solve the Schrodinger wave equation for a particle in a box and also find an expression for wave function and energy for it.

5. Answer any two parts of the following. **[10×2=20]**

    a. (i) What do you mean by solar cell, explain it?

      (ii) What are direct and indirect band gaps semiconductors. Explain with diagram and examples.

    b) What is Hall Effect? Explain how to find the type of semiconductor, carrier concentration, mobility and conductivity of the material using it.

    c) Explain construction type and characteristics of LED and semiconductor laser.

****