Code No: R201117 **R20** SET - 1

I B. Tech I Semester Supplementary Examinations, August/Sep- 2022

APPLIED PHYSICS

(Common to CSE, CSE-CS&T, IT , CSE-CS, CSE-IOT&CS incl BCT, CSE-CS & BS, CSE-IOT)

Time: 3 hours Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks

UNIT-I

1. a) Why is the central fringe in Newton's rings dark in the case of the reflected system? Explain. Discuss any two applications of Newton's rings experiment. (10M)

   b) In Newton's ring experiment, the diameter of the 5^{th} ring is 0.30 cm, and the diameter of the 15^{th} ring is 0.62*cm.* Find the diameter of the 25^{th} ring. (4M)

Or

2. a) Analyze qualitatively Fraunhofer diffraction at the double-slit with suitable diagrams. (10M)

   b) In double-slit Fraunhofer diffraction, calculate the fringe spacing on the screen 50 cm away from the slit if they are illuminated with the blue light of wavelength 4800 Å. Given that slit separation is 0.1 mm, and slit width is 0.020 mm. (4M)

UNIT-II

3. a) Derive the relationship between various Einstein's coefficients. What are the necessary conditions for the laser action to take place? (10M)

   b) Discuss any four applications of lasers. (4M)

Or

4. a) What are the types of optical fibres? Classify fibres based on the modes of propagation and index profile. (10M)

   b) Calculate the numerical aperture, acceptance angle and critical angle of a fibre having core refractive index 1.5 and cladding refractive index 1.45. (4M)

UNIT-III

5. a) Derive an expression for the wave function and energy of a particle confined in a one-dimensional potential box using Schrodinger's wave equation. (10M)

   b) Find the energy of an electron moving in one dimension in an infinitely high potential box of width 1Å. Given that mass of the electron is 9.1×10^{-31} kg and $h = 6.63 \times 10^{-34}$ Js. (4M)

Or

6. a) Explain the Fermi-Dirac distribution function. Explain how the Fermi function varies with temperature and energy. (10M)

   b) In a solid, consider the energy level lying 0.01 eV below Fermi level. What is the probability of this level not being occupied by an electron? (4M)

UNIT-IV

7. a) Explain the hysteresis of ferromagnetic material with the help of the B-H curve. (10M)

   b) Suitable plots explain how the susceptibility of paramagnetic materials dependent on temperature. (4M)

Or

8. a) Define polarization and electric flux density vectors in dielectrics and show that electronic polarizability is directly proportional to the volume of the atom. (10M)

   b) Calculate the electronic polarizability of neon. The radius of a neon atom is 0.158 nm. ($\varepsilon_0 = 8.854 \times 10^{-12}$ Fm^{-1}). (4M)

UNIT-V

9. a) Obtain the expression for carrier concertation in the conduction band of an intrinsic semiconductor. (10M)

   b) The Intrinsic carrier density at room temperature in Ge is 2.37×10^{19} m^3. If the electron and hole mobilities are 0.38 and 0.18 $m^2 V^{-1} s^{-1}$, respectively, calculate the resistivity. (4M)

Or

10. a) Discuss the general properties of superconductors and distinguish between Hard and Soft superconductors. (10M)

    b) Write short notes on SQUIDS (4M)