Code No: **R201207** **R20** **SET - 1**

I B. Tech II Semester Supplementary Examinations, January/February - 2023

APPLIED PHYSICS

(Common to **EEE, ECE, EIE, ECT, CSE-AI&ML, CSE-AI, CSE-DS, CSE-AI&DS, AI&DC)**

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 Newton's rings are circular in shape? With Newton's ring experiment explain how to determine the refractive index of the liquid. [7M]

   b) In Newton's ring experiment the diameter of the 15^{th} dark ring was found to be 0.590 cm and that of the 5^{th} dark ring was 0.336 cm. If the radius of curvature of the plano-convex lens is 100 cm, Calculate the wavelength of light. [3M]

   c) Distinguish between interference and diffraction. [4M]

(OR)

2. a) What is the grating element? Derive the condition for primary maxima at diffraction grating. [7M]

   b) A diffraction grating has 2000 lines per centimetre. At what angle will the first-order maximum be for a 520-nm-wavelength green light? [3M]

   c) Explain the two simplest ways of producing plane-polarized light. [4M]

UNIT-II

3. a) What are Einstein's coefficients? Derive the relation between them. [8M]

   b) What do you mean by laser pumping? Explain three-level pumping scheme for laser action. [6M]

(OR)

4. a) Describe the fibre optic communication system with a suitable block diagram. Explain the functioning of each block. [7M]

   b) Explain various applications of fibre optics. [7M]

UNIT-III

5. a) Discuss the dual nature of matter and explain the Heisenberg uncertainty principle with examples. [7M]

   b) Write short notes on the effective mass of electron. [7M]

(OR)

6. a) What is Fermi distribution function? Explain with the help of a diagram how it varies with the change of temperature. [8M]

   b) Discuss drawbacks of the classical free electron theory. [6M]
~~~~~~

Code No: **R201207** **R20** **SET - 1**

UNIT-IV

7. a) What do you mean by dielectric polarization? Briefly discuss different dielectric polarization mechanisms. [7M]

   b) Explain "internal field" in a solid dielectric. Derive Clausius-Mosotti equation. [7M]

(OR)

8. a) Explain how susceptibility varies with temperature for dia, para, and ferromagnetic materials with detailed plots. [7M]

   b) What do you mean by hysteresis in Ferro magnetic materials and explain the hysteresis curve on the basis of domain theory. [7M]

UNIT-V

9. a) Derive an expression for the density of electrons in an intrinsic semiconductor. [7M]

   b) Express electric conductivity of an intrinsic semiconductor in terms of energy band gap. How will you determine the energy band gap of a semiconductor from its conductivity? [7M]

(OR)

10. a) What is superconductivity? Discuss the general properties of superconductors. [7M]

    b) Explain the Meissner effect. [3M]

    c) For a specimen of superconductor, the critical fields are 1.4×10^5 and 4.2×10^5 A/m, respectively for temperature 14 K and 13 K, respectively calculate transition temperature and critical fields at 0 K and 4.2 K. [4M]

*****