

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

(Common to EEE, ECE, EIE, ECT, CSE-AI&amp;ML, CSE-AI, CSE-DS, CSE-AI&amp;DS, AI&amp;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<sup>th</sup> dark ring was found to be 0.590 cm and that of the 5<sup>th</sup> 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)**

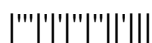
4. a) Describe the fibre optic communication system with a suitable block diagram. Explain the functioning of each block. [7M]
- b) Explain various applications of fibre optics. [7M]

**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]



**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  $1.4 \times 10^5$  and  $4.2 \times 10^5$  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]

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