







ENGINEERING PHYSICS

(Common to ECE, EEE, EIE, Bio-Tech, EComE, Agri.E)

Time: 3 hours

Max. Marks: 100

Question Paper Consists of **Part-A** and **Part-B**  
Answering the question in **Part-A** is Compulsory,  
Three Questions should be answered from **Part-B**

\*\*\*\*\*

**PART-A**

- 1.(i) Calculate the maximum number of orders possible for a plane diffraction grating.
- (ii) What is meant by Intermodal dispersion in optical fibers? How to overcome this problem? Explain.
- (iii) The penetration depths for Lead at 3K and 7.1K are 39.6nm and 173nm respectively. Calculate the critical temperature for Lead.
- (iv) What are the fundamental laws of electromagnetism?
- (v) Explain the concept of hole.
- (vi) Write notes on Direct and Indirect band gap semiconductors.

[3+4+4+3+4+4]

**PART-B**

- 2.(a) Derive expression for interplanar spacing between two adjacent planes of Miller indices (h, k, l) and lattice constant 'a'.
  - (b) State Brewster's law. How can this law be used to produce plane polarized light?
  - (c) Explain in detail the flux quantization in a Superconducting ring.
- [8+4+4]
- 3.(a) Identify whether unit cells of SC, BCC and FCC lattices are primitive or not. Explain with reason.
  - (b) Derive an expression for wavelength of light in Newton's rings experiment.
  - (c) Distinguish between soft and hard magnetic materials.
- [4+8+4]
- 4.(a) Explain the origin of magnetism in materials.
  - (b) Explain the principle, construction and working of a Nicol prism with neat diagram.
  - (c) Draw the crystal planes having Miller indices (110) and (211).
- [4+8+4]
- 5.(a) State and explain Stoke's theorem in its calculus form.
  - (b) If  $R_H$  of a specimen is  $3.66 \times 10^{-4} \text{ m}^3 \text{ c}^{-1}$ . Its resistivity is  $8.93 \times 10^{-3} \Omega \text{m}$ . Find mobility and charge carrier concentration.
  - (c) Derive an expression for the effective mass of an electron moving in energy bands of a semiconductor. How it varies with the wave vector.
- [6+4+6]
- 6.(a) Explain the origin of energy bands in solids.
  - (b) Write notes on Rayleigh's Criterion.
  - (c) Derive expression for Hall coefficient.
- [6+6+4]
- 7.(a) State and explain Hall effect.
  - (b) Draw and explain B-H curve for a ferromagnetic material placed in a magnetic field.
  - (c) Calculate the thickness of half wave plate of quartz for a wavelength 500nm. [Given that  $\mu_e = 1.553$  and  $\mu_o = 1.544$ ]

[6+6+4]