SEMICONDUCTOR PHYSICS

Paper–BS–115A

Time Allowed : 3 Hours]   [Maximum Marks : 75

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

UNIT–I

1. (a) Explain the Nature of bond in Ice and NaCl.   7

   (b) What do you mean by Point defects in solids? Derive an expression for concentration of Schottky defects in a crystal and how it depends on temperature. 8

2. (a) What are Miller indices and how are they determined?
   7

   (b) Explain three-dimensional Bravais lattices.   8

UNIT–II

3. (a) Define the Wave packet. What is the relation between phase velocity and group velocity associated with the wave packet.   8

   (b) Derive Schrodinger time independent equation for matter waves. Give physical significance of the wave function.   7

4. (a) Define the Heisenberg's uncertainty principle. Explain the existence of protons and alpha particles in nucleus using Heisenberg's Uncertainty Principle. 8

(b) Explain the Origin of concept of wave particle duality on the basis of Quantum theory with example. 7

UNIT–III

5. (a) Explain the Kronig-Penney model. 7

(b) Based on band theory of Solids distinguish between metals, insulators and semiconductor. 8

6. (a) Write short notes on the following : 8

(i) E versus K diagram.

(ii) Density of states.

(b) Explain Hall effect and its applications. 7

UNIT–IV

7. (a) Explain the Working of Semiconductor laser. 7

(b) What do you mean by Extrinsic Semiconductor? Derive an expression for carrier concentration in extrinsic semiconductor. 8

8. (a) Explain the working and current-voltage characteristics of p-n junction. 8

(b) Explain the construction and working of Field effect Transistor. 7