Roll No. ....

Total Pages : 2

BT-2/M-22

42033

SEMICONDUCTOR PHYSICS

Paper–BS-115-A

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 lattice translation vector and symmetry operations in a crystal.   7

    (b) What do you mean by point defects in solids? Derive an expression for concentration of Frenkel defects in a crystal.   8

2. (a) Explain hcp structure. Calculate its packing fraction.   7

    (b) Explain two-dimensional and three-dimensional Bravais lattice.   8

UNIT–II

3. (a) What are De-Broglie waves? What is the relation between De-Broglie group velocity associated with the wave packet and velocity of the particle.   8

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

4. (a) Explain the non existence of electron in nucleus using Heisenberg's uncertainty principle. 8

(b) Explain the concept of wave particle duality with examples. 7

UNIT–III

5. (a) Based on band theory of solids distinguish between metals, insulators and semiconductor. 8

(b) Explain the electrical conductivity in metals using classical free electron theory. 7

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

   (i) Fermi Energy.

   (ii) Brillion zone.

(b) Explain Hall effect and its applications. 7

UNIT–IV

7. (a) Explain the working and characteristics of Bipolar Junction Transistor. 8

(b) What do you mean by extrinsic semiconductor? Derive an expression for carrier concentration in extrinsic semiconductor. 7

8. (a) Describe the formation of p-n junction. Discuss its current voltage characteristics. 8

(b) Explain the construction and working of semiconductor laser. 7