

Roll No.

Total Pages : 3

BT-I/D-20

41045

SEMICONDUCTOR PHYSICS

Paper-BS-115A

Time : Three Hours]

[Maximum Marks : 75

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

UNIT-I

1. (a) Explain Diamond structure. Calculate its packing fraction. 7
- (b) What do you mean by point defects in solids? Derive an expression for Concentration of Schottky defects in a crystal. 8
2. (a) Discuss in brief crystal structure of sodium chloride and cesium chloride. 8
- (b) What are Miller Indices? For a simple cubic lattice, find the ratio of spacing of (110) and (111) planes. 7

UNIT-II

3. (a) What are De-Broglie waves? Show that the De-Broglie group velocity associated with the wave packet is equal to the velocity of the particle. 7

(b) Derive Schrodinger time dependent equation for matter waves. Give physical significance of the wave function. 8

4. (a) State Uncertainty Principle and discuss its various applications. 7

(b) Discuss the shortcomings of the classical physics and explain wave-particle duality. 8

UNIT-III

5. (a) What is Hall Effect? Mention applications of Hall Effect. 7

(b) What is meant by Fermi Energy? Calculate its value for free electron gas at 0K. 8

6. (a) Discuss the origin of energy bands in solids on the basis of Kronig-Penney model. 7

(b) Discuss briefly :

(i) E-K diagram.

(ii) Brillouin Zone. (4×2=8)

UNIT-IV

7. (a) What do you mean by intrinsic semiconductor? Derive an expression for carrier concentration in intrinsic semiconductor. 8

(b) Explain the working and characteristic of Bipolar Junction Transistor. 7

8. (a) What are extrinsic semiconductors? Explain conductivity of charge carriers in n -type and p -type semiconductors. 8
- (b) Describe the principle and working of semiconductor laser. 7
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