

Roll No.

Total Pages : 03

BT-1/D-22 .

41045

SEMICONDUCTOR PHYSICS
BS-115-A

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 bonding in solids with suitable examples. 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 Diamond structure. Calculate its packing fraction. 7
(b) Explain three-dimensional Bravais lattices. 8

Unit II

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

- (b) Derive Schrödinger time dependent equation for matter waves. Give physical significance of the wave function. 7
4. (a) Define Heisenberg's uncertainty principle. Explain *two* of its applications. 8
- (b) Explain the origin of concept of wave particle duality with example. 7

Unit III

5. (a) Explain quantum free electron theory. 8
- (b) Explain Fermi-Dirac distribution function. 7
6. (a) Write short notes on the following : 8
- (i) E *versus* K diagram
- (ii) Brillouin zone.
- (b) Explain Hall effect and its applications. 7

Unit IV

7. (a) Explain the working and characteristics of Field Effect Transistor. 8
- (b) What do you mean by intrinsic semiconductor ? Derive an expression for carrier concentration in intrinsic semiconductor. 7

8. (a) Describe the formation of p-n junction. Discuss its current-voltage characteristics. 8
- (b) Explain the construction and working of Bipolar Junction Transistor. 7