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Total Pages : 3

**BT-I/D-19**　　　　**31045**

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 hcp structure and find its packing fraction. 7

   (b) What is Frenkel Defect? Derive the relation to show that Frenkel defect in ionic crystal depend on temperature. 8

2. (a) Discuss the nature of bonds in the following: Na. Ice. Mg. 7

   (b) What is bravais lattice? Explain different types of bravais lattice in three dimension. 8

### UNIT–II

3. (a) Explain the basic postulates of Quantum mechanics. 7

   (b) Derive the expression for Schrodinger time dependent wave equation for a free particle. 8

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4. (a) State and explain Heisenberg uncertainty principle. Apply this principle to find the binding energy of an electron in an atom. 8

   (b) Explain wave particle dualism with example. 7

### UNIT–III

5. (a) Explain Kronig-Penney model for the motion of an electron in a periodic potential. 8

   (b) Wtat is Fermi-Dirac Distribution Function ? What is the effect of temperature on Fermi function. 7

6. (a) What is Fermi energy. Derive an expression for carrier concentration in terms of Fermi energy. 8

   (b) Calculate the expression for effective mass of an electron moving in a periodic potential. Explain its physical significance. 7

### UNIT–IV

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

   (b) Explain the working and characteristics of field effect transistor. 7

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8. (a) Discuss in detail Schottky metal semiconductor junction. 7

(b) Describe the principle and working of semiconductor laser. 8

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