Roll No. ..... Total Pages : 2

BT-2/M-20 **32033**

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 hep structure and find 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) Name various types of bonds in solids and give *one* example of each. 7

(b) Discuss in brief crystal structure of sodium chloride and cesium chloride. 8

UNIT–II

3. (a) What do you mean by De-Broglie wave. Show that the De-Broglie group velocity associated with the wave packet is equal to the velocity of the particle. 8

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

4. (a) What is the need and origin of quantum mechanics? 7

(b) State Uncertainty Principle and discuss its various applications. 8

UNIT–III

5. (a) Explain electrical conduction in metals using Drude's electron gas model. 8

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

6. (a) Based on band theory of solids, distinguish between conductors, semiconductors and insulators. 8

(b) Explain briefly success and drawbacks of free electron theory. 7

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 characteristics of field effect 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
