Roll No. ..... Total Pages : 3

BT-1/D-18 **31046**

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 various types of crystal system with example. (7)

(b) What do you mean by point defects in soilds? Derive an expression for Concentration of Schottky in a crystal. (8)

2. (a) Explain the characteristics of the following unit cells with examples: SC, BCC and FCC. (8)

(b) What are Miller Indices? Draw the following planes (110) $(\bar{1}\,\bar{1}\,\bar{1})$ and $(\bar{1}\,\bar{1}0)$. (7)

UNIT–II

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

(b) Derive Schrödinger time independent 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) Explain group velocity and phase velocity. Derive the expression for group velocity with which a wave packet travels. (8)

UNIT–III

5. (a) Discuss Drude's electron gas model to explain electrical conduction in metals. (8)

(b) What are Brillion Zones? Explain. (7)

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

(b) What is Hall Effect? Mention applications of Hall Effect. (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 characteristic of bipolar junction transistor. (7)

8. (a) Explain conductivity of charge carriers in n-type and p-type semiconductors. (8)

(b) Describe the formation of p-n junction. Discuss its current voltage characteristic. (7)
