

Roll No.

Total Pages : 03

BT-2/M-19

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APPLIED PHYSICS-II
AS-102N

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) Explain two and three dimensional bravais lattice. 8
- (b) Explain various lattice symmetry operations. 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 Schrödinger time dependent equation for matter waves. 8
4. (a) What are the limitations of old quantum theory ? Explain wave particle duality by giving examples. 8
- (b) Explain the existence of neutrons, protons and alpha particles in the nucleus on the basis of Heisenberg Uncertainty Principle. 8

Unit III

5. (a) Discuss quantum free electron theory of metals. 8
- (b) Derive an expression for Density of states. 7
6. (a) Discuss the origin of energy bands in solids on the basis of Kronig-Penney Model. 7
- (b) Discuss briefly the following :
 - (i) E-K diagram
 - (ii) Fermi-Dirac distribution function. 4×2=8

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Unit IV

7. (a) What is Meissner Effect ? Explain. 7
(b) Discuss various properties of nanomaterials. 8
8. (a) Explain Bottom-up and Ball milling method for synthesis of non-material with its advantages and disadvantages. 8
(b) Discuss various applications of superconductivity. 7