

## PHY2 - JUNE - 2008 - 1

Roll No. ....

Total No. of Pages : 2

BT-2/J08

8244

Physics—II (From 2005 onwards)

Paper—Phy. 102 E

Amit

Time : Three Hours]

[Maximum Marks : 100

Note :— Attempt FIVE questions in all, selecting at least ONE question from each unit.

### UNIT—I

1. (a) Discuss fully by giving examples also at least two crystal structures which have minimum and maximum packing efficiencies, respectively. Also calculate the values of packing efficiencies. 12
- (b) If the density of copper is 8.98 gm/cc, and has fcc structure, calculate the atomic radius of copper (Atomic wt = 63.5). 8
2. (a) How are various physical characteristics of solids depend upon the nature of bonding ? Explain by giving examples also. 10
- (b) Discuss the nature of bonds in the following :  
Na, Mg, Ice, Oxygen. 4
- (c) Name various point defects in solids. 6

### UNIT—II

3. (a) Give simple concepts of quantum mechanics and how could it solve various problems faced ? 8
- (b) Derive time-dependent SCHRÖDINGER'S wave equation. 8
- (c) What is F-D distribution law ? Explain. 4

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4. (a) Discuss the elements of classical free electron theory. What were its limitations ? 8
- (b) Define FERMI ENERGY and FERMI LEVEL. Derive an expression for FERMI ENERGY. 12

### UNIT—III

5. (a) Prove that for a completely filled band, the number of effective electrons vanishes. 6
- (b) Calculate the number of possible wave functions per band. 6
- (c) Calculate the expression for effective mass of an electron moving in a periodic potential. 8
6. (a) Discuss the origin of energy bands in solids using KRONIG PENNEY MODEL. 12
- (b) What is the physical meaning of BRILLOUIN ZONES ? Explain. 6
- (c) What are holes ? Explain. 2

### UNIT—IV

7. (a) Why does an atom show magnetic dipole moment ? Explain. Give classical theory of paramagnetism and explain Curie law and Curie-Weiss law. 12
- (b) Why do transition metals like Ni, Co, Fe, show magnetism even the external magnetising field is removed even ? Briefly discuss using a suitable theory (no derivation required). 8
8. Write notes on :—  
(a) Experimental Survey on Superconductivity.  
(b) Photovoltaic Cells—working and characterization.  
(c) Photoconductivity—Effect of illumination. 20