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 efficiences, 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 SCHRODINGER'S wave equation. 8

   (c) What is F-D distribution law ? Explain. 4

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