Roll No. .....

1212

B. E. 2nd Sem.

Examination – May, 2008

PHYSICS - II

Paper : Phy - 102 - E

Time : Three hours] *[Maximum Marks : 100*

Before answering the question, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions, selecting at least *two* questions from each Part.

PART – A

1. (a) What are Miller indices ? Give their significance. How would you determine the Miller indices of a plane in a crystal ? 10

   (b) What are point defects in solids ? Derive an expression for the concentration of Schottky defects at equilibrium temperature. 10

2. (a) What is Plank's constant ? Discuss its importance. 8

   (b) Derive time independent Schrodinger wave equation for a free particle. 12

3. (a) Discuss the motion of a free electron in a periodic potential and discuss. Fermi-Dirac distribution function. 14

(b) What is density of states ? Discuss briefly. 6

4. Write notes on any *two* : 10 + 10

(i) X-ray diffraction powder method for crystal structure analysis.

(ii) Thermionic Emmission,

(iii) Drude theory of conduction.

PART – B

5. (a) Discuss briefly : 15

(i) Origin of energy bands,

(ii) E-k diagrams, and

(iii) Brillouin zones.

(b) What is fermi energy ? Discuss its variation with temperature. 5

6. (a) What is photo-conductivity ? Discuss a simple model of a photo-conductor. Show that sensitive photo-conductors should have long response time. 15

(b) Write a short note on photovoltaic cells. 5

7. (a) What is superconductivity ? Give salient features and uses of superconductors. 12

(b) Describe London theory of superconductivity. 8

8. Write notes on any *two* : 10 + 10

(i) Classical theory of ferromagnetism,

(ii) Effective mass,

(iii) Hall effect.
