

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

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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 Emission,
- (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.