

24019

B.Tech. 2nd Semester Examination, May-2011

PHYSICS - II

Paper - PHY-101-F

Time allowed : 3 hours]

[Maximum marks : 100

Note : Attempt five questions in all, selecting atleast one question from each section. Section-A is compulsory.

Section-A

1. (a) Define the terms unit cell and primitive unit cell.
- (b) What are Quantum dots? Give their two applications.
- (c) What is meant by Fermi level & Fermi energy?
- (d) What is Hall effect? Define using diagram.
- (e) What are the traps? Explain.
- (f) Explain the term spontaneous magnetization.
- (g) Define Schottky and Frenkel defects.
- (h) State Ehrenfert's theorem. Also give its mathematical form.
- (i) Define atomic magnetic moment.
- (j) What is photoelectric effect?

20

Section-B

2. (a) Derive time independent Schrodinger wave equation. 10
- (b) Discuss the short comings of the classical physics. 10
3. What are miller indices? Draw the (011) and (111) planes. Derive the expression for spacing between two adjacent planes of a simple cubic lattice. 20

Section-C

4. Explain the effect of periodic potential on the energy of electrons in metals on the basis of Kronig-Penny model and explain the formation of energy bands. 20
5. (a) What is Photovoltaic effect? Describe the construction of solar cell and sketch its characteristic curve. Define its fill factor. 10
- (b) Explain Brillouin Zone in two dimensions. 10

Section-D

6. What is thermoionic emission in metals? Obtain Richardson-Dushman equation for the emission current density. 20

7. What is free electron theory of metals? Derive the expression for conductivity of metals on the basis of Drude-Lorentz theory. 20

Section-E

8. What is paramagnetism? On the basis of classical theory of paramagnetism, prove that susceptibility of paramagnetic substance is inversely proportional to absolute temperature. 20
9. Derive an expression for diamagnetic susceptibility on the basis of Langevin's theory and show that it is independent of temperature. 20