

B.E./B.Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, APR/MAY 2011

(Common to Manufacturing Engg., Chemical Engg., Petroleum Refining and Petrochemicals, Textile Technology, Apparel Technology, Leather Technology, Biotechnology, Food Technology, Pharmaceutical Technology, Ceramic Technology, Aeronautical Engg., Production Engg., and Rubber and Plastics Technology)

SECOND SEMESTER (REGULATIONS: R 2008)

PH 9164 – PHYSICS OF MATERIALS

Time : 3 hr

Max. Mark:100

Answer ALL Questions

PART - A (10 x 2 = 20 Marks)

1. Explain the Gibbs Phase Rule. What is the degree of freedom of a system of one component and the number of phases is two?
2. If the actual concentration of a supersaturated solution is 55 gram/100cc at 300K and the solubility of the solute is 50 gram/100cc at the same temperature, calculate the degree of supersaturation of the solution.
3. Determine the value of Fermi distribution function for an energy kT above the Fermi energy at that temperature.
4. The critical temperature for a metal with isotopic mass 200 is 4.12 K. Find the isotopic mass if the critical temperature falls to 4.13 K.
5. What are intrinsic and extrinsic semiconductors? Give examples.
6. What are compound semiconductors? Give two examples.
7. Compare the properties of hard and soft magnetic materials.
8. What are the classifications of insulating materials?
9. What is renogram?
10. What are the properties of shape memory alloys?

PART – B (5 x 16 = 80 Marks)

- 11 a) Describe a eutectic phase diagram with an example.
b) Explain the crystal growth techniques from vapour phase. (8 +8)
12. a) Derive Schrödinger's time independent wave equation. Solve it for the case of a particle in a one-dimensional potential well. (8 +8)
OR
b) (i) What are the properties of superconductors? What are the applications of superconductors (4 + 6)
(ii) Write a note on high T_c superconductors. (6)
13. a) Derive an expression for the conductivity of intrinsic semiconductors in terms of carrier concentrations and carrier mobility. Explain the variation of Fermi level with temperature. (12+ 4)
OR
b) Obtain expressions for the density of majority charge carriers in n-type and p-type semiconductors.

14. a) i) What is meant by polarization in dielectric? Explain the different types of polarization mechanisms involved in a dielectric material. (8)
- ii) What is dielectric breakdown? Explain the different types of breakdown in dielectrics (8)

OR

- b) Explain the domain theory of ferromagnetism. Discuss the hysteresis loop on the basis of domain theory. (8 + 8)

15. a) Describe in detail the methods of production of metallic glasses, their types and applications.

OR

- b) Describe in detail the principle and working of scintillation detectors and Magnetic Resonance Imaging.