J 1350

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2006.

Third Semester

Leather Technology

PH 232 – MATERIALS SCIENCE

(Common to Chemical, Textile Technology)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the significance of phase diagram?

2. What are nano phase materials?

3. Define critical resolved shear stress.

4. Define endurance limit.

5. The superconducting transition temperature of lead is 7.26 K. The critical magnetic field required to destroy superconductivity at zero Kelvin is 64×10^3 amp/m. Calculate the critical magnetic field at 5 K.

6. Mention any two applications of shape memory alloys.

7. What are compound semiconductors? Give two examples.

8. What is dielectric loss?

9. Define thermal conductivity.

10. What is light emitting diode?

PART B — (5 × 16 = 80 marks)

11. (i) What is Hall effect? Obtain an expression for Hall coefficient and give some applications of Hall effect. (8)

(ii) What is dielectric break down? Explain in detail the different break down mechanisms that are responsible for dielectric break down. (8)

12. (a) (i) Draw the equilibrium (phase) diagram of iron carbon system and discuss the transformations that take place from melting point to room temperature for any percentage of carbon. (8)

(ii) Upon what factors does recrystallization depend? What benefits are achieved through the process of recrystallization? (8)

Or

(b) (i) What do you understand from time-temperature-transformation diagram? Discuss the importance of these diagrams in the heat treatment of steel. (8)

(ii) Give an account on solidification and crystallization. (8)

13. (a) (i) What is creep? Draw a creep curve and explain the different stages of creep. (8)

(ii) What are ductile and brittle fractures? Discuss Griffith's theory of brittle fracture. (8)

Or

(b) (i) Explain plastic deformation by the phenomenon of slip and obtain an expression for critical resolved shear stress. (8)

(ii) What is fatigue fracture? Describe the method of carrying out fatigue test and hence an S-N curve. (8)

14. (a) (i) Give the postulates of classical free electron theory and hence obtain an expression for the electrical conductivity of metals. (8)

(ii) What is the Meissner effect? Describe the classification of superconductors as type – I and type – II superconductors. (8)

Or

(b) (i) Describe the classification of magnetic materials as dia, para, ferro, antiferro and ferri magnetic materials. (8)

(ii) What is magnetic hysteresis? Explain magnetic hysteresis using domain theory. (8)

15. (a) (i) Describe the working of LCD. (8)

(ii) Give an account on thermal expansion and describe its variation with temperature. (8)

Or

(b) (i) Give an account on fibre optic materials. Mention some of their applications. (8)

(ii) Explain the construction and working of LED. (8)
