T 8256

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Second Semester

Mechatronics Engineering

MH 1151 — ENGINEERING MATERIALS AND METALLURGY

(Regulation 2004)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Why iron is called allotropic in nature?

2. Calculate the relative amount of proeutectoid cementite in a steel containing 0.8% carbon.

3. What is air quenching?

4. What are the limitations of induction hardening?

5. List the applications of malleable cast iron.

6. What is the main difference between a brass and bronze?

7. What are polymer additives? Name any two.

8. Why are ceramics dried before firing?

9. What are slip bands?

10. State the main causes of fatigue failure.

PART B — (5 × 16 = 80 marks)

11. (a) What are the micro constituents of iron? Discuss the different reactions take place in iron carbon equilibrium diagram. (16)

Or

(b) Draw Fe-Fe_3C phase diagram and label the phase fields. Distinguish between (i) Eutectoid (ii) Hypoeutectoid (iii) Hypereutectoid. (16)

12. (a) With neat sketch, explain the TTT diagram and also mention its significance. (16)

Or

(b) (i) Give the test procedure for the Jominy end quench test.

(ii) What is gas carburizing? How it differs from other types of carburizing? (8 + 8)

13. (a) Discuss the influence of each of the following alloying elements on the properties of steels.

(i) Silicon

(ii) Chromium

(iii) Manganese

(iv) Tungsten and

(v) Molybdenum. (16)

Or

(b) Sketch the Copper-Zinc phase diagram and also describe the microstructure, properties and application of the following Cu-Zn brasses (i) Cartridge brass (ii) Naval brass and (iii) Muntz metal. (16)

14. (a) (i) What is polymerization? How it is performed?

(ii) Compare the Addition and Condensation polymerization. (8 + 8)

Or

(b) (i) What are artificial abrasives? And also list their properties and uses.

(ii) What are fibrous composites? Give their classification. (8 + 8)

15. (a) Describe the slip mechanism which enables a metal to be plastically deformed without under going fracture. (16)

Or

(b) Define notch impact strength of a material. Describe how the notch toughmen is determined by using Charpy's and Izod's impact test. (16)
