Reg. No. : | | | | | | | | | | | |

Question Paper Code : C 1392

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2010.

Fourth Semester

Mechanical Engineering

MH 1151 — ENGINEERING MATERIALS AND METALLURGY

(Common to Automobile Engineering, Production Engineering)

(Common to Second Semester Mechatronics Engineering)

(Regulation 2004)

(Common to B.E. (Part Time) Third Semester Mechanical Engineering Regulation 2005)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are interstitial solid solutions and interstitial compounds?

2. Differentiate between eutectic and eutectoid phase reactions.

3. Define critical cooling rate.

4. What is the final microstructure in austempering of steels?

5. What are the effects of adding Si in steels?

6. Differentiate brass from bronze.

7. What are PMMA and PET polymers? What are their uses?

8. What are the uses of alumina?

9. What is twinning in metals?

10. What is the difference between HRB and HRC?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss Hume-Rothery rules for the formation of solid solutions. (6)

(ii) Draw a typical isomorphous phase diagram and explain the structural changes of an alloy (say 50% A and 50% B). Apply Lever rule at some temperature in the alpha + liquid portion for this alloy. (10)

Or

(b) (i) Draw Fe-C diagram and mark all the phases. (8)

(ii) Discuss microstructure, properties and applications of a medium carbon steel and a white cast iron. (8)

12. (a) (i) Discuss different types of annealing processes. (8)

(ii) Discuss the need for hardening and tempering of steels. Can mild steel be hardened this process? (8)

Or

(b) (i) Draw a typical TTT diagram and show different cooling curves superimposed on this diagram. (8)

(ii) Discuss the need for austempering and martempering. (8)

13. (a) (i) Discuss the properties and applications of different varieties of stainless steels. (8)

(ii) What are HSLA and maraging steels? Why these steels are important? (8)

Or

(b) (i) Discuss precipitation strengthening of an Al base alloy. (8)

(ii) What are cupronickel alloys? Give two examples of composition, their properties and applications. (8)

14. (a) What are the different types of polymers? Give any four polymers, their properties and applications. (16)

Or

(b) What are the different types of engineering ceramics? Give any four ceramics, their properties and applications. (16)

15. (a) Discuss the mechanism of slip taking place metals using edge dislocation and screw dislocation. (8 + 8)

Or

(b) (i) Discuss fatigue testing of metals. How to improve fatigue life? (8)

(ii) Discuss creep testing of metals. Draw a typical creep curve and explain. (4 + 4)
