Question Paper Code : 10413

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2012.

Fourth Semester

Automobile Engineering

ME 2253 / ME 44 / ME 1253 / 10122 ME 304 / 080120017 — ENGINEERING MATERIALS AND METALLURGY

(Common to Mechanical Engineering)

(Regulation 2008)

(Common to B.E. (Part-Time) Fourth Semester — Mechanical Engineering — Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate Isomorphous and Eutectic reactions.

2. Draw the microstructure eutectoid steel and white cast iron.

3. Write the importance of spheroidising annealing.

4. Define hardenability and case depth.

5. Differentiate between Izod and Charpy impact testing.

6. Draw the S-N curve for mild steel and aluminium.

7. What is the effect of alloying Nickel and Chromium in steels?

8. Differentiate between precipitation hardening and dispersion strengthening.

9. Define degree of polymerization.

10. What are PEEK and PMMA?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Indicate the different invariant reactions in Fe-Fe_3C phase diagram and draw and label all the phases. (10)

(ii) Discuss the different classifications of steels and cast irons. (6)

Or

(b) (i) Draw the indicative eutectic phase diagram (partially soluble type). (4)

(ii) Explain the Hume Rothery rules governing substitutional solid solution. (8)

(iii) Write short note on about SG cast iron. (4)

12. (a) What is Annealing? Discuss in details on different types of annealing and compare with normalizing. (16)

Or

(b) (i) What is tempering? Discuss the structural transformation during tempering. (6)

(ii) What is carburizing? Discuss nitriding process and its importance for industrial applications. (6)

(iii) Describe the Jominy End Test in details for determination of hardenability. (4)

13. (a) (i) Draw the engineering stress — strain curve for mild steel, aluminium and cast iron. Discuss the tensile test and different mechanical properties obtained in tensile testing. (6 + 6)

(ii) Write a short note on compression test. (4)

Or

(b) (i) List the various types of hardness testing. Write a short note on Brinell and Vickers hardness and their significance. (4 + 4 + 4)

(ii) What do you mean by slip and twinning? (4)

14. (a) (i) Describe the stainless steels with respect to composition, properties and applications. (10)

(ii) What is maraging steels? Discuss the strengthening method of maraging steels. (6)

Or

(b) (i) Discuss different types of copper alloys and their properties and applications. (10)

(ii) Write a short note on bearing alloys. (6)

15. (a) Write the properties and applications of the following polymers and discuss anyone fabrication methods of polymers. (12 + 4)

(i) PMMA,

(ii) PP,

(iii) ABS and

(iv) PTFE.

Or

(b) (i) List the important engineering ceramic materials and discuss its general applications of ceramic materials in various engineering fields. (12)

(ii) What are the advantages and disadvantages of ceramics? (4)

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