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Question Paper Code : 70896

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Third/Fourth Semester

Mechanical Engineering

ME 8491 — ENGINEERING METALLURGY

(Common to : Automobile Engineering/Manufacturing Engineering/Mechanical and
Automation Engineering/Production Engineering)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Classify steel and state its significance.
2. Distinguish between substitutional solid solution and interstitial solid solution.
3. Define stress relieving.
4. Distinguish between Austempering and Martempering.
5. Define HSLA.
6. List out the Compositions of Bearing alloys.
7. Give the applications of polymers.
8. Explain glass transition temperature.
9. Differentiate between engineering stress strain curve and true stress strain curve.
10. Define endurance limit.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the iron-carbon phase diagram with a neat sketch.

Or

- (b) Draw the eutectic phase diagram and explain all the regions in it.

12. (a) Explain the hardening and normalizing heat treatment methods for steel.

Or

- (b) Explain nitriding, case hardening and carburizing treatment with neat sketches.

13. (a) Explain the various strengthening mechanisms of ferrous and nonferrous metals.

Or

- (b) Explain the properties and uses of Mg alloys and Titanium alloys.

14. (a) Explain the different properties and applications of polymers.

Or

- (b) Explain the different properties and applications of MMC.

15. (a) Explain salient features of stress strain curve of ductile and brittle material and explain it with a suitable example.

Or

- (b) Explain salient features of SN curve and explain it with a suitable example.

PART C — (1 × 15 = 15 marks)

16. (a) Explain the Vacuum and Plasma hardening with a neat sketch. Also mention the Merits and Demerits.

Or

- (b) Explain the procedures for Rockwell Hardness test, Izod and Charpy test with neat sketches.