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**Question Paper Code : 80658**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Third Semester

Manufacturing Engineering

ME 6403 — ENGINEERING MATERIALS AND METALLURGY

(Common to Fourth Semester Automobile Engineering, Mechanical and Automation Engineering and Mechanical Engineering)

(Regulations 2013)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define the term solid solutions.
2. How will you classify steels?
3. When will you prefer annealing?
4. Define the term Cementite.
5. List the important properties of HSLA.
6. What are Bronzes? List the uses of Bronzes.
7. Define the term degree of polymerization.
8. State any four applications of Bakelite.
9. Define the term Fatigue.
10. List any four mechanical testing methods of metals.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Explain the various micro constituents present in steel. (8)  
(ii) With a neat sketch, label the reactions of Fe-Fe<sub>3</sub>C diagram. (5)

Or

- (b) (i) Discuss the classification of cast iron and draw its microstructure. (9)
- (ii) State the properties and applications of plain carbon steel. (4)
12. (a) (i) Distinguish between annealing and tempering. (4)
- (ii) Explain in detail the flame and induction hardening with neat sketches. (9)

Or

- (b) Explain the principle and procedure of Jominy end quench test with a diagram. Also sketch the graph hardness Vs distance from quenched end. (13)
13. (a) (i) With a neat sketch, explain precipitations hardening. (8)
- (ii) State the compositions, properties and uses of bearing alloys. (5)

Or

- (b) Write short notes on the following :
- (i) Maraging steels (4)
- (ii) SS (5)
- (iii) HSS. (4)
14. (a) Explain the following.
- (i) Engineering ceramics. (5)
- (ii) Formaldehydes (4)
- (iii) PMMA. (4)

Or

- (b) (i) Explain the Engineering polymers in detail. (7)
- (ii) State the properties and uses of reinforced composites. (6)
15. (a) (i) What are the different hardness tests performed in metallic material? Specify the indenter and hardness measurement scale of the same. (4)
- (ii) Explain the procedure of tensile test for metals. (9)

Or

- (b) (i) Explain the mechanism of plastic deformation with suitable illustrations. (8)
- (ii) Discuss about the creep test with a typical creep curve. (5)

PART C — (1 × 15 = 15 marks)

16. (a) Discuss the effects and characteristics of alloying elements in steel. (15)

Or

- (b) Name the suitable alloys, polymers and ceramics for manufacturing the following items. (15)
- (i) Bush
- (ii) Furnaces heating element
- (iii) Lathe bed
- (iv) Coins
- (v) Girders for Airship
- (vi) Big end bearing
- (vii) Turbine blades
- (viii) Conduit pipes
- (ix) Knobs
- (x) Windshields
- (xi) Touch screens
- (xii) Furnace linings
- (xiii) Grinding (abrasive) wheels
- (xiv) Coatings on cutting inserts
- (xv) Cutting inserts for ferrous alloys.