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Question Paper Code: 93706

B.E./B.Tech. DEGREE EXAMINATION, MAY 2024

Third Semester

Mechanical Engineering

19UME306– MATERIALS ENGINEERING

(Regulation 2019)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. First material known to be used by man CO1- R
(a) Cotton (b) Bronze (c) Iron (d) Rock
2. Brass is an alloy of CO1- R
(a) brass and zinc (b) brass, tin and zinc (c) copper and tin (d) none of these
3. Annealing is done to CO1- R
(a) reduce carbon percent (b) change in crystalline structure
(c) reduce hardness (d) soften the metals
4. Which carburizing method has high production rate? CO1- R
(a) Pack carburizing (b) liquid carburizing (c) gas carburizing (d) All of the above
5. % C in medium carbon steels ranges from _____. CO1- R
(a) 0.3 – 0.4 (b) 0.3 – 0.5 (c) 0.3 – 0.6 (d) None of the above
6. Stainless steel is so called because of its _____. CO1- R
(a) High strength (b) High corrosion resistance (c) High ductility (d) Brittleness
7. Rubber is a CO1- R
(a) Thermoplastic polymer (b) Thermosetting (c) Elastomer (d) Fiber
8. Density of ceramics compare with metal CO1- R
(a) Very high (b) same (c) Low (d) unpredictable

9. Slow plastic deformation of metals under a constant stress is known as CO1- R
- (a) Creep (b) Fatigue
- (c) Gradual deformation (d) Endurance limit
- 10 Tensile test can be performed on CO1- R
- (a) Impact testing machine (b) universal testing machine
- (c) Rockwell tester (d) Brinell tester

PART – B (5 x 2= 10 Marks)

- 11 Define solid solution.. CO2- U
- 12 Classify type of hardening process CO2- U
- 13 What is HSLA? CO2- U
- 14 What is polymerization? CO4- U
- 15 Distinguish between slip and twinning CO5- U

PART – C (5 x 16= 80 Marks)

- 16 (a) How will you plot binary phase diagram for two metals which are completely soluble in liquid and partially soluble solid state? CO2-U (16)
- Or
- (b) How will you plot binary phase diagram for two metals which are completely soluble in liquid and completely insoluble solid state? CO2-U (16)
- 17 (a) What is a CCT diagram? Describe various cooling curves on CCT diagrams. How such curves are drawn? Write short notes on critical cooling rate. CO2-U (16)
- Or
- (b) Define the following surface hardening process: CO2-U (16)
- (a) Carburising (b) Nitriding (c) Cyaniding (d) Carbonitriding.
- 18 (a) Enumerate the composition and properties of malleable cast iron and white cast iron. CO2-U (16)
- Or
- (b) Write an engineering brief (composition, heat treatment, properties) about the following steels: [a] Tool steel [b] HSLA steel [c] Maraging steels CO2-U (16)

- 19 (a) Describe the difference between thermoplastics and thermosetting plastics. CO4-U (16)
- Or
- (b) What are ceramics? List and briefly explain five important properties of ceramics that make them useful engineering materials. Explain the main classification of ceramic materials. CO4-U (16)
- 20 (a) Discuss the tensile test and different mechanical properties obtained in tensile testing. Write a short note on compression test. CO3-U (16)
- Or
- (b) Explain the procedure for performing the Rockwell test. CO3-U (16)

