

B.E. DEGREE EXAMINATIONS: APRIL / MAY 2010

Third Semester

MECHANICAL ENGINEERING

U07ME301: Engineering Materials and Metallurgy

Time: Three Hours

Maximum Marks: 100

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

- 1 Eutectoid reaction occurring at 727°C with 0.77%C is
 - a) Austenite -----> ferrite + pearlite
 - b) Austenite -----> ferrite + martensite
 - c) Austenite -----> ferrite + cementite
 - Austenite -----> martensite + bainite
- 2 Example for binary isomorphous system is
 - a) Copper- Nickel
 - b) Copper-Aluminium
 - c) Copper -- Silver
 - d) Lead - tin
- 3 A harder material is more prone to
 - a) Fracture
 - b) deformation
 - c) wear
 - d) rupture
- 4 General purpose mineral oils used as quenchants are used in the temperature range of
 - a) 50°C to 80°C
 - b) 80°C to 100°C
 - c) 20°C to 80°C
 - d) 100°C to 180°C
- 5 Pack carburizing uses
 - a) 80% BaCO₃ and 20% granular coal
 - b) 20% BaCO₃ and 80% granular coal
 - c) 60% BaCO₃ and 20% granular coal
 - d) 60% BaCO₃ and 80% granular coal
- 6 The alloying element in steel that improve fatigue strength is
 - a) Mo
 - b) S
 - c) P
 - d) V
- 7 As percentage of Zn in brass increases up to 40%
 - a) Its strength increases but ductility reduces
 - b) its ductility increases but corrosion resistance reduces
 - c) its corrosion resistance increases but strength reduces
 - All three properties reduce
- 8 Plastics that are used for their transparency belong to group
 - a) Nylon
 - b) melamine
 - c) TEFLON
 - d) PMMA

- 9 In a fiber reinforced composite
- a) matrix is stronger than fiber
 - b) matrix is weaker than fiber
 - c) matrix and fibers are of equal strength
 - d) matrix is comparatively defect free
- 10 Diffusion coatings provide superior oxidation, corrosion and erosion resistance of the base metal up to
- a) 1900° F without spallation
 - b) 2600° F without spallation
 - c) 2100° F without spallation
 - d) 3100° F without spallation

PART B (10 x 2 = 20 Marks)

- 11 What is constitution diagram?
- 12 What is tie line?
- 13 What is TTT diagram
- 14 What are the limitations of cyaniding?
- 15 What are the drawbacks of cast aluminium alloys?
- 16 State the composition of a typical Babbit metal
- 17 What are whiskers?
- 18 What are the applications of Ceramics?
- 19 What is wear?
- 20 What is cold spraying?

PART C (5 x 14 = 70 Marks)

21. a) (i) What is substitutional solid solution? Briefly discuss (7)
- (ii) Draw and explain binary isomorphous systems with suitable examples. (7)
- (OR)**
- b) Draw and explain iron – carbide equilibrium diagram
22. a) Describe different types of annealing with neat sketches. What are their applications?
- (OR)**
- b) (i) What is meant by hardenability and what are the factors affecting it? (5)
- (ii) Explain the Jominy end-quench test. (9)

23. a) Describe in detail the effect of alloying elements on the properties of steels

(OR)

- b) (i) Differentiate cast and wrought aluminium alloy (4)
(ii) State the composition and mechanical properties of aluminium alloys (10
)

24. a) What are the effects of impurities and imperfections in ceramics?

(OR)

- b) Discuss on the properties and applications of PE, PP and PVC.

25. a) What is surface engineering? Discuss its features.

(OR)

- b) (i) Describe briefly the mechanism of wear. (6)
(ii) What are the means of wear prevention? (8)
