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Question Paper Code: 45702

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Fifth Semester

Mechanical Engineering

14UME502 - ENGINEERING MATERIALS AND METALLURGY

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- The number of Bravais space lattices with two lattice points are
(a) 2 (b) 3 (c) 4 (d) 5
- The reaction that, on heating one solid phase, yields another solid phase and one liquid phase is called
(a) eutectic (b) eutectoid (c) peritectic (d) peritectoid
- Hardness of steel is greatly improved with
(a) Annealing (b) Cyaniding (c) Normalising (d) Tempering
- Which of the following material has maximum ductility?
(a) Mild steel (b) Copper (c) Nickel (d) 6000 bytes
- The hardness number 1 on Moh's scale is assigned to
(a) quartz (b) talc (c) topaz (d) diamond

6. Poisson's ratio is

- | | |
|-----------------------------------|----------------------------------|
| (a) Linear stress/lateral stress | (b) Linear strain/lateral strain |
| (c) Lateral stress/lateral stress | (d) Lateral strain/linear strain |

7. Copper is ductile, because

- | | |
|-----------------------------|----------------------------------------------------|
| (a) it is a perfect crystal | (b) it contains a very high density of dislocation |
| (c) it has glassy structure | (d) the stress to move a dislocation in it is low |

8. Aero plane and certain automobile parts are usually made of

- | | |
|---------------|----------------------|
| (a) Magnalium | (b) Aluminium bronze |
| (c) Duralumin | (d) German silver |

9. Structure of a polymer is

- | | |
|----------------|---------------------------|
| (a) Long Chain | (b) Rhombic |
| (c) Cubic | (d) Closed pack hexagonal |

10. Which one of the following materials is not a composite?

- | | | | |
|----------|--------------|-------------|------------|
| (a) Wood | (b) Concrete | (c) Plywood | (d) Sialon |
|----------|--------------|-------------|------------|

PART - B (5 x 2 = 10 Marks)

11. Differentiate between eutectic and eutectoid phase reactions (any four points).

12. What is meant by case hardening?

13. What is meant by Ductility?.

14. How to classify stainless steel materials?

15. Name any two polymers and state their applications.

PART - C (5 x 16 = 80 Marks)

16. (a) Explain the following invariant reactions with reference to a phase diagram

- | | |
|---------------------------|---------------------------|
| (i) Eutectic reaction | (ii) Eutectoid reaction |
| (iii) Peritectic reaction | (iv) Peritectoid reaction |
- (16)

Or

(b) Draw and explain various points in iron-carbide equilibrium diagram. List the compositions and typical applications of steels. (16)

17. (a) Explain Annealing, Process annealing, Stress relief and Normalizing in detail. (16)

Or

(b) Define the term hardenability of steels. Explain Jominy end quench test used to determine hardenability of steels. How will you draw hardenability curves using this test? (16)

18. (a) (i) Explain the mechanism of fatigue fracture. (8)

(ii) Discuss any two mechanism of creep fracture. (8)

Or

(b) (i) Explain Creep with neat sketch. (8)

(ii) What is Fatigue? Explain with neat sketch. (8)

19. (a) What are stainless steels? What are the main characteristics of stainless steels? Name different types of stainless steel and their main applications. (16)

Or

(b) Discuss the composition, properties and typical applications of any four copper alloys. (16)

20. (a) (i) Discuss the properties and applications of ceramic materials in industries. (8)

(ii) With schematic diagrams illustrate the processing of fiber reinforced composites. (8)

Or

(b) Explain ceramic composite and its any two types of fabrication processes. (16)
