Reg. No. : | | | | | | | | | | |

Question Paper Code: 45702

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

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)

1. An eutectoid steel consists of

   (a) wholly pearlite (b) wholly austenite
   (c) pearlite and ferrite (d) pearlite and cementite

2. Malleable cast iron is produced

   (a) by adding magnesium to molten cast iron
   (b) by quick cooling of molten cast iron
   (c) from white cast iron by annealing process
   (d) none of these

3. Hardness of steel is greatly improved with

   (a) Annealing (b) Cyaniding (c) Normalising (d) Tempering

4. Which one of the following mediums is used for fastest cooling rate of steel quenching

   (a) Air (b) Oil (c) Water (d) Brin

5. 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. Polymethyl Methacrylate (PMMA) is known as

(a) Perspex (b) Teflon (c) Bakelite (d) Nylon 6

PART - B (5 x 2 = 10 Marks)

11. Explain GIBB's phase rule.

12. What is meant by case hardening?

13. Define yield strength.

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) With suitable example, draw and explain the phase diagram for a binary alloy of two metals, which are completely soluble in liquid phase but only partly soluble in solid phase. (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) Write short note on the following surface heat treatment operations:

(i) Carburizing (ii) Nitriding

(iii) Cyaniding (iv) Carbonitriding (16)

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

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

Or

(b) What is meant by Fatigue? How fatigue strength is measured experimentally and Distinguish low and high fatigue cycles. (16)

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) (i) Explain the difference between commodity plastics and engineering plastics. (8)

(ii) What do you understand by polymerization? With the help of suitable examples, compare addition and condensation polymerization. (8)