

Reg. No.

Question Paper Code

11704

**B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022**

Third Semester

**Mechanical Engineering**

**20MEPC303 - ENGINEERING METALLURGY**

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

**PART - A (10 × 2 = 20 Marks)**

Answer ALL Questions

- |   | <i>Marks,<br/>K-Level, CO</i> |
|---|-------------------------------|
| 1. Define solid solution.   | 2,K1,CO1                      |
| 2. How will you classify steels?  | 2,K1,CO1                      |
| 3. When is annealing process preferred?   | 2,K2,CO2                      |
| 4. State Hall Petch Relation.   | 2,K1,CO2                      |
| 5. Which type of stainless steel is used for surgical instruments?                            | 2,K1,CO4                      |
| 6. Give the composition of the following non ferrous alloys (a) Gunmetal<br>(b) Babbit metal. | 2,K1,CO4                      |
| 7. What is polymerisation?  | 2,K1,CO5                      |
| 8. List the applications of Engineering Ceramics.   | 2,K2,CO6                      |
| 9. Distinguish between Brittle fracture and Ductile fracture.                                 | 2,K2,CO3                      |
| 10. What is creep? Draw a typical creep curve and show different creep stages on it.          | 2,K2,CO3                      |

**PART - B (5 × 13 = 65 Marks)**

Answer ALL Questions

11. a) Draw Iron-Carbon equilibrium diagram and label all the phases. Also enumerate the properties of the following phase. (a) Ferrite  
(b) Austenite (c) Cementite. 13,K2,CO1
- OR**
- b) What are the different types of cast irons? Draw the microstructure of any four types of cast irons. Give one application for each. 13,K2,CO1
12. a) Draw a neat sketch of the Isothermal Transformation diagram for Eutectoid steel and explain the constructional procedure. Label all the salient features on it. Superimpose on it a cooling curve to obtain bainitic phase. 13,K2,CO2

**OR**

*K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create*

**11704**



b) Define hardenability and explain Jominy End Quench test. How to use this jominy end quench test data? 13,K2,CO2

13. a) Write Short notes on
- (i) Maraging steels 4,K2,CO4
  - (ii) Stainless steels 5,K2,CO4
  - (iii) High Speed Steel 4,K2,CO4

**OR**

b) Explain Age Hardening of Al-Cu with the help of a Phase Diagram. 13,K2,CO4

14. a) Write the properties and applications of the following polymers (i) PE 13,K2,CO6  
(ii) PEEK (iii) ABS and (iv) PTFE

**OR**

b) (i) Write short note about the different types of matrix materials and reinforcement materials used to make polymer matrix composites. 7,K2,CO6

(ii) Discuss the properties and applications of Sialons. 6,K2,CO6

15. a) Explain the two mechanisms of plastic deformation with neat sketch. 13,K2,CO3

**OR**

b) Define the term 'Hardness of metal'. With a neat sketch explain the hardness measurement by Rockwell method. 13,K2,CO3

**PART - C (1 × 15 = 15 Marks)**

16. a) Suggest a suitable material that is required for food Processing tanks and Medical Equipment industries, with its Properties, Advantages and Applications. 15,K3,CO5

**OR**

b) Identify a suitable Surface Hardening method that does not require Post treatment methods. 15,K3,CO5