

Roll No.

Total No. of Pages : 02

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B.Tech. (Mechanical Engineering) (Sem.-4)

**MATERIALS ENGINEERING**

Subject Code : BTME-404-18

M.Code : 77549

Date of Examination : 17-05-2024

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

**1. Write briefly :**

- a) Define line defect.
- b) Define polymorphism
- c) Draw Body Centered Cubic lattice (BCC).
- d) What is recovery?
- e) Define eutectic reaction.
- f) Discuss the utility of lever rule in phase diagrams.
- g) Define tempering?
- h) State difference between hardness and hardenability.
- i) What is carburising?
- j) Name different alloying elements of stainless steel.

## SECTION-B

2. What is non steady-state diffusion? Discuss important factors affecting diffusion.
3. How atomic packing factor for Face Centered Cubic (FCC) crystal structure is calculated?
4. Explain Time temperature Transformation (TTT) curves.
5. What do you mean by heat treatment of steel? Explain annealing process.
6. Discuss the effect of alloying Si, Cr, and Mn on properties of steel.

## SECTION-C

7. (a) What is the difference between slip and twinning deformation?  
(b) Explain Jominy end-quench test to determine harden-ability of steel.
8. Draw Iron Carbon (Fe-C) equilibrium diagram. Label all the phases and temperatures properly. Also describe the possible phase reactions.
9. **Write a short note on :**
  - (a) Equilibrium diagram of binary system
  - (b) Flame hardening.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**