

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech.(IE) (All) / (ME) (Sem.-3)**  
**ENGINEERING MATERIALS AND METALLURGY**

Subject Code : ME-205

Paper ID : [A0860]

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION 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 has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

**SECTION-A**

**1. Write briefly :**

- (a) What is a Unit Cell?
- (b) What is Burger's Vector?
- (c) What do you understand by Allotropy and Polymorphism?
- (d) What do you mean by Toughness of a Material?
- (e) What do you mean by Binary Isomorphous System?
- (f) What is Gibb's phase rule?
- (g) Why hardening is always followed by tempering treatment?
- (h) What is Martensite?
- (i) What are Whiskers?
- (j) What is Stainless Steel?

## SECTION-B

2. Discuss briefly the various stages of solidification process.
3. Define hardness. Explain three scales A, B and C of Rockwell hardness test.
4. Explain the process of twinning, how it is different from a slip.
5. Differentiate between CCT and TTT diagrams.
6. Write a brief note on flame hardening treatment of steel.

## SECTION-C

7. (a) Explain the process of recovery and recrystallization.  
(b) Explain Engineering Stress vs. Engineering strain curve for mild steel.
8. Draw Fe-Fe<sub>3</sub>C equilibrium diagram, labeling all points, lines and areas. Discuss the various invariant reactions observed in this diagram. Explain the changes in microstructure of 0.8% C-steel, slowly cooled from liquid region to room temperature.
9. Discuss the role of adding Mn, Si, Cr, Ni, Al and W in alloy steels.