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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (ME) (Sem.-3)

ENGINEERING MATERIALS AND METALLURGY

Subject Code : BTME-306

M.Code : 59116

Date of Examination : 19-05-2023

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. Differentiate between primary and secondary bonding.
 - b. Depict (111) plane in FCC unit cell.
 - c. What do you mean by polymorphism?
 - d. Discuss the signification of Burgers vector.
 - e. Define steady-state diffusion.
 - f. How microstructural and mechanical characteristics of a plastically deformed metal specimen may be restored to their pre-deformed states?
 - g. List the applications of phase diagrams.
 - h. Why Fe-Fe₃C diagram is called metastable equilibrium phase diagram?
 - i. Define hardenability.
 - j. What are austenite stabilizers?

SECTION-B

2. Using suitable sketch, explain the difference between edge and screw dislocations.
3. State and explain Fick's first law of diffusion. What is the influence of temperature on diffusion?
4. Draw and label Fe-Fe₃C diagram for plain carbon steel. Explain the phases present in this system.
5. List the applications of surface hardening treatment of steel components. Explain pack carburizing in brief.
6. Discuss the effects of adding alloying elements on iron-iron carbide equilibrium diagram.

SECTION-C

7.
 - a. Distinguish between recovery and recrystallization.
 - b. Differentiate between annealing and normalizing heat treatment processes.
8. What is the purpose of alloying of steels? Discuss the effects of adding Ni and Cr on the properties of steels.
9. Write brief notes on the following :
 - a. Flame hardening
 - b. Jominy end-quench hardenability test.

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.