

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

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

MATERIALS ENGINEERING

Subject Code : BTME-404-18

M.Code : 77549

Date of Examination : 09-07-22

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) What are point defects? Name them.
- b) Define steady state diffusion process.
- c) Discuss the applications of lever rule.
- d) What is the importance of Iron-Carbon equilibrium diagram?
- e) Define critical cooling rate.
- f) Define the term harden-ability and severity of quench.
- g) Enlist different defects due to heat treatment.
- h) Define Thermal stress.
- i) Using suitable sketch, explain the difference between FCC and BCC unit cells.
- j) What are super alloys? Give an example.

SECTION-B

2. What is the difference between an iron-carbon diagram and a T-T-T diagram? Discuss their applications.
3. Why hardening is always followed by tempering treatment? Explain the various stages of tempering.
4. Discuss nitriding as a method of surface-hardening of steel and compare it with induction hardening.
5. Explain with sketches the difference between edge dislocation and screw dislocation.
6. What is atomic packing factor of a crystal structure? Show that the atomic packing factor for F.C.C. structure is 0.74.

SECTION-C

7. What are purposes of heat treatment? Classify heat treatment. Explain any one heat treatment process in detail.
8. Discuss the classification of alloying elements in steels. Explain the effects of adding Mo, Ni and Mn on the properties of steels.
9. How are carbon steels heat-treated to develop their properties? What are the limitations of such steels and how may they be overcome? Explain your statement with reference to T-T-T diagram.

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.