

Time: 3 Hour

Max. Marks: 80

N. B.

- 1) Question No.1 is compulsory.
- 2) Attempt any three questions from remaining five questions.
- 3) All questions carry equal marks.

- Q1. Write notes on any FOUR [20]
- (a) Burgers vector.
  - (b) Allotropic form of iron.
  - (c) Sub-zero treatment.
  - (d) Fracture toughness.
  - (e) Composite Materials.
- Q2. (a) What is recrystallization annealing? Discuss the various stages of recrystallization annealing in detail. [10]
- (b) Draw neat Fe-Fe<sub>3</sub>C carbide diagram indicating all important temperature, phases and composition. Also write the invariant reactions. [10]
- Q3. (a) Define strain hardening. Explain the phenomenon on the basis of dislocation theory. [10]
- (b) Define Critical Cooling Rate. Describe various cooling curves on TTT diagram for eutectoid steel. [10]
- Q4. (a) How is surface hardening different from case hardening? Discuss any one of the case hardening methods in detail. [10]
- (b) Define fatigue failure. Discuss fatigue testing. Explain interpretation of S-N curve for ferrous and non-ferrous metals. [10]
- Q5. (a) What are Nano Materials? Explain methods used for Nano materials synthesis. [8]
- (b) What are polymers and its types? Explain the advantages of polymer over metallic materials [7]
- (c) Explain Tempering and its different types. [5]
- Q6. (a) Explain Creep resistant materials. [6]
- (b) What is Nondestructive testing and explain any one type of it in detail? [8]
- (c) What are smart materials? Explain any one in detail. [6]