

(3 Hours)

[Total Marks: 80]

N.B. (1) Question no.1 is compulsory

(2) Answer any 3 questions out of the remaining questions.

(3) Assume suitable data if necessary.

- Q.1. Write Short notes on the following: -- 20
- (a) Stainless Steels.
 - (b) Crystal Defects.
 - (c) Carburising.
 - (d) Classification of Composites.
- Q.2. (a) Explain the importance of phase diagram in the development of new alloys. 10
Also, explain the lever rule with an example in connection with phase diagrams.
- (b) Differentiate between edge and screw dislocations. 10
- Q.3. (a) What do you mean by TTT diagram? Plot the diagram for 0.8% carbon steel 10
and superimpose various cooling curves on it to describe the end products of such transformations. Also explain the concept of critical cooling rate.
- (b) What is fatigue failure? Elaborate on fatigue testing, data representation and 10
analysis.
- Q.4. (a) Explain the difference between hardening and hardenability. Also explain 10
Jominy End quench test for measurement of hardenability.
- (b) Define fracture and explain the phenomenon of brittle and ductile fracture. 10
Also, explain ductile-to-brittle transition with suitable examples.
- Q.5. (a) Explain the heat treatment processes of Hardening and Tempering. 10
- (b) Explain the heat treatment processes of Annealing and Normalizing. 10
- Q.6. Write short notes on :- 20
- (a) Strain Hardening.
 - (b) Tool Steels.
 - (c) Alloys of Copper.
 - (d) Nano Structured Materials.
