

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) Explain the advantages of polymer over metallic materials.
 - (b) Allotropic form of iron
 - (c) Critical Resolved Shear Stress (C.R.S.S.)
 - (d) Ductile to Brittle Transition Temperature (DBTT)
 - (e) Normalizing
- Q2.** (a) Classify various types crystal defects? Discuss line defects and their types. [10]
- (b) State and explain Griffith's theory for brittle material with derivation [10]
- Q3.** (a) Draw the iron -iron carbide equilibrium diagram and write the important transformation seen in the diagram. [10]
- (b) What is Nitriding and explain types of nitriding processes. Explain the heat treatment before nitriding. [10]
- Q4.** (a) What is recrystallization annealing? Discuss the various stages of recrystallization annealing with neat sketch [10]
- (b) Define fatigue failure. Discuss fatigue testing. Explain interpretation of S-N curve for ferrous and non -ferrous metals. [10]
- Q5.** (a) Draw a binary alloy phase diagram with example. [10]
- (b) Write note on Shape Memory alloys [6]
- (c) Explain ceramics and its applications. [4]
- Q6.** (a) Write note on composites and its applications. [8]
- (b) Explain Magnetic Particle Testing with neat sketch [8]
- (c) Define nano materials. Discuss their applications. [4]