

**B Tech.**  
**(SEM III) THEORY EXAMINATION 2022-23**  
**MATERIALS ENGINEERING**

**Time: 3 Hours****Total Marks: 100****Note:** Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A**

**1. Attempt all questions in brief.****2 x 10 = 20**

- (a) Define Unit Cell.
- (b) Define Malleability.
- (c) What do you mean by Fatigue? Explain.
- (d) Explain Non-Destructive Testing.
- (e) Differentiate between alloy and ore.
- (f) Explain Degree of Freedom used in Phase Diagram.
- (g) Describe the Heat Treatment.
- (h) Explain the need or purpose of Heat Treatment.
- (i) Mention the percent of carbon (range) used in Tool Steel.
- (j) Differentiate between Martensite and Cementite forms.

**SECTION B**

**2. Attempt any three of the following:****10x3=30**

- (a) Explain the Crystal Structure (System) in detail.
- (b) Elaborate the ductile and brittle failure mechanism.
- (c) Discuss the Iron-Carbon Phase diagram in detail with neat sketch.
- (d) Describe the process of Annealing and Normalizing and its effect on different properties.
- (e) Mention the properties of Stainless Steel and Tool Steel. Also discuss their utilization for engineering materials.

## SECTION C

3. Attempt any *one* part of the following: 10x1=10

- (a) Discuss the Line Imperfections with the help of neat sketches.
- (b) Explain the Load-Deformation diagram for a brittle material.

4. Attempt any *one* part of the following: 10x1=10

- (a) Name the various types of Static Failure Theories. Explain any one in detail.
- (b) Discuss the SN Curve in detail. Explain typical S-N curve for ferrous and non-ferrous alloys.

5. Attempt any *one* part of the following: 10x1=10

- (a) What do you mean by Solid Solution? Explain the various types of Solid Solutions.
- (b) Describe various types of micro-constituents of Eutectic Steel (at STP).

6. Attempt any *one* part of the following: 10x1=10

- (a) What is Tempering? Explain its need and types also.
- (b) Explain Case Hardening? Mention its types.

7. Attempt any *one* part of the following: 10x1=10

- (a) Discuss the constituents and properties of Nickel based Super alloys.
- (b) Discuss the constituents and properties of Titanium Alloys.