10/06/2025 SE MECHANICAL SEM-III C-SCHEME MT QP CODE: 10087080

Time: 3 Hour **Max. Marks: 80**

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

Q1. Write notes on any FOUR [20]
- (a) Hume-Rothary conditions
- (b) Cooling curve of pure iron
- (c) Normalizing
- (d) Critical Resolved Shear Stress (C.R.S.S.)
- (e) Nano composites

Q2. (a) What is plastic deformation? Explain slip mechanism with a neat sketch. [10]
(b) Define fatigue failure. Discuss fatigue testing. Explain interpretation of S-N curve for ferrous and non –ferrous metals. [10]

Q3. (a) Classify various types of crystal defects? Discuss any one defect in details. [10]
(b) Draw the iron -iron carbide equilibrium diagram and write the important transformation seen in the diagram. [10]

Q4. (a) What is flame hardening process? Discuss advantages, disadvantages and applications of it. [8]
(b) Discuss the properties of polymer materials. [4]
(c) Derive an expression for Griffith's theory of brittle materials failure. [8]

Q5. (a) Draw and explain pack carburizing process. Discuss its applications. [8]
(b) Explain the processing of ceramics materials through injection moulding operation. [7]
(c) Define Shape Memory Alloys (SPA). Discuss their properties and applications. [5]

Q6. (a) Draw and explain Isomorphous and Eutectoid phase diagram. [6]
(b) Discuss working principle of ultrasonic testing machine with neat sketch. [8]
(c) Define nanotechnology? Discuss its applications in various fields. [6]

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