

SE / MECH / SEM III / MT / CBCS

13 MAY 2019

Time: 3 hours

Marks: 80



- N. B. 1) Question No.1 is compulsory.
 2) Attempt any three questions from remaining five questions.
 3) Figures at right indicate marks.

- Q. 1 Write notes on any four:- (20)
- Explain thermal fatigue of metal.
 - What are smart materials? Where are they used?
 - Write the difference between ductile fracture and brittle fracture.
 - Explain Hume-Rothery's rules of solid solubility.
 - Explain the transformation of austenite to Bainite.
- Q. 2
- What is dislocation? What are the sources of dislocation? Compare edge and screw dislocation. (10)
 - What is recrystallization annealing? Discuss the various stages of recrystallization annealing. (05)
 - Write the difference hot-working and cold working. (05)
- Q. 3
- What are the characteristic of brittle fracture? Discuss Griffith's theory and derive its equation. (10)
 - Discuss ductile-brittle transition in steel. (05)
 - Define creep and explain stages of creep. (05)
- Q. 4
- Draw Fe-Fe₃C diagram indicating all important temperatures, phases and compositions. Explain slow cooling of an alloy containing 0.9% carbon when cooled from 1600^o C temperature to room temperature. (10)
 - Write short note on allotropic forms iron. (05)
 - Draw and explain Isomorphous phase diagram. (05)
- Q. 5 Write short notes on following : (20)
- Nano-materials
 - Discuss the process of nitriding.
 - What are composites? Write its characteristics
 - Explain the effect of retained austenite on steels.
 - What are stainless steels? Give brief of classification of stainless steels
- Q. 6
- Draw TTT curve for a eutectoid steel and explain the effects of various cooling curves on transformation products (10)
 - Write the classification of tool steels (05)
 - Explain induction hardening process (05)