

- 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:- (5x4=20)
- Smart materials
 - Creep Test
 - Effect of Alloying elements on properties of steel.
 - Critical resolved shear stress
 - Classification of Stainless steels
- Q. 2 a) What do you understand by Composite materials? Explain their properties and applications. (10)
- b) What is Fatigue? Explain fatigue testing in detail. (10)
- Q. 3 a) Draw Fe-Fe₃C Diagram and Explain cooling of 0.9 % C alloy in the Fe-Fe₃C Diagram. (10)
- b) How are dislocations regenerated at Frank Reed Source? Explain with neat diagram. (10)
- Q. 4 a) Draw and explain construction of Time Temperature Transformation (TTT) diagram. Also indicate various cooling patterns on the diagram. (10)
- b) Derive an expression for Griffith theory of brittle fracture. Explain Orowan's Modification. (10)
- Q. 5 a) Explain slip and twin mechanism of plastic deformation. (10)
- b) Classify Crystal Imperfections. Distinguish between Edge and Screw dislocation. (10)
- Q. 6 Write short notes on any four (5x4=20)
- Hardenability test
 - Martempering
 - Synthesis of Nanomaterials
 - Recrystallisation annealing
 - Rule of mixtures for composites
