

N.B.:--

- (1) Question No.1 is compulsory
- (2) Attempt any three questions out of remaining five questions
- (3) Figures to right indicate full marks
- (4) Assume suitable data if necessary

Q.1. Write note on any four:-

(20)

- (a) Rotating beam fatigue testing machine
- (b) Effect of alloying elements on phase transformation
- (c) Strain hardening
- (d) Subzero treatment
- (e) Nano Materials

Q.2. (a) Derive an expression for critical resolved shear stress. Explain "slip Mechanism" and "twinning mechanism" of plastic deformation

(8)

(b) Define creep. Explain stages of creep

(6)

(c) Write short note on Transformed Ledeburite.

(6)

Q.3. (a) Derive an expression for Griffith theory of brittle fracture. Also state Rowan's modification

(8)

(b) Draw Fe-Fe₃C Diagram and explain cooling of 1.0 % C alloy in Fe-Fe₃C diagram

(12)

Q.4. (a) Draw and explain construction of Time Temperature Transformation (TTT) diagrams of 0.8% carbon alloy

(10)

(b) What is case hardening? Discuss the process of Nitriding and Cyaniding in detail

(10)

Q.5. (a) What is recrystallization annealing? Discuss the various stages of recrystallization annealing. What are factors affecting it?

(8)

(b) What are stainless steels? Classify stainless steels. Discuss and mention their applications

(6)

(c) What are Nano Composites? Give applications of Nano Composites

(6)

Q.6. Write short notes on following (any four)

(20)

- (a) Chromising
- (b) Berger vector
- (c) Retained austenite
- (d) Solid solution
- (e) Frank reed source