Q.P. Code : 555603

Time: 3 hours   Max. marks: 80

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   (8)
       Mechanism" and "twinning mechanism" of plastic deformation
    (b) Define creep. Explain stages of creep   (6)
    (c) Write short note on Transformed Lediburite   (6)

Q.3. (a) Derive an expression for Griffith theory of brittle fracture. Also state   (8)
       Orowan's modification
    (b) Draw Fe-Fe3C Diagram and explain cooling of 1.0 % C alloy in   (12)
       Fe-Fe3C diagram

Q.4. (a) Draw and explain construction of Time Temperature Transformation   (10)
       (TTT) diagrams of 0.8% carbon alloy
    (b) What is case hardening? Discuss the process of Nitriding and Cyaniding   (10)
       in detail

Q.5. (a) What is recrystallization annealing? Discuss the various stages of   (8)
       recrystallization annealing. What are factors affecting it?
    (b) What are stainless steels? Classify stainless steels. Discuss and mention   (6)
       their applications
    (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