Q.P. Code:13963

(3 Hours) **[Total Marks: 80]**

N.B: **(1) Question No. 1 is compulsory.**
(2) Attempt any three questions from remaining five questions.
(3) Figures to the right indicate full marks
(4) Illustrate the answer with neat sketches wherever required.
(5) Answers to questions should be grouped & written together.

1. Write short note on **any four** of the following: **(20)**
   a) Ceramic Materials.
   b) Fatigue Failure
   c) Hume Rothery's rules of solid solubility
   d) Critical cooling curve
   e) Classification of alloying elements.

2. (a) What are surface defects? Illustrate and discuss the various types of surface defects. **(8)**
   (b) What are the objectives of heat treatment of metals? Give classification of heat treatment processes. **(6)**
   (c) Explain the mechanism of creep failure. **(6)**

3. (a) Draw a neat and labelled TTT diagram for eutectoid steel. Superimpose the CCT, CCR and various other cooling curves showing a different transformed product. **(8)**
   (b) What is Surface hardening? Explain the flame hardening heat treatment process. **(6)**
   (c) Differentiate between Edge dislocation and Screw dislocation. **(6)**

4. (a) Define strain hardening. Explain the effect of strain hardening on behavior of materials. **(8)**
   (b) Discuss the cyclic Annealing heat treatment of Steel. **(6)**
   (c) Draw a typical eutectoid type diagram and explain its important features. **(6)**

5. (a) Discuss Griffith's theory and derive the Griffith's equation. **(8)**
   (b) Discuss the Ausforming heat treatment of Steel. **(6)**
   (c) Write a note on "Jominy End Quench Test". **(6)**

6. (a) Explain in detail the Heat Treatment for 18-4-1 Tool Steel. **(8)**
   (b) Define fatigue failure. Draw and explain the S-N curve. **(6)**
   (c) Give classification of Nano-materials with advantages, disadvantages and applications. **(6)**
