Q. P. Code : 27940

[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.
4) Draw neat well labeled sketches.

Q. 1 **Write note on any four:-** **(5x4=20)**
- **a)** Martempering
- **b)** Stress cycle (fatigue).
- **c)** Effect of Alloy on Hardenability.
- **d)** Hume-Rothery Rule.
- **e)** Flame Hardening

Q. 2
- **A)** What do you mean by Composite material? Explain their properties and practical applications. **(7)**
- **B)** What is Fatigue? Explain fatigue testing in detail. **(7)**
- **C** Explain Nitriding treatment. **(6)**

Q. 3
- **A)** Draw Fe-Fe_3C Diagram and Explain cooling of 1.0 % C alloy. **(7)**
- **B)** How dislocations are generated at Frank Reed Source? Explain dislocation Pile-Up. **(7)**
- **C)** Explain general effect of alloying element on Fe-c dia and properties of material. **(6)**

Q. 4
- **A)** Draw and explain construction of Time Temperature Transformation (TTT) diagram. **(7)**
- **B)** Derive an expression for Griffith theory of brittle fracture. Explain Orowan's Modification. **(7)**
- **C)** Explain Recrystallization Annealing. **(6)**

Q. 5
- **A)** What are the type's deformation? Explain SLIP and TWIN mechanism of plastic deformation. **(7)**
- **B)** Classify crystal Imperfections. Explain Edge and Screw dislocation. **(7)**
- **C)** Explain creep test and Andrade's analysis of creep curve. **(6)**

Q. 6 **Write short note on any four** **(5x4=20)**
- **a)** Martensite and its crystal structure.
- **b)** Engineering Materials.
- **c)** Strain Hardening.
- **d)** Jominy End quench test.
- **e)** Annealing.
