GANPAT UNIVERSITY

M.TECH SEM. I – (AMS/CAD-CAM) REGULAR EXAMINATION NOV/DEC-2016

3ME101 - MATERIAL SCIENCE

Time: 3 Hours   Total Marks: 60

Instructions:

1). All questions are **compulsory**.

2). Figures to the **right** indicate full marks.

3). Answers to the two sections must be written in **separate** answer books.

SECTION – I

Que:-1

(A) Explain significance of $Fe-Fe_3C$ equilibrium diagram and T.T.T diagram on heat treatment of steel. [05]

(B) Discuss austempering and martempering process. Also discuss importance of tempering with respect to hardening process. [05]

OR

Que:-1

(A) Discuss distinction between fracture toughness and plain strain fracture toughness. [05]

(B) Describe the mechanism of crack propagation for both ductile and brittle modes of fracture. Also explain why the strength of brittle materials are much lower than predicted by theoretical calculations. [05]

Que:-2

(A) What is stress corrosion cracking? Enlist and explain method of preventing stress corrosion. [05]

(B) What is intergrannular corrosion? Differentiate between weld decay and knife line attack. Also discuss method of prevention. [05]

OR

Que:-2

(A) Define pitting corrosion. Discuss factors affecting rate of pitting corrosion and method of preventing pitting corrosion. [05]

(B) Define corrosion prevention methods in detail: [05]
   (i) Design improvement
   (ii) Coating
   (iii) Cathodic protection

Que:-3

(A) Differentiate between fatigue failure and creep. Discuss factors affecting both failures. [05]

(B) Define strengthening mechanism. Discuss strain hardening. Also discuss recovery recrystallization and grain growth. [05]

SECTION – II

Que:-4

(A) What is point defect? Explain with the help of sketch Schottky defect and Frenkel defect. **[03]**

(B) Explain the effect of imperfections on metal properties. **[03]**

(C) Enlist different ceramic forming techniques and explain glass blowing process in details. **[04]**

OR

Que:-4

(A) Define ceramic and explain classification of ceramic materials. **[03]**

(B) Explain with neat sketch silicate structure in ceramic materials. **[03]**

(C) Define and explain the following terms: **[04]**
1) Burger vector
2) Slip plane
3) High angle grain boundary
4) Dislocation

Que:-5

(A) Classify polymerization processes and give the difference between Addition and Condensation polymerization. **[05]**

(B) Explain the role of reinforcement and matrix materials in composites. **[05]**

OR

Que:-5

(A) Differentiate between thermoplastics and thermosetting material with examples. **[05]**

(B) Define composite and explain classification of composite materials. **[05]**

Que:-6

(A) Write a short note on Metal Matrix Composite. **[03]**

(B) Write a short note on carbon nano tube. **[03]**

(C) Enlist various non-destructive testing methods and explain X-ray radiography method with neat sketch. **[04]**

END OF PAPER