M.Tech. - Mech

Date: 21/12/2017

Exam No: _____

GANPAT UNIVERSITY

M.TECH SEM. I – AMS/CAD-CAM REGULAR EXAMINATION NOV-DEC 2017

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) Describe and explain solid-solution strengthening for substitutional impurity atoms in terms of lattice strain interactions with dislocations. **[05]**

(B) Describe recrystallization in terms of both the alteration of microstructure and mechanical characteristics of the material. Also describe the phenomena of grain growth. **[05]**

OR

Que:-1

(A) Define fatigue and specify the conditions under which it occurs. Also define creep and specify the conditions under which it occurs. **[05]**

(B) With reference fatigue plot for some material, determine: **[05]**

(i) The fatigue life time (At a specified stress level)

(ii) The fatigue strength (At a specified number of cycles)

Que:-2

(A) Differentiate between ductile and brittle fracture. **[05]**

(B) What is creep? Explain creep curve. Also discuss alloys for high temperature use. **[05]**

OR

Que:-2

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

(B) Enlist and explain corrosion prevention techniques. **[05]**

Que:-3 **Write short notes on any Two.** **[10]**

(A) Strengthening by grain size reduction.

(B) Importance of T.T.T diagram with respect to phase transformation.

(C) Fracture toughness.

SECTION – II

Que:-4

(A) Explain the effect of imperfections on metal properties. [04]

(B) Define crystal imperfection and explain classification of crystal imperfection. [03]

(C) Enlist different ceramic forming techniques. Explain Slip casting process in details. [03]

OR

Que:-4

(A) Define and explain the following terms: [04]

1. Burger vector
2. Slip plane
3. High angle grain boundary
4. Dislocation

(B) Explain Drying and Firing process in ceramic materials. [03]

(C) Enlist various characteristics and applications of ceramic materials. [03]

Que:-5

(A) Differentiate between thermoplastic and thermosetting material along with examples. [05]

(B) Enlist various characteristics and applications of polymer materials. [05]

OR

Que:-5

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

(B) Compare Properties of Metal Matrix composites & Ceramic Matrix composites. What are advantages of ceramic matrix composites over other two classes of composites? [05]

Que:-6

(A) Write a short note on shape memory alloys. [05]

(B) Explain ultrasonic testing method along with advantages, disadvantages and applications. [05]

END OF PAPER