

GANPAT UNIVERSITY
M.Tech. Sem. I (CAD/CAM) Mechanical Engineering
Regular CBCS Examination December-2013
3ME111 - MATERIAL SCIENCE & TECHNOLOGY

Time: 3 Hours

Total Marks: 70

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) What is crevice corrosion? Discuss methods and procedures for preventing crevice corrosion. [03]
- (B) Explain intergranular corrosion. Explain intergranular corrosion of 18-8 austenitic stainless steel. [04]
- (C) Write short note on: Weld decay & knife line attack. [04]

OR

Que:-1

- (A) What is Metal Matrix Composite? Enlist properties and applications of MMCs. [04]
- (B) Explain interfaces in composite. [03]
- (C) Explain the role of reinforcement and matrix materials in composites. [04]

Que:-2

- (A) Enlist different ceramic forming techniques. Explain Slip casting process in details. [04]
- (B) Explain with a neat sketch the atomic bonding arrangement in SiO_4^{4-} tetrahedron. [04]
- (C) Enlist various characteristics and applications of ceramic materials. [04]

OR

Que:-2

- (A) Classify polymerization process and give the difference between addition and condensation polymerization. [04]
- (B) Differentiate between thermoplastic and thermosetting material along with examples. [04]
- (C) Enlist various characteristics and application of polymer materials. [04]

Que:-3

Write short notes on Any Three of the following: [12]

- (A) Functionally graded materials
- (B) Shape memory alloy
- (C) Carbon Nano tube
- (D) Bio-materials

SECTION – II

Que:-4

- (A) Differentiate between metallic & covalent bond. Why it is conveniently possible to plastically deform the material bonded by metallic bond? Explain why it is not possible to plastically deform the material bonded by ionic or covalent bond? [12]
- (B) Differentiate between edge & screw dislocation.
- (C) Explain low angle & high angle grain boundary in details.

OR

Que:-4

- (A) What is the principle of ionic bond? Explain the mechanism of ionic bond in detail along with general properties of material bonded with ionic bond. [12]
- (B) Explain the role of dislocation in plastic deformation of material. Explain the process of strain hardening in light of dislocation theory
- (C) Explain the following terms with respect to dislocations:
- Burger vector
 - Stress fields & energies of dislocations.

Que:-5

- (A) Explain the mechanism of austenite to perlite as well as austenite to bainite transformation. [04]
- (B) Explain annealing process in detail. Also discuss recovery, recrystallization & grain growth in detail. [04]
- (C) Differentiate between Fe-C equilibrium diagram & T.T.T. diagram with respect to phase transformation. [03]

OR

Que:-5

- (A) Name different strengthening mechanism in solids. Also explain the method of strengthening the materials by grain size reduction. [04]
- (B) Explain solid solution strengthening in detail. [04]
- (C) Differentiate between ductile & brittle fracture. [03]

Que:-6

- (A) Explain Ashby's model of deformation of poly crystal. [12]
- (B) Draw S.N. Curve. What is the importance of endurance limit in choice of material for rotational application?
- (C) Explain the method of creep test and explain the creep curve in detail.

END OF PAPER