GANPAT UNIVERSITY

M.Tech. Sem I (CAD/CAM) Mechanical Engineering

January -2012 Examination

3ME111 Material Science & Technology

Time: 3 Hour **Total Marks: 70**

Instructions: (i) Attempt all questions.
(ii) Figures to the right indicate full marks.
(iii) Two sections must be written in separate answer sheets.

Section I

Q-1

(a) Enlist objectives of strengthening mechanism. Discuss strengthening by grain size reduction. **11**

(b) Explain solid solution strengthening in detail. Also discuss lattice strain due to solute atom.

(c) Explain the process of annealing of cold work metal.

OR

Q-1

(a) Explain the role of dislocation in plastic deformation of material. Explain the process of strain hardening in light of dislocation theory. **11**

(b) Differentiate between edge and screw dislocation.

(c) Differentiate between primary and secondary bonding.

Q-2

(a) What is creep? Explain the method of creep test and creep curve in detail. **12**

(b) What is fatigue? Explain the mechanism of fracture taking place by fatigue failure.

(c) How can the fatigue resistance of materials be improved?

OR

Q-2

(a) Explain following with respect to brittle fracture: **12**
i) Stress concentration,
ii) Fracture toughness

(b) Explain the S-N curve and endurance limit for article made of steel.

(c) Explain the stages in development of ductile fracture. Also differentiate Between ductile and brittle fracture.

Q-3

(a) What is corrosion? Differentiate between dry and wet corrosion. Also discuss factors affecting rate of corrosion. **12**

(b) What is pitting corrosion? Differentiate between pitting and crevice corrosion. Explain preventive measure from pitting corrosion.

(c) What is intergrannular corrosion? Differentiate between weld decay and knife line attack. Explain preventive measure for intergranular corrosion.

Section II

Q-4

(a) Explain with neat sketch the atomic bonding arrangement in SiO_4^{4-} tetrahedron, also discuss with suitable examples the island, ring, chain, sheet and network structure of silica. 12

(b) Discuss the effect of crystalline structure and molecular weight on properties of polymer.

(c) Why are composites used in place of metals, ceramics and polymers?

OR

Q-4

(a) Classify polymer based on applications, physical properties, physicochemical reactions and mode of preparation. 12

(b) Discuss the effect of following on properties of polymer:
(i) Fillers, (ii) Plasticizers, (iii) Colorants and (iv) Stabilizers.

(c) Discuss the method of polymerization.

Q-5

(a) Explain the characteristics of polymers. 11

(b) Discuss the reaction mechanism of chain addition polymerization.

(c) Explain Branched and cross linked polymers.

OR

Q-5

(a) Explain following polymer structure with suitable examples: 11
(i) Linear polymers,
(ii) Network polymer

(b) Define the term 'Traditional ceramics' and 'modern ceramics'. How traditional ceramics differ from modern ceramics.

(c) Write short note on: Mechanical properties of ceramic materials.

Q-6 Write short note on any three : 12

(i) Burger Vector

(ii) Differentiate between thermoplastic and thermosetting

(iii) Defects arising in solid materials.

(iv) Polymer Matrix Composite

End of Paper