GANPAT UNIVERSITY

M.Tech. [ME-(AMT)] SEM-I CBCS (NEW) Regular Theory
Nov.-Dec.-2015
3ME101 MATERIAL SCIENCE

Time: 3 Hours **Total Marks: 60**

Instructions: i) Answer two sections must be separately.
ii) Figures to the right indicate full marks.
iii) Assume suitable data if necessary.

Section - I

Q.1

[a] Define Polymerization. Explain the mechanisms of polymerization. Classify polymerization processes. **03**

[b] Differentiate between addition and condensation polymerization. **03**

[c] Discuss effect of following on properties of polymer: **04**
i) Fillers, ii) Plasticizers, iii) Colorants, iv) Stabilizers

OR

Q.1

[a] What is Metal Matrix Composites? Enlist and explain matrix and reinforcement materials for MMCs. **03**

[b] Explain fiberglass-reinforcement composite. **04**

[c] Write short note on carbon fiber. **03**

Q.2

[a] Define ceramic and explain classification of ceramic materials. Also enlist various characteristics and applications of ceramic materials. **03**

[b] Enlist different ceramic forming techniques. Explain Slip casting process in details. **04**

[c] Explain with neat sketch silicate structure in ceramic materials. **03**

OR

Q.2

[a] Classify different types of rubbers used in industry and discuss its structure, properties and application of each one. **04**

[b] Explain interfaces in composite. **03**

[c] Discuss the Pultrusion process in detail. **03**

Q.3 **Write short notes on the following:(Any Two)** **10**

[a] Ceramic matrix composite
[b] Pitting corrosion
[c] Prevention of Intergrannular corrosion
[d] Carbon nanotube

Section II

Q.4

[a] What are point defects? Explain various point defects with sketch. 03

[b] Explain secondary bonding and enlist examples of secondary bonded materials in details. 04

[c] What is dislocation? Differentiate between edge and screw dislocation. 03

Q.5

[a] Differentiate between low angle grain boundary and high angle grain boundary. Also explain twin boundary. 03

[b] Enlist two major differences between deformation by twinning and deformation by slip relative to mechanism, conditions of occurrence and final result. 04

[c] Differentiate between ionic, metallic and covalent bonding. 03

OR

Q.5

[a] Define strengthening mechanism. Explain solid solution strengthening. 04

[b] Explain strain hardening. Briefly explain why lead and tin do not strain harden when deformed at room temperature. 03

[c] Explain critical resolved shear stress and dislocation climb. 03

Q.6

[a] Explain strengthening mechanism of solids by marten site strengthening. 04

[b] Explain Griffith theory of brittle fracture. 03

[c] Write short notes on: Fracture toughness. 03

OR

Q.6

[a] What is creep? Differentiate between Fatigue and Creep. 04

[b] Explain stages in the development of ductile fracture. Also differentiate between ductile and brittle fracture. 04

[c] How can the fatigue resistance of materials be improved? 02

End of Paper