

Ganpat University
M.Tech. Sem. I (CAD/CAM) Mechanical Engineering
CBCS Regular Examination January-2015
3ME111-MATERIAL SCIENCE & TECHNOLOGY

Time: 3 Hours

Total Marks: 60

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

Section I

Q.1

- [a] What is coordination number? Draw and explain following ceramic crystal structure: **03**
i) $AmXp$ ii) $AmBnXp$
- [b] What is silicate ceramics? Explain various silicate ion structures formed from SiO_4^{4-} tetrahedral. **04**
- [c] Enlist classification of ceramic materials on the basis of application. Also explain refractory ceramics briefly. **03**

OR

Q.1

- [a] Briefly sketch a classification of ceramic forming techniques. **03**
- [b] What is devitrification? Name three factors that influence the degree to which vitrification occurs in clay based ceramics wares. **04**
- [c] Explain powder pressing process of ceramic forming. **03**

Q.2

- [a] Explain following molecular structure of polymer: **03**
i) Branched Polymer, ii) Network polymer
- [b] Differentiate between thermoplastics and thermosetting polymer. **04**
- [c] What is glass transition temperature? Explain factors affecting glass transition temperature. **03**

OR

Q.2

- [a] Differentiate between addition and condensation polymerization. **04**
- [b] What are polymer additives? Explain role of various polymer additives. **03**
- [c] Enlist factors that determine what fabrication technique is used to form polymeric materials. **03**

[1/2]

- Q.3 Write short notes on the following:(Any two) 10**
- i) Glass Fiber
 - ii) Bio materials
 - iii) Metal Matrix Composite
 - iv) Ceramic Matrix Composite

Section - II

- Q.4**
- [a] Enlist characteristics of materials bonded by ionic bonding. Also differentiate between covalent and metallic bonding. 03
 - [b] What is imperfection? Explain point defects in detail. 04
 - [c] Differentiate between edge and screw dislocation. 03

OR

- Q.4**
- [a] Differentiate between crevice and pitting corrosion. 03
 - [b] Explain weld decay in detail. 04
 - [c] What is intergranular corrosion? Enlist and explain preventing of intergranular corrosion. 03

- Q.5**
- [a] What is phase diagram? Explain importance of phase diagram. Explain significance of Fe-C equilibrium diagram to heat treatment of steel. 04
 - [b] Draw a neat sketch of T.T.T diagram. Also explain austempering process in detail. 03
 - [c] Define strengthening mechanism. Enlist objectives of strengthening mechanism. 03

OR

- Q.5**
- [a] Explain strengthening mechanism by grain size reduction. 04
 - [b] Explain stages of recovery, recrystallisation and grain growth of annealed steel. 03
 - [c] Differentiate between resolved shear stress and critical resolved shear stress. 03

- Q.6 Write short notes on the following:(Any Three) 10**
- [a] Stages of ductile fracture
 - [b] Fracture toughness
 - [c] S-N curve
 - [d] Factors affecting fatigue life

[2/2]

End of Paper