



Code: 9D15105

M.Tech I Semester Regular & Supplementary Examinations January/February 2017

MATERIALS TECHNOLOGY

(Machine Design)

Time: 3 hours

Max. Marks: 60

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Briefly describe solid solution strengthening mechanism.
(b) Explain the role of dislocations and yield stress in engineering materials.
- 2 (a) What is the effect of temperature, strain and strain rate on plastic behavior? Explain.
(b) Briefly explain precipitation, fiber and dispersion strengthening.
- 3 (a) Discuss any four types of mechanical properties with neat sketches.
(b) Briefly discuss motivation of selection, cost basis and service requirements of properties of materials.
- 4 (a) Explain maraging steels and dual phase steels.
(b) Enumerate HSLA steels and TRIP steels.
- 5 (a) Explain metallic glass, quasicrystals and nanocrystalline materials.
(b) What are the special characteristics of smart materials and explain shape memory alloys?
- 6 (a) Briefly describe production techniques for foams and fibers.
(b) Make comparisons of thermoplastic and thermosetting polymers:
(i) On the basis of mechanical characteristics upon heating.
(ii) According to possible molecular structure.
- 7 (a) Explain processing advantages of Al_2O_3 , WC and TiC.
(b) Enumerate properties and applications of Si_3N_4 , CBN and diamond.
- 8 (a) Is it possible to produce a continuous and oriented fiber-epoxy matrix composite having longitudinal and transverse moduli of elasticity of 35 GPa and 5.7 GPa respectively? Why or why not? Assume that the elastic modulus of epoxy is 3.4 GPa.
(b) Briefly describe laminar composites, what is the prime reason for fabricating these materials.
