M.Tech 1st Semester (Civil Engg.) Examination,
December–2018

SPECIALIZATION IN STRUCTUAL DESIGN

Paper–MTSD-110

Material Science

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt any five questions. All questions carry equal marks.*

1. (i) Define metallic bond.

(ii) What are the numbers of atoms in FC C unit cell?

(iii) Make a two dimensional sketch of edge dislocation.

(iv) State Gibb's phase rule.

(v) Give the names of different steels.

(vi) Define normalising heat treatment.

(vii) Name two crystal structures of ceramic materials.

(viii) What is cermet?

(ix) What is the difference between thermoplastic polymer and thermosetting polymer?

(x) Define liquid crystal polymer. 10×2=20

2. (a) State Hume Rothery rules for substitutional solid solution formation. 10

(b) Draw the eutectic phase diagram and label all regions in it. 10

3. (a) Draw a neat TTT diagram for eutectoid steel. Show a cooling curve for the formation of 100% marten site on it and explain. 10

(b) What do you mean by residual life assessment? Explain the testing methods used for assessing it. 10

4. (a) Explain in detail with examples, the fiber reinforced composites and particulate composites. 10

(b) Describe briefly structure, properties and control of multiphase solids. 10

5. (a) Describe injection moulding process for particulate reinforced polymers with figure. 10

(b) List the advantages and disadvantages of composite materials. Write application of polymer matrix composite. 10

6. (a) What do you mean by residual life assessment? Explain the testing methods used for assessing it. 10

(b) Write a short note on performance of materials under high temperature.

7. Differentiate between: 4×5=20

(a) Hard and soft magnetic materials.

(b) Particle reinforced and fibre reinforced composite.

(c) True strain and engineering strain.

(d) Crystal structure and crystal system.

8. Explain:

(i) Hydration mechanism of cement. 7

(ii) Microstructure and related properties of cement. 7

(iii) High strength concretes 6