Q 8060

M.E. DEGREE EXAMINATION, MAY/JUNE 2006.

First Semester

Computer Integrated Manufacturing

CM 1601 — APPLIED MATERIALS ENGINEERING

(Regulation 2005)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Mention the role of dislocation in strengthening mechanism.

2. What is visco elasticity?

3. What are the differences between ductile and brittle fracture?

4. What is low cycle fatigue?

5. What is inter granular corrosion?

6. Mention the application where the material selection is made based on toughness.

7. What is the use of TRIP steel and Dual phase steel?

8. What is meant by maraging steel?

9. Name four modern metallic material used for cutting tools.

10. What are the different types of coatings?

PART B — (5 × 16 = 80 marks)

11. (i) Define Schmid's law. Derive an expression for the same.

(ii) Mention the conditions that are favourable for extensive solid solubility of one element in another.

(iii) Explain the mechanism of grain boundary strengthening.

12. (a) (i) Explain with sketch, the low cycle fatigue test.

(ii) Explain the use of Larson-Miller parameter with the help of graph.

(8)

Or

(b) (i) Discuss the various factors affecting the fracture strength of a material. (10)

(ii) Consider a brittle material with $\gamma_s = 1 \frac{J}{m^2}$ and E = 100 Gpa.

(1) What is the breaking strength of this material if it contains crack like defects as long as 1 mm?

(2) If it is possible to increase γ_s to 3000 J / m^2, what would be the breaking strength for a 1 mm long crack? (6)

13. (a) (i) What are the factors to be considered in the selection of materials?

(8)

(ii) Discuss the materials selection process for machine tool. (8)

Or

(b) (i) Discuss briefly the different methods widely used to prevent corrosion. (8)

(ii) Explain the procedure involved to select material for aeronautical component. (8)

14. (a) Briefly explain the following materials :

(i) Inter metallics

(ii) Smart materials

(iii) Ni and Ti aluminides. (5 + 5 + 6)

Or

(b) Explain the need and use of the following material with an example

(i) Quasi crystal

(ii) Dual phase steels. (8 + 8)

(a) (i) Compare the stress strain behaviour of brittle, plastic and highly elastic polymeric materials. (8)

(ii) Explain how the degree of crystallinity is controlled by rate of cooling. (8)

Or

(b) Write short notes on :

(i) Adhesives

(ii) Elstomers

(iii) CBN. (5 + 5 + 6)
