

**G 6106**

M.E. DEGREE EXAMINATION, MAY/JUNE 2007.

Second Semester

CAD/CAM

CM 1601 — APPLIED MATERIALS ENGINEERING

(Common to ME-Computer Integrated Manufacturing)

(Regulation 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the difference between the slip and twinning mechanism of plastic deformation of metals?
2. What is strain hardening?
3. What are the sources of fracture of a material?
4. What is Larson-Miller parameter?
5. Name some of the high strength material.
6. Mention the different types of corrosion.
7. What is shape memory alloy?
8. What are the applications of Ti aluminides?
9. Name any two polymeric materials with its engineering application.
10. Mention some of the non metallic material used for cutting tools.

*Scanned  
Completed  
up to  
cm/11*

PART B — (5 × 16 = 80 marks)

11. (a) (i) What is solid solution strengthening? Describe the two main types. (8)
- (ii) Obtain the relationship between true and engineering stress-strain and discuss the Ludwig relation for the stress-strain curve. (8)

Or

- (b) (i) Discuss the role of dislocation in strengthening mechanism. (6)
- (ii) Explain precipitation strengthening and fiber strengthening with sketches. (5+5)
12. (a) (i) With the help of sketches, explain any three toughening mechanisms. (9)
- (ii) A titanium alloy is used for aircraft applications. The NDE methods used cannot detect flaws whose size is smaller than 1 mm. Specify the maximum tensile stress that the part can bear in plane-stress and plane-strain situations. The yield stress of the alloy is 1450 Mpa. Take  $E = 115 \text{ Gpa}$ ,  $\nu = 0.321$  &  $G_c = 23.6 \text{ KN/m}$ . (7)

Or

- (b) (i) Explain the steps involved in calculation of fatigue cycles using Paris Law. (8)
- (ii) Discuss the factors that affect the fatigue strength of a material. (8)
13. (a) Explain the various surface treatment methods to reduce wear. (16)

Or

- (b) Illustrate with example, the procedure to select a material for
- (i) Aero application
- (ii) Marine application (8 + 8)
14. (a) Briefly explain the following materials:
- (i) Intermetallics
- (ii) Nano crystalline materials
- (iii) Smart materials (5 + 5 + 6)

Or

(b) Explain the need and use of the following materials with examples:

(i) TRIP steel

(ii) HSLA steel.

(8 + 8)

15. (a) (i) How does increasing the temperature of the thermoplastics affect their strength? (8)

(ii) What changes in bonding structure occur as thermoplastics are heated. (8)

Or

(b) (i) Explain various methods of producing coatings. (10)

(ii) What is sintering process? What occurs to the ceramic particles during sintering? (6)

types.

(8)

strain

(8)

(6)

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(9)

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