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Question Paper Code : 71113

M.E. DEGREE EXAMINATION, JUNE/JULY 2013.

First Semester

Computer Integrated Manufacturing

CI 9211/CI 911 — APPLIED MATERIALS ENGINEERING

(Common to M.E. CAD/CAM)

(Regulation 2009)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   What do you understand by Shockley partials?

2.   Distinguish between Jog and Kink.

3.   Mention any one materials which exhibit conchoidal fracture.

4.   Define the term Quasi-cleavage fracture.

5.   Name any two materials is having stiffness higher than steel.

6.   What do you understand by weighted property index?

7.   What do you mean by machining envelope?

8.   Mention any two secondary processing required during welding of stainless steel.

9.   Distinguish between top-down and bottom-up approaches during production of Nano-sized materials.

10. What is the principle by which shape memory alloys display a memory effect?

PART B — (5 × 16 = 80 marks)

11. (a) (i)   In precipitation hardening, does the phase that provides strengthening forms directly from the super saturate matrix. Explain. (8)

         (ii) How is the resistance to dislocation motion provided in metallic materials that exhibit strain hardening? Why it is not a consideration in ceramic materials? (8)

Or

     (b) (i)   Discuss the influence of temperature on flow properties. (8)

         (ii) Write a brief note on the mechanism of superplastic deformation. (8)

12. (a) (i) Obtain the criteria for the propagation of crack in a plate under plain strain condition. (8)

   (ii) Discuss the mechanisms involved in creep deformation. (8)

Or

   (b) (i) A high strength steel plate which has a plain strain fracture toughness of 80 Mpa $\sqrt{m}$ is alternatively loaded in tension to 500 Mpa and in compression to 60 Mpa. The plate is to survive for 10 years with stress being applied at frequency of once every 5 minutes. Design a manufacturing procedure that assures that the component will serve the requisite period. (Take $C = 1.62 \times 10^{-12}$ and $n = 3.2$). (8)

   (ii) Mention the step by step procedure involved in failure analysis. (8)

13. (a) Explain the basis of material selection for the crank shaft of an engine meant for heavy duty trucks.

Or

   (b) (i) What are the service conditions and physical properties of the rudder in a ship? (6)

   (ii) Discuss the procedure for material selection of the same with necessary justifications. (10)

14. (a) (i) What are the factors to be considered for materials design of a weldment? (4)

   (ii) Discuss the methodology of determining the weldability of a material. (6)

   (iii) Elaborate the process induced defects in welding. (6)

Or

   (b) (i) Discuss the metallurgical changes that may take place during forging operation. (6)

   (ii) What are the guidelines to be followed during materials design for forging as you aware that it is a bulk deformation process? (6)

   (iii) Does the forged material have to undergo any secondary operation? Explain. (4)

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15. (a) Write a brief note on :

(i) Structural ceramics. (8)

(ii) Maraging steel. (8)

Or

(b) Explain the technology involved in the fabrication of thin film of a solar cell.

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