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Question Paper Code: 42917

M.E. DEGREE EXAMINATION, NOVEMBER 2015

Elective

CAD / CAM

14PCD524- MATERIAL TESTING AND CHARACTERIZATION

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. If ASTM grain size number is 1, approximate grain diameter (in mm)
(a) 0.1 (b) 0.2 (c) 0.25 (d) 10
2. Usually materials with following crystal structure fail in ductile mode
(a) FCC (b) BCC (c) HCP (d) None
3. Which type of microscope has a useful magnification limit of about 1,000X?
(a) Light microscope
(b) Transmission electron microscope
(c) Scanning electron microscope
(d) Scanning probe microscope
4. Which hardness method can measure hardness of a grain?
(a) Knoop (b) Shore (c) Rockwell (d) Vickers
5. Time dependent recoverable deformation under load is called _____ deformation.
(a) Elastic (b) Anelastic (c) Elastic after-effect (d) Visco-elastic

PART - B (5 x 3 = 15 Marks)

6. State the need of microstructure evaluation.

7. List different lattice systems and sketch the same.
8. When TEM is preferred? Why?
9. Differentiate between engineering stress and true stress with a stress strain diagram.
10. Draw S-N curve.

PART - C (5 x 16 = 80 Marks)

11. (a) Explain in detail about optical microscopy. (16)

Or

- (b) (i) To characterize the metal matrix composite, what preparatory methodology you would suggest? (10)

- (ii) How to determine the particle size using sieve shaker? (6)

12. (a) Write about Bragg's law and explain the principle of X-Ray diffraction technique. Also list the applications of the X-Ray diffraction technique. (16)

Or

- (b) (i) Write a short note on NMR technique. (8)

- (ii) Data given: For FCC $(hkl) = (1\ 1\ 1)$, $a = 5.63\ \text{\AA}$, $\theta = 5.2^\circ$, for $n = 1$, find λ . (8)

13. (a) List the applications of AFM in material characterization. Explain its construction and working. (16)

Or

- (b) With a neat sketch explain the working principle of SEM. (16)

14. (a) Discuss the mechanical testing behavior of ductile and brittle materials. (16)

Or

- (b) Describe methods that can be used to determine the toughness of plastic materials. (16)

15. (a) The classical fatigue limit of a material is equated to the condition for which fatigue cracks cannot propagate beyond micro structural barriers-justify. (16)

Or

- (b) What is creep? Explain Larson Miller parameter with reference to predicting creep behavior of material. (16)