Reg. No. : | | | | | | | | | | |

Question Paper Code: 52916

M.E. DEGREE EXAMINATION, JUNE 2016

Elective

CAD / CAM

15PCD524 - MATERIAL TESTING AND CHARACTERIZATION

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. Separation between the specimen and mounting compound can be result in _____ of the residual etchant and subsequent staining.

   (a) Coating (b) Drying (c) Bleeding (d) None of these

2. A ferrite is a type of _____ compound composed of iron oxide.

   (a) Hexagonal (b) Ceramic (c) Barium (d) Strontium

3. The electron beam is generally scanned in a _____ pattern.

   (a) Raster scan (b) topography scan (c) electron scan (d) none of these

4. The toughness and fracture of the materials are studied through _____test.

   (a) three-point bend specimens (b) two-point joint specimens
   (c) three-point joint specimens (d) two-point bend specimens

5. _____ is high temperature progressive deformation at constant stress.

   (a) creep (b) strain (c) rupture test (d) none of these

PART B - (5 x 3 = 15 Marks)

6. How optical microscope is different from electron microscope?

7. State the Bragg's law equation for crystal studies.

8. List the application of AFM.

9. What is engineering stress and true stress?

10. State the function of LCF with a suitable example.

PART C - (5 x 16 = 80 Marks)

11. (a) What are the types of microscope available to study the texture and surface quality of the materials? With a neat sketch explain the working principle of optical microscope. (16)

Or

(b) Explain the ASTM standard procedure and steps involved in preparing the samples for microstructure studies. List the etchants used for following materials: (i) copper alloys (ii) nickel alloys (iii) stainless steel (iv) aluminium and (v) titanium alloys. (16)

12. (a) Write short notes on (i) X – ray diffraction and (ii) crystal structure (16)

Or

(b) How phase change crystal structure are studied under elevated temperature. Explain with a neat sketch. (16)

13. (a) Write short notes on: (i) AFM and (ii) EPMA. (16)

Or

(b) Compare and explain the working principle of SEM and TEM for characterization studies. (16)

14. (a) Differentiate the behavior of aluminium alloy and fibre composite while subjected to mechanical tensile load test. Draw SN curve for more details. (16)

Or

(b) Explain with neat sketch on: (i) Izod test and (ii) micro hardness and geometry measurements. (16)

15. (a) (i) What are the various stages of creep? List the factors involved in affecting creep. (8)

(ii) Draw and explain deformation mechanism map of an engineering material. (8)

Or

(b) (i) What is ductile – brittle transition in steel? Explain the parameters affecting the same. (8)

(ii) What do you understand by the fatigue crack growth mechanism? (8)