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**Question Paper Code: 92015**

M.E. DEGREE EXAMINATION, DECEMBER 2013.

Elective

CAD / CAM

01PCD524 – MATERIAL TESTING AND CHARACTERIZATION

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. What is the principle of optical microscopy?
2. Write down the step by step procedure for sample preparation.
3. State Bragg's law.
4. What are the elements for X-ray diffraction methods?
5. What are the applications of atomic force microscopy?
6. What are the applications of SEM?
7. Draw the stress – strain curve for steel.
8. What are the differences between micro and macro hardness?
9. Draw the S-N curve for steel and explain shortly.
10. What is fatigue crack growth rate?

PART - B (5 x 14 = 70 Marks)

11. (a) Explain the working principles of optical microscopy? What are the significance for grey cast iron microstructure? (14)

Or

- (b) Explain the standard test methods for determining average grain size with suitable example and also what standard are followed by measurement of grain size. (14)

12. (a) What are the different techniques in X- ray crystallography? Explain briefly. (14)

Or

- (b) Explain the diffraction patterns, and also brief about the crystal structures. (14)

13. (a) Explain the working principle of transmission electron microscopy with neat sketch. (14)

Or

- (b) Explain the construction and working principle of scanning electron microscopy. (14)

14. Briefly explain the following.

- (i) Vickers hardness test. (7)  
(ii) Rockwell hardness test. (7)

Or

- (b) Explain the various types of impact test with suitable examples. (14)

15. a) Explain with suitable procedure for conducting different types of fatigue test. (14)

Or

- (b) Explain neatly with crack growth theory for steel. (14)

PART - C (1 x 10 = 10 Marks)

16. (a) What are the methods available for the measurement of ductility in steel and explain with suitable diagram? (10)

Or

- (b) Explain the polarization techniques used for micro structure analysis and evaluation. (10)