B.E/B. Tech (Full Time) DEGREE END SEMESTER EXAMINATION APRIL/MAY 2011

MATERIALS SCIENCE AND ENGINEERING

FIFTH SEMESTER – R 2008

25

ML 9303 – CHARACTERISATION OF MATERIALS

Time: 3 hr Max. Marks: 100

PART – A (2 X 10 =20)

1. Differentiate between electropolishing and electro-etching.
2. Why oil immersions increase the resolution of optical microscope?
3. Intensity of diffracted beam in XRD is independent on type of unit cell. Justify.
4. What is the structure factor for FCC?
5. Why phase quantification based disappearance phase method is inferior to parametric method?
6. Why uniform compressive residual stresses cause peak shifting to higher angle?
7. How the SAED pattern of amorphous material shall be?
8. State the advantage of STM over AFM.
9. What is the unique advantage of auger electron spectroscopy?
10. Why allotrophic phase changes cannot be analysed by thermal gravimetric method.

PART – B (5 X 16 =80)

11. (a) Compare and contrast WDS and EDS technique of chemical analysis.

12. (a) Derive simplified expression for F^2 for diamond which is cubic and contains 8 atoms per unit cell, located at following positions:

0 0 0 ½ ½ 0 ½ 0 ½ 0 ½ ½

¼ ¼ ¼ ¾ ¾ ¼ ¾ ¼ ¾ ¼ ¾ ¾

(OR)

(b) (i) Brief on the X-ray generation and state what do you mean by characteristic X-ray, white radiation and choice of filters?

13. (a) (a) Brief on the optical microscopy based on following principle:

(i) Interference (8)

(ii) Polarisation (8)

(OR)

(b) (i) Comment on specimen preparation techniques of optical microscopy (8)

(ii) Describe Kohler Illumination system. (8)

13. (a)(i) Show calculation and graphical representation how the residual stress is determined by "two exposure" diffraction method.

(OR)

(b) (i) Compare and contrast between various types of counters used in XRD.

15. (a) (i) Explain the working principle of tapping mode AFM. (8)

(ii) Derive an equation governing selected area electron diffraction(SAED). (4)

(iii) Give various application of SAED. (4)

(OR)

(b) (i) Discuss on the electron beam materials interaction and various modes of operation.