



B.E/B. Tech (Full Time) DEGREE END SEMESTER EXAMINATION APRIL/MAY 2014
MATERIAL SCIENCE AND ENGINEERING
FIFTH SEMESTER – R 2008
ML 9303 – CHARACTERISATION OF MATERIALS

Time: 3 hr

Max. Marks: 100

PART – A (2 X 10 =20)

1. Differentiate between intensity and contrast.
2. List the methods of quantitatively defining shape of precipitates.
3. Though a plane obeys Bragg's law, but may not generate diffraction in XRD. Justify.
4. Give the schematic representation of Seeman-Bohlin focusing camera.
5. List the sources for line broadening of XRD peaks.
6. Which counter offer best resolution and efficiency? Why?
7. Resolution in STM is better than AFM. State true or false. Justify.
8. Draw a typical SAED pattern of polycrystalline material and amorphous material.
9. What do you depth profiling in case of XPS/AES?
10. What are the uses of evolved gas analysis in Thermogravimetric Analysis?

PART – B (5 X 16 =80)

- 11 (i) Derive the structure factor for NaCl structure. (10)
(ii) List the factors that affect the intensity of XRD peak in case of Debye-Scherrer powder diffraction method. (6)
 12. (a) (i) Draw and highlight the capabilities of Kohler Illumination system. (8)
(ii) Brief on principle of polarization based optical microscopy. (8)
- (OR)**
- (b) (i) Comment on various types of aberration of lens with appropriate sketches. (8)
(ii) Brief on principle of DIC based optical microscopy. (8)
13. (a) (i) Show that diffraction at two different inclination in case of diffractometer for determination of residual stress of the materials.

(OR)

- (b) (i) Brief on the methods of construction of phase diagram with use of XRD.

14. (a) (i) List the applications of TEM with respect to metallic samples. (6)
(ii) Compare the advantages and disadvantages of three modes of AFM operation. (10)

(OR)

- (b) (i) What are the various signals that emanate during electron beam material interaction?
In case of SEM, compare the signals used for imaging with respect to their energy, resolution, escape depth and application. (4+12)

15. (a) (i) Discuss on the application of thermal analysis techniques in characterization of polymers.

(OR)

- (b) Draw typical spectra and list the similarities and dissimilarities of the following pairs of techniques.
(i) Energy Dispersive X-Spectroscopy and Wavelength Dispersive X-Spectroscopy (8)
(ii) X-ray Photoelectron Spectroscopy and Auger Electron Spectroscopy. (8)