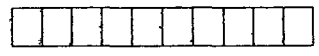


13/4/13



B.E/B. Tech (Full Time) DEGREE END SEMESTER EXAMINATION APRIL/MAY 2013

MATERIAL SCIENCE AND ENGINEERING

FIFTH SEMESTER – R 2008

21

ML 9303 – CHARACTERISATION OF MATERIALS

Time: 3 hr

Max. Marks: 100

**PART – A (2 X 10 =20)**

1. What do you mean by contrast?
2. List the methods of quantitative determination of grain size.
3. What is the difference between Bragg's law and Structure factor?
4. List the methods of generating monochromatic radiation for XRD.
5. Why high angle diffraction, is chosen for lattice parameter determination?
6. What is Warren method?
7. What are the forces that are encountered in non-contact AFM?
8. What do you mean mass thickness contrast in case of TEM?
9. What is uniqueness of XPS over X-ray spectroscopy?
10. Give TWO examples for which endothermic and exothermic peaks occur in DTA.

**PART – B (5 X 16 =80)**

11. (a) (i) Derive the structure factor for diamond cubic structure. (10)  
(ii) Draw schematic representation of Seeman-Bohlin focusing camera and state its features. (6)
  12. (a) (i) Draw and highlight the capabilities of Kohler Illumination system. (6)  
(ii). Brief on differential interference contrast type of optical microscopy. (10)
- (OR)**
- (b) (i) Comment on various types of aberration of lens with appropriate sketches. (10)  
(ii) What is the difference between negative and positive phase contrast. (6)
13. (a) (i) Show that diffraction at two different inclination helps in determination of residual stress of the materials.

**(OR)**

- (b) (i) Brief on the TWO methods of quantitative determination of phases by XRD.

14. (a) (i) Brief on the method of sample preparation for metals for TEM studies. (6)
- (ii) Derive an expression for calculation of interplanar spacing from SAED pattern and comment the typical diffraction pattern of monocrystalline, polycrystalline and amorphous material. (10)

(OR)

- (b) (i) List the various signals out of electron beam materials interaction in SEM and state its energy, escape depth and usefulness in characterization. (12)
- (ii) What do you mean by magnification and empty magnification? (4)

15. (a) (i) Critically compare and contrast power compensated DSC, heat flux DSC and DTA.

(OR)

- (b) (i) Differentiate between EDX and WDX? (6)
- (ii) Compare XPS and AES method of chemical composition analysis. (10)