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Total Number of Pages : 02

B.Tech
PCMT4401

7th Semester Back Examination 2018-19
X - RAY AND ELECTRON MICROSCOPY
BRANCH : METTA, MME

Time : 3 Hours

Max Marks : 70

Q.CODE : E533

Answer Question No.1 which is compulsory and any FIVE from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions : **(2 x 10)**

- a) Briefly mention the significance of Bragg's law in x-ray analysis?
- b) What are the target metals used for XRD analysis? Mention their name with respective wavelength?
- c) Define resolution of microscope. How the resolution is related to the wavelength of the illumination system?
- d) What changes you will get in XRD pattern when there is a transition from order to disorder transformation?
- e) What are the signals generated when X-ray interacts with sample?
- f) What is the effect of spotsize on the resolution of the SEM image?
- g) Why secondary electrons are mainly used for imaging in a SEM rather than the back scattered electrons?
- h) Why STM (scanning tunneling microscope) is not applicable for nonconductive sample and what do you mean by tunneling?
- i) Why lighter element cannot be detected by EDS?
- j) What do you mean by texture?

Q2 a) Derive the mathematical expression for λ_{SWL} and voltage and also explain how the intensity of X-ray varies with tube voltage? **(5)**

b) What is structure factor? Calculate the structure factor for FCC unitcell? **(5)**

Q3 a) Explain any two diffraction methods and write down their application? **(5)**

b) With the help of suitable diagrams briefly explain the generation of characteristic x-rays? **(5)**

Q4 a) In a SEM, briefly explain the process of generation of at least five signals from electron beam-specimen interaction? **(5)**

b) Compare and contrast between EDS and WDS detector? **(5)**

Q5 a) Explain the principle of residual stress measurement? **(5)**

b) What are the factors which affect relative integrated intensity? Explain any two factors? **(5)**

