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Total Number of Pages: 02

B.TECH
PCMT4401

7th Semester Regular / Back Examination 2015-16
X-RAY AND ELECTRON MICROSCOPY

Branch: MM,MME

Time: 3 Hours

Max marks: 70

Q.CODE: T197

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) What is white radiation?
 - b) What is Moseley's law?
 - c) What is Laue diffraction?
 - d) What is atomic scattering factor?
 - e) What is filter?
 - f) What is inelastic scattering?
 - g) What is depth of focus?
 - h) What is spherical aberration?
 - i) What is dark field image?
 - j) What is back scattered electrons?
- Q2 a) Describe the basic principles of X-ray generation with schematic diagram. (5)
- b) Differentiate between Compton scattering and Thomson scattering. (5)
- Q3 a) What is Debye Scherer Camera? Briefly explain the principles of diffraction using this camera. (5)
- b) What is structure factor? Calculate the structure factor of FCC crystal. (5)
- Q4 (10)
- Identify the crystal structure and determine the theoretical density of an unknown cubic metal which was collected using $\text{CuK}\alpha$ radiation ($\lambda=1.54\text{\AA}$). The following angles of diffraction of XRD pattern are 38.43, 44.67, 65.02, 78.13, 82.33, 98.33, 111.83, and 116.36.
- Q5 a) Describe the basic principles of different mode of image formation in scanning Electron Microscope (SEM) with schematic diagram. (5)
- b) Differentiate between the x-ray diffraction and electron diffraction. (5)

- Q6 a) What is SAED pattern? Explain briefly how it determines the different crystalline and amorphous materials. (5)
b) Differentiate between the reciprocal lattice and real lattice. (5)
- Q7 a) Describe briefly the function of different components of TEM with schematic. (5)
b) Differentiate between energy dispersive x-spectroscopy (EDS) and wave length dispersive x-spectroscopy (WDS). (5)
- Q8 Write short notes: (5 x 2)
a) Mass absorption coefficient.
b) Electron probe microanalysis.
c) Ordered and disordered transformation.
d) Scanning tunneling microscope.