Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech

PCMT 4401

Seventh Semester Back Examination – 2014

X-RAY AND ELECTRON MICROSCOPY

BRANCH(S) : MM, MME

QUESTION CODE : L 151

Full Marks – 70

Time : 3 Hours

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

1. Answer the following questions : 2×10

   (a) What is Bragg's law ?

   (b) What is FWHM ?

   (c) Draw the schematic of X-ray tube.

   (d) What is inelastic scattering ?

   (e) What does resolution mean ?

   (f) What is electron scattering ?

   (g) What is Debye Scherer camera ?

   (h) What is thermionic emission ?

   (i) What is electromagnetic lens ?

   (j) Define depth of focus.

2. Calculate the lattice parameter and crystal structure of the following XRD pattern which was collected using CuK_α radiation ($\lambda = 1.54\,\text{Å}$) having diffraction 2θ angles of 38.43, 44.67, 65.02, 78.13, 82.33, 98.93, 111.83, and 116.36. 10

3. Discuss the different types of diffraction methods and their advantages and disadvantages. 10

P.T.O.

4. Describe the processes of image formation in scanning electron microscope (SEM) with schematic diagrams. 10

5. (a) Determine the structure factor of BCC crystal. 5

   (b) Write down the steps for the calculation of lattice parameter from given X-ray pattern. 5

6. (a) Differentiate between the EDS and WDS. 5

   (b) Explain the difference between characteristic and continuous radiation of X-ray diffraction. 5

7. (a) Explain the interaction of electron beam with sample in SEM. 5

   (b) Explain the difference between Secondary electrons and back scattered electrons. 5

8. Write short notes on any **two** of the following : 5×2

   (a) Thomason's and Crompton effect

   (b) Dark and Bright field TEM

   (c) Atomic and structure factor

   (d) Order and disorder transformation.

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