

Code No: R05411804

R05**Set No. 2**

IV B.Tech I Semester Examinations, November 2010

X-RAY METALLOGRAPHY

Metallurgy And Material Technology

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Line positions are determined solely by size and shape of unit cell, while the line intensities are determined by the atoms in the unit cell. Discuss.
(b) X-rays with a wavelength of $0.58^\circ \text{ \AA}$ are used for calculating d_{200} in nickel. The reflection angle θ is 9.5° for the first order. What is the size of the unit cell. [8+8]
2. Explain how phase boundaries can be determined by
(a) Disappearing phase method
(b) Lattice parameter method. [16]
3. (a) Show that the velocity with which electrons strike the target of an X-ray tube depends only on the voltage between anode and cathode and not on the distance between them.
(b) A nickel filter is required to produce an intensity ratio of CuK_α to CuK_β of 100/1 in the filtered beam. Calculate the thickness of the filter and the transmission factor for CuK_α line $\left(\frac{I_{K_\alpha}}{I_{K_\beta}}\right) = 7.5$ for incident beam, $I_{K_\alpha} \text{ trans} = 0.42 * I_{K_\alpha} \text{ incident}$. [8+8]
4. (a) What do you understand by the K absorption edge of an element? At what wavelength does it occur? Why? Discuss.
(b) Discuss the applications of stress measurement by x-ray diffraction methods over other methods of stress measurement. Explain the advantages and disadvantages in X-ray diffraction methods over other methods. [10+6]
5. (a) What are the ways by which the diffraction pattern of an unknown substance can be obtained by diffractometer? Explain.
(b) Explain the differences between the operation of a powder camera and a diffractometer. [8+8]
6. Describe the phenomenon of scattering of X-rays by an electron. [16]
7. Differentiate between the following:
(a) Deformation texture and recrystallisation texture
(b) Fiber texture and Sheet texture. [8+8]
8. (a) Derive the necessary equations and discuss how x-rays are used in the study of order-disorder transformations

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(b) Explain about short range order and clustering.

[12+4]

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R05**Set No. 4**

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8. Describe the phenomenon of scattering of X-rays by an electron. [16]

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R05**Set No. 1**

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- (b) Explain the differences between the operation of a powder camera and a diffractometer. [8+8]

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R05**Set No. 3**

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