



Either.

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| 1. | a) | Explain production and production efficiency of X-rays. | 8 |
| | b) | Explain absorption of X-rays and absorption edges. | 8 |

OR

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| e) | What is fluorescence? Explain X-ray fluorescence analysis. | 8 |
| f) | Discuss X-ray emission from thick and thin targets. | 8 |

Either.

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| 2. | a) | Explain dispersion of X-rays increases with decrease of spacing of the particular set of lattice planes of the crystal. | 8 |
| | b) | Explain method of detection and measurement of X-rays. | 8 |

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| e) | Explain resolving power of x-ray detectors. | 8 |
| f) | What is EXAFS? Explain it with absorption edges? | 8 |

Either.

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| 3. | a) | Derive an expression of intensity of the scattered X-rays in Thomson scattering. | 8 |
| | b) | Explain the scattering of X-rays by helium atom. | 8 |

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| e) | Explain dispersion theory applied to X-rays. | 8 |
| f) | Describe techniques of measurement of refractive index using dispersion of X-rays. | 8 |

Either.

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| 4. | a) | What is symmetry operation? Explain different types of symmetry elements. | 8 |
| | b) | Explain Laue method of structure analysis. | 8 |

OR

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| e) | How is synchrotron radiation used in structural studies? Explain it. | 8 |
| f) | Discuss electron, neutron diffraction techniques and their applications. | 8 |

5. Briefly discuss on the followings.

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| a) | Pelletron as source of X-rays. | 4 |
| b) | XANES. | 4 |
| c) | X-ray optics and X-ray microscopy. | 4 |
| d) | Study of nanoparticles. | 4 |
