

AS-201: ENGINEERING PHYSICS - II

Long Question sheet of Crystal Structure

1. Explain the terms: Space lattice, crystal lattice, basis, crystal translation vectors, interfacial angles, unit cell, primitive cell, Wigner-Seitz cell.
2. What is crystal structure? Explain its types.
3. What are Bravais lattices? Discuss seven crystal systems and fourteen space lattices in crystal structure.
4. What are Miller indices? How are they determined? Give their significance and a few examples.
5. Derive the expression for the inter-planar spacing between the two parallel planes with Miller indices (h k l). Also calculate it for simple cubic lattice and for tetragonal crystal.
6. Define Coordination Number and calculate the lattice constant of a cubic lattice?
7. Define atomic packing factor. Calculate APF in case of SC, BCC and FCC.
8. What is Atomic Packing Factor (APF)? Show that: $APF_{FCC} > APF_{BCC} > APF_{SC}$
9. Define coordination number and atomic packing factor and determine them for simple cubic, bcc and fcc structures.
10. Prepare the chart for the comparative analysis of the cell properties of some crystal systems.
11. Describe rock salt and diamond cubic structures.
12. Derive an expression for Compton shift showing dependency on angle of scattering.
13. Describe briefly about Bragg's spectrometer.
14. Derive Bragg's law for the diffraction of X-rays by crystals. Describe Bragg's X-ray spectrometer.
15. Derive Bragg's equation for reflection of X-rays by crystal planes.
16. What are the outcomes of Laue's X-ray diffraction experiment?
17. What is Compton Effect? Derive an expression for Compton shift and wavelength of scattered photon?
Explain why Compton shift is not observed with visible light?
18. Distinguish between Compton shift and Compton wavelength. Explain the factors on which Compton shift depends.
19. Derive the expression for energy of scattered X-ray photon.
20. Deduce a relation between angle of scattering and angle of recoil in Compton Effect.