

B.Sc. semester VI

Paper: XIII (Solid State Physics and Classical Mechanics)

Model Question Paper

Short answer type question

1. Define crystal lattice and unit cell.
2. Calculate atomic packing fraction for a simple cubic cell.
3. Describe the hexagonal closed pack structure.
4. What do you mean by a symmetry operation? Name the various symmetry operation.
5. Why does Dulong's and Petit's law fails at low temperature.
6. State Wiedemann Franz law.

Long answer type questions

7. State D' Alembert's principle. Derive lagrangian equation of motion using it.
8. Explain the phase space and Hamiltonian function. derive Hamilton's equation of motion for a system of particles.
9. What are Millar indices? For a cubic lattice show that the distance between successive planes of miller indices h, k and l is given by

$$d_{hkl} = \left(\frac{a^2}{h^2 + k^2 + l^2} \right)^{1/2}$$

10. What is reciprocal lattice? Derive an expression for the primitive translation vectors of the reciprocal lattice. Give the geometrical significance of reciprocal lattice.
11. Derive Bragg's law of crystal diffraction. Discuss the experimental methods for the determination of crystal structure.
12. Deduce the dispersion relation for the lattice waves in a monoatomic linear lattice.
13. What are the assumptions of Einstein theory of specific heat of solids? derive the relation for lattice heat Capacity using Einstein model.