Unit IV

8. (a) What is Nanotechnology ? Explain the size dependence of particles in detail. **4**

(b) Discuss the tools for the synthesis of nanostructures. **4**

9. (a) Explain carbon fullerene. **4**

(b) Discuss the different fields in which nanotechnology is used. **4**

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32581

B.Sc. EXAMINATION, 2025

(Sixth Semester)

(Regular & Re-appear)

PHYSICS

Paper XI

Solid State and Nano-Physics

Time : 3 *Hours*] [*Maximum Marks :* 40

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. **1** is compulsory. All questions carry equal marks.

Compulsory Question

1. (a) Define lattice and basis. **2**

(b) What is the significance of reciprocal lattice ? **2**

(c) What are high temp superconductors. **2**

(d) Explain carbon nanotubes. **2**

Unit I

2. (a) Differentiate between amorphous and crystalline solids. **4**

(b) Find the Miller indices for a plane, which intercepts the A, B and C axes at 3A, 2B and 3C. **2**

(c) Distinguish between primitive and non-primitive unit cell with the help of two- dimensional diagrams. **2**

3. (a) Discuss the crystal structures of diamond, ZnS Structure in detail with diagrams. **6**

(b) Calculate the interplanar spacing for (111) planes in a cubic lattice of lattice constant 1.5 Å. **2**

Unit II

4. (a) What is the Bragg's Law ? Describe the Laue method used in X-ray diffraction. **6**

(b) The Spacing between the planes of NaCl crystal is 2.82 Å. The first order Bragg's reflection occurs at an angle of 30°. Find the wavelength of X-rays. **2**

5. What are the reciprocals lattice vectors ? Discuss its physical significance. Find the reciprocal lattice vectors for BCC Lattice. **8**

Unit III

6. (a) Explain Meissner effect. Describe Type 1 and Type 2 Superconductors. **4**

(b) Find out London Equations. **4**

7. (a) What is the isotope effect ? **4**

(b) Discuss the applications and limitations of the superconductors. **4**