

Roll No.

78613

M. Sc. 4th Sem. Physics (New)

Examination – May, 2014

SOLID STATE PHYSICS - II (New)

Paper : XVII (Spl- 1) Opt (i)

Time : Three hours]

[Maximum Marks : 80

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

Note : Attempt *one* question from each Unit. Question No. 1 is *compulsory*.

1. (a) Classify the symmetry operations. 4
- (b) Draw a cube and show all the possible planes with miller indices. 4
- (c) Draw the picture of icosahedron and dodecahedron. 4
- (d) Discuss the boundary at which one reach from Bulk crystal to nanocrystal. 4

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UNIT - I

2. Show that electrical conductivity tensor for tetragonal lattice has only diagonal elements. 16
3. (a) What do you understand by microscopic symmetry elements? Explain glide planes and screw axes. 8
- (b) Prove that five fold symmetry does not exist. 8

UNIT - II

4. Give an account of powder method for crystal structure determination. 16
5. (a) Explain Lorentz and polarization corrections to obtain the final structure factor. 8
- (b) Calculate the geometrical structure factor for a bcc lattice. Which planes will be missing from XRD spectrum? 8

UNIT - III

6. (a) Discuss the symmetries of Solids and Liquid crystals. 8
- (b) Discuss quasicrystals with examples. 8

7. (a) Discuss Fibonacci sequence. What are its uses? 8
- (b) What are various types of fullerenes? Discuss their applications. 8

UNIT - IV

8. What are nanostructured materials? Discuss their properties. How are they synthesised? 16
9. Write note on:
- (a) Characterization of nanomaterials. 8
- (b) Quantum size effect and its applications. 8