

FACULTY OF SCIENCE

M.Sc. II-Semester (CBCS & NON-CBCS) (New) Examination, April / May 2013

Subject: Physics & Applied Electronics

Paper – IV (204)

General Solid State Physics

Time: 3 Hours

Max.Marks: 80

Note: Answer all questions from Part – A and Part – B.

Each question carries 4 marks in Part-A and 12 marks in Part-B.

PART – A (8x4 = 32 Marks)

[Short Answer Type]

1. What is the necessity of a unit cell in crystallography?
2. What is the concept of reciprocal lattice?
3. Write a note on infrared absorption in ionic crystals.
4. Write the importance of anharmonicity in thermal expansion.
5. Write a short note on free electron theory of metals.
6. Give the concept of hole.
7. Discuss the model of electron and hole colour centres in crystals.
8. What are dislocations? Classify them.

PART – B (4x12 = 48 Marks)

[Essay Answer Type]

- 9.(a) Describe CsCl and NaCl structures. Sketch a few unit cells of simple cubic lattice with planes (100), (110), (111).

OR

 (b) Explain the method of Laue to determine the crystal structures. Also give the detailed experimental set up.
- 10.(a) Derive an expression for specific heats of solids using Einstein's theory. What are the conclusions?

OR

 (b) Obtain dispersion relation for a linear diatomic lattice. Sketch acoustical and optical branches.
- 11.(a) Give a detailed account of Hall effect in semi-conductors. What are the applications of Hall-effect?

OR

 (b) Explain the formation of bands on the basis of Kronig Penny model. How does it lead to the classification of solids?
- 12.(a) What are imperfections, classify them. Derive an expression for the equilibrium concentration of Schottky defects in ionic crystals.

OR

 (b) What is Kirkendal effect? Obtain an expression for the ionic conductivity in ionic