

45074-A

M.Sc. DEGREE EXAMINATION, APRIL 2018.

Physics

FOURTH SEMESTER

Paper IV — CONDENSED MATTER PHYSICS — II

Time : Three hours

Maximum : 75 marks

(No additional sheet will be supplied)

PART A — (5 × 3 = 15 marks)

Answer any FIVE questions.

Each question carries 3 marks.

Each answer should not exceed 1 page.

1. State and explain Hooke's law.
2. Explain Bulk modulus and compressibility in solids.
3. Explain the criticism of Debye model.
4. Give a note on Anharmonicity.
5. What are Periodic potentials?
6. Explain de Haas Van Alpha effect.
7. Mention the properties of nano structured materials.
8. What is Blue shift in semiconductors?

PART B — (4 × 15 = 60 marks)

Answer ALL questions.

Each question carries 15 marks.

Each answer should not exceed 6 pages.

9. What is elastic energy density? Explain in detail the elastic compliances and stiffness constants.

Or

10. Determine the elastic constants using Pulse-echo technique.

11. Distinguish between Einstein and Debye theories. Discuss the origin of thermal expansion and obtain Gruneisen relation.

Or

12. Discuss what lattice thermal conductivity is and what its origins are.
13. State and prove the Bloch's theorem and explain the reduced zone schemes.

Or

14. Explain in detail the quantization of electron orbits.
15. What are nanomaterials? Write about Chemical Vapor Deposition of nanomaterials? How they can be characterized?

Or

16. Discuss the XRD and AFM techniques in nanomaterials.

