

45074 A

M.Sc. DEGREE EXAMINATION, MARCH/APRIL 2019.
FOURTH SEMESTER

Physics

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. Obtain relation between bulk modulus and compressibility.
3. Write the properties of phonons.
4. Write the role U and N processes in thermal conductivity of solids.
5. State Bloch theorem and write the Bloch function.
6. Write the characteristics of Fermi surface.
7. Explain the blue shift in semiconductor nano particles.
8. Distinguish between quantum wells, wires and dots.

PART B — (4 × 15 = 60 marks)

Answer ALL questions.

Each question carries 15 marks.

Each answer should not exceed 6 pages.

9. (a) Obtain the expression for elastic energy density.
(b) Write the process of reduction of elastic constants in cubic crystals.

Or

10. (a) Obtain the expression for wave equation in cubic crystal.
(b) Obtain the expression for elastic wave velocity along [110] direction when the wave is propagating along XY plane and particle displacement also along XY plane.

11. (a) Write the Einstein theory of specific and its draw backs.
(b) Discuss the inadequacy of harmonic model.

Or

12. Obtain the expression for Gruneisen parameter by using elementary kinetic theory.
13. (a) Discuss the Kronig-penney model in explaining energy bands of solids.
(b) Describe reduced and periodic zone schemes.

Or

14. (a) Discuss quantization of electron orbits.
(b) Write the experimental study of Fermi surface by de Haas Van Alphen effect.
15. (a) Explain with neat diagram inert gas condensation method in synthesis of nano particles.
(b) Write the synthesis of nano particles by sol-gel method.
16. (a) Discuss the principle and instrumentation of AFM technique to determine particle size of nano materials.
(b) Write the applications of nano materials in medicine.

