

M.Sc., DEGREE EXAMINATIONS – MARCH 2016
IV SEMESTER

45074 -A

Physics

PAPER IV – Condensed Matter Physics – II (Solid state Materials)

Time : 3 Hours

Max. Marks: 75

(No additional sheet will be supplied)

PART – A (5 x 3 = 15 marks)

Answer any FIVE Questions

Each question carries 3 marks

Each answer should not exceed 1 page

1. Explain Hooke's law.
2. Define compressibility.
3. Outline the quantum theory of lattice vibrations.
4. Explain inelastic scattering of neutrons by phonons.
5. Distinguish between reduced zone scheme and periodic zone scheme.
6. Give an account of De Hass Van Alphen effect.
7. Write notes on quantum wells.
8. Mention three applications of nanomaterials.

PART – B (4 x 15 = 60 marks)

Answer ALL Questions

Each question carries 15 marks

Each answer should not exceed 6 pages

9. Describe the lattice as a homogenous and continuous medium. Analyze stress and strain tensors
(Or)
10. Describe the experimental determination of elastic constants. Discuss Pulse-echo technique.
(Or)
11. Derive an expression for the specific heat of solid on the basis of Debye model. Discuss the variation of Debye Specific heat with temperature.
(Or)
12. Explain the origin of thermal expansion and obtain Gruneisen relation.
13. Discuss the problem of an electron moving in a periodic potential. Explain the occurrence of energy gap in a semiconductor.
(Or)
14. Define Fermi surface. Explain the characteristics, importance and construction of Fermi surfaces in metals.
15. Give the general methods of preparation of nanomaterial. Explain the sol-gel process in particular.
(Or)
16. Describe the particle size determination of nanoparticles by XRD and SPM techniques.

