

45074

M.Sc. DEGREE EXAMINATION, APRIL 2015.

FOURTH SEMESTER

Physics

Paper IV — CONDENSED MATTER PHYSICS – II (SOLID STATE MATERIALS)

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. Explain spontaneous polarization in ferro electric materials.
2. Explain the phenomena of ferri electricity.
3. Discuss the concept of Bloch wall in ferromagnetic materials.
4. What are the applications of ferrites? Explain.
5. What is Cooper pair? Explain BCS ground state.
6. Write a note on Gaiever tunneling.
7. Discuss nano-crystalline materials.
8. Briefly explain 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) Explain the classification of ferro electric materials with suitable examples.
(b) Describe various applications of ferroelectric materials.

Or

10. (a) Differentiate between ferro electricity and anti ferro electricity.
(b) Explain titanium and oxygen ion displacement theory in ferro electrics.

11. (a) What are magnons?
(b) Explain the magnon dispersion in ferro magnetic materials.

Or

12. (a) Write a note on ferrites?
(b) Discuss the change of magnetic susceptibility with temperature.
13. (a) Derive London's equation and discuss how they are useful in explaining superconducting state.
(b) Explain flux quantization in super conductors.

Or

14. (a) What are SQUIDS? Give their applications.
(b) Write a brief account of super conductivity in fullerenes.
15. (a) Give the general methods of preparation of nanomaterials.
(b) Describe the chemical vapor deposition method of preparation of nanomaterials.

Or

16. (a) Describe the particle size determination using SPM technique.
(b) Explain the concept of size quantization in semiconductors.

