

FACULTY OF SCIENCE
M. Sc. III – Semester Examination, January 2018

Subject : Physics

Paper – II
Advanced 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 (8 x 4 = 32 Marks)
(Short Answer Type)

- 1 What are the characteristics of Fermi surfaces in metals?
- 2 How does de Hass-Van Alphen effect help us to determine Fermi surfaces?
- 3 Distinguish between local field and external electric field in dielectrics.
- 4 Briefly describe the characteristic features of ferroelectric materials.
- 5 What do you mean by Weiss molecular field?
- 6 Manganese has more unpaired d-electrons as against iron. Even then Mn is not a ferromagnet but iron is. Why?
- 7 Explain persistent currents in superconductivity.
- 8 How are super electrons different from normal electrons?

PART – B (4 x 12 = 48 Marks)
(Essay Answer Type)

- 9 (a) Explain Fermi surfaces of simple cubic (SC) and face centered cubic (FCC) lattices pertaining to metals.
OR
(b) Differentiate between periodic and reduced zone schemes of representing the energy bands in solids.
- 10 (a) Classify various types of polarizabilities and derive Clausius – Mosotti relation.
OR
(b) Discuss the dipole theory of ferroelectricity.
- 11 (a) Describe an experimental method of achieving lowest temperature.
OR
(b) Give a detailed account of Neel's theory of anti ferromagnetism.
- 12 (a) Explain the terms:
(i) Entropy
(ii) Thermal conductivity and
(iii) Energy gap in superconductivity
OR
(b) Elaborate the tunneling phenomena in super conductivity as given by Giavier and Josephson.
