

M.Sc. DEGREE EXAMINATION, JANUARY 2016**Third Semester**

Faculty of Science

Branch II—Physics-A-Pure Physics

Paper X—CONDENSED MATTER PHYSICS—I

(Common with B Non-Conventional Energy)

[Prior to 2012 Admissions]

Time : Three Hours

Maximum : 75 Marks

Part A

*Answer any six questions.
Each question carries 2 marks.*

1. Write a short note on Brillouin zone.
2. What is meant by atomic form factor ?
3. What is called Burgers vector ?
4. Give Debye T^3 law.
5. Give a note on thermal expansion.
6. Obtain an expression for electrical conductivity.
7. What is called Lorentz number ?
8. What is meant by antiferro electricity ?
9. Briefly explain the exciton condensation into electron-hole drop process .

(6 × 2 = 12 marks)

Part B

*Answer any three questions.
Each question carries 5 marks.*

10. Explain the different methods for estimating the density of dislocations in crystals.
11. Discuss the theory of quantization of lattice vibrations.
12. Discuss the Hall Effect.
13. Obtain the solution for the situation of an electron in a periodic potential.
14. Discuss the Landau theory of phase transition.

(3 × 5 = 15 marks)

Turn over

Part C .

*Answer all questions.
Each question carries 12 marks.*

15. (a) Obtain the reciprocal lattices to sc lattice, bcc lattice and fcc lattice.

Or

(b) Describe the various types of dislocations.

16. (a) Discuss in detail, the N process and U process.

Or

(b) Discuss the Debye model of density of states.

17. (a) Considering electrons as a gas obtain the expression for heat capacity.

Or

(b) Discuss the various experimental methods in Fermi surface studies.

18. (a) Write note on (1) soft optical phonons ; and (2) ferroelectric domains.

Or

(b) Deduce Kramers-Kronig relations.

(4 × 12 = 48 marks