Roll No. ....

Total Pages : 4

715/MH

C-2050

CONDENSED MATTER PHYSICS-II

Paper-A

Semester - VI

Time Allowed : 2 Hours]   [Maximum Marks : 30

Note : Attempt any four questions. All question carry
equal marks.

1. What is the difference between a phonon and
   photon ? Discuss lattice vibration of monoatomic
   linear lattice.

2. Explain the Debye model of specific heat of solids.
   Discuss its drawbacks.

3. (i) Discuss Dulong and Petit's law. What
   discrepancy was removed by Einstein.

   (ii) Find the Einstein temperature if the Einstein
   frequency is 2.76×10^{11} Hz.

4. (i) What do you understand by Fermi energy ?
   Derive an expression for Fermi energy for the
   electron gas at 0K. Give its physical significance.

   (ii) Calculate the average energy of free electrons
   in silver at 0K, if the Fermi energy in silver
   is 5.00 eV.

5. (i) Discuss the energy bands formation in
   solids.

   (ii) Differnentiate between metals. semiconductors
   and insulators on basis of band theory.

6. What are intrinsic and extrinsic semi conductor ?
   Derive and expression for electrical conductivity
   of an intrinsic semi conductor.

7. What do you understand by Fermi level ? Derive an expression for Fermi level of an intrinsic semi conductor.

8. (i) Explain BCS theory of super conductors. Give its physical significance.

   (ii) Discuss effect of magnetic field on super conductors.

9. Attempt any five parts :

   (i) Discuss momentrum of a phonon.

   (ii) What is Sommerfield model ?

   (iii) "Valence electrons" comment on this statement.

   (iv) Give the conclusion drawn from Kronig - Penney model.

   (v) Discuss Meissner effect in superconductivity.

   (vi) "Semiconductors have negative temperature coefficient of resistance." Explain.

   (vii) What do you understand by static and transport properties in case of electron gas model ?