

M.Sc. S.Y. (Physics) (NEP Pattern) - Semester-III
03MSCPH2 - Paper-II : Advanced Condensed Matter Physics

P. Pages : 2

Time : Three Hours



GUG/W/24/16024

Max. Marks : 80

Either :

1. a) Derive relation for Bloch $T^{3/2}$ law. 8
- b) Discuss in detail Sommerfeld model of free electron theory. 8

OR

- e) Discuss in details Drude model of free electron theory. 8
- f) Explain Heisenberg model of Ferromagnetism. 8

Either :

2. a) Write in detail Band structure of silicon & Germanium. Also discuss band structure of direct Gap III-V & III-VI semiconductors 8
- b) Explain the electrical conductivity in Intrinsic and Extrinsic semiconductors. 8

OR

- e) What is Hall Effect Derive expression for Hall coefficient and give its applications. 8
- f) Write note on:
- a) Intrinsic carrier density 4
- b) Extrinsic carrier density 4

Either :

3. a) What is Debye – Waller factor? Discuss its origin in details. 8
- b) Give the theory of interaction of electrons & phonons with photons. 8

OR

- e) Explain in detail Mossbauer effect using the theory of Isomer shift & electric quadrupole. 8
- f) Derive expression for thermal conductivity of a crystal. Also discuss the variation of this with temperature and with the size of the crystal. 8

Either :

4. a) What is mean by exotic solids? Discuss in detail structure and symmetry of Liquids. 8
- b) Write the difference between Amorphous solids, Aperiodic solids & Quasicrystals. 8

OR

- e) What is mean by fullerenes and Tubules. Discuss in detail formation and characterization of fullerenes & Tubules. 8
- f) What is the difference between single wall carbon Tubules and Multiwall carbon Tubules. Also give some electronic properties of Tubules. 8

5. All questions are compulsory :

- a) Write a note on magnetic ordering. 4
- b) What is mean by disordered systems in semiconductors. 4
- c) What is the difference between Ionic & covalent crystals. 4
- d) Write short note on Fibonacci sequence. 4
