

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

P. Pages : 2

Time : Three Hours



GUG/S/25/16024

Max. Marks : 80

Either :

1. a) Explain Drude Model in details with the help of example. 8
b) Explain Heisenberg Theory and Exchange Interaction in detail. 8

OR

- e) Explain Sommerfeld Model in detail with its applications. 8
f) Write a detail note on: 4+4
i) Heat Capacity of Electron Gas,
ii) Experimental Heat Capacity.

Either :

2. a) Explain Band Structure of Direct Gap III-V and III-VI semiconductors. 8
b) Explain the terms:
i) Optical Absorption and Excitons, 4
ii) Thermal Population of Bands in Semiconductors. 4

OR

- e) State and Explain Hall Effect in detail. Give its applications. 8
f) Explain following terms:
i) Degenerate Semiconductors. 4
ii) Electrical Conductivity of Semiconductors. 4

Either :

3. a) Explain Inter-atomic Forces and Lattice Dynamics of Simple Metals. 8
b) Explain in detail :
i) Ionic and Covalent Crystals. 4
ii) Optical Phonons and Dielectric Constants. 4

OR

- e) Explain :
 - i) Inelastic Neutron Scattering, 4
 - ii) Debey – Waller Factor. 4
- f) Explain Interaction of Electrons and Phonons with Photons in detail. 8

Either :

- 4. a) Discuss Structure and Symmetries of Liquids in detail. 8
- b) Explain Aperiodic Solids and Quasi-crystals in detail with their importance. 8

OR

- e) Discuss Characterization of Fullerenes and Tubules. 8
- f) Write a detailed note on:
 - i) Carbon Nano-tubules. 4
 - ii) Grapheme 4

- 5. Attempt all of the followings.
 - a) Explain Antiferromagnetism and Super Exchange Interactions. 4
 - b) Discuss Quantum Hall Effect in brief. 4
 - c) Write a short note on Mossbauer Effect. 4
 - d) Write a note on Fibonacci Sequence. 4
