S-1128

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PHY-503

Solid State Physics

M.Sc. Physics (MSCPHY)

1st Year Examination, 2022 (Dec.)

Time : 2 Hours] **Max. Marks : 70**

Note : This paper is of Seventy (70) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

SECTION–A
(Long Answer Type Questions)

Note : Section 'A' contains Five (05) long answer type questions of Nineteen (19) marks each. Learners are required to answer any Two (02) questions only.

(2×19=38)

1. Describe the Einstein model of lattice heat capacity. How does this model differ from Debye's model of heat capacity?

2. What is meant by superconductivity? What are the applications of superconductors? Explain BCS theory of superconductivity.

3. Explain the paramagnetism in detail. Give the quantum theory of paramagnetism in detail.

4. Define the concept of effective mass. Explain the Kronig Penny model for solids in detail.

5. Explain the Bravais Lattice in three dimension. Draw and explain NaCl structure in detail.

SECTION–B

(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Eight (08) marks each. Learners are required to answer any Four (04) questions only. (4×8=32)

1. What do you mean by Schottky and Frenkel defects?

2. What do you mean by coordination number? Find out the coordination number of simple cubic, body centered and face centered crystal structure.

3. What do you mean by Fermi level? Show that for an intrinsic semiconductor Fermi level lies in the middle of band gap.

4. State and obtain Bragg's Law for X-ray diffraction.

5. What are Brillouin zones? Determine the Brillouin zones of FCC lattice.

6. Derive Clausius-Mossoti equation?

7. What is the Hall Effect? What are its applications?

8. Differentiate between optical and acoustical branches of diatomic lattice?