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Total Pages : 3

Roll No.

MPHY-507

Solid State Physics

M.Sc. Physics (MSCPHY-20)

2nd Semester Examination, 2022 (June)

Time : 2 Hours]

Max. Marks : 40

Note : This paper is of Forty (40) 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 Ten (10) marks each. Learners are required to answer any Two (02) questions only.

(2×10=20)

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

2. For two dimensional structure find the variation of density of states with respect to frequency. Calculate electronic specific heat capacity.
3. What do you mean by lattice vibrations? Explain the lattice dynamics of a diatomic linear chain in detail.
4. What do you mean by polarization? Explain different types of polarization mechanisms and their frequency dependence with suitable diagrams.
5. How are cooper pairs formed? Explain the BCS theory of superconductivity and discuss the energy gap based on this theory.

SECTION-B

(Short Answer Type Questions)

Note : Section 'B' contains Eight (08) short answer type questions of Five (05) marks each. Learners are required to answer any Four (04) questions only. (4×5=20)

1. Define super conductivity. What is isotope effect in superconductivity?
2. Differentiate between optical and acoustical branches of diatomic lattice.
3. Discuss Curie-Weiss law and its applications.

4. What are antiferroelectricity and piezoelectricity?
 5. A paramagnetic material has 10^{28} atoms/m³. The magnetic moment of each atom is 1.8×10^{-23} A-m⁻². Calculate the paramagnetic susceptibility at 300 K.
 6. What are the drawbacks of Einstein model of heat capacity of solids?
 7. What is hysteresis? Discuss its importance in industries.
 8. Derive Clausius-Mossotti equation.
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