

P-942

Total Pages : 3

Roll No.

PHY-503

Solid State Physics

M.Sc. Physics (MSCPHY)

1st Year Examination, 2023 (June)

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. Candidates should limit their answer to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

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. Explain the concept of Reciprocal lattice. Discuss its properties. Show that the reciprocal lattice of a bcc Bravais lattice is an fcc lattice.
2. State and prove Bloch Theorem. Explain the properties of Bloch functions.
3. Discuss the Einstein theory of specific heat of solids. What are the refinements of Debye's theory over Einstein's theory?
4. Derive and discuss the Clausius-Mossoti relation How it is different from Lorentz-Lorentz relation.
5. Give the salient features of BCS theory. On the basis of this theory explain the formation of Cooper pairs and energy gap in superconductors.

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 is meant by packing fraction? Obtain the value of packing fraction in case of bcc structure.

2. Distinguish between first and second order phase transition.
 3. Explain the Braggs law of X-ray diffractions.
 4. Explain the effect of temperature on Fermi distribution function.
 5. Distinguish between metals, insulators and semiconductors based on band theory.
 6. What is Hall Coefficient? How it is used to distinguished between n-type and p-type semiconductors.
 7. What is polarizability? Derive the relation between D, E and P.
 8. Distinguish between the dia, para and ferromagnetism.
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