# A-100

**Total Pages : 3** **Roll No. ----------**

# MPHY-507

**Solid State Physics**

**M.Sc. Physics (MSCPHY)**

2nd Semester, Examination 2024 (June)

Time: 2:00 hrs Max. Marks: 35

Note : This paper is of Thirty five (35) marks divided into Two (02) Section A and B. Attempt the questions contained in these sections according to the detailed instructions given therein. Candidates should limit their answers 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 Nine and Half (9.5) marks each. Learners are required to answer any Two (02) questions only.

[2x9.5=19]

P.T.O.

Q.1. What do you mean by lattice vibrations? Obtain dispersion relation of a monatomic chain of identical atoms.

Q.2. Explain the Einstein model of heat capacity. Find out the expression for heat capacity and explain the behaviour of solids at low temperature and high temperature.

Q.3. What do you mean by polarization in the dielectrics? Deduce the relation between dielectric constant and polarizability.

Q.4. Discuss Langevin's theory of Paramagnetism and derive an expression for paramagnetic susceptibility.

Q.5. Explain the superconducting tunnelling and discuss Josephson AC and DC tunnelling effect in detail.

## Section-B (Short-Answer-Type Questions)

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

[4x4=16]

Q.1. What are group velocity and phase velocity? Obtain the relation between group and phase velocities.

Q.2. Describe the inelastic scattering of neutrons for the experimental determination of phonon spectra.

Q.3. What is the meaning of Anharmonicity in crystals?

Q.4. Explain different types of polarizibility.

Q.5. Write a short note on Antiferroelectricity?

Q.6. What is hysteresis? Discuss its importance in industries.

Q.7. Explain the origin of diamagnetism in free electron.

Q.8. Discuss Meissner effect. Prove that the value of magnetic susceptibility for diatomic materials is -1.

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