

B.Sc. Semester - 6 (CBCS) Examination**April/May-2022 (NEW COURSE)****Statistical Mechanics & Solid State Physics (Core (New))****Time: 2:30 Hours****Marks: 70****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate marks.

-
- Q.1(A) **Answer the following questions (any two out of three)** (10)
1. Derive the distribution law of Bose - Einstein statistics.
 2. Explain: Maxwell – Boltzmann distribution law.
 3. Derive the general equation of volume in Phase Space.
- Q.1(B) **Answer the following questions (any one out of two)** (04)
1. Discuss: Stirling's Approximation.
 2. Explain: Thermodynamic Probability.
- Q.2(A) **Answer the following questions (any two out of three)** (10)
1. Explain: Miller Indices.
 2. What is single crystal and polycrystalline crystal? Explain symmetry consideration.
 3. Discuss Bravais Lattices in two dimensions (2-D).
- Q.2(B) **Answer the following questions (any one out of two)** (04)
1. Define Unit cell and explain primitive and non-primitive unit cell.
 2. Calculate the Packing Factor of Body Centered Cubic crystal structure.
- Q.3(A) **Answer the following questions (any two out of three)** (10)
1. Write a note on BCS Theory.
 2. Explain Meissner Effect in detail.
 3. Write a note on influence of external agents on superconductivity.
- Q.3(B) **Answer the following questions (any one out of two)** (04)
1. Write any six applications of superconductivity.
 2. Write a note on properties that change in Superconducting Transition.
- Q.4(A) **Answer the following questions (any two out of three)** (10)
1. Write a note on Ionic Bond.
 2. Write a note on Quasi Crystal.
 3. Discuss thermotropic liquid crystal.
- Q.4(B) **Answer the following questions (any one out of two)** (04)
1. Write application of Liquid Crystal.
 2. Write Characteristics of Metallic Glass.
- Q.5(A) **Answer the following questions (any two out of three)** (10)
1. Discuss fabrication of carbon nanotubes.
 2. Write a note on Discovery and Structure of C_{60} .
 3. Write a note on electrical properties of carbon nanotubes.
- Q.5(B) **Answer the following questions (any one out of two)** (04)
1. Discuss quantum nanostructures.
 2. What are the applications of carbon nanotubes?
