Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 07

B.Sc. (CS) (2013 & Onwards)   (Sem.–5)
CONDENSED MATTER PHYSICS
Subject Code : BCS-503
M.Code : 72576

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and a student has to attempt any FOUR questions.**

SECTION-A

1. **Answer briefly :**

   (a) Distinguish between primitive and non-primitive unit cell with the help of two dimensional diagram.

   (b) State 'Bragg's Law'.

   (c) Draw the planes (100) and (110) in a simple cubic unit cell.

   (d) Explain the term 'Brillouin Zone'.

   (e) Why X-rays are used for crystal structure analysis?

   (f) What is the concept of phonon? Which statistics does it obey?

   (g) Define Fermi energy level.

   (h) Explain 'Meissner effect'.

   (i) Why conductivity of metals decreases with rise of temperature?

   (j) What do you mean by Coherent length?

SECTION-B

2. Derive Laue's equations of diffraction of X rays and obtain Bragg's diffraction condition from them.

3. What is reciprocal lattice? Why it is named so? How is reciprocal lattice constructed?

4. Explain the crystal structure of diamond. In diamond crystal what is the number of nearest neighbours, the number of atoms per unitcell and packing fraction?

5. What are the drawbacks of Einstein's model of specific heat? Explaining the assumptions clearly, derive an expression for the lattice specific heat according to Debye model.

6. Distinguish between Type I and Type II superconductors. Discuss BCS theory of superconductivity.

7. Derive an expression for the density of electrons in the conduction band of an n-type semiconductor. What happens to the Fermi level as the temperature increases?

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.