

(i) Printed Pages : 3]

Roll No.

(ii) Questions : 7]

Sub. Code :

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Exam. Code :

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**B.A/B.Sc. (General) 6th Semester
Examination**

1047

PHYSICS

Paper : A (Condensed Matter Physics-II)

Time : 3 Hours]

[Max. Marks : 22

- Note* :- (i) Attempt *five* question in all by selecting *two* questions from each of Unit-I, II and III is compulsory
- (ii) Use of non-programmable calculator is allowed.

Unit-I

1. (a) Obtain an expression for the dispersion relation in case of mono-atomic linear chain of atoms.
- (b) Find the cut off frequency for a one dimensional monoatomic chain, given that the interatomic spacing is 3\AA and velocity of sound is 3000 m/sec.

2.5,1.5

2. (a) Discuss Debye model of specific heat.
(b) Find the value of debye temperature for gold.
The density of gold is 19000 kg/m^3 and velocity of sound is 2100 m/s . Take atomic mass of gold 197. 2.5,1.5
3. Explain Weiss theory of ferromagnetism. Also discuss the variation of saturation magnetisation with temperature. 4

Unit-II

4. (a) What are liquid crystals ? How can they be classified ? Give *two* important properties and applications of liquid crystals.
(b) the dielectric constant of sulphur is 4. Sulphur has cubic structure and its density is 2080 kg m^{-3} . Calculate the atomic polarizability of sulphur. Given that its atomic mass is 32. 2.5,1.5
5. Discuss the BCS theory of superconductors. 4
6. (a) Name the various methods to fabricate the nenomaterials. Discuss how lithography helps us to design the nenostuctures.
(b) What is the size of the human hair on nenometer scale ? 2.5,1.5

Unit-III

7. Attempt any *six* of the following :

- (i) What are the assumptions made in discussing the one dimensional mono-atomic lattice.
- (ii) Why does Debye-Petttis law fail at low temperatures ?
- (iii) Define magnetic susceptibility. What is its Physical significance ?
- (iv) What are domain walls ?
- (v) What are liquid crystals ?
- (vi) Name the *two* types of nanotubes.
- (vii) What is Meissner effect ? 1×6=6