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SUBJECT CODE NO: - Y-2034
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. S.Y (Sem. IV)
Examination March / April - 2023
Physics Paper- XII Solid State Physics

[Time: 1.30 Hours]

[Max. Marks: 50]

Please check whether you have got the right question paper.

N. B

- 1) All questions are compulsory.
- 2) Use of logarithmic table and electronic pocket calculator is allowed.

- Q1 a) Define and explain primitive and non primitive cell. 10
 b) Given the difference between ionic and covalent bonding in solids. 10

OR

- a) Explain Dulong's and Petit's law about lattice heat capacity and compare result with experimental result / Observation 10
 b) Obtain an expression for electrical conductivity of metals. 10

- Q2 a) Write a short notes on "Wigner Sietz primitive cell" 5
 b) Lattice constant of cubic lattice is "a". Calculate spacing between (2 11) plane. 5
 c) Give limitation of Debye theory of lattice heat capacity. 5
 d) The Einstein's temperature of carbon (diamond- Structure) is 2000k, calculate Height lattice frequency involved in a Debye theory. Where $K_B = 1.38 \times 10^{-23} \text{ J/K}$, $h = 6.63 \times 10^{-34} \text{ Js}$. 5

OR

- a) Give characteristics of ionic bonds 5
 b) Calculate bond length "ro" for stable configuration is equal of two atoms which having $m=9$, $n=2$ 5
 c) Write a short note on Transport properties. 5
 d) Calculate the Widemann Frantz ratio at 300°k given that $K_B = 1.38 \times 10^{-23} \text{ J/K}$. 5

Q3 Attempt all questions

10

- The collection of points in three dimension is known as
 - Space lattice
 - Unit cell
 - Basis
 - Crystal
- Total number of distinct crystal system is _____.
 - 6
 - 14
 - 2
 - 7
- Shearing of valence electron is a type of _____ bonding.
 - Ionic
 - Hydrogen
 - Co-valent
 - Vander-Wall
- Hydrogen bond is formed in
 - Alcohol
 - Sodium chloride
 - Chlorine Gas
 - Silver nitrate.
- According to which theorem vibrational energy is distributed equally along each dimension or degree of freedom.
 - Einstein's theorem
 - Equipartition theorem
 - Dulong - Petit's theorem
 - Debye- theorem
- Quantum of elastic vibration is
 - Photon
 - Phonon
 - Graviton
 - meson
- Fermi level is define as
 - Lowest filled level at 0^0 k
 - Longest filled level at 0^0 k
 - Lowest filled level 300^0 k
 - Highest filled level at 300^0 k
- The Weidmann – Franze law is represented by _____.
 - $k/6 \propto T$
 - $K/6 \propto 1/T$
 - $6/k \propto T$
 - None of these
- The Bravais of NaCl is
 - S.C
 - B.C.C
 - F.C.C
 - None of these
- Cesium chloride is which type crystal
 - Ionic crystal
 - Covalent crystal
 - Molecular crystal
 - None of these