B-2156

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SUBJECT CODE NO:- B-2156
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. S.Y (Sem.-IV) Examination OCT/NOV 2019
Physics Paper- XII
Solid State Physics

[Time: 1:30 Minutes]   [Max.Marks:50]

Please check whether you have got the right question paper.

N.B
  i) Attempt all questions.
  ii) Use of logarithmic table and electronic pocket calculator is allowed.

Section A

Q.1   a) Define translation symmetry element Explain   10
       (i) Glide plane symmetry operation.
       ii) Screw symmetry operation
       b) Show that the lattice heat capacity at high temperature approaches classical value 3 &   10
OR
       a) What is cohesive energy? Explain in detail primary bond and secondary bond with suitable   10
       example.
       b) What is Hall effect ? Give experimental determination of Hall coefficient and Hall voltage.   10

Q.2   a) What are the assumption of Debye's theory of lattice heat capacity.   05
       b) Write short note on ionic band   05
       c) For a orthogonal lattice, calculate the distance of plane (2,2,3) from origin, if sides of unit cell are   05
       (1,2,1) along respected axises.
       d) Determine Hall voltage for sign data magnetic field along Y-axis is 1 tesla & drift velocity of   05
       electron is 2.9×10^8 m/sec.
OR
       a) Explain Boarais lattices in three dimensions   05
       b) Write short note on bond formation in valence bond   05
       c) If the Hall coefficient of the specimen sample was 0.0076, calculate density of the specimen   05
       sample
       d) Calculate the value of potential energy for a stable configuration of 2 atoms having M=15 and   05
       N=6

Q.3   Attempt all question   10
       1. The Boarais lattices found in two and three dimensions are
       a) 10 and 32   b) 10 and 5   c) 32 and 14   d) 5 and 14

       2. The coordination number of fcc structure is
       a) 12   b) 8   c) 6   d)4

       3. The density of modes in 1. D is
       a) $\left(\frac{3}{vs}\right)$dv   b) $\left(\frac{1}{vs}\right)$dv   c) $\left(\frac{2}{vs}\right)$dv   d) $\left(\frac{4}{vs}\right)$dv

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4. At high temperature Debye theory shows CV=3R is known as
a) Classical theory   b) Dwong & petit law
c) Einstein theory   d) None of these.

5. Which of the following is not a property of covalent compounds.
a) They are bad conducting of electricity
b) Soluble in polar solvants
c) Crystals are hard , but brittle
d) Have low melting point compared to ionic crystals.

6. In first Brillioun Zone discontinuity in energy occurs at
a) $\pm \pi/a$ b) $\pm 2\pi/a$ c) $\pm 3\pi/a$ d) $\pm \pi/2a$

7. Attractive and repulsive potential energy are function of
a) Charge on atoms
b) masses of atoms
c) interatomic distance
d) gravitational force.

8. Average kinetic energy of an electron at ok in three dimension is.
a) 5/3 of fermi energy   b) $\frac{1}{2}$ fermi energy
c) $\frac{2}{5}$ of fermi energy   d) $\frac{3}{5}$ of fermi energy

9. The Hall electric field per unit current density per unit magnetic field is known as.
a) Hall coefficient   b) Hall voltage
c) Hall mobility   d) Hall current

10. ------ electronic are loosely bound of their individual atoms in the metals.
a) conduction electron   b) valence electron
c) conduction& evidence electron   d) non of these.

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