**M 9933**

V Semester B.Sc. Degree (CCSS-Reg./Supple./Imp.)
Examination, November 2015
Core Course in Physics
**5B08 PHY : PHYSICS OF SOLIDS**

Time : 3 Hours

Max. Weightage : 30

**SECTION – A**

Choose the **correct** answer. **Each** bunch carries a weightage of **1.**

1. i) The bond formed between electropositive elements and electronegative elements is known as _____

   a) Covalent bond

   b) Ionic bond

   c) Metallic bond

   d) Hydrogen bond

   ii) The packing factor of diamond cubic crystal structure is _____

   a) 60%

   b) 56%

   c) 90%

   d) None of these

   iii) Name the following crystal system $a \neq b \neq c$, $\alpha = \beta = 90° \neq \gamma$

   a) Cubic

   b) Mono clinic

   c) Triclinic

   d) Tetragonal

   iv) In body centered cubic structure ratios between interplanar distances

   a) $1 : \sqrt{2} : \sqrt{3}$

   b) $1 : \frac{1}{\sqrt{2}} : \sqrt{3}$

   c) $1 : \sqrt{2} : \frac{\sqrt{3}}{2}$

   d) $1 : \frac{1}{\sqrt{2}} : \frac{1}{\sqrt{3}}$

   (W = 1)

P.T.O.

2. i) X-rays consist of

   a) Negatively charged particles

   b) Stream of neutrons

   c) Electro magnetic radiation

   d) Positively charged particles

   ii) If the mobility of electrons in a metal increases, the resistivity

   a) Decreases                    b) Increases

   c) Remains constant             d) Varies exponentially

   iii) At lower temperatures the lattice specific heat varies as

   a) $T^3$        b) $\frac{1}{T^3}$ .        c) T        d) $\frac{1}{T}$

   iv) The Laue spots are obtained according to the _____

   a) Structure of the crystal used    b) Shape of solid

   c) Periodicity of lattice           d) X-ray

(W = 1)

## SECTION – B

Answer **any six**. **Each** question carries a weightage of **1**.

3. What is a covalent bond ?

4. What is meant by co-ordination number ?

5. What are miller indices ?

6. Explain the terms unit cell and primitive cells.

7. Distinguish between soft X-rays and hard X-rays.

8. Write a note on relaxation time.

9. Obtain the expression for Debye's frequency.

(6×1=6)

10. What is a cooper pair ?

## SECTION – C

Answer **any nine. Each** question carries weightage of **2.**

11. The transition temperature of mercury with an average atomic mass of 200.59 amu is 4.153 K. Determine the transition temperature of one of its isotopes, $^{204}_{80}Hg$.

12. Distinguish between type I and type II super conductors.

13. How did Einstein's theory explain the failure of Dulong and Petit law ?

14. The following data are known for copper. Density $= 8.92 \times 10^3 \text{ kg/m}^3$, Resistivity $= 1.73 \times 10^{-8} \ \Omega \text{ m}$. Atomic weight $= 63.5$. Calculate the mobility and average time of collision of the electrons in copper obeying classical laws.

15. Briefly explain the drawbacks of classical theory.

16. The second order reflection from the plane of NaCl is obtained at an angle $2\theta=40°$ with the incident beam. Calculate the $\lambda$ of the X rays.

17. Determine the value of packing factor for FCC and SC structure.

18. Discuss the various type of interatomic bonding.

19. Describe Bragg's X-ray spectrometer.

20. Illustrate the various symmetry elements present in a cube.

21. Explain Meissner Effect.

22. Briefly explain about Lattice point and space lattice.

(9×2=18)

## SECTION – D

Answer **any one. Each** question carries a weightage of **4.**

23. Explain the electron – scattering mechanism and variation of resistivity with temperature.

24. Briefly outline the BCS theory of superconductivity. Discuss some applications of superconductors.

(1×4=4)

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