Code No. : 10309 E   **Sub. Code : AMPH 63**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023.

Sixth Semester

Physics – Core

SOLID STATE PHYSICS

(For those who joined in July 2020 onwards)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Effective number of atoms belonging to the unit cell of simple cubic structure
    (a) 8   (b) 1
    (c) 4   (d) 6

2. The miller indices of the plane parallel to the X axis and Y axis are
    (a) (100)   (b) (010)
    (c) (001)   (d) (111)

3. The element which has covalently bonded crystal structure is
    (a) aluminium   (b) sodium chloride
    (c) lead   (d) germanium

4. The bond between the ice molecules is
   (a) ionic bond   (b) covalent bond
   (c) metallic bond   (d) hydrogen bond

5. Diamagnetic Susceptibility is
   (a) large, negative   (b) small, positive
   (c) small, negative   (d) large, positive

6. The transition from the ferromagnetic to the paramagnetic state is named after
   (a) Curie   (b) Curie- Weiss
   (c) Neel   (d) Debye

7. Below transition temperature a superconducting material exhibits
   (a) only zero resistance
   (b) only diamagnetic property
   (c) zero resistance and diamagnetism
   (d) zero resistance and ferromagnetism

8. Examples of Type-I Superconductors are
   (a) Al, Nb and Ta   (b) Al, Zn and Hg
   (c) Ta, V and Nb   (d) Al, Zn Ba

9. An example of zero dimensional nanostructure
   (a) Nanoparticles   (b) Nanorods
   (c) Nanotubes   (d) All of the above

10. Carbon nanotubes are the sheets of graphite about
    (a) 0.1 nm   (b) 0.2 nm
    (c) 0.3 nm   (d) 0.4 nm

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Describe the Bravais lattices in a cubic crystals.

    Or

    (b) Describe the crystal structure of Diamond.

12. (a) Write a note on Hydrogen bonding.

    Or

    (b) Outline the comparison between ionic and covalent solids.

13. (a) Explain Domain theory of ferromagnetism.

    Or

    (b) Explain the electronic polarizability in atoms and obtain an expression for it.

14. (a) What is Meissner effect? Show that superconductors exhibit perfect diamagnetism.

    Or

    (b) Write a note on BCS theory of Superconductivity.

15. (a) Write a brief note on Sol gel technique.

Or

(b) Outline the Properties of Fullerene.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Draw and Explain the structure of Nacl.

Or

(b) Derive Bragg law of X ray diffraction.

17. (a) What are ionic crysatals? Explain the formation of ionic crystals. Obtain an expression for its cohesive energy.

Or

(b) What is Madelung constant? Evaluate its value for Nacl.

18. (a) Explain Weiss theory of paramagnetism.

Or

(b) Explain ionic and orientation polarization.

19. (a) Derive London equation.

Or

(b) Outline comparison of Type I and Type II Superconductor.

20. (a) Explain Ball milling method.

Or

(b) Outline the properties and applications of grapheme.

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