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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2023 ONLY)

SUBJECT CODE 23PCY101

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : NOVEMBER 2023

M.Sc.CHEMISTRY **MAXIMUM MARKS: 75**

SEMESTER I **TIME : 3 HOURS**

PART - III
SOLID STATE AND NUCLEAR CHEMISTRY

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS. (K1)

1.What type of compounds are carboranes?

A) Organic compounds B) Inorganic compounds C) Coordination compounds D) Transition metal compounds

2. In a close-packed structure, how many nearest neighbor does each atom/ion have?

A) 4 B) 6 C) 8 D) 12

3. What is the key property of metals that the free electron theory explains?

A) Insulating behavior B) High electrical conductivity C) Low melting point D) Transparency to visible light

4. Which of the following nuclear model describes the nucleus as a liquid drop with cohesive forces?

A) Shell model B) Rutherford model C) Liquid drop model D) Quantum model

5. Which type of nuclear reaction involves bombarding a target nucleus with high-energy particles to change its identity?

A) Transmutation B) Stripping C) Pick-up D) Spallation

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES (K2)

6. List the applications of fullerenes.

7. What is the influence of the radius ratio on crystal structures?

8. Define intrinsic semiconductors?

9. What is the concept of half-life in radioactive decay?

10. How will you determine the Q value in the nuclear reactions.

SECTION – B (5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTION (K3)

11. a) Explain the structure and types of bonding in borazines.

(OR)

b) Describe the structure of S_4N_4 and its significance.

12. a) List the solids based on the close packing of atoms and ions

(OR)

b) Outline the concept of the Madelung constant in the context of ionic crystals.

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13. a) Distinguish between Schottky and Frenkel defects in ionic crystals

(OR)

b) Explain the difference between intrinsic semiconductors impurity semiconductors.

14. a) Explain the difference between Liquid drop model and shell model.

(OR)

b) Describe the Scintillation counters technique.

15. a) Find out the alpha, beta and gamma modes of decay in nuclear chemistry.

(OR)

b) Explain the types of nuclear reactions involving natural and accelerated particles

SECTION – C (5 X 8 = 40 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(K4 (Or) K5)

16. a) Summarize the concepts of catenation and heterocatenation with examples

(OR)

b) Analyze the structure and bonding of dinuclear, trinuclear and tetranuclear metal clusters.

17. a) Derive radius ratio and explain its influence their structures.

(OR)

b) Describe the Born-Haber cycle and provide examples of its applications.

18. a) Elaborate the effects of dislocations on the mechanical properties of materials.

(OR)

b) Explain the following (i) Insulators (ii)Band theory (iii) Super conductors.

19. a) Write the Concepts related to the decay of radioactive isotopes, and how is the half-life period determined?

(OR)

b) Explain the concept of nuclear stability and the factors that influence it

20. a) Summarize the significance of Q value in nuclear reactions

(OR)

b) Explain the following (i) uses of radio isotopes (ii) isotopic dilation method.

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ETHICAL PAPER