



**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**B.Sc. DEGREE EXAMINATION – CHEMISTRY**

**FIRST SEMESTER – NOVEMBER 2023**

**UCH 1501 – BASIC CONCEPTS IN INORGANIC CHEMISTRY**

Date: 01-11-2023

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

**Part-A**

**Answer ALL questions.**

**(10 × 2 = 20)**

1. What do you mean by inert-pair effect?
2. Mention the significance of de Broglie equation.
3. Find the oxidation number of P in  $\text{NaH}_2\text{PO}_4$ .
4. State Usanovich definition of acids and bases.
5. State octet rule and its exceptions.
6. Draw the electron-dot-structure of  $\text{CCl}_4$  and  $\text{CO}_2$ .
7. Why does  $\text{He}_2$  not exist?
8. What are superconductors?
9. Draw the structure of dichlorine monoxide.
10. What are pseudohalogens? Give an example.

**Part-B**

**Answer any EIGHT questions.**

**(8 × 5 = 40)**

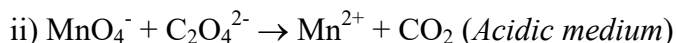
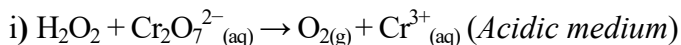
11. Discuss the horizontal and vertical relationships in the periodic table.
12. Illustrate the postulates of Bohr's theory.
13. Discuss Mulliken-Jaffee concept of electronegativity.
14. Explain Lewis theory of acids and bases with examples.
15. Classify the non-aqueous solvents and mention the use of sodium in liquid ammonia.
16. Explain Pearson's concept of hard and soft acids. Cite a few examples.
17. Illustrate the hybridization and geometry of  $\text{PCl}_5$  and  $\text{XeF}_4$  using VSEPR theory.
18. State Sidgwick-Powell theory and explain its role in the prediction of molecular shapes.
19. Construct a qualitative MO energy level diagram for  $\text{O}_2$  molecule. Write the MO electronic configuration and bond order for  $\text{O}_2$  and  $\text{O}_2^+$  molecules.
20. Fluorine molecule is diamagnetic whereas oxygen molecule is paramagnetic. Explain.
21. Write a note on interhalogen compounds of iodine.
22. Write the preparation, properties, and structure of dioxygen difluoride.

### Part-C

**Answer any FOUR questions.**

**(4 × 10 = 40)**

23. Explain the following
  - i) Aufbau principle
  - ii) Pauli's exclusion principle
  - iii) Hund's rule.
24. Discuss the following reactions in liquid ammonia as a solvent
  - i) Acid-base reaction
  - ii) Ammonolysis
  - iii) Precipitation
  - iv) Complex formation
25. Balance the following redox reactions by oxidation number method.



- 26a. Explain the hybridization and geometry of  $\text{ICl}_2^-$  and  $\text{CO}_3^{2-}$ .
- b. Methane and ammonia are  $sp^3$  hybridized. But bond angles are  $109^\circ$  and  $107^\circ$ , respectively. Explain. (5+5)
- 27a. Draw the M.O. diagram of carbon monoxide and write its bond order.
- b. Compare and contrast valence bond and molecular orbital theories. (5+5)
- 28a. Write a note on the anomalous behavior of fluorine.
- b. Explain a method of estimating the amount of chlorine present in bleaching powder. (5+5)

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