

# **KAMARAJ COLLEGE (Autonomous)**

Accredited with A+ Grade by NAAC

(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

THOOTHUKUDI – 628 003

**(5 Pages)**

**Reg. No: .....**

**Question. Code No : 25E00304**

**Sub Code : 24UMCH11**

**UG Degree - End Semester Examinations, April 2025**

**First Semester**

**B.Sc. CHEMISTRY**

**Major - General Chemistry -I**

**(For those who joined in July 2024 onwards)**

**Time : 3 Hours**

**Maximum : 75 Marks**

**PART – A (10 × 1 = 10 Marks)**

**Answer ALL Questions**

**Choose the correct answer :**

1. The shape of s-orbital is
  - (a) Dumb bell
  - (b) Double dumb bell
  - (c) Spherical
  - (d) square
2. Dual nature of an electron was proposed by

- (a) Planck (b) Einstein  
(c) De Broglie (d) Bohr
3. The maximum number of an electron in an orbit is equal to  
(a)  $n$  (b)  $2n$   
(c)  $n^2$  (d)  $2n^2$
4. The size of cation will be \_\_\_\_\_ the size of an atom  
(a) Smaller than (b) Larger than  
(c) Equal to (d) Either smaller or longer than
5. \_\_\_\_\_ type of hybridisation present in tetrahedral complexes  
(a)  $sp$  (b)  $sp^2$   
(c)  $sp^3$  (d)  $dsp^2$
6. The molecule has permanent dipole moment is \_\_\_\_\_  
(a)  $O_2$  (b)  $N_2$   
(c)  $CO_2$  (d)  $HCl$
7. Which among the following is a paramagnetic molecule?  
(a)  $H_2$  (b)  $O_2$   
(c)  $F_2$  (d)  $HCl$
8.  $NaCl$  dissolves readily in water due to  
(a) Keesom forces (b) London forces  
(c) Ion - dipole interactions (d) Dipole - induced dipole interactions

9.  $\text{AlCl}_3$  is an example of
- (a) Negative nucleophile                      (b) Neutral electrophile  
(c) Negative electrophile                      (d) positive nucleophile
10. The central carbon atom of a carbonium ion is \_\_\_\_\_ hybridised
- (a)  $sp$     (b)  $sp^2$   
(c)  $sp^3$     (d)  $sp^3d$

**PART - B (5X5=25 Marks)**

**Answer ALL Questions choosing either (a) or (b).**

**Answer should not exceed 250 words.**

11. (a) Write notes on
- (i) Aufbau principle  
(ii) Pauli's exclusion principle

**(OR)**

(b) Explain : Compton effect

12. (a) Write Schrodinger wave equation. What is its application?

**(OR)**

(b) Explain the structural features of the periodic table.

13. (a) State and explain Fajan's rule.

**(OR)**

- (b) Define lattice energy. Discuss the factors affecting it.
14. (a) Draw the molecular orbital diagram for CO molecule and explain its bond order and magnetic behavior.

**(OR)**

- (b) What is meant by hydrogen bonding? What are the different types of hydrogen bonding? Explain the effects of hydrogen bonding.
15. (a) Explain about addition reaction with examples.

**(OR)**

- (b) What are electrophilic and nucleophile reagents? Explain with examples.

**PART - C (5 X 8 = 40 Marks)**

**Answer ALL Questions choosing either (a) or (b).**

**Answer should not exceed 500 words.**

16. (a) Derive de Broglie wave equation. How it is verified experimentally?

**(OR)**

- (b) Discuss briefly about Bohr's model of an atom
17. (a) Define electronegativity. Explain the methods of determination of electronegativity.

**(OR)**

(b) Discuss the postulates of Quantum mechanics.

18. (a) Describe VSEPR theory. Explain the structure of  $\text{NH}_3$  and  $\text{BeCl}_2$ .

**(OR)**

(b) Define dipole moment. Give its application.

19. (a) Describe the band theory of metallic bonding.

**(OR)**

(b) Give the comparison of VB and MO theories.

20. (a) Explain how the inductive effect influence the basic strength of amines.

**(OR)**

(b) Define hyper conjugation affect and explain its influence in the reactivity of organic compounds