

KAMARAJ COLLEGE (Autonomous)

Accredited with A+ Grade by NAAC

(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

THOOTHUKUDI – 628 003

(6 Pages)

Reg. No:

Question Code No : 25000310

Course Code: 25UFCH11

UG Degree - End Semester Examinations, November 2025

First Semester

B.Sc. CHEMISTRY

Foundation Course in Chemistry

(For those who joined in June 2025 onwards)

Time: 3Hours

Maximum: 75 Marks

PART – A (10 × 1 = 10 Marks)

Answer ALL Questions

Choose the correct answer:

1. Which one of the following orbitals is non- directional

(a) p - orbital

(b) d- orbital

(c) s - orbital

(d) f - orbital

2. The general electronic configuration of d-block elements is

(a) $(n-1)d^{1 \text{ to } 10}ns^2$

(b) $(n-1)d^{1 \text{ to } 9}ns^2$

(c) $(n-1)d^{1 \text{ to } 10}ns^1$ (d) $(n-1)d^{1 \text{ to } 10}ns^{0,1}$

3. Which one of the following compounds show sp^3d hybridisation?

(a) CH_4

(b) PCl_5

(c) BF_3

(d) $BeCl_2$

4. The paramagnetic substance among the following is _____

(a) Fe

(b) O_2

(c) Co

(d) N_2

5. Pick out the aromatic compound from the following.

(a) toluene

(b) cyclobutane

(c) Cyclohexane

(d) cyclopropane

6. The IUPAC name of $CH_2=CH-COOH$ is

(a) propanoic acid

(b) propenoic acid

(c) butanoic acid

(d) butenoic acid

7. Gases deviate from ideal behaviour at _____

(a) low pressure and high temperature

(b) high temperature and high pressure

(c) low temperature and high pressure

(d) low pressure and low temperature

8. The surface tension of water is due to _____

(a) density

(b) hydrogen bonding

(c) viscosity (d) vapour pressure

9. The correct order of energy of a molecule is

(a) $E_{tr} > E_{el} > E_{vib} > E_{rot}$ (b) $E_{tr} > E_{vib} > E_{el} > E_{rot}$

(c) $E_{el} > E_{vib} > E_{rot} > E_{tr}$ (d) $E_{rot} > E_{el} > E_{vib} > E_{tr}$

10. Wavelength is the reciprocal of _____

(a) frequency (b) amplitude

(c) intensity (d) wave number

PART - B (5 X 5 = 25 Marks)

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

Answer should not exceed 250 words.

11. (a) State and explain Pauli's exclusion principle with an example.

(OR)

(b) Give reason

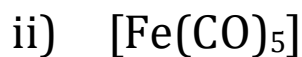
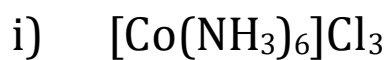
i) The ionisation energy decreases as we move across a group.

ii) Noble gases have zero electron affinity.

12. (a) Apply the principle of hybridisation and predict the hybridisation and geometry of BF_3

(OR)

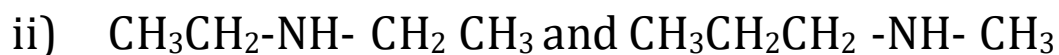
(b) Calculate the oxidation state of central metal ion in the following complexes



13. (a) 'Carbon is unique in nature.' Justify this statement by giving evidences.

(OR)

(b) Explain the type of isomerism that exist between the following molecules



14. (a) How do you apply Linde's process for the liquefaction of gases?

(OR)

(b) Differentiate between crystalline and amorphous solids.

15. (a) State and explain Born- Oppenheimer approximation.

(OR)

(b) Distinguish absorption and emission spectrum with a neat sketch.

PART - C (5 X 8 = 40 Marks)

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

Answer should not exceed 500 words.

16. (a) Classify the elements found in the periodic table based on electronic configuration.

(OR)

- (b) Explain the four quantum numbers. Give their significances.

17. (a) Based on Fajan's rule, give the conditions required for a compound to undergo transition from ionic to covalent character.

(OR)

- (b) i) Calculate the percentage ionic character of HCl. The bond length is 1.275 \AA and the observed dipole moment is 1.03 D .

- ii) Differentiate paramagnetic from diamagnetic substances.

18. (a) i) Analyze why meso compound and racemic mixture are optically inactive.

- ii) Compare the properties of a homocyclic and heterocyclic compounds.

(OR)

(b) Classify hydrocarbons into its types and give examples for each type.

19. (a) Explain hexagonal close packing and cubic close packing with a neat diagram.

(OR)

(b) Identify the types of intermolecular forces that exist between molecules.

20. (a) Summarize the characteristics of a wave.

(OR)

(b) Discuss the various types of spectroscopy.