Answer any 4 Questions from 1 to 5.
Each Carries one mark.

1. Find the number of Significant figure in 0.0025

2. Give the Hybridisation of S in SF_6.

3. Identify the Intensive property among the following.
   a) Mass   b) Volume
   c) Density   d) Internal energy.

4. Write the Conjugate acid and Conjugate base of H_2O.

5) Aniline – Water mixture is separated by ——— method.

Answer any 8 Questions from 6 to 15. Each Carries Two mark.

6. Name and State the law of Chemical Combination illustrated by the pair of Compounds CO and CO_2.

7. Calculate the de-Broglie wavelength of a ball moving with velocity 100m/s having mass 0.1 kg.

8. Match the following.

Quantum Number	Information Provided.
1. Principle Quantum Number	a) Orientation of Orbital
2. Azimuthal Quantum Number	b) Energy and Size of Orbital
3. Magnetic Quantum Number	c) Spin of Orbital
4. Spin Quantum Number	d) Shape of the Orbital.

9) who proposed modern periodic law and state the law.

10) Dipole moment of NH_3 is greater than that of NH_3. Account.

11) Write Gibb's Helmoltz equation and give the criterion for a reaction to be spontaneous

12) The solubility product of $Al(OH)_3$ is 2.7×10^{-11}. Calculate its solubility.

13) Identify the oxidant and reductant in the following reaction.

$$Cu_2S + 2Cu_2O \longrightarrow 6Cu + SO_2$$
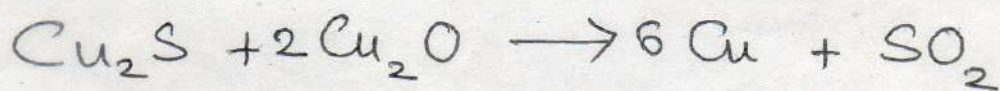
14) Write the structure and IUPAC names of the chain isomers of C_4H_{10}

15) Explain Wurtz reaction with an example.

Section. C

Each question carries 3 marks.

16) A compound contains 4.07% hydrogen, 24.27% carbon and 71.65% chlorine. Its molar mass is 98.96 g. what are its empirical and molecular formula.

17) Write any 3 postulates of Bohr's model of atom.

18) What is ionisation enthalpy? How does it varies along a period? Give reason.

19) Explain geometry of NH_3 and H_2O using VSEPR theory.

20) Draw Born-Haber cycle for the calculation of lattice enthalpy of $NaCl$.

21) What are buffer solutions? Give example for two types of buffer solutions.

22) Balance the following redox reaction in acidic medium using half reaction method.
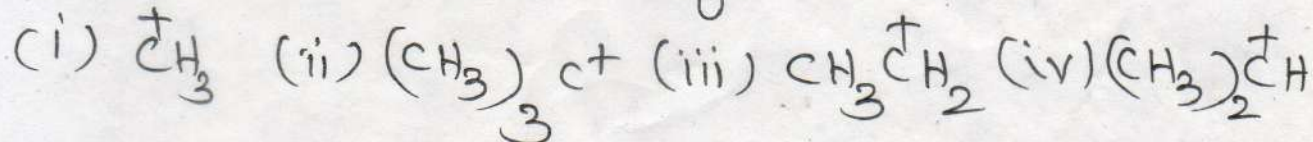
$$Cr_2O_7^{2-}{}_{(aq)} + SO_3^{2-}{}_{(aq)} \longrightarrow Cr^{3+}{}_{(aq)} + SO_4^{2-}{}_{(aq)}$$
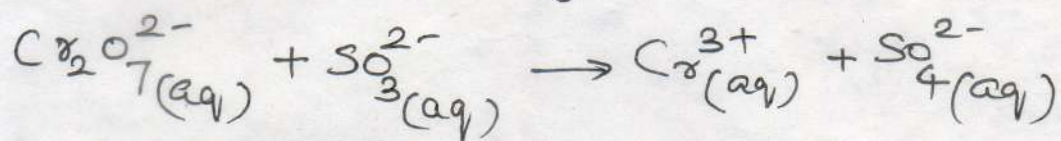
23) What are isoelectronic species. Arrange the following in the increasing order of size.

$$O^{2-}, Na^+, F^-, Mg^{2+}, Al^{3+}$$
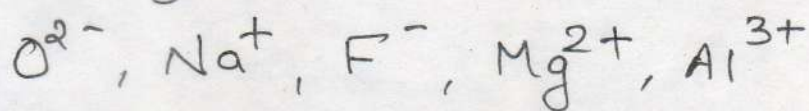
24) Derive the relationship between C_p and C_v.

25) Arrange the following in the increasing order of stability

(i) $\overset{+}{C}H_3$ (ii) $(CH_3)_3\overset{+}{C}$ (iii) $CH_3\overset{+}{C}H_2$ (iv) $(CH_3)_2\overset{+}{C}H$

Justify.

26) Draw the eclipsed and staggered conformations of Ethane. Which is more stable? why?

<u>Section. D</u>

27 (i) What is Photoelectric effect.   (2)

(ii) Threshold frequency (γ_0) of a metal is $6.2 \times 10^{14} s^{-1}$. Calculate Kinetic energy of an electron emitted when a radiation of frequency (γ) $8.7 \times 10^{14} s^{-1}$ strikes on it.   (2)

28) Draw the molecular orbital diagram of O_2. Calculate its bond order. and account for its magnetic property.

29) State Le-chatlier principle.
What is the effect of temperature and pressure on the following equilibrium.

$$2 NO_2 \text{ (g)} \rightleftharpoons N_2 O_4 \text{ (g)} , \Delta H = -57.2 \text{ kJmol}^{-1}$$
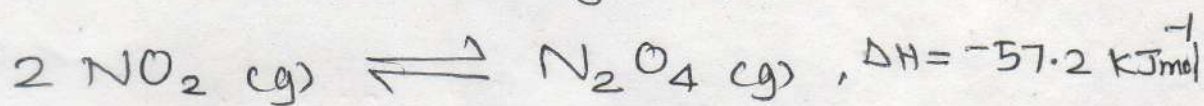
30) How will you detect Nitrogen and sulphur in an organic compound using Lassaigne's test?

31) Identify A, B, C and D.

(i) $3 \quad CH \equiv CH \xrightarrow[\text{873 K.}]{\text{red hot Iron tube}} A$

(ii) $CH_3 - CH = CH_2 + HBr \xrightarrow{\text{Peroxide}} B$

(iii) [benzene ring] $+ CH_3 Cl \xrightarrow{\text{Anhydrous } AlCl_3} C$

(iv) $CH_3 COONa + NaOH \xrightarrow[\Delta]{CaO} D$