INSTRUCTION:

i) **The question paper has four parts A, B, C and D. All parts are compulsory.**

ii) **Write balanced chemical equations and draw diagrams wherever necessary.**

iii) **Use log tables and simple calculator if necessary. (use of scientific calculators is not allowed)**

PART-A

I   **Answer the following questions:**   **10 x 1 = 10**

1. Name the law behind the dissolution of CO_2 gas in soft drinks under high pressure.
2. Ornamental gold containing copper is an example for what type of solution?
3. What happens to molar conductivity when one mole of KCl dissolved in 1 litre is diluted to 5 litres?
4. What happens to the half life period for a first order reaction, if the initial concentration of the reactant is increased?
5. Name the adsorbent used in the removal of colouring matter from solution.
6. Give reason for chemical inertness of noble gases.
7. Write the structure of XeF_4.
8. Which gas is liberated when 2-bromopropane is heated with alcoholic potash?
9. Ethanal undergoes aldol condensation reaction. Give reason.
10. Name the nucleic acid which is responsible for genetic information.

PART-B

II   **Answer any Five of the following:**   **5 x 2=10**

11. What type of stoichiometric defect is shown by the following solids? (a) AgCl (b) KCl
12. What is molar conductivity? How is it related to the conductivity of a solution whose concentration is $Cmol/m^3$?
13. The rate constant of a certain first order reaction is $200s^{-1}$. What is its half life period?
14. Give any two differences between lanthanoids and actinoids.

15. Explain Wurtz- Fitting reaction.
16. How are carboxylic acids prepared from nitriles?
17. Explain Clemmenson's reduction with an example.
18. How do you convert aniline to BDC? Give equation.

PART-C

III   Answer any Five of the following: 5 x 3 = 15

19 (a) Write the structure of Orthophosphoric acid. Mention its basicity.
(b) Why dinitrogen is inert at room temperature?

20. Complete the following chemical equations.

   (i) $PbS + 4 O_3$ →   _____+_____
   (ii) $Cu + 2 H_2SO_4$ → _____ +_____ +2 H_2O
   (iii) $Cl_2 +2 H_2O + SO_2$ →_____ +2 HCl

21. (a) How is chlorine prepared using $KMnO_4$?
   (b) Give reason.
   (i) Fluorine exhibit only -1 oxidation state.
    (ii) HF is liquid but other hydrogen halides are gases.

22. a) Melting point of transition metals increases upto d^5 configuration and then decreases. Explain.
   b) Calculate the magnetic moment of Sc^{3+}.
   c) Among Zn^{2+} and Co^{3+} which is not attracted by a magent ?   1+1+1

23. a) Among $La(OH)_2$ and $Ln(OH)_2$ which is more basic in nature. Why?
   b) Name the element which is radioactive in lanthanoids.   2+1

24. (a) Give the IUPAC name of $[Ti(H_2O)_6]^{3+}$
   (b) Draw cis and trans isomers of $[Pt(NH_3)_2Cl_2]$ 1+2

25. Explain the formation of $[Co(NH_3)_6]^{3+}$ complex based on VBT.

26. (a) Define co-ordination number of metal ion in a complex? What is the co-ordinatin number of Fe in $[FeCl_2(en)_2]Cl$.

   (b) Is metal carbonyl, homoleptic or heteroleptic complex?   2+1

PART-D₄

IV   Answer any Three of the following: 3 x 5 = 15
27. a) Calculate the packing efficiency in simple cubic lattice.
   (b) Silver forms ccp lattice. The edge length of its unit cell is 200 pm. Calculate the density of silver. (Given N_a = 6.022 x 10^{-23} ,atomic mass of Ag = 108g/mol)
                    3+2

28. a) Addition of 0.643g of compound to 50ml of a liquid (density = 0.879g/mL) lowers the freezing point from 5.51°C to 5.03°C. Calculate the molar mass of the compound. (K_f for benzene = 5.12KKg/mol)
    b) Mention two differences between ideal and non-ideal solutions.   (3+2)

29. a) How does the electronic conductance and ionic conductance vary with increase of temperature?
    b) Calculate the EMF of the cell in which the following reaction takes place
    $Mg_{(s)} + 2Ag^+_{(0.0001M)} \longrightarrow Mg^{2+}_{(0.001M)} + 2Ag_{(s)}$. $E°(Mg^{2+}/Mg) = 2.37V$ and $E°(Ag^+/Ag) = 0.80V$
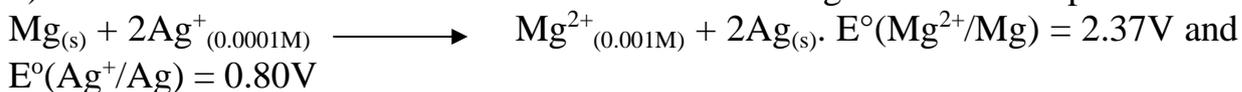
    2+3

30. a) Show that $t_{1/2}$ of a first order reaction is independent of initial concentration of the reactants.
    (b) Mention any 3 factors which influence the rate of a reaction.   2+3

31. (a) Mention any 3 differences between lyophilic and lyophobic colloids.
    (b) Give any two characteristics of chemisorption.   3+2

PART-D$_5$

V. **Answer any FOUR of the following**   **4 x 5 = 20**

32. (a) Explain S_N1 mechanism with example.
    (b) Name the product formed when chloromethane reacts with (i) aqueous KOH and (ii) alcoholic AgCN
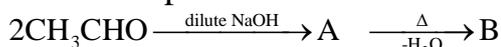   (c) What is asymmetric carbon?   2+2+1

33. (a) Explain esterification reaction between acetic acid and ethylalcohol as an example.
    (b) Boiling point of alcohol is greater than the boiling point of hydrocarbons of comparable molar masses. Why?
    (c) What is the effect of $-NO_2$ group on the acidic strength of phenol? Give reason.   2+1+2

34. (a) Explain Etard reaction.
    (b) Name the product A and B in the following reaction
    $2CH_3CHO \xrightarrow{\text{dilute NaOH}} A \xrightarrow[-H_2O]{\Delta} B$
    (c) Name the reagent used in the decarboxylation of carboxylic acid.   2+2+1

35. (a) Complete the reaction $C_6H_5CHO \xrightarrow{\text{Conc.HNO}_3 / H_2SO_4}$
    $C_6H_5CH_3 + CrO_2Cl_2 \xrightarrow[H_3O^+]{CS_2}$
    (b) (i) Name the main product when aniline is heated with alcoholic KOH and chloroform.
    (ii) Give the IUPAC name of $(CH_3)_2N-C_2H_5$
    (c) Complete the chemical equation $CH_3CONH_2 \xrightarrow{Br_2 / NaOH}$.   2+2+1

36. (a) Write the Haworth structure of β-D(+)glucopyranose.
    (b) How peptide bonds are formed? How many peptide bonds are present in tripeptide?
    (c) Name the base which forms hydrogen bonds with adenine in double stranded helix structure of DNA.   2+2+1

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