Time: 3 Hours 15 Minutes   **Max. Marks: 70**

INSTRUCTIONS : 1. The question paper has four parts: A, B, C and D. All parts are compulsory.

         2. Write balanced chemical equations and draw labeled diagrams wherever required.

         3. Use log tables and the simple calculator if necessary. (Use of scientific calculators is not allowed)

PART-A

I.   **Answer ALL of the following. (Each question carries 1 mark)**   **10 × 1 = 10**

1. What happens when a pressure greater than osmotic pressure is applied on solution separated from solvent by semipermeable membrane?
2. When does a solution exhibit same osmotic pressure?
3. What is the effect of dilution on molar conductivity of electrolytes?
4. A reaction 3A → 2B + C is carried in a closed vessel, the rate of disappearance of A is $0.01 molL^{-1}s^{-1}$. Calculate d[B]/dt & d[C]/dt
5. State Hardy-Schulze rule.
6. Name the common element present in the anode mud.
7. Nobel gases have very low boiling point, why?
8. Name the mixture, which has equimolar concentration of d & l isomers of an optically active compound.
9. Name the compound obtained by the reduction of propanaldehyde by amalgamated zinc and concentrated HCl.
10. Give an example of fibrous protein

PART-B

II.   **Answer any FIVE of the following. (Each question carries 2 marks)**   **5 × 2 = 10**

11. What are anti ferromagnetic substances? Give example.
12. Explain mercury cell.
13. For a reaction activation energy is zero. What is the value of rate constant at 300K, if K = 1.6×10^{6} at 280K. Given R = $8.314 JK^{-1}mol^{-1}$.
14. What is lanthanoid contraction?
15. How do you convert phenol to salicylaldehyde? Give equations.
16. Give the equation for the preparation of benzaldehyde from benzene. Name the reaction.
17. (a)Give one example each for (i) Anionic detergent (ii) Cationic detergent.
    (b) Give one example each for (i) Food preservative and (ii) Artificial sweetener.
18. What are tranquilizers? Give an example.

PART-C

III.   **Answer any FIVE of the following. (Each question carries 3 marks)**   **5 × 3 = 15**

19. Out of C and CO which is the better reducing agent for reduction of ZnO.   (3)
20. How is nitric acid prepared by Ostwald's method?   (3)
21. Complete the following reactions
    $S + H_2SO_4 \rightarrow$
    $PbS + O_3 \rightarrow$
    $SO_2 + Fe^{3+} + H_2O - \rightarrow$ (1+1+1)
22. List two anomalous properties of fluorine.   (3)

23. (a) Why do d block elements form complexes?
    (b) Give an example for interstitial compound.   (2+1)
24. (i) Which is the most stable oxidation state of actinoids?

(ii) Actinoid contraction is greater from element to element than lanthanoid Contraction, Why?

(iii) Most of the transition elements do not displace hydrogen from dilute acids. Why?(1+1+1)

25. List out the postulates of Werner's theory. (3)

26. Draw the sketch to show the splitting of d- orbitals in an octahedral crystal field. Explain how d-orbitals split in octahedral crystal field with respect to d^6 configuration and how it affects the value of Δ_0 & P. (3)

PART-D

IV. **Answer any THREE of the following. (Each question carries 5 marks)** **3 × 5 = 15**

27. (a) Explain with example how n-type & p-type semiconductors are formed?
(b) How many tetrahedral and octahedral voids are possible if number of close packed spheres in two layers is N. (3+2)

28. (a) With the help of vapour pressure temperature diagram explain depression in freezing point of a solution of non-volatile solute in volatile solvent. How do you determine molar mass of solute using above property?
(b)What is reverse osmosis? Mention any one of its use. (3+2)

29. (a) Discuss the mechanism for rusting of iron.
(b) Explain electrolysis of molten NaCl. (3+2)

30. (a) The ¾th of a first order reaction is completed in 32 minutes. What is the half life period of the first order reaction?
(b) What is pseudo first order reaction? (3+2)

31. (a) What is shape selective catalysis. Explain with an example.
(b) Explain what is observed
   (i) When a beam of light is passed through colloidal sol.
   (ii) Zig-zag movement of colloidal particle.
   (iii) The migration of colloidal particles either towards cathode or anode. (2+3)

V. **Answer any FOUR of the following. (Each question carries 5 marks)** **4 × 5 = 20**

32. (a) What is the product formed when secondary butyl bromide reacts with alcoholic KOH? Write the equation and give the IUPAC name of the product.
(b) Racemic mixture is optically inactive give reason. (3+2)

33. (a) Complete the following reactions
   (i) CH_3CH_2MgBr + HCHO -----------$\rightarrow$ -----------

   (ii) C_6H_5-OH + Br_2 --------$\rightarrow$ --------------

   $$CS_2$$
   (iii) C_6H_5-OH + conc. HNO_3 ------------$\rightarrow$ -------------

   b) Arrange the following in the increasing order of their acidity and justify your answer.
   C_6H_5-OH ; C_6H_5-OH (ortho)CH_3; C_6H_5-OH (ortho)NO_2. (3+2)

34. (a) Explain the addition mechanism of HCN to aldehydes or ketones.
(b) Give two tests to distinguish between propanal and propanone. (3+2)

35. (a) What is Hinsberg test? How does it help in distinguishing primary secondary and tertiary amines?
(b) Explain Gabriel Phthalimide synthesis for amines. (3+2)

36. (a) Write the Haworth structures of Lactose and Sucrose.
(b) What are the common types of secondary structure of proteins? (3+2)

37. (a) Write the name and structure of monomer units in (i) Nylon 6,6 (ii) Terylene.
(b) Give an example for (i) natural polymer and (ii) Synthetic rubber. (3+2)

Time: 3 Hours 15 Minutes   Max. Marks: 70

PART A

I.   Answer all of the following (each question carries 1 mark)

1.   Define osmotic pressure.
2.   When salt dissolved in water what happens to its boiling point?
3.   What is limiting molar conductivity?
4.   What is the order of the reaction which has rate expression rate $=k\,[A]^{1/2}[B]^{3/2}$
5.   What is the dispersed phase and medium in foam?
6.   Which method is used for refining of Zirconium and Titanium?
7.   Why is helium used as diluent in diving apparatus?
8.   Which of the following is more reactive towards S_N1 ? $(CH_3)_3CBr$, CH_3Br , $(CH_3)_2CHBr$
9.   Name the reaction from which α – bromo acetic acid is prepared?
10. Name the vitamin responsible for coagulation of blood.

PART –B

II.   Answer any five of the following (each question carries 2 mark)

11. Calculate the number of particles in unit cell of Fcc cube.
12. Calculate molar conductance at infinite dilution for acetic acid given λ_m^∞ HCl = 425 $\Omega^{-1}cm^2mol^{-1}$,
     λ_m^∞ NaCl =188 $\Omega^{-1}cm^2mol^{-1}$
     and λ_m^∞ CH_3COONa =96 $\Omega^{-1}cm^2mol^{-1}$.
13.   Distinguish between order and molecularity of a reaction.
14. How does acidified potassium permanganate solution react with oxalic acid solution? Write the ionic equation for the reaction.
15. Explain Williamson's ether synthesis with an example.
16. Arrange the following acids in decreasing order of their acidity
     C_6H_5COOH , $CH_2(Cl)COOH$,$HCOOH$,$CH(Cl_2)COOH$
17. Why do soaps not work in hard water?
18. (i)Name a substance which can be used as an antiseptic as well as disinfectant.
     (ii) Name the sweetening agent used in the preparation of sweets for a diabetic patient.

PART –C

III.   Answer any five of the following. (Each question carries 3 marks)

19. a) Write down the reactions taking place in blast furnace related to the metallurgy of iron in the temperature range 500-900K.
     b) Explain Hall –Heroult's process?   (2+1)
20. a) Why does PCl_5 fume in moist air? Explain with the help of reactions.
     b) N_2 is inert at room temperature. Give reason.   (2+1)
21. a) Give reason why water is liquid and hydrogen sulphide is a gas.
     b) Give the structure of pyrodisulphuric acid.   (2+1)
22. a) Explain the action of chlorine on slaked lime.
     b) What is aquaregia?   (2+1)
23.   a) Why most of d –block elements are catalyst?
     b) Which divalent metal ions have maximum paramaganetic character among the first transition metal series?   (2+1)
24. How is potassium dichromate prepared from chromite ore?   (3)
25. Using VBT explain hybridization, magnetic behavior and geometry 0f $[NiCl_4]^{2-}$.
26. a) What is ionization isomerism ? Give an example.
     b) Give the IUPAC name of $[Co(NH_3)_4(H_2O)_2]Cl_3$ (2+1)

PART –D₁

IV. **Answer any three of the following (each question carries 5 marks)**

27. a) Write a note on metal excess defect with suitable example.
    b) Write difference between metallic and covalent solids .   (3+2)

28. a) Give reason
       (i) NaCl dissolves in water not in benzene.
       (ii) Negative deviation is observed for a solution of chloroform and acetone.
       (iii) Raisin kept in water swells in size.
    b) A 4% solution of non volatile solute is isotonic with 0.702% urea. Calculate the molar mass of non volatile solute (molar mass of urea = 60 $gmol^{-1}$)   (3+2)

29. a) Explain SHE
    b) Write the reactions of lead storage cell during charging and   recharging   (3+2)

30. a) Derive an expression for rate constant in zero order integrated rate equation .
    b) Why does the rate of a reaction increases with the rise in temperature?   (4+1)

31. a) Explain the mechanism of Enzyme catalysis.
    b) Write any two differences between Lyophylic and Lyophobic solution.   (3+2)

PART D₂

V. **Answer any four of the following questions (each question carries 5 marks)**

32. a) How do you bring about the following conversions
       (i) Chloroethane to nitroethane
       (ii) Bromopropane to fluoropropane
       (iii) Prop-1-ene to chloropropane.
    b) A + $SOCl_2$ $\xrightarrow{Pyr}$ $CH_3-CH_2- Cl$ $\xrightarrow{AgCN}$ B what is A and B ?   (3+2)

33. a) Explain Kolbel's reaction .What is the reagent used in oxidation of primary alcohol to aldehyde?
    b) How is phenol prepared by Cumene?   (3+2)

34. a) Give the chemical equations for the following conversions .
       (i) Ethane nitrile to ethanol
       (ii) Acetyl chloride to acetone
       (iii) Methyl magnesium iodide to acetic acid.
    b) Explain Cannizzaro's reaction with suitable example.   (3+2)

35. a) Write chemical equation for the following conversions
       (i) Benzene diazonium chloride to nitrobenzene
       (ii) Aniline to Sulphanilic acid
       (iii) Ethanamine to N-Ethyl ethanamide
    b) How do you obtain p- bromo aniline (mono substituted product) from aniline?   (3+2)

36. a) (i) What are reducing sugars ?Give an example
       (ii) Name the storage polysaccharide in plants.
    b) What is isoelectric point of an amino acid? Write the Zwitter ion structure of glycine.   (3+2)

37. a) (i) Write the partial structure of the polymer polystyrene and Teflon
       (ii) Name the monomer units present in Bakelite.
    b) What is a biodegradable polymer? Give an example.   (3+2)

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