(English Version)

Instructions : *1. The question paper has four parts. All parts are compulsory.*

2. Part-A carries 10 marks. Each question carries one mark.

Part-B carries 10 marks. Each question carries two marks.

Part-C carries 15 marks. Each question carries three marks.

Part-D carries 35 marks. Each question carries five marks.

3. Write balanced chemical equations and draw diagrams wherever necessary.

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

PART – A

I. Answer **all** the questions. Each question carries **one** mark. (Answer each question in **one word** or in **one sentence**) : **(10 × 1 = 10)**

1) State Henry's law.

2) Van't Hoff's factor for a solution is less than one, what is the conclusion drawn from it.

3) How many Faraday of electricity is required to reduce 1 mole of MnO_4^- ions to Mn^{2+} ions?

4) If the unit of rate constant of a reaction is $mol^{-1}LS^{-1}$ then mention its order.

5) Name a metal refined by Van Arkel method.

6) Complete the following equation.

$XeF_6 + H_2O \rightarrow ..... + 2HF$.

7) What is an ambidentate ligand?

8) Name the following reaction.

$H_3C - Br + AgF \rightarrow H_3C - F + AgBr$.

9) Ethanal (CH_3CHO) undergoes aldol condensation reaction. Give reason.

10) Deficiency of which vitamin causes the disease "Rickets".

PART – B

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

11) What is Frenkel defect? How does it affect density of the solid?

12) Draw a neat labelled diagram of $H_2 - O_2$ fuel cell. Write the reaction occurs at cathode of the cell.

13) A first order reaction is found to have a rate constant, $K = 5.5 \times 10^{-14} S^{-1}$. Find the half-life of the reaction.

14) Give reason :

a) Cerium (Ce) exhibits +4 oxidation state.

b) Actinoid contraction is greater from element to element than lanthanoid contraction.

15) How anisole reacts with bromine in ethanoic acid? Write the chemical equation for the reaction.

16) Explain the preparation of carboxylic acids from Grignard reagent. Give equation.

17) Give an example each for

a) Artificial sweetening agents

b) Narcotic analgesics.

18) What are cationic detergents? Give an example.

PART – C

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

19) Explain the process of obtaining "blister copper" from "copper matte" with equations.

20) Write the equations involved in the manufacture of nitric acid by Ostwalds process by maintaining reaction conditions.

21) a) How is Ozonised oxygen prepared in the laboratory? Give equation. **(2)**

b) Give the composition of "Oleum". **(1)**

22) Complete the following equations :

a) $2NaOH + Cl_2 \rightarrow NaCl + ... + H_2O$ **(1)**

b) $Na_2SO_3 + 2HCl \rightarrow 2NaCl + H_2O + ...$ **(1)**

c) $Cl_2 + 3F_2 \xrightarrow{573K} .....$ **(1)**

23) How is potassium permanganate ($KMnO_4$) prepared from MnO_2? Write the equations. **(3)**

24) a) Why 3d-series of elements acts as good catalyst? **(2)**

b) Given reason : Ti^{4+} salts are colourless where as Cr^{3+} salts are coloured. **(1)**

25) With the help of Valence Bond Theory (VBT), explain hybridisation, geometry and magnetic property of $[NiCl_4]^{2-}$. **(3)**

26) a) Write the IUPAC name of : $[Co(NH_3)_4(H_2O)Cl]Cl_2$. **(1)**

b) Explain linkage isomerism with example. **(2)**

PART – D

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

27) a) Calculate packing efficiency in simple cubic lattice. **(3)**

b) An element having atomic mass 107.9 u has FCC lattice. The edge length of its unit cell is 408.6 pm. Calculate density of the unit cell. [Given, $N_A = 6.022 \times 10^{23} mol^{-1}$]. **(2)**

28) a) The boiling point of benzene is 353.23 K. When 1.80 g of a non-volatile, non-ionisable solute was dissolved in 90 g of benzene, the boiling point raised to 354.11 K. Calculate molar mass of the solute. [K_b for benzene = 2.53 K Kg mol^{-1}]. **(3)**

b) Define :

i) Molality of a solution. **(1)**

ii) Isotonic solutions. **(1)**

29) a) Calculate e.m.f. of the cell for the reaction :

$$Mg_{(s)} + Cu^{2+}(0.0001\,M) \rightarrow Mg^{2+}(0.001\,M) + Cu_{(s)}$$

Given that : $E^{o}_{Mg^{2+}/Mg} = -2.37\ V$

$E^{o}_{Cu^{2+}/Cu} = +0.34\ V$. **(3)**

b) i) State Kohlrausch law. **(1)**

ii) What is meant by limiting molar conductance. **(1)**

30) a) Derive an integrated rate equation for rate constant of a first order reaction. **(3)**

b) Draw a graph of potential energy V/S reaction co-ordinates showing the effect of catalyst on activation energy (E_a) of a reaction. **(2)**

31) a) Write any two differences between lyophilic and lyophobic colloids. **(2)**

b) What is heterogeneous catalysis? Give an example. **(2)**

c) Give an expression for Freundlich adsorption isotherm. **(1)**

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

32) a) Write the equations for the steps in S_N1 mechanism of the conversion of tert-Butyl bromide into tert-Butyl alcohol. **(2)**

b) Explain Fittig reaction. **(2)**

c) Name the reagent used in the dehydrohalogenation of haloalkanes. **(1)**

33) a) Write the mechanism of acid catalysed dehydration of ethanol to ethene. **(3)**

b) Between phenol and alcohol which is more acidic? Why? **(2)**

34) a) Explain Rosenmund reduction with equation. **(2)**

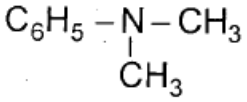
b) How does propanone (CH_3COCH_3) reacts with hydrazine? Give equation. **(2)**

c) Name an oxidising agent used in the Etard's reaction. **(1)**

35) a) Explain carbyl amine reaction with equation. **(2)**

b) How does nitrobenzene is reduced to aniline? Give equation. **(2)**

c) Write the IUPAC name of



(1)

36) a) Write Haworth structure of "Lactose". **(2)**

b) i) What are non-essential amino acids? **(1)**

ii) Write Zwitter ionic structure of "glycine". **(1)**

c) Name the nitrogenous base present in RNA but not in DNA. **(1)**

37) a) Explain the preparation of Nylon–6, 6 with equation. **(2)**

b) What are thermoplastic polymers? Give an example. **(2)**

c) Write the structure of isoprene (2-methyl–1, 3-butadiene). **(1)**

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