KENDRIYA VIDYALAYA SANGATHAN JAMMU REGION

FIRST PREBOARD EXAMINATION 2025-26 **SET NO. II**

CODE: 4312

Class: XII **Maximum Marks: 70**

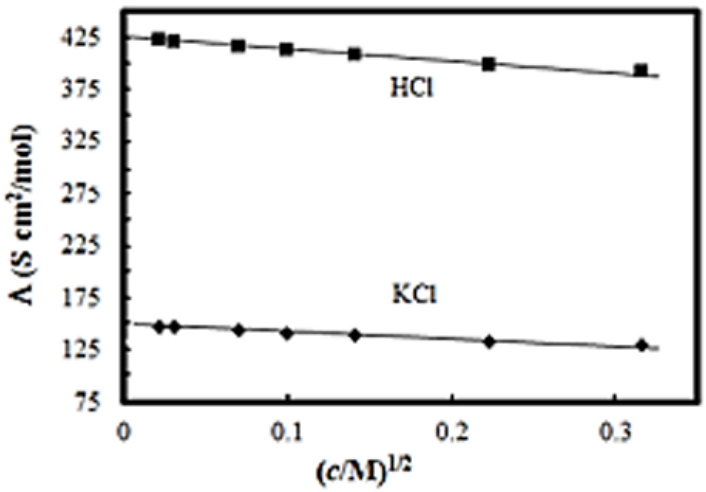
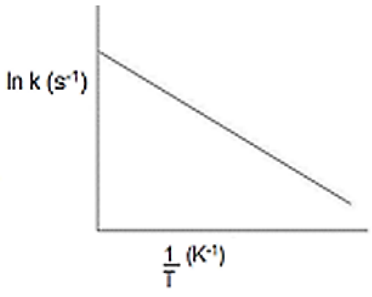
Subject: Chemistry (Theory) **Time Allowed: 3 Hrs**

GENERAL INSTRUCTIONS:

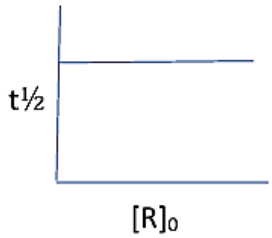
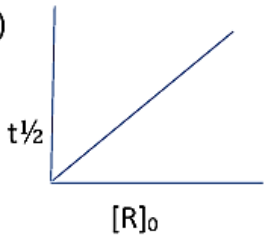
Read the following instructions carefully.

1. There are **33 questions** in this question paper with internal choice.
2. **SECTION-A** consists of 16 multiple-choice questions carrying 1 mark each.
3. **SECTION-B** consists of 5 short answer questions carrying 2 marks each.
4. **SECTION-C** consists of 7 short answer questions carrying 3 marks each.
5. **SECTION-D** consists of 2 case-based questions carrying 4 marks each.
6. **SECTION-E** consists of 3 long answer questions carrying 5 marks each.
7. All questions are compulsory.
8. Use of log tables and calculators is not allowed.

Q.N.	**Section-A** **Question 1 to 16 are multiple choice questions. Only one of the choices is correct.** **Select and write the correct choice as well as the answer to these questions.**	Marks
1.	**Which of the following salt will have same value of Van't Hoff's factor (i) as that of $K_4[Fe(CN)_6]$:** (a) NaCl (b) $Al_2(SO_4)_3$ (c) $Al(NO_3)_3$ (d) Na_2SO_4	**1**
2.	**$KMnO_4$ acts as an oxidizing agent in alkaline medium. When alkaline $KMnO_4$ is treated with KI, iodide ion is oxidized to:** (a) IO_3^- (b) IO_4^- (c) I_2 (d) IO^-	**1**
3.	**Which one of the following is always true about the spontaneous cell reaction in a galvanic cell?** (a) E° cell > 0, ΔG° < 0, Q >Kc (b) E° cell < 0, ΔG° < 0, Q <Kc (c) E° cell > 0, ΔG° > 0, Q >Kc (d) E° cell > 0, ΔG° < 0, Q <Kc	**1**
4.	**Primary and secondary valency of Pt in $[Pt(en)_2Cl_2]$ are:** (a) 4, 4 (b) 2, 6 (c) 4, 6 (d) 6, 4	**1**
5.	**Reimer-Tiemann reaction is given by phenols when treated with alkali and chloroform. Which of the following statement is INCORRECT?** a. The product of reaction is salicyldehyde. b. If $CHCl_3$ is substituted by chloroform salicylic acid is formed. c. It is electrophillic substitution reaction d. Reaction does not occur in presence aq KOH.	**1**
6.	**The charge required for reduction of 1 mol of $Cr_2O_7^{2-}$ ions to Cr^{3+} is:** (a)96500 C (b) 2 x 96500 C (c) 6 x 96500 C (d) 4 x 96500 C	**1**
7.	**For a reaction X → Y the rate of reaction becomes twenty-seven times when the concentration of X is increased three times. What is the order of the reaction?** (a) 2 (b) 1 (c) 3 (d) 0	**1**

8.	**Which of the following orders of relative strengths of acids is correct?** (a) $ClCH_2COOH > FCH_2COOH > BrCH_2COOH$ (b) $ClCH_2COOH > BrCH_2COOH > FCH_2COOH$ (c) $BrCH_2COOH > ClCH_2COOH > FCH_2COOH$ (d) $FCH_2COOH > ClCH_2COOH > BrCH_2COOH$	**1**
9.	**Highest oxidation state of manganese in fluoride is +4 (MnF_4) but highest oxidation state in Oxides is +7 (Mn_2O_7) because:** (a) fluorine is more electronegative than oxygen. (b) fluorine does not possess d-orbitals. (c) fluorine stabilizes lower oxidation state. (d) in covalent compounds fluorine can form single bond only while oxygen forms double bond	**1**
10.	**The molar conductivity of CH_3COOH at infinite dilution is 390 Scm2/mol. Using the graph and given information, the molar conductivity of CH3COOK will be:** a. 100 Scm^2/mol b. 150 Scm^2/mol c. 115 Scm^2/mol d. 125 Scm^2/mol 	**1**
11.	**$CH_3Cl \xrightarrow{KCN}$ "A" $\xrightarrow{Dil.HCl}$ "B". The compound "B" is:** (a) HCOOH (b) CH_3COOH (c) CH_3NH_2 (d) CH_3COCH_3	**1**
12.	**Arrhenius equation can be represented graphically as follows: The (i) intercept and (ii) slope of the graph are:** (a) (i) ln A (ii) Ea/R (b) (i) A (ii) Ea (c) (i) ln A (ii) - Ea/R (d) (i) A (ii) -Ea 	**1**
	Given below are two statements labelled as Assertion (A) and Reason (R) Select the most appropriate answer from the options given below: **a. Both A and R are true and R is the correct explanation of A** **b. Both A and R are true but R is not the correct explanation of A.** **c. A is true but R is false.** **d. A is false but R is true.**	
13.	**Assertion** : Aldehydes and ketones, both react with Tollen's reagent to form silver mirror. **Reason** : Both, aldehydes and ketones contain a carbonyl group.	**1**
14.	**Assertion** : α-hydrogen atoms of carbonyl compounds are acidic in nature. **Reason**: The strong electron donating effect of the carbonyl group and resonance destabilization of the conjugate base makes	**1**

	the alpha hydrogen acidic.	
15.	**Assertion(A):** Boiling point of 0.1 M KCl solution is higher than 0.1 M Glucose solution. **Reason:** Glucose is a non-electrolyte while KCl molecule dissociates in aqueous state.	**1**
16.	**Assertion:** Conductivity of an electrolyte increases with decrease in concentration. **Reason:** Number of ions per unit volume decreases on dilution.	**1**
	Section-B **Question No. 17 to 21 are very short answer questions carrying 2 marks each.**	
17.	**Attempt either option A or B** **A.**a) Arrange the following in increasing order of boiling point: **(i)** $CH_3CH_2CH_2CH_2Br$ (ii)$(CH_3)_3.Br$ (iii)$(CH_3)_2C.Br$ **b)** Convert Propene to1-iodopropane. **OR** **B.** Givereasons: **a)** R- X reacts with KCN to give cyanides as major product and isocyanides as major product with AgCN. **b)** Chloroform is preserved in dark colored bottles.	**2**
18.	**(a)** Why is osmotic pressure of 1M NaCl higher than 1M glucose solution? **(b)** Blood cells are isotonic with 0.9 % sodium chloride solution. What happens if we place blood cells in a solution containing: **(i)** 1.2 % NaCl solution (**ii)** 0.4% NaCl solution.	**2**
19.	Using crystal field theory, write the electronic configuration of Iron ion in the following complex ion. Also predict its magnetic behavior:$[Fe(H_2O)_6]^{2+}$	**2**
20.	For a first order reaction, show that time required for 99% completion is twice the time required for the completion of 90% of reaction.	**2**
21.	When ethanol is treated with H_2SO_4 at 423K, the following reaction takes place: $CH_3\text{-}CH_2\text{-}OH + H_2SO_4 \rightarrow CH_2=CH_2$ Give a mechanism for this reaction.	**2**
	Section-C **Question No. 22 to 28 are short answer questions, carrying 3 marks each.**	
22.	Give one chemical test to distinguish between: (a) methylamine and dimethylamine. (b) secondary and tertiary amine.	**3**
23.	A solution of glucose (M = 180 g/mol) in water has a boiling point of 100.20 ^{0}C. Calculate the freezing point of same solution. Molar constant for water K_f and K_b are 1.86 K kg mol^{-}1 and 0.512K kg mol^{-1} respectively	**3**
24.	**(a)** Electrophilic reactions in haloarenes occur slowly. Why? **(b)** Primary alkyl halide (A), C_4H_9Br reacted with alcoholic KOH to give compound (B). Compound (B) when reacted with HBr gives (C) which is an isomer of (A). When (A) was reacted with sodium metal it gave a compound (D), C_8H_{18} that was different from the compound obtained when n-butyl bromide was reacted with sodium metal. Give the structures of A, B, C and D.	**1** **2**

25.	**Arrange the following:** **(i)** CH_3NH_2, $(CH_3)_2NH$, NH_3, $(CH_3)_3N$ **[in decreasing order of basic strength in gaseous phase]** **(ii)** $C_2H_5NH_2$, $C_6H_5NH_2$, NH_3, $C_6H_5CH_2NH_2$ and $(C_2H_5)_2NH$ **[in increasing order of basic strength]** **(iii)**$C_2H_5NH_2$, $(C_2H_5)_2NH$, $(C_2H_5)_3N$ **[in increasing order of pKb]**	**3**
26.	**(a)** A first order reaction is 75% completed in 40 min. Calculate t½. (Given log 2 = 0.3010 log 4 = 0.6021) **(b)** Predict order of reaction: **(i)**  (ii)  	**3**
27.	**a)** What is meant by a peptide linkage? **b)** What are essential and non-essential amino acids in human food? Give one example of each type. **OR** **a)**Differentiate between amylose and amylopectin. **b)** Write a reaction which shows that all the carbon atoms in glucose are linked in a straight chain. **c)** Which component of starch is a branched polymer of a-glucose and insoluble in water?	**3**
28.	**a)** Explain the following giving one example for each: **i)** Reimer-Tiemann reaction **ii)** Kolbe's reaction **b)** Write the products obtained when benzyl phenyl ether is heated with HI.	**3**
	Section-D **Question No. 29 & 30 are case-based questions carrying 4 marks each.**	
29.	Valence bond theory considers the bonding between metal ion and ligands as purely covalent. On the other hand, crystal field theory considers the metal ligand bond to be ionic arising from electrostatic interaction between the metal ion and the ligands. In coordination compounds, the interaction between the ligand and the metal ion causes the five d-orbitals to split-up. This is called crystal field splitting and the energy difference between the two sets of energy levels is called crystal field splitting energy. The crystal field splitting (Δ_o) depends upon the nature of the ligand and the charge of the metal ion. The electronic configuration of the metal ion in the complexes depends on the relative values of Δ_o and P (pairing energy). **Based on the information provided above, answer the following questions:** **(i)** Calculate the magnetic moment of the metal ion in the complex $K_4[(Fe(CN)_6]$. **(ii)** On the basis of crystal field theory, write the electronic configuration of d^5 in terms of t_{2g} and e_g in an octahedral field when $\Delta_O < P$. **(iii)** Explain why $[Fe(H_2O)_6]^{3+}$ has magnetic moment value of 5.92 BM whereas	**4**

	$[Fe(CN)_6]^{3-}$ has a value of only 1.74 BM. **OR** **(iii)** Which of the following is more stable complex and why? $[Co(NH_3)_6]^{3+}$ and $[Co(en)_3]^{3+}$	
30.	Carbohydrates are optically active polyhydroxy aldehydes or ketones or molecules which provide such units on hydrolysis. They are broadly classified into three groups – monosaccharides, oligosaccharides and polysaccharides. Monosaccharides are held together by glycosidic linkage to form disaccharides like sucrose, maltose. Another biomolecule: proteins are polymers of α-amino acids which are linked by peptide bonds. On the basis of number of amino group and carboxyl group, amino acids are classified as acidic, basic or neutral amino acids. Amino acids are amphoteric in nature. **Based on the information provided above, answer the following questions:** **(ii)** Define Oligosaccharides with an example. **(ii)** Why amino acids are amphoteric in nature? **(iii)** Under what conditions glucose is converted to gluconic and saccharic acid? Write chemical reactions. (1+1) **OR** **(iii)** What is difference between glycosidic linkage and peptide linkage? The pentacetate of glucose does not react with Hydroxyl amine. What does it indicate? (1+1)	 **1** **1** **2** **2**
	<u>Section-E</u> **Question No. 31 to 33 are long answer type questions carrying 5 marks each.**	
31.	**Attempt either A or B:** **A.** Give reasons: **(a)** The enthalpies of atomization of the transition metals are high. **(b)**Why is Cr^{2+} reducing and Mn^{3+}oxidising when both have d^4 configuration? **(c)** Among the transition metals, the highest oxidation state is exhibited in oxoanions of a metal. **(d)** The lowest oxides of transition metal is basic where the highest oxide is amphoteric or acidic. **Or** **B.** Answer the following: **(a)** What is 'Misch metal'? Give its one use. **(b)** Write the formula of an oxoanion of chromium in which it shows the oxidation state equal to its group number. **(c)** Why does Vanadium pentoxide (V_2O_5) act as a catalyst? **d)**When chromite ore $FeCr_2O_4$ is fused with NaOH or (Na_2CO_3) in presence of air, a yellow coloured compound (A) obtained which on acidification with dilute sulphuric acid gives a compound (B). Compound (B) on reaction with KCl forms an orange coloured crystalline compound (C). **(i)** Write the formulae of (A), (B) & (C). **(ii)** $MnO^{4-} + H^+ + C_2O_4^{2-} \rightarrow$	 **1** **1** **1** **2** **1** **1** **1** **1½** **½**

32.	**Attempt either A or B** **A. (a)** Arrange the following compounds in an increasing order of their acidic strength: Benzoic acid, 4-Nitrobenzoic acid, 3,4-Dinitrobenzoic acid, 4-Methoxybenzoic acid **(b)** Write the equations involved in the following reactions: **(i)** Wolff-Kishner reduction **(ii)**Etard reaction **(c) Write the product of the following reactions** **(i)** $CH_3COCH_3 \xrightarrow{Zn-Hg/HCl}$ **(ii)**$C_6H_5COCl + H_2 \xrightarrow{Pd/BaSO4}$ **Or** **B.** Give reason in support of the answer: (a) Presence of Alpha hydrogen in aldehyde and ketones is essential for aldol condensation. (b)Ketones do not give Tollens' test but 3-Hydroxypentan -2-one shows positive Tollens' test. (c) Arrange the following compounds in increasing order of their acidity: benzoicacid, p-nitrobenzoicacid, p-methylbenzoicacid (d) Write the reactions involved in the following: (i) Hell-Volhard Zelinsky reaction. (ii) Wollf-Kishner reduction.	**1** **1** **1** **1** **1** **1** **1** **1** **1** **1** **1**
33.	**Attempt either A or B** **A. (a)** Conductivity of 2.5 x 10^{-4} M methanoic acid is 5.25 x 10^{-5} Scm^{-1}. Calculate its molar conductivity and degree of dissociation. (Given $\lambda^\circ (H^+)$ = 349.5 Scm^2mol^{-1} and $\lambda^\circ (HCOO^-)$ = 50.5 Scm^2mol^{-1}. **(b)** Represent the cell in which the following reaction takes place $Mg(s) + 2Ag^+(0.0001M) \rightarrow Mg^{2+}(0.130M) + 2Ag(s)$ Calculate its E_{cell} if E^ocell = 3.17 V. **Or** **B.** (a) A lead storage battery isthe most important type of secondary cell having a lead anode and A gride of lead packed with PbO_2 as cathode.38% solution of sulphuric acid is used as electrolyte (density =1.294 g mL-1). The battery holds 3.5 L of the acid. During the discharge of the battery. The density of H_2SO_4 falls to 1.20 gmL^{-1}(20%H_2SO_4 by mass). Write the reaction take king place at the cathode when the battery is in use. (b) How much electricity in terms of Faradays required to carry out the reduction of one mole of PbO_2 . (c) What is the molarity of sulphuric acid before discharge? (d) Write the reaction involved during the charging of lead storage battery.	 **3** **2** **1** **2** **1** **1**