# केन्द्रीय विद्यालय संगठन, बेंगलुरु संभाग

**KENDRIYA VIDYALAYA SANGATHAN BENGALURU REGION**

# पूर्व परिषदीय परीक्षा 2025-26

**FIRST PRE-BOARD EXAMINATION: 2025-26**

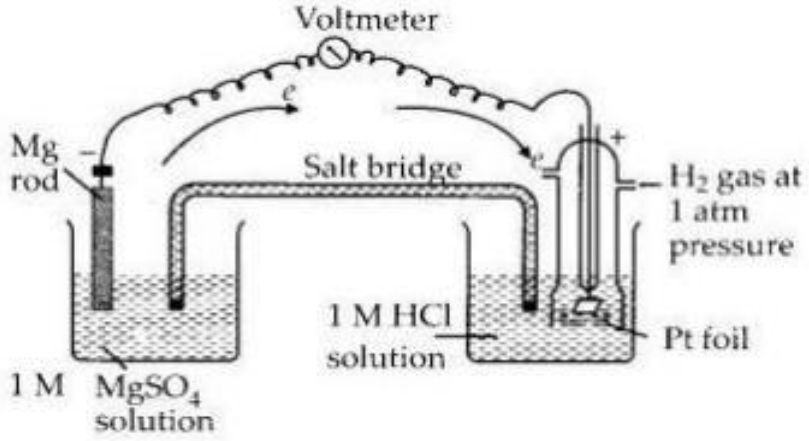
**CLASS: XII**
**MAX.MARKS: 70**
**SUBJECT: CHEMISTRY (043)** **TIME: 3 Hours**

***General Instructions:***

a) There are 33 questions in this question paper with internal choice.
b) Section A consists of 16 multiple-choice questions carrying 1 mark each.
c) Section B consists of 5 very short answer questions carrying 2 marks each.
d) Section C consists of 7 short answer questions carrying 3 marks each.
e) Section D consists of 2 case-based questions carrying 4 marks each.
f) Section E consists of 3 long answer questions carrying 5 marks each.
g) All questions are compulsory.
h) Use of log tables and calculators is not allowed.

**SECTION A**

**The following questions are multiple-choice questions with one correct answer. Each question carries 1 mark. There is no internal choice in this section.**

| | | |
|---|---|---|
| 1. | The following cell is found to have the standard cell potential of 2.36 V.<br>  <br><br>What will be standard reduction potential value of magnesium electrode?<br>0 V B. -2.36 V C. -1.36 V D. 2.36 V | 1 |
| 2. | In which of the following oxo metal anions does the metal not exhibit an oxidation state equal to its group number<br>A. $CrO_4^{2-}$ B. $MnO_4^-$ C. $MnO_4^{2-}$ D. $Cr_2O_7^{2-}$ | 1 |
| 3. | Given below is an image showing a trend of specific property of transition metals | 1 |

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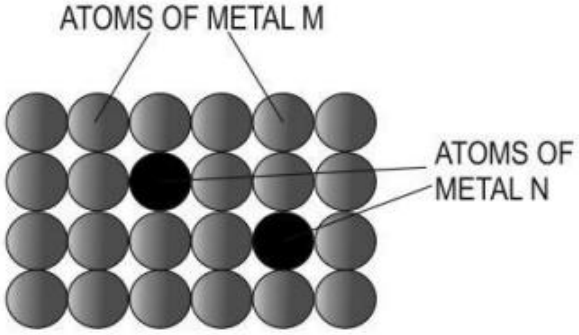
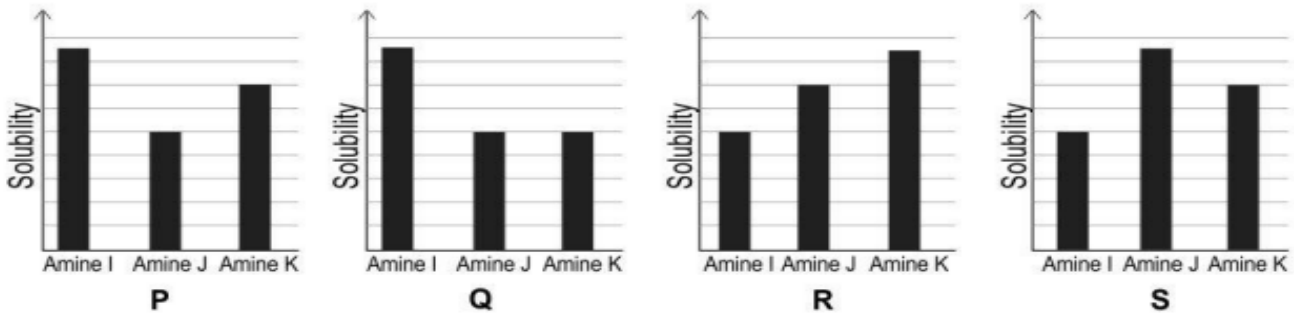
| |  <br>Which property of transition metals is shown in the image?<br>A. Catalytic action B. Formation of alloy<br>C. Colored complex formation D. Interstitial compound formation | |
| 4. | Which one of the following is an outer orbital complex and exhibits paramagnetic behaviour<br>A. $[Cr(NH_3)_6]^{3+}$ B. $[Co(NH_3)_6]^{3+}$ C. $[Ni(NH_3)_6]^{2+}$ D. $[Fe(CN)_6]^{4-}$ | 1 |
| 5. | By which name the reaction $C_2H_5\text{-}Br + 2Na + C_6H_5\text{-}Br \xrightarrow{dry\ ether} C_2H_5\text{-}C_6H_5 + 2NaBr$ is known?<br>A. Swart's reaction B. Wurtz reaction C. Wurtz – Fittig reaction D. Fittig reaction | |
| 6. | Which is the correct increasing order of boiling points of the following compounds?<br>**1-Iodobutane, 1-Bromobutane, 1-Chlorobutane, Butane**<br>A. Butane < 1-Chlorobutane < 1-Bromobutane < 1 -Iodobutane<br>B. 1-Iodobutane < 1-Bromobutane < 1-Chlorobutane < Butane<br>C. Butane < 1-Iodobutane < 1-Bromobutane < 1-Chlorobutane<br>D. Butane < 1-Chlorobutane < 1-Iodobutane < 1-Bromobutane | 1 |
| 7. | Nucleophilic addition of Grignard reagent to Acetone followed by hydrolysis with dilute acids form<br>A. Alkene B. Primary alcohol C. Tertiary alcohol D. Secondary alcohol | 1 |
| 8. | The graphs below show the solubility of aliphatic amines I, J, and K in water, at the same temperature. The number of carbon atoms in each of these amines is three. Amine I is the tertiary amine, amine J is the primary amine, and amine K is the secondary amine.<br>  <br>Which of the graphs identifies the three amines correctly?<br>A. P B. Q C. R D. S | 1 |
| 9. | The correct increasing order of $pK_b$ values for the following amines is<br>***Aniline, 2-methylaniline, 3-methylaniline, 4-methylaniline***<br>A. 4-Methylaniline < 3-Methylaninline < Aniline < 2-Methylaniline. | 1 |

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| | B. Aniline < 2-Methylaniline < 4-Methylaninline < 3 -Methylaniline.<br>C. 4-Methylaniline < 3-Methylaninline <2-Methylaniline < Aniline<br>D. Aniline < 2-Methylaniline < 3-Methylaninline < 4 -Methylaniline. | |
| 10. | Which of the following is formed when an alkyl primary amine reacts with nitrous acid?<br>A. Alkyl nitrite B. Secondary amine C. Nitroalkane D. Alcohol | 1 |
| 11. | How many possible sequences of tripeptides can be formed from the three amino acids Gly, Ala, and Ser, if each tripeptides contains all three amino acids?<br>A. 6 B. 8 C. 3 D. 9 | |
| 12. | The type of linkage is present in Nucleic acids is -------<br>A. Glycosidic linkage B. Phosphodiester linkage C. Amide linkage D. Ester linkage | 1 |
| ***For question number 13 to 16 two statements labelled as Assertion (A) and Reason (R)***<br>***Select the most appropriate answer from the options given below:***<br>A. ***Both A and R are true and R is the correct explanation of A***<br>B. ***Both A and R are true but R is not the correct explanation of A.***<br>C. ***A is true but R is false.***<br>D. ***A is false but R is true.*** | | |
| 13. | **Assertion :** If a liquid solute more volatile than the solvent is added to the solvent, the vapour pressure of the solution may increase i.e., $p_s > p_o$.<br>**Reason :** In the presence of a more volatile liquid solute, only the solute will form the vapours and solvent will not. | 1 |
| 14. | **Assertion:** Average rate and instantaneous rate of a reaction have the same unit.<br>**Reason:** Average rate becomes an instantaneous rate when the time interval is too small. | 1 |
| 15. | **Assertion :** It is difficult to replace chlorine by -OH in chlorobenzene in comparison to that in chloroethane.<br>**Reason :** Chlorine-carbon (C – Cl) bond in chlorobenzene has a partial double bond character due to resonance. | 1 |
| 16. | **Assertion:** Aldehydes undergo aldol condensation only if they do not have α-hydrogen.<br>**Reason:** The ∝-hydrogen in aldehydes are acidic in nature because the anion formed by the loss of the ∝-hydrogen is resonance stabilized. | 1 |
| **SECTION B**<br>**This section contains 5 questions with internal choice in one question. The following questions are very short answer type and carry 2 marks each.** | | |

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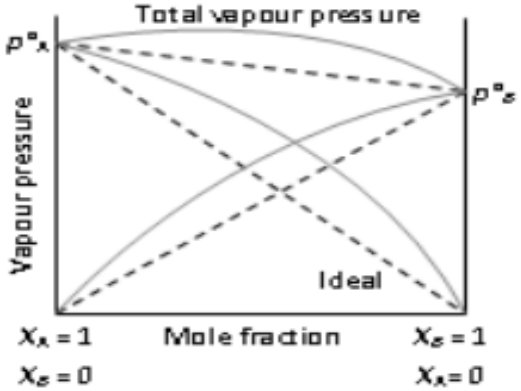
| 17. | Given below is the graph of non-ideal solution. Observe and answer the following questions<br>  <br><br>a. On the basis of above graph predict the type of deviation shown by the non - ideal solution.<br>b. Under what condition such type of deviation is observed?<br>c. What are constant boiling mixtures called and what type of constant boiling mixture is formed by the solutions showing above type of deviation?<br>**OR**<br>a. Two liquids 'X' and 'Y' boil at $110^0$C and $130^0$C respectively. Which one of the following has higher vapour pressure at $50^0$C and why?<br>b. On mixing Acetone and Chloroform, a reduction occurs in total volume. What type of deviations from ideal behavior is shown in this case and why? | ½<br>½<br>1<br><br>1<br>1 |
| 18. | For the complex **[Mn (ox)$_3$]** $^{3-}$<br>a. Write the electronic configuration of valence electrons of metal ion in octahedral crystal field, assuming $\Delta_0$ > P.<br>b. What type of hybridization metal ion will have and also name the type of isomerism exhibited by the complex. | 1<br>1 |
| 19. | a. Arrange the following compounds in increasing order of acidic strength<br>Phenol, o-nitrophenol, o-cresol<br>b. The C-O bond is much shorter in phenol than in ethanol. Give reason | 1<br>1 |
| 20. | a. Identify organic compound 'A' and 'B' in the following reaction.<br>$C_6H_5COOH + SOCl_2 \xrightarrow{Pyridine} A \xrightarrow{H_2,\ Pd-BaSO_4} B$<br>b. The name given for the reaction of converting 'A' to 'B' is known as _____<br>c. Will the compound 'B' undergo Fehling's reagent test? | 1<br>½<br>½ |
| 21. | a. Identify the disaccharide with molecular formula $C_{12}H_{22}O_{11}$ which produces two moles of<br>α – D (+) – Glucose on hydrolysis. What will be the observation when Tollen's reagent is added to such a disaccharide?<br>b. Name the reagent used to detect the presence of Hydroxyl groups in Glucose molecule. | 1<br>1 |
| | **SECTION C**<br>**This section contains 7 questions with internal choice in one question. The following questions are short answer type and carry 3 marks each.** | |
| 22. | a. Represent the cell in which the following reaction takes place.<br>$\mathbf{2Al_{(s)} + 3Cd^{2+}(0.1M) \rightarrow 2Al^{3+}(0.01M) + 3Cd_{(s)}}$<br>b. The value of $E^0$ for the cell in which above reaction occurs is 1.260 V . What is the value of | 1+2 |

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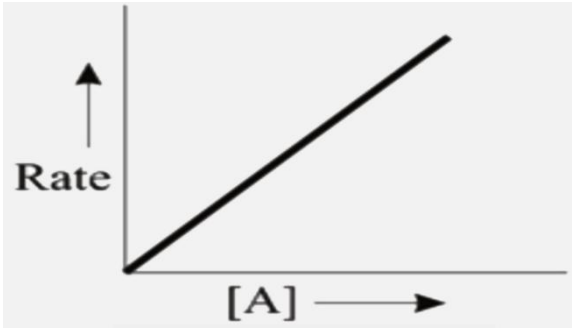
| | $E_{cell}$? | |
| 23. | A reaction has a rate constant of 2.5 × $10^{-3}$ $s^{-1}$ at 300 K and 7.5 × $10^{-3}$ $s^{-1}$ at 310 K. Calculate the activation energy. (R = 8.314 J/mol·K)<br>**OR**<br>The rate constant for the first order decomposition of $H_2O_2$ is given by the following equation:<br>$$log\ k\ =\ 14.2\ -\ \frac{(1.0 \times 10^4)}{T}\ K$$<br>Calculate $E_a$ for this reaction and rate constant k if its half-life period be 200 sec | 3 |
| 24. | For the reaction A $\xrightarrow{K}$ B, plot of rate of reaction and concentration of reaction is shown below Observe and answer the following questions.<br>  <br><br>a. Predict the order of reaction.<br>b. Write the units of k in this case<br>c. Write the expression for integrated rate equation for the above reaction.<br>d. Derive the expression for $t_{1/2}$ for the above reaction.<br>e. A reaction has high activation energy. What can be done to make it proceed faster? | ½<br>½<br>½<br>1<br>½ |
| 25. | Phenol reacts with dil. $HNO_3$ at low temperature. The products are separated into two beakers. Zainab and Christine recorded the boiling point of the compounds as given in the table below:<br>Sl. No \| Beakers \| Christine's readings \| Zainab's readings<br>01. \| Beaker 1 \| 489 K \| 387 K<br>02. \| Beaker 2 \| 387 K \| 489 K<br>a. If beaker 1 contains p-nitrophenol and beaker 2 o-nitrophenol, identify the student whose data collection is correct. Give reason for your answer<br>b. An organic compound (A) having molecular formula $C_6H_6O$ gives a characteristic color with an aqueous $FeCl_3$ solution. (A) on treatment with $CO_2$ and NaOH at 400 K under pressure gives (B), which on acidification gives a compound (C). The compound (C) reacts with acetyl chloride to give (D) which is a popular pain killer. Identify compound 'A' and 'C' | 1<br>2 |
| 26. | Two important nucleophilic substitution mechanisms in haloalkanes are **$S_N1$** (unimolecular) and **$S_N2$** (bimolecular).**$S_N1$** follows first order kinetics, the reaction proceeds in two steps: first, the halide leaves forming a carbocation, then the nucleophile attacks. **$S_N2$**, follows second order kinetics. The reaction is a one-step process where the nucleophile attacks from the | |

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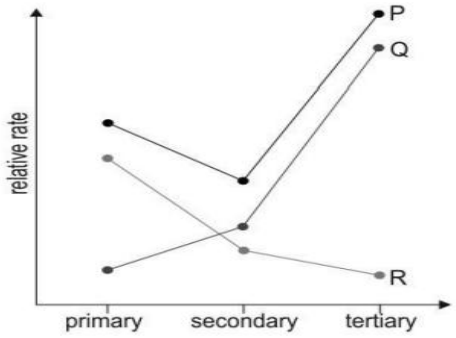
| | opposite side of the leaving group.<br>**a.** What stereochemical changes are observed in $S_N1$ and $S_N2$ mechanism?<br>**b.** Which among the following compounds undergoes $S_N1$ reaction faster and why ?<br>$C_6H_5CH_2Cl$ **and** $C_6H_5Cl$<br>**c.** Which among the following compounds will easily undergo $S_N2$ reaction ?<br>**tert-bromobutane, tert-chlorobutane, iodobutane, bromobutane**<br>**d.** Three graphs P, Q and R have been drawn to represent the relative rates of hydrolysis reactions for primary, secondary, and tertiary haloalkanes.<br>  <br><br>Which of the above graph correctly represents $S_N1$ reaction? | 1<br>1<br><br>½<br><br><br><br><br><br><br>½ |
| 27. | a. Paheli took two amines **'X'** and **'Y'**. On adding Hinsberg's reagent, amine **'X'** gave a product soluble in aq. NaOH solutions whereas **'Y'** formed a product which was insoluble in aq NaOH. Which of these amines have the structural formula of R-NH-R?<br>b. What is Hinsberg's reagent ?<br>c. While studying about diazotization of amines and their reactions, students carried out the following two processes **P** and **Q** in the laboratory to prepare orange-colored dye.<br>**P -** $Aniline + dil\ HCl + NaNO_2 + ice \xrightarrow{30\ minutes} X \xrightarrow{Phenol/OH^-}$ **Coloured dye**<br>**Q -** $Aniline + dil\ HCl + NaNO_2 + ice \xrightarrow{30\ minutes} X \xrightarrow{Aniline/H^+}$ **Coloured dye**<br>Which of the two processes is likely to produce the orange-colored dye? Explain why above reactions are carried out in an ice-cold solution?<br>d. Butanamide reacts with bromine in an aqueous solution of sodium hydroxide to form a compound '**G'**. What is the geometry of compound '**G'** and also write the IUPAC name of the compound **G.** | ½<br><br>½<br><br><br><br><br>1<br><br>1 |
| 28. | a. If the nitrogenous base in one strand of DNA is Adenine, then name the complementary nitrogenous base in another strand of DNA. How do these nitrogenous bases pair with | 1<br><br>1 |

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| | each other?<br>b. What is the effect of denaturation on the structure of Proteins?<br>c. The sample of a virus was tested and it was found to contain 20% adenine, 20% thymine, 20 % guanine and the rest cytosine. Is the genetic material of this virus<br>(i) DNA- double helix (ii) DNA-single helix (iii) RNA?<br>What do you infer from this data? Give justification. | 1 |
| | **SECTION D**<br>**The following questions are case-based questions. Each question has an internal choice and carries 4 (1+1+2) marks each. Read the passage carefully and answer the questions that follow.** | |
| 29. | *Coordination compounds are chemical species in which a central metal atom or ion is bonded to a set of surrounding molecules or ions called ligands through coordinate covalent bonds, where the ligand donates both electrons. These complexes exhibit diverse geometries such as octahedral, tetrahedral, and square planar, depending on the metal's size, oxidation state, and the nature of the ligands. The stability and properties of coordination compounds are influenced by ligand field effects, which can lead to low-spin or high-spin arrangements, affecting their magnetic and spectral characteristics. Coordination compounds are widely important in biological systems, catalysis, and industrial processes, such as the use of metal carbonyls in the purification of metals or complexation in metalloproteins, demonstrating their versatility and significance in chemistry.*<br>a. Draw the structures of stereoisomers of $[Co(NH_3)_3(\mathrm{Cl})_3]$<br>b. What is the sum of coordination number and oxidation state of central metal atom/ion in the complex $K_4[Ni(CN)_2(\mathrm{ox})_2]$<br>c. A coordination compound $CrCl_3.4H_2O$ precipitates silver chloride when treated with silver nitrate. The molar conductance of its solution corresponds to a total of two ions. Write structural formula of the compound and write the IUPAC name.<br>**OR**<br>a. What kind of isomerism exists between $[Cr(H_2O)_6]Cl_3$ (violet) and $[Cr(H_2O)_5Cl)Cl_2.H_2O$ (greyish- green) ?<br>b. Out of $[Co(en)_3]^{3+}$ and $[Co(NH_3)_6]^{3+}$ which is more stable and why? | 1<br>1<br>2<br>1<br>1 |
| 30. | *Colligative properties are the physical properties of solutions that depend only on the number of solute particles present in a given amount of solvent, and not on their chemical nature. The main colligative properties include relative lowering of vapour pressure, elevation in boiling point, depression in freezing point, and osmotic pressure. When a non-volatile solute is added to a solvent, the vapour pressure of the solvent decreases because fewer solvent molecules can escape into the* | |

*vapour phase. This leads to an elevation in the boiling point and a depression in the freezing point of the solution compared to the pure solvent. Osmotic pressure, another important colligative property, is the pressure required to prevent the flow of solvent through a semipermeable membrane. Colligative properties help in determining the molar mass of unknown solutes and have wide applications in daily life such as pickles and jams are preserved by adding large amounts of salt or sugar, preventing microbial growth.*

a. Which colligative property is most useful in studying biological systems such as blood and cells? 1

b. If a solute dissociates into ions in a solution, how will it affect the observed colligative property? 1

c. Mention two real-life applications of colligative properties other than mentioned in the paragraph. 2

**OR**

c. Explain why high salt or sugar concentration prevents bacterial growth. 1

Four samples $BaCl_2$, NaCl, $ZnCl_2$ and $AlCl_3$ of 0.5 M are being boiled. Which among these will show highest elevation in boiling point? 1

**SECTION E**

**The following questions are long answer type and carry 5 marks each. All questions have an internal choice.**

31. i. Oxide of metal 'D' in Lanthanoid series is used as phosphors in T V screen and similar fluorescing surfaces. 2

a. State the valency of element D and write the formula of its oxide in terms of D

b. What will be the pH range of its aqueous solution?

ii. The ionic radii of certain elements of third Transition series are tabulated below:

| Sl.No | Elements/Ions | Ionic Radii |
|---|---|---|
| 01. | $X^{3+}$ | 87pm |
| 02. | $Y^{3+}$ | 106pm |
| 03. | $Z^{3+}$ | 95pm |

Arrange these elements in decreasing order of ionic radii and mention the phenomenon seen in this table 1

iii. Aqueous solution of copper sulphate appears blue, whereas the aqueous solution of Zinc sulphate is colourless. Give reason 1

iv. Transition elements exhibit variable oxidation states. Why? 1

**OR**

a. When a ore 'A' is fused with an aqueous solution of sodium carbonate in free excess

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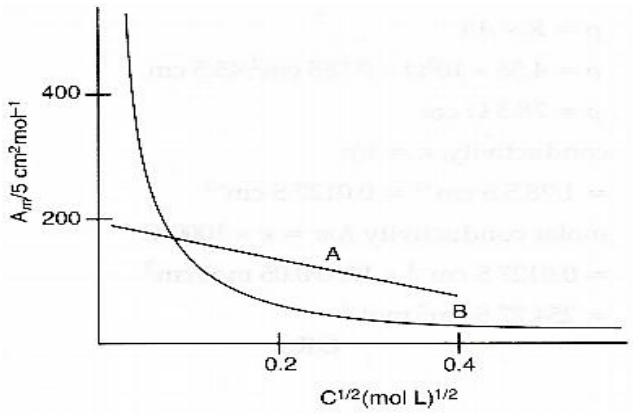
| | of air, a yellow solution of compound 'B' is obtained. This solution is filtered and acidified with Sulphuric acid to form compound 'C'. Compound 'C' on treatment with the solution of KCl gives orange crystals of 'D'. Write the chemical formulae and the names of compounds A,B,C and D and also write the chemical reaction for conversion of A to B | 3 |
| | b. In an acidic waste water discharge (pH = 3), what is the predominant chromium species present, and what is its colour ? | 1 |
| | c. How is magnetic moment related to number of unpaired electrons? Give the formula | 1 |
| 32. | a. Give the structure and IUPAC name of the product formed when propanone is reacted with methylmagnesium bromide followed by hydrolysis. Write the chemical reaction | 2 |
| | b. Arrange the following compounds in an increasing order of their acidic strength<br>***Benzoic acid, 4-Nitrobenzoic acid, 3,4-Dinitrobenzoic acid, 4-Methoxybenzoic acid*** | 1 |
| | c. Aldehydes and Ketones have lower boiling points than corresponding alcohols. Why? | 1 |
| | d. Write one chemical test to distinguish between Methanoic acid and Benzoic acid | 1 |
| | **OR** | |
| | a. Arrange the following in increasing order of reactivity towards nucleophilic addition reaction<br>**Acetaldehyde, Acetone, Propanal, Butanone** | 1<br>1 |
| | b. Write one chemical test to distinguish between Acetophenone and Benzophenone | 1 |
| | c. Carboxylic acids do not give characteristic reactions of carbonyl group. Explain why? | 2 |
| | d. Write down functional isomers of a carbonyl compound with molecular formula $C_3H_6O$. Which isomer will react faster with HCN and why? | |
| 33. | a. The resistance of a conductivity cell filled with 0.1M $KCl$ solution is 100 ohms. Resistance of the same cell when filled with 0.02M $KCl$ solution is 520 ohms. Calculate the conductivity and molar conductivity of 0.02M $KCl$ solution. (Conductivity of 0.1M $KCl$ solution is 1.29$Sm^{-1}$) | 3 |
| | b. 4.0 molar aqueous solution of NaCl is prepared and 500 mL of this solution is electrolysed. What are the products of electrolysis and how much total charge (coulomb) is required for complete electrolysis? | 2 |
| | OR | |
| | In the plot of molar conductivity ($\Lambda_m$) vs square root of concentration ($C^{1/2}$), following curves are obtained for two electrolytes A and B. | |

**Answer the following questions**




a. Predict the nature of electrolytes A and B. 1

b. For which of the above plot the value of limiting molar conductivity cannot be determined graphically. How can this value be obtained alternatively? 1

c. How does conductivity of electrolytic solution vary with dilution and why? 1

d. Determine the values of equilibrium constant ($K_c$) and $\Delta G°$ for the following reaction: 2

$Ni(s) + 2Ag^+ (aq) \rightarrow Ni^{2+} (aq) + 2Ag(s)$,

$E^0_{cell}$= 1.05 V (1F = 96500 C mol$^{-1}$) Given antilog (.473) = 2.9717