

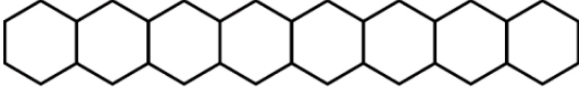


**Series : W4YXZ**

**SET ~ 1**

रोल नं.

Roll No.



प्रश्न-पत्र कोड

Q.P. Code

**56/4/1**

परीक्षार्थी प्रश्न-पत्र कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें।

Candidates must write the Q.P. Code on the title page of the answer-book.

(I) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ **23** हैं।

Please check that this question paper contains **23** printed pages.



(II) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।

Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.

(III) कृपया जाँच कर लें कि इस प्रश्न-पत्र में **33** प्रश्न हैं।

Please check that this question paper contains **33** questions.

(IV) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में यथा स्थान पर प्रश्न का क्रमांक अवश्य लिखें।

Please write down the Serial Number of the question in the answer-book at the given place before attempting it.

(V) इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक परीक्षार्थी केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।

15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the candidates will read the question paper only and will not

# write any answer on the answer-book during this period.



**रसायन विज्ञान (सैद्धान्तिक)**

**CHEMISTRY (Theory)**



निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 70

Maximum Marks : 70

56/4/1

1

P.T.O.



### General Instructions :

Read the following instructions carefully and follow them :

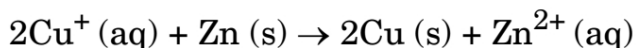
- (i) This question paper contains **33** questions. **All** questions are **compulsory**.
- (ii) This question paper is divided into **five** sections – **Section A, B, C, D** and **E**.
- (iii) **Section A** – questions number **1** to **16** are multiple choice type questions. Each question carries **1** mark.
- (iv) **Section B** – questions number **17** to **21** are very short answer type questions. Each question carries **2** marks.
- (v) **Section C** – questions number **22** to **28** are short answer type questions. Each question carries **3** marks.
- (vi) **Section D** – questions number **29** and **30** are case-based questions. Each question carries **4** marks.
- (vii) **Section E** – questions number **31** to **33** are long answer type questions. Each question carries **5** marks.
- (viii) There is no overall choice given in the question paper. However, an internal choice has been provided in few questions in all the sections except Section A.
- (ix) Kindly note that there is a separate question paper for Visually Impaired candidates.
- (x) Use of calculator is **not** allowed.

### SECTION A

Questions no. **1** to **16** are Multiple Choice type Questions, carrying **1** mark each.

$16 \times 1 = 16$

1. In an electrochemical cell, the following reaction takes place :



$$E_{\text{cell}}^{\circ} = 1.28 \text{ V}$$

As the reaction progresses, what will happen to the overall voltage of the cell ?

- (A) Voltage will remain constant.
  - (B) It will decrease as  $[\text{Zn}^{2+}]$  increases.
  - (C) It will increase as  $[\text{Cu}^+]$  increases.
  - (D) It will increase as  $[\text{Zn}^{2+}]$  increases.
2. Out of  $\text{Fe}^{3+}$ ,  $\text{Sc}^{3+}$ ,  $\text{Cr}^{3+}$  and  $\text{Co}^{3+}$  ions, the one which is colourless in aqueous solution is :

- |                      |                      |
|----------------------|----------------------|
| (A) $\text{Sc}^{3+}$ | (B) $\text{Fe}^{3+}$ |
| (C) $\text{Cr}^{3+}$ | (D) $\text{Co}^{3+}$ |

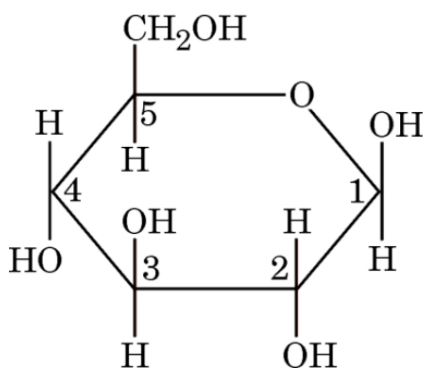
[Atomic number : Fe = 26, Sc = 21, Cr = 24, Co = 27]



3. Hoffmann Bromamide degradation reaction is given by :

- (A)  $\text{ArNO}_2$
- (B)  $\text{ArNH}_2$
- (C)  $\text{ArCONH}_2$
- (D)  $\text{ArCH}_2\text{NH}_2$

4. In the Haworth structure of the following carbohydrate, various carbon atoms have been numbered. The anomeric carbon is numbered as :



- (A) 1
- (B) 2
- (C) 3
- (D) 5

5. The value of Henry's constant  $K_H$  is :

- (A) greater for gases with higher solubility
- (B) greater for gases with lower solubility
- (C) constant for all gases
- (D) not related to the solubility of gases

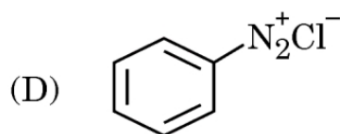
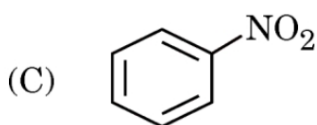
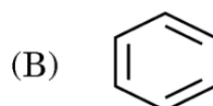
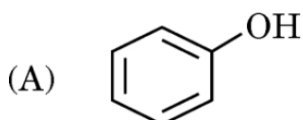
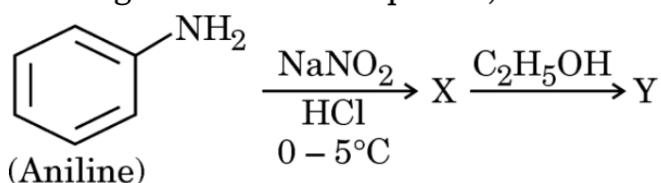
6. Out of the following statements, the *incorrect* statement is :

- (A) La is actually an element of transition series.
- (B) Zr and Hf have almost identical atomic radii because of lanthanoid contraction.
- (C) Ionic radius decreases from  $\text{La}^{3+}$  to  $\text{Lu}^{3+}$  ion.
- (D) Lanthanoids are radioactive in nature.



7. Out of 2-Bromobutane, 1-Bromobutane, 2-Bromopropane and 1-Bromopropane, the molecule which is chiral in nature is :
- (A) 2-Bromobutane  
(B) 1-Bromobutane  
(C) 2-Bromopropane  
(D) 1-Bromopropane

8. In the given reaction sequence, the structure of Y would be :



9. The product of the oxidation of  $\text{I}^-$  with  $\text{MnO}_4^-$  in alkaline medium is :

- (A)  $\text{IO}_4^-$   
(B)  $\text{I}_2$   
(C)  $\text{IO}^-$   
(D)  $\text{IO}_3^-$

10. Polyhalogen compounds have wide application in industries and agriculture. DDT is also a very important polyhalogen compound. It is a :

- (A) greenhouse gas  
(B) fertilizer  
(C) biodegradable insecticide  
(D) non-biodegradable insecticide



11. What amount of electric charge is required for the reduction of 1 mole of  $\text{MnO}_4^-$  into  $\text{Mn}^{2+}$  ?
- (A) 1 F (B) 5 F  
(C) 4 F (D) 6 F
12. Alkenes are formed by heating alcohols with conc.  $\text{H}_2\text{SO}_4$ . The first step in the reaction is :
- (A) formation of carbocation  
(B) formation of ester  
(C) protonation of alcohol molecule  
(D) elimination of water

***For Questions number 13 to 16, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.***

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).  
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of the Assertion (A).  
(C) Assertion (A) is true, but Reason (R) is false.  
(D) Assertion (A) is false, but Reason (R) is true.
13. *Assertion (A)* : Electrolysis of aqueous NaCl gives  $\text{H}_2$  at cathode and  $\text{Cl}_2$  at anode.  
*Reason (R)* : Chlorine has higher oxidation potential than  $\text{H}_2\text{O}$ .
14. *Assertion (A)* : Cuprous salts are diamagnetic.  
*Reason (R)* : Cuprous ion has completely filled 3d-orbitals.
15. *Assertion (A)* : n-Butyl chloride has higher boiling point than n-Butyl bromide.  
*Reason (R)* : C – Cl bond is more polar than C – Br bond.
16. *Assertion (A)* : Acetanilide is less basic than aniline.  
*Reason (R)* : Acetylation of aniline results in decrease of electron density on nitrogen.



## SECTION B

17. (a) Reactant 'A' underwent a decomposition reaction. The concentration of 'A' was measured periodically and recorded in the table given below :

Time/Hours	[A]/M
0	0.40
1	0.20
2	0.10
3	0.05

Based on the above data, predict the order of the reaction and write the expression for the rate law. 2

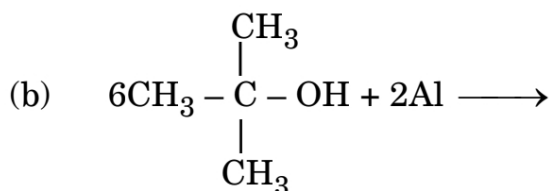
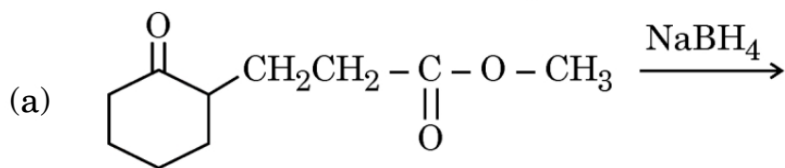
**OR**

- (b) The reaction between  $H_2(g)$  and  $I_2(g)$  was carried out in a sealed isothermal container. The rate law for the reaction was found to be :

$$\text{Rate} = k[H_2][I_2]$$

If 1 mole of  $H_2(g)$  was added to the reaction chamber and the temperature was kept constant, then predict the change in rate of the reaction and the rate constant. 2

18.  $PtCl_4 \cdot 2KCl$  doesn't give precipitate of  $AgCl$  with  $AgNO_3$  solution. Write the structural formula and IUPAC name of the complex. 2
19. Define fuel cell. Give two advantages of fuel cell over ordinary cell. 2
20. Write the structures of the main products of the following reactions : 2



21. What is meant by essential amino acids ? Why are amino acids amphoteric in nature ? 2



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**SECTION C**

- 22.** (a) Account for the following : 3
- (i) Allyl chloride is hydrolysed more readily than n-propyl chloride.
  - (ii) Isocyanides are formed when alkyl halides are treated with silver cyanide.
  - (iii) Methyl chloride reacts faster with  $\text{OH}^-$  ion in  $\text{S}_{\text{N}}2$  reaction than t-butyl chloride.

**OR**

- (b) Complete the following reactions by writing the structural formulae of 'A' and 'B' : 3
- (i)  $\text{CH}_3\text{CH}=\text{CH}_2 \xrightarrow[\text{Peroxide}]{\text{HBr}} \text{'A'} \xrightarrow{\text{aq. KOH}} \text{'B'}$
  - (ii)  $\text{CH}_3\text{CH}_2\underset{\text{Cl}}{\text{CH}}\text{CH}_3 \xrightarrow[\Delta]{\text{alc. KOH}} \text{'A'} \xrightarrow{\text{HBr}} \text{'B'}$
  - (iii)  $\text{'A'} \xrightarrow{\text{Mg}} \text{CH}_3\text{CH}_2\text{MgCl} \xrightarrow[\text{H}^+]{\text{H}_2\text{O}} \text{'B'}$   
(Main product)

- 23.** Calculate the cell voltage of the voltaic cell which is set up by joining following half-cells at  $25^\circ\text{C}$  : 3
- $\text{Al}/\text{Al}^{3+}$  (0.001 M) and  $\text{Ni}/\text{Ni}^{2+}$  (0.1 M)
- Given :  $E^\circ_{\text{Ni}^{2+}/\text{Ni}} = -0.25 \text{ V}$ ,  $E^\circ_{\text{Al}^{3+}/\text{Al}} = -1.66 \text{ V}$

- 24.** Give explanation for each of the following observations : 3
- (a) With the same d-orbital configuration ( $d^4$ ),  $\text{Mn}^{3+}$  ion is an oxidising agent whereas  $\text{Cr}^{2+}$  ion is a reducing agent.
  - (b) Actinoid contraction is greater from element to element than that among lanthanoids.
  - (c) Transition metals form large number of interstitial compounds with H, B, C and N.



25. An aqueous solution of NaOH was made and its molar mass from the measurement of osmotic pressure at 27°C was found to be 25 g mol<sup>-1</sup>. Calculate the percentage dissociation of NaOH in this solution. 3
- [Atomic mass : Na = 23 u, O = 16 u, H = 1 u]
26. Arrange the following compounds as asked : 3
- (a) in decreasing order of pK<sub>b</sub> values  
C<sub>2</sub>H<sub>5</sub>NH<sub>2</sub>, (C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>NH, C<sub>6</sub>H<sub>5</sub>NHCH<sub>3</sub>, C<sub>6</sub>H<sub>5</sub>NH<sub>2</sub>
- (b) increasing order of boiling point  
C<sub>2</sub>H<sub>5</sub>OH, C<sub>2</sub>H<sub>5</sub>NH<sub>2</sub>, (CH<sub>3</sub>)<sub>2</sub>NH
- (c) increasing order of solubility in water  
C<sub>6</sub>H<sub>5</sub>NH<sub>2</sub>, (C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>NH, C<sub>2</sub>H<sub>5</sub>NH<sub>2</sub>
27. An aromatic compound 'A' with molecular formula C<sub>8</sub>H<sub>8</sub>O gives positive 2,4-DNP test. It gives yellow precipitate. of compound 'B' on treatment with sodium hypiodite. Compound 'A' does not react with Tollen's or Fehling's reagent; on drastic oxidation with KMnO<sub>4</sub> it forms a carboxylic acid 'C'. Elucidate the structures of A, B and C. Also give their IUPAC names. 3
28. (a) Can sodium ethoxide and t-butyl chloride be used for the preparation of t-butyl ethyl ether ? Give suitable explanation. Justify your answer by suggesting the appropriate starting material required for preparation of t-butyl ethyl ether. 2
- (b) Give the IUPAC name of above mentioned ether. 1



## SECTION D

The following questions are case-based questions. Read the case carefully and answer the questions that follow.

- 29.** According to the generally accepted definition of the ideal solution there are equal interaction forces acting between molecules belonging to the same or different species. (This is equivalent to the statement that the activity of the components equals the concentration.) Strictly speaking, this condition is fulfilled only in exceptional cases for mixtures (optical isomers, isotopic mixtures of an element, hydrocarbon mixtures). It is still usual to talk about ideal solutions as limiting cases in reality since very dilute solutions behave ideally with respect to the solvent. This view is further supported by the fact that Raoult's law empirically found for describing the behaviour of the solvent in dilute solutions can be deduced thermodynamically via the assumption of ideal behaviour of the solvent. Answer the following questions :
- (a) Give one example of miscible liquid pair which shows negative deviation from Raoult's law. What is the reason for such deviation ? 2
- (b) (i) State Raoult's law for a solution containing volatile components. 1

**OR**

- (b) (ii) Raoult's law is a special case of Henry's law. Comment. 1
- (c) Write two characteristics of an ideal solution. 1
- 30.** Ribose and 2-deoxyribose have an important role in biology. Among the most important derivatives are those with phosphate groups attached at the 5 position. Mono-, di- and tri-phosphate forms are important, as well as 3-5 cyclic monophosphates. Purines and pyrimidines form an important class of compounds with ribose and deoxyribose. When these purine and pyrimidine derivatives are coupled to a ribose sugar, they are called nucleosides.

Answer the following questions :

- (a) What products would be formed when DNA is hydrolysed ? How is DNA different from RNA with reference to a structure ? 2
- (b) Differentiate between nucleotide and nucleoside. 1
- (c) (i) Mention two important functions of nucleic acid. 1

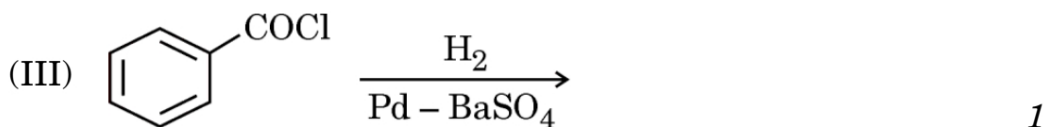
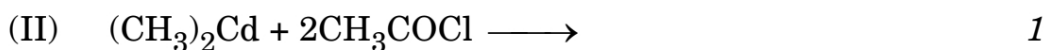
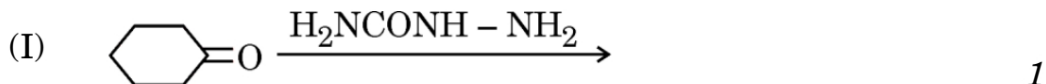
**OR**

- (c) (ii) Name the linkage which joins two nucleotides. Name the base that is found in nucleotide of RNA but not in DNA. 1

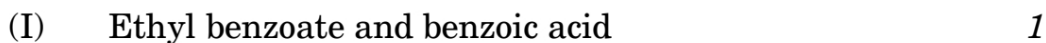


## SECTION E

31. (a) (i) Complete the following reactions by writing the structure of the main products :

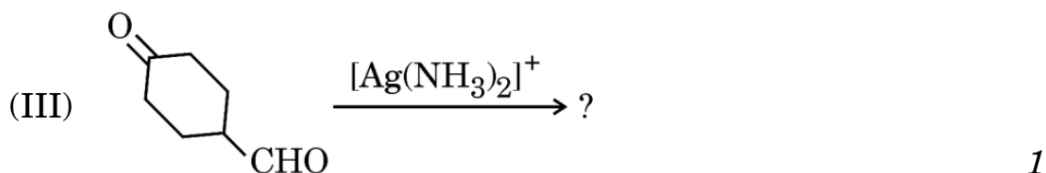
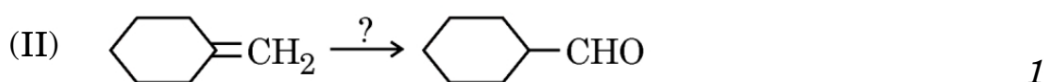
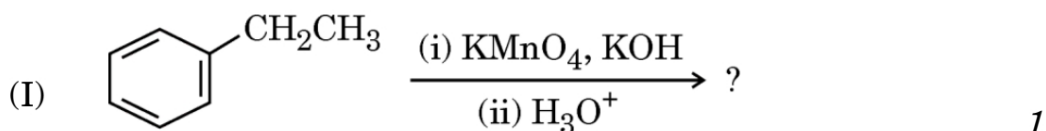


- (ii) Give simple chemical test to distinguish between the following pairs of compounds :

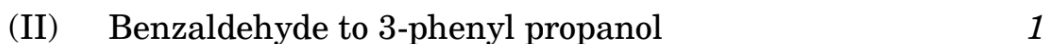
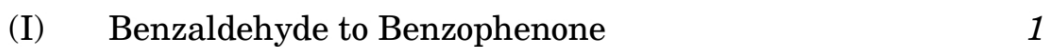


**OR**

- (b) (i) Complete each synthesis by giving missing starting material, reagent or products :



- (ii) Carry out the following conversions :





- 32.** (a) (i) Give reasons :
- (I)  $[\text{Ni}(\text{CO})_4]$  is diamagnetic whereas  $[\text{NiCl}_4]^{2-}$  is paramagnetic. [Atomic number : Ni = 28] 1
- (II) CO is a stronger complexing agent than  $\text{NH}_3$ . 1
- (III) The trans isomer of complex  $[\text{Co}(\text{en})_2\text{Cl}_2]^+$  is optically inactive. 1
- (ii) Using Crystal Field theory, write the number of unpaired electrons in octahedral complexes of  $\text{Fe}^{3+}$  in the presence of :
- (I) Strong field ligand
- (II) Weak field ligand
- [Atomic number : Fe = 26]

**OR**

- (b) (i) Name the type of isomerism exhibited by the following compounds. Also draw their corresponding isomers.
- (I)  $[\text{Co}(\text{NH}_3)_6] [\text{Cr}(\text{CN})_6]$  1
- (II)  $[\text{Co}(\text{en})_3]^{3+}$  1
- (III)  $[\text{Co}(\text{NH}_3)_3(\text{NO}_2)_3]$  1
- (ii) Differentiate between weak field and strong field ligands. How does the strength of the ligand influence the spin of the complex ? 2
- 33.** (a) (i) The initial concentration of  $\text{N}_2\text{O}_5$  in the first order reaction :
- $$\text{N}_2\text{O}_5 (\text{g}) \rightarrow 2\text{NO}_2 (\text{g}) + \frac{1}{2} \text{O}_2 (\text{g})$$
- was  $1.2 \times 10^{-2} \text{ mol L}^{-1}$ . The concentration of  $\text{N}_2\text{O}_5$  after 60 minutes was  $0.2 \times 10^{-2} \text{ mol L}^{-1}$ . Calculate the rate constant of the reaction at 318 K. 3
- [log 6 = 0.778]



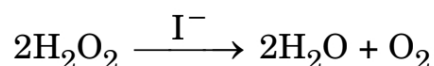
- (ii) Account for the following :
- (I) We cannot determine the order of a reaction by taking into consideration the balanced chemical equation. 1
- (II) A bimolecular reaction may become kinetically of first order under a specified condition. 1

**OR**

- (b) (i) The rate of the chemical reaction doubles for an increase of 10 K in absolute temperature from 298 K. Calculate activation energy ( $E_a$ ). 3

$$[2.303 R = 19.15 \text{ JK}^{-1} \text{ mol}^{-1}, \log 2 = 0.3]$$

- (ii) For a reaction :



the proposed mechanism is as given below :

- (I)  $\text{H}_2\text{O}_2 + \text{I}^- \longrightarrow \text{H}_2\text{O} + \text{IO}^-$  (slow)
- (II)  $\text{H}_2\text{O}_2 + \text{IO}^- \longrightarrow \text{H}_2\text{O} + \text{I}^- + \text{O}_2$  (fast)
- (1) Write rate law for the reaction.
- (2) Write the overall order and molecularity of the reaction. 2



A full scale of marks \_\_\_\_\_(example 0 to 80/70/60/50/40/30 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.

Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines). This is in view of the reduced syllabus and number of questions in question paper.

Ensure that you do not make the following common types of errors committed by the Examiner in the past:-

- Leaving answer or part thereof unassessed in an answer book.
- Giving more marks for an answer than assigned to it.
- Wrong totaling of marks awarded on an answer.
- Wrong transfer of marks from the inside pages of the answer book to the title page.
- Wrong question wise totaling on the title page.
- Wrong totaling of marks of the two columns on the title page.
- Wrong grand total.
- Marks in words and figures not tallying/not same.
- Wrong transfer of marks from the answer book to online award list.
- Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)

Half or a part of answer marked correct and the rest as wrong, but no marks awarded.

While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0)Marks.

Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.

The Examiners should acquaint themselves with the guidelines given in the “**Guidelines for Spot Evaluation**” before starting the actual evaluation.

Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.

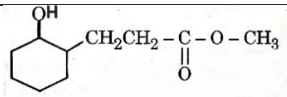
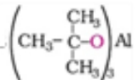
The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

MARKING SCHEME 2024-25

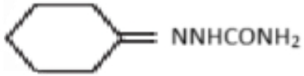
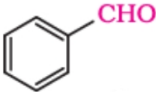
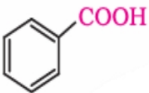
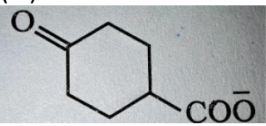
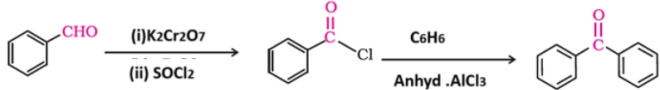
CHEMISTRY (Theory)- 043

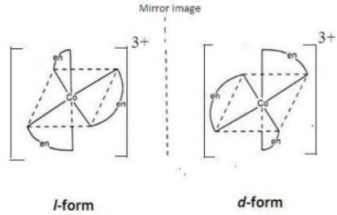
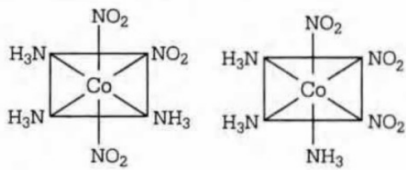
QP CODE 56/4/1

MM: 70

Q.No	Value points	Mark
<b>SECTION A</b>		
1	(B)	1
2	(A)	1
3	(C)	1
4	(A)	1
5	(B)	1
6	(D)	1
7	(A)	1
8	(B)	1
9	(D)	1
10	(D)	1
11	(B)	1
12	(C)	1
13	(C)	1
14	(A)	1
15	(D)	1
16	(A)	1
<b>SECTION B</b>		
17	Order of the reaction =1 / First Rate =k[A]	1 1
<b>OR</b>		
17	Rate of the reaction will increase. Rate constant remains same.	1 1
18	Structural formula: $K_2[PtCl_6]$ IUPAC Name: Potassium hexachloridoplatinate(IV)	1 1
19	Galvanic cell which converts the energy of combustion of fuels directly into electrical energy. Advantages 1.High efficiency 2.Pollution free (or any other two correct advantages)	1 $\frac{1}{2} \times 2 = 1$
20	(a)  (b) 	1 1
21	<ul style="list-style-type: none"> <li>Amino-acids which cannot be synthesized in the body and must be obtained through diet.</li> <li>In zwitter ionic form, amino-acids react both with acids and bases./ Due to the presence of both carboxylic group and amino group.</li> </ul>	1 1
<b>SECTION C</b>		
22(a)	(i) Greater stability of allylic carbocation due to resonance. (ii) Being covalent in nature, only nitrogen is free to donate electron pair in AgCN. (iii) Less sterically hindered carbon in Methyl chloride/ greater steric hinderance on tertiary carbon of t-butyl chloride.	1 1 1
<b>OR</b>		
22(b)	(i) A = $CH_3CH_2CH_2Br$ B = $CH_3CH_2CH_2OH$ (ii) A = $CH_3CH=CHCH_3$ B = $CH_3CH_2CH(Br)CH_3$	$\frac{1}{2} \times$ 6=3

	(iii)A = CH <sub>3</sub> CH <sub>2</sub> Cl B= CH <sub>3</sub> CH <sub>3</sub>	
<b>23</b>	$2Al + 3 Ni^{2+} \rightarrow 2Al^{3+} + 3Ni$ $E^{\circ}_{cell} = E^{\circ}_{Ni^{2+}/Ni} - E^{\circ}_{Al^{3+}/Al}$ ; $E^{\circ}_{cell} = -0.25 - (-1.66) = 1.41V$ $n=6$ $E_{cell} = E^{\circ}_{cell} - \frac{2.303RT}{nF} \log \frac{[Al^{3+}]^2}{[Ni^{2+}]^3}$ $E_{cell} = 1.41 - \frac{0.059}{6} \log \frac{[0.001]^2}{[0.1]^3}$ $E_{cell} = 1.41 - \frac{0.059}{6} \log \frac{[10]^{-6}}{[10]^{-3}}$ $E_{cell} = 1.41 - \frac{0.059}{6} \log 10^{-3}$ $E_{cell} = 1.41 - (-0.0295)$ $E_{cell} = 1.41 + 0.0295$ $E_{cell} = 1.439V/1.44V$ (Deduct ½ mark for no or incorrect unit)	 ½ ½  1       1
<b>24</b>	(a) Change from Mn <sup>3+</sup> to Mn <sup>2+</sup> results in extra stable half filled d <sup>5</sup> configuration. Cr <sup>2+</sup> is reducing as its configuration changes from d <sup>4</sup> to d <sup>3</sup> which is stable half filled t <sub>2g</sub> <sup>3</sup> configuration. (b) Due to poorer shielding offered by 5f electrons than 4f. (c) H, B, C and N atoms being small in size get trapped inside the crystal lattices of transition metals.	 ½ ½ 1 1
<b>25</b>	$i = \text{Normal molar mass} / \text{Abnormal molar mass}$ $i = 40/25$ $= 1.6$ $\alpha = i - 1/n - 1$ $= \frac{1.6 - 1}{1}$ $= 0.6 \times 100$ $= 60\%$ (Any other suitable method)	 ½ 1 ½  1
<b>26.</b>	(a) C <sub>6</sub> H <sub>5</sub> NH <sub>2</sub> > C <sub>6</sub> H <sub>5</sub> NHCH <sub>3</sub> > C <sub>2</sub> H <sub>5</sub> NH <sub>2</sub> > (C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> NH (b) (CH <sub>3</sub> ) <sub>2</sub> NH < C <sub>2</sub> H <sub>5</sub> NH <sub>2</sub> < C <sub>2</sub> H <sub>5</sub> OH (c) C <sub>6</sub> H <sub>5</sub> NH <sub>2</sub> < (C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> NH < C <sub>2</sub> H <sub>5</sub> NH <sub>2</sub>	 1 1 1
<b>27</b>	A: C <sub>6</sub> H <sub>5</sub> COCH <sub>3</sub> Acetophenone B : CHI <sub>3</sub> Triiodomethane C : C <sub>6</sub> H <sub>5</sub> COOH Benzoic acid	 ½ , ½ ½ , ½ ½ , ½
<b>28</b>	(a) No Sodium ethoxide is a strong nucleophile as well as a strong base so elimination reaction of t-butyl chloride predominates over substitution.  Chloroethane and Sod.tert-butoxide / C <sub>2</sub> H <sub>5</sub> Cl and (CH <sub>3</sub> ) <sub>3</sub> CONa  (b) 2-Ethoxy-2-methylpropane	 ½ ½  ½ + ½  1
<b>SECTION D</b>		
<b>29</b>	(a) Chloroform and Acetone (or Any other correct example) A-B interactions are stronger than A-A and B-B interaction. (b)(i) For any solution the partial vapour pressure of each volatile component is directly proportional to its mole fraction.  OR (b)(ii) $p = p^{\circ} x_i$ ; $p = K_H x$ When $p^{\circ} = K_H$ $p \propto x$ for both. (c) The enthalpy of mixing of the pure components in the ideal solution is Zero/ $\Delta_{mix}H=0$ . The Volume of mixing of the pure components in the ideal solution is Zero. / $\Delta_{mix}V=0$ (or any other two suitable characteristics)	 1 1 1          ½ + ½

30	(a) 2-Deoxyribose, Phosphoric acid, Nitrogenous base.	1				
	<table border="1"> <thead> <tr> <th>DNA</th> <th>RNA</th> </tr> </thead> <tbody> <tr> <td>1. Double stranded helix</td> <td>Single stranded helix</td> </tr> </tbody> </table>	DNA	RNA	1. Double stranded helix	Single stranded helix	1
	DNA	RNA				
	1. Double stranded helix	Single stranded helix				
(or any other suitable structural difference)						
(b)	<table border="1"> <thead> <tr> <th>Nucleotide</th> <th>Nucleoside</th> </tr> </thead> <tbody> <tr> <td>1. Pentose sugar + Nitrogenous base + Phosphate</td> <td>1. Pentose sugar + Nitrogenous base</td> </tr> </tbody> </table>	Nucleotide	Nucleoside	1. Pentose sugar + Nitrogenous base + Phosphate	1. Pentose sugar + Nitrogenous base	1
Nucleotide	Nucleoside					
1. Pentose sugar + Nitrogenous base + Phosphate	1. Pentose sugar + Nitrogenous base					
(c)	(i) To preserve genetic information and Protein synthesis	1				
	OR					
	(c)(ii) Phosphodiester linkage					
	Uracil	$\frac{1}{2} + \frac{1}{2}$				
SECTION E						
31	(a)(i) (I)	1				
						
	(II) $\text{CH}_3\text{COCH}_3$	1				
	(III)		1			
	(ii) (I) Benzoic acid with Sodium bicarbonate gives brisk effervescence. No reaction with Ethyl benzoate	1				
	(ii) Propanal, when heated with ammoniacal solution of silver nitrate (Tollens' reagent) gives silver mirror. No reaction with propanone	1				
(or any other suitable chemical test)						
OR						
31	(b)(i) (I)	1				
						
	(II) 1. $(\text{BH}_3)_2$ , 2. $\text{H}_2\text{O}_2/\text{OH}^-$ , 3. PCC	1				
	(III)		1			
	(b)(ii) (I)					
			1			
(II) $\text{C}_6\text{H}_5\text{CHO} \xrightarrow{\text{CH}_3\text{CHO, dil NaOH, } \Delta} \text{C}_6\text{H}_5\text{CH}=\text{CHCHO} \xrightarrow{\text{H}_2/\text{Ni}} \text{C}_6\text{H}_5\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$	1					
(Or any other suitable method)						
32	(a)(i)					
	(I) CO being a strong field ligand, causes pairing of electrons therefore, there is no unpaired electron.	1				

	<p>Whereas <math>\text{Cl}^-</math> is a weak field ligand, does not cause pairing, therefore presence of unpaired electrons.</p> <p>(II) CO can form both sigma (<math>\sigma</math>) and pi (<math>\pi</math>) bond with central metal atom/Metal to ligand bonding creates synergic effect between CO and the Metal.</p> <p>(III) Mirror images are superimposable/ Presence of plane of symmetry.</p> <p>(ii)  (I) <math>\Delta_0 &gt; P</math>, causes pairing of electrons, therefore 1 unpaired electron  (II) <math>\Delta_0 &lt; P</math>, No pairing of electrons therefore 5 unpaired electrons</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
<b>OR</b>		
<b>32</b>	<p>(b)(i)  (I) Coordination Isomerism / <math>[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]</math>  (II) Optical Isomerism /</p>  <p>(III) Geometrical isomerism /</p>  <p>(ii) Weak field ligands produce weak field and leads to small splitting of d-orbitals whereas strong field ligands produce strong field leading to large splitting of d-orbitals.</p> <p>Strong field ligands cause pairing of electrons/a smaller number of unpaired electrons hence produces low spin complexes and weak field ligands causes no pairing of electrons/ a greater number of unpaired electrons hence produces high spin complexes.</p>	<p><math>\frac{1}{2}, \frac{1}{2}</math>  <math>\frac{1}{2}, \frac{1}{2}</math></p> <p><math>\frac{1}{2}, \frac{1}{2}</math></p> <p>1</p> <p>1</p>
<b>33</b>	<p>(a)  (i)  <math>k = \frac{2.303}{t} \log \frac{[\text{R}]_0}{[\text{R}]}</math>  <math>k = \frac{2.303}{60} \log \frac{1.2 \times 10^{-2}}{0.2 \times 10^{-2}}</math>  <math>= \frac{2.303}{60} \log 6</math>  <math>= \frac{2.303}{60} \times 0.778</math>  <math>k = 2.98 \times 10^{-2} \text{ min}^{-1} / 0.0298 \text{ min}^{-1}</math> (Deduct <math>\frac{1}{2}</math> mark for incorrect or no unit.)  (ii)  (I) Order is determined experimentally.  (II) If one of the reactants is taken in excess.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
<b>OR</b>		
<b>33</b>	<p>(b)(i)  <math>\log \frac{k_2}{k_1} = \frac{E_a}{2.303R} \left[ \frac{1}{T_1} - \frac{1}{T_2} \right]</math></p>	<p>1</p>

$\log \frac{2k_1}{k_1} = \frac{E_a}{19.15} \left[ \frac{1}{298} - \frac{1}{308} \right]$ $0.3 = \frac{E_a}{19.15} \left[ \frac{10}{298 \times 308} \right]$ $E_a = \frac{0.3 \times 19.15 \times 298 \times 308}{10}$ $E_a = 52729 \text{ Jmol}^{-1} \text{ or } 52.729 \text{ kJmol}^{-1}$	(Deduct ½ mark for incorrect or no unit.)	1 1
(ii)		1
(1). Rate= k[H <sub>2</sub> O <sub>2</sub> ] [I <sup>-</sup> ]		½
(2) Overall order : 2/ Second		½
Molecularity : 2 / Bimolecular		½