Series : W2YXZ

SET ~ 1

रोल नं.
Roll No.

प्रश्न–पत्र कोड
Q.P. Code **56/2/1**

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.

नोट / NOTE

(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) कृपया जाँच कर लें कि इस प्रश्न–पत्र में **33** प्रश्न हैं ।
Please check that this question paper contains **33** questions.

(III) 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.

(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.

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रसायन विज्ञान (सैद्धांतिक)
CHEMISTRY (Theory)

निर्धारित समय : 3 घण्टे
Time allowed : 3 hours

अधिकतम अंक : 70
Maximum Marks : 70

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.*

You may use the following values of physical constants wherever necessary :

$c = 3 \times 10^8$ m/s

$h = 6.63 \times 10^{-34}$ Js

$e = 1.6 \times 10^{-19}$ C

$\mu_0 = 4\pi \times 10^{-7}$ T m A^{-1}

$\varepsilon_0 = 8.854 \times 10^{-12}$ C^2 N^{-1} m^{-2}

$\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9$ N m^2 C^{-2}

Mass of electron (m_e) = 9.1×10^{-31} kg.

Mass of neutron = 1.675×10^{-27} kg.

Mass of proton = 1.673×10^{-27} kg.

Avogadro's number = 6.023×10^{23} per gram mole

Boltzmann's constant = 1.38×10^{-23} JK^{-1}

SECTION – A $16 \times 1 = 16$

Question No. **1** to **16** are Multiple Choice type questions carrying **1** mark each.

1. The charge required for the reduction of 1 mol of MnO_4^- to MnO_2 is

   (A) 1 F (B) 3 F

   (C) 5 F (D) 6 F

2. Which among the following is a false statement ?

   (A) Rate of zero order reaction is independent of initial concentration of reactant.

   (B) Half-life of a zero order reaction is inversely proportional to the rate constant.

   (C) Molecularity of a reaction may be zero.

   (D) For a first order reaction, $t_{1/2} = 0.693/k$.

3. The number of molecules that react with each other in an elementary reaction is a measure of the :

   (A) activation energy of the reaction (B) stoichiometry of the reaction

   (C) molecularity of the reaction (D) order of the reaction

4. The element having $[Ar]3d^{10}4s^1$ electronic configuration is

   (A) Cu (B) Zn

   (C) Cr (D) Mn

5. The complex ions $[Co(NH_3)_5 (NO_2)]^{2+}$ and $[Co(NH_3)_5(ONO)]^{2+}$ are called

   (A) Ionization isomers (B) Linkage isomers

   (C) Co-ordination isomers (D) Geometrical isomers

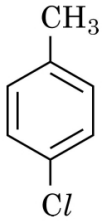
6. The diamagnetic species is :

   (A) $[Ni(CN)_4]^{2-}$ (B) $[NiCl_4]^{2-}$

   (C) $[Fe(CN)_6]^{3-}$ (D) $[CoF_6]^{3-}$

   [At. No. Co = 27, Fe = 26, Ni = 28]

7. Which is the correct IUPAC name for



(A) Methylchlorobenzene
(B) Toluene
(C) 1–Chloro–4–Methylbenzene
(D) 1–Methyl–4–Chlorobenzene

8. What will be formed after oxidation reaction of secondary alcohol with chromic anhydride (CrO_3) ?

(A) Aldehyde
(B) Ketone
(C) Carboxylic acid
(D) Ester

9. The conversion of phenol to salicylic acid can be accomplished by

(A) Reimer-Tiemann reaction
(B) Friedel-Crafts reaction
(C) Kolbe reaction
(D) Coupling reaction

10. Which of the following is/are examples of denaturation of protein ?

(A) Coagulation of egg white
(B) Curdling of milk
(C) Clotting of blood
(D) Both (A) and (B)

11. Nucleotides are joined together by

(A) Glycosidic linkage
(B) Peptide linkage
(C) Hydrogen bonding
(D) Phosphodiester linkage

12. Scurvy is caused due to deficiency of

(A) Vitamin B1
(B) Vitamin B2
(C) Ascorbic acid
(D) Glutamic acid

For question 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) :** In a first order reaction, if the concentration of the reactant is doubled, its half-life is also doubled.

Reason (R) : The half-life of a reaction does not depend upon the initial concentration of the reactant in a first order reaction.

14. **Assertion (A) :** Cu cannot liberate H_2 on reaction with dilute mineral acids.

Reason (R) : Cu has positive electrode potential.

15. **Assertion (A) :** Aromatic primary amines cannot be prepared by Gabriel Phthalimide synthesis.

Reason (R) : Aryl halides do not undergo nucleophilic substitution reaction with the anion formed by phthalimide.

16. **Assertion (A) :** Vitamin D cannot be stored in our body.

Reason (R) : Vitamin D is fat soluble vitamin and is not excreted from the body in urine.

SECTION – B

17. (A) The rate constant for a zero order reaction A → P is 0.0030 mol $L^{-1}s^{-1}$. How long will it take for the initial concentration of A to fall from 0.10 M to 0.075 M ? **2**

OR

(B) The decomposition of NH_3 on platinum surface is zero order reaction. What are the rates of production of N_2 and H_2 if $k = 2.5 \times 10^{-4}$ mol L^{-1} s^{-1} ? **2**

18. Define the following terms : **2 × 1**

(a) Pseudo first order reaction

(b) Half-life period of reaction ($t_{1/2}$)

19. Examine the following observations : **2 × 1**

(a) Transition elements generally form coloured compounds.

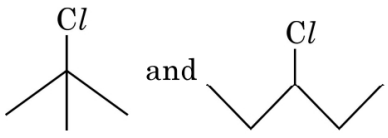
(b) Zinc is not regarded as a transition element.

20. Name the following coordination compounds according to IUPAC norms : **2 × 1**

(a) $[Co(NH_3)_4(H_2O)Cl]Cl_2$

(b) $[CrCl_2\ (en)_2]\ Cl$

21. (a) In the following pair of halogen compounds, which compound undergoes S_N1 reaction faster and why ? **1**



(b) Arrange the following compounds in increasing order of their reactivity towards S_N2 displacement : **1**

2–Bromo–2–methylbutane, 1–Bromopentane, 2–Bromopentane.

SECTION – C

22. At 25 °C the saturated vapour pressure of water is 24 mm Hg. Find the saturated vapour pressure of a 5% aqueous solution of urea at the same temperature. (Molar mass of urea = 60 g mol^{-1}) **3**

23. The electrical resistance of a column of 0.05 M NaOH solution of area 0.8 cm^2 and length 40 cm is 5×10^3 ohm. Calculate its resistivity, conductivity and molar conductivity. **3**

24. Complete and balance the following chemical equations : **3 × 1**

(a) $MnO_4^- + C_2O_4^{2-} + H^+ \longrightarrow$

(b) $KMnO_4 \xrightarrow[513\ K]{Heat}$

(c) $Cr_2O_7^{2-} + H_2S + H^+ \longrightarrow$

25. Using valence bond theory, explain the hybridization and magnetic character of the following : **2 × 1½ = 3**

(a) $[Co(NH_3)_6]^{3+}$

(b) $[Ni(CO)_4]$

[At. no. : Co = 27, Ni = 28]

26. (a) Define the following : **2 + 1 = 3**

(i) Enantiomers

(ii) Racemic mixture

(b) Why is chlorobenzene resistant to nucleophilic substitution reaction ?

27. (A) Explain the following reactions and write chemical equation involved : **3 × 1 = 3**

(a) Wolff-Kishner reduction

(b) Etard reaction

(c) Cannizzaro reaction

OR

(B) Write the structures of A, B and C in the following sequence of reactions : **2 × 1½ = 3**

(a) $CH_3COOH \xrightarrow{SOCl_2} A \xrightarrow{H_2,\ Pd\text{-}BaSO_4} B \xrightarrow{H_2N\text{–}NH_2} C$

(b) $CH_3CN \xrightarrow[2.\ H_2O]{1.(DIBAL\text{–}H)} A \xrightarrow{Dil.\ NaOH} B \xrightarrow{\Delta} C$

28. Define the following terms : **3 × 1 = 3**

(a) Glycosidic linkage

(b) Invert sugar

(c) Oligosaccharides

SECTION – D

29. The spontaneous flow of the solvent through a semipermeable membrane from a pure solvent to a solution or from a dilute solution to a concentrated solution is called osmosis. The phenomenon of osmosis can be demonstrated by taking two eggs of the same size. In an egg, the membrane below the shell and around the egg material is semipermeable. The outer hard shell can be removed by putting the egg in dilute hydrochloric acid. After removing the hard shell, one egg is placed in distilled water and the other in a saturated salt solution. After some time, the egg placed in distilled water swells-up while the egg placed in salt solution shrinks. The external pressure applied to stop the osmosis is termed as osmotic pressure (a colligative property). Reverse osmosis takes place when the applied external pressure becomes larger than the osmotic pressure.

(a) Define reverse osmosis. Name one SPM which can be used in the process of reverse osmosis. **2**

(b) (i) What do you expect to happen when red blood corpuscles (RBC's) are placed in 0.5% NaC*l* solution ? **1**

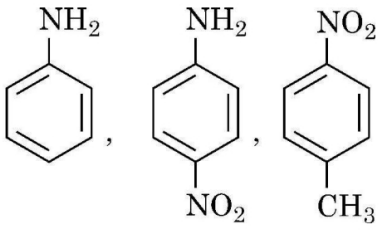
OR

(b) (ii) Which one of the following will have higher osmotic pressure in 1 M KC*l* or 1 M urea solution. Justify your answer. **1**

(c) Why osmotic pressure is a colligative property ? **1**

30. Amines have a lone pair of electrons on nitrogen atom due to which they behave as Lewis base. Greater the value of K_b or smaller the value of pK_b, stronger is the base. Amines are more basic than alcohols, ethers, esters, etc. The basic character of aliphatic amines should increase with the increase of alkyl substitution. But it does not occur in a regular manner as a secondary aliphatic amine is unexpectedly more basic than a tertiary amine in aqueous solutions. Aromatic amines are weaker bases than ammonia and aliphatic amines. Electron releasing groups such as $-CH_3$, $-OCH_3$, $-NH_2$, etc., increase the basicity while electron-withdrawing substituents such as $-NO_2$, $-CN$, halogens etc., decrease the basicity of amines. The effect of these substitute is more at p^- than at m^- position.

(a) Arrange the following in the increasing order of their basic character. Give reason : **2**



(b) Why pK_b of aniline is more than that of methylamine ? **1**

(c) (i) Arrange the following in the increasing order of their basic character in an aqueous solution : **1**

$(CH_3)_3N$, $(CH_3)_2NH$, NH_3, CH_3NH_2

OR

(c) (ii) Why ammonolysis of alkyl halides is not a good method to prepare pure amines ? **1**

SECTION – E

31. (A) (a) Give IUPAC name of $CH_3 - CH = CH - CHO$. **1**

(b) Give a simple chemical test to distinguish between propanal and propanone. **1**

(c) How will you convert the following : **3**

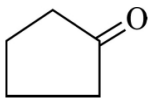
(i) Toluene to benzoic acid

(ii) Ethanol to propan–2–ol

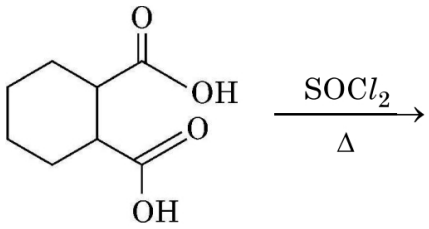
(iii) Propanal to 2–hydroxy propanoic acid

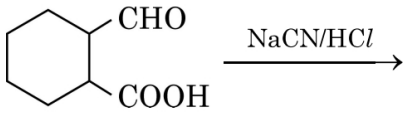
OR

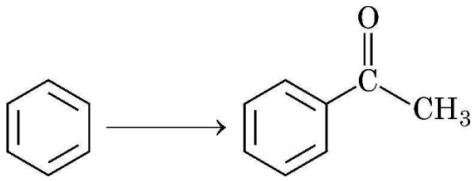
31. (B) Complete each synthesis by giving missing starting material, reagent or products : **5 × 1 = 5**

(a)  $+ HO — NH_2 \xrightarrow{H^+}$

(b) ? $\xrightarrow[(ii)\ Zn - H_2O]{(i)\ O_3}$ 2  $= O$

(c) 

(d) 

(e) 

32. (A) (a) Calculate the standard Gibbs energy ($\Delta_r G^o$) of the following reaction at 25 °C : **3 + 2**

$Au(s) + Ca^{2+}(1M) \rightarrow Au^{3+}(1M) + Ca(s)$

$E^{\circ}_{Au^{3+}/Au} = + 1.5$ V, $E^{\circ}_{Ca^{2+}/Ca} = - 2.87$ V

Predict whether the reaction will be spontaneous or not at 25 °C.

[1 F = 96500 C mol^{-1}]

(b) Tarnished silver contains Ag_2S. Can this tarnish be removed by placing tarnished silverware in an aluminium pan containing an inert electrolytic solution such as NaCl ? The standard electrode potential for half reaction :

$Ag_2S(s) + 2e^- \longrightarrow 2Ag(s) + S^{2-}$ is -0.71 V and for

$Al^{3+} + 3e^- \longrightarrow 2Al(s)$ is -1.66 V

OR

32. (B) (a) Define the following : **2 + 3**

(i) Cell potential

(ii) Fuel cell

(b) Calculate emf of the following cell at 25 °C :

$Zn(s)\,|\,Zn^{2+}_{(0.1M)}\;||\;Cd^{2+}_{(0.01M)}\;|\;Cd(s)$

Given : $E^{\circ}_{Cd^{2+}/Cd} = -0.40\ V$

$E^{\circ}_{Zn^{2+}/Zn} = -0.76\ V$

[log 10 = 1]

33. (A) An organic compound 'A', molecular formula C_2H_6O oxidises with CrO_3 to form a compound 'B'. Compound 'B' on warming with iodine and aqueous solution of NaOH gives a yellow precipitate of compound 'C'. When compound 'A' is heated with conc. H_2SO_4 at 413 K gives a compound 'D', which on reaction with excess HI gives compound 'E'. Identify compounds 'A', 'B', 'C', 'D' and 'E' and write chemical equations involved. **5**

OR

33. (B) (a) Write chemical equations of the following reactions : **3 + 1 + 1 = 5**

(i) Phenol is treated with conc. HNO_3

(ii) Propene is treated with B_2H_6 followed by oxidation by H_2O_2/OH^-.

(iii) Sodium t-butoxide is treated with CH_3Cl.

(b) Give a simple chemical test to distinguish between butan–1–ol and butan–2–ol.

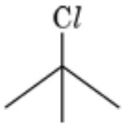
(c) Arrange the following in increasing order of acid strength :
phenol, ethanol, water

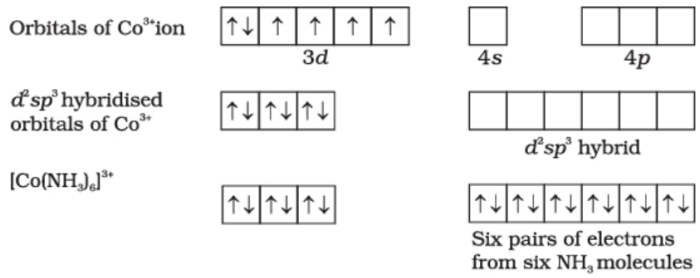
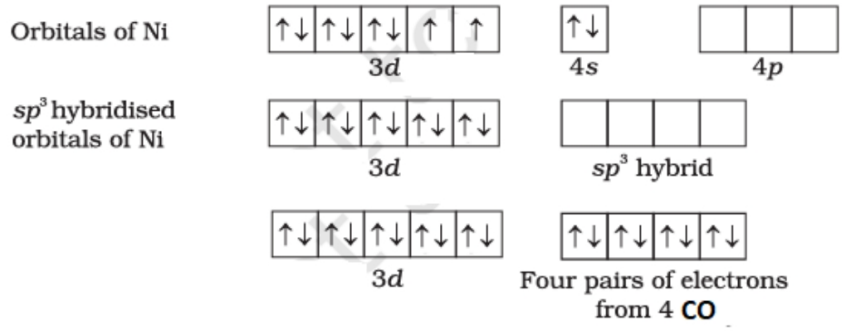
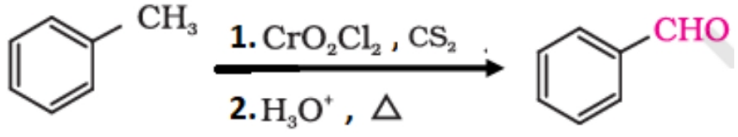
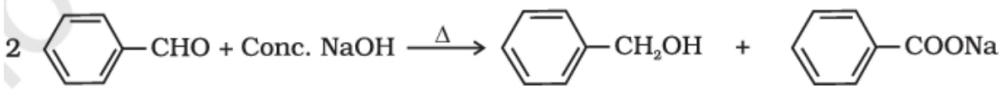
MARKING SCHEME 2024-25

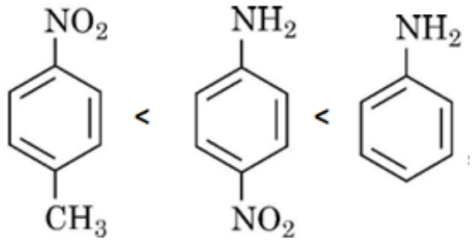
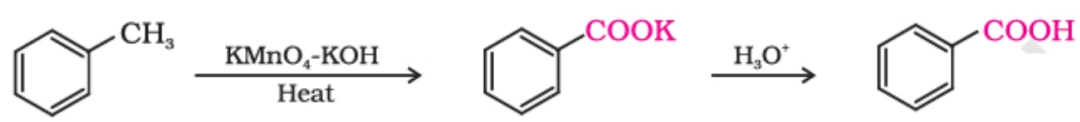
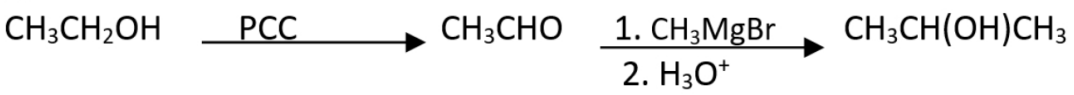
CHEMISTRY (Theory)- 043

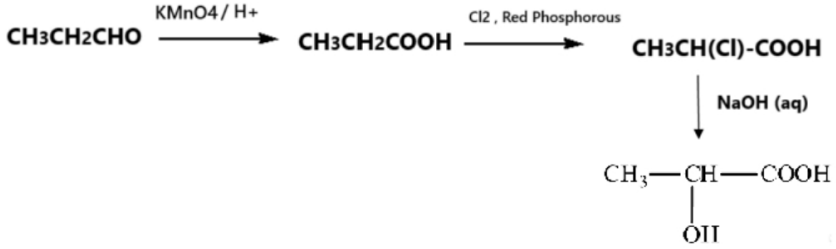
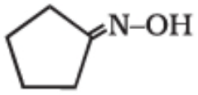
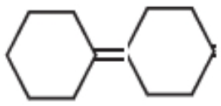
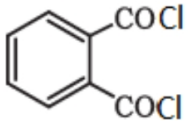
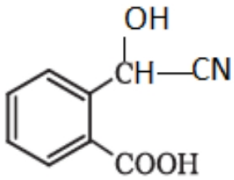
QP CODE 56/2/1 **MM: 70**

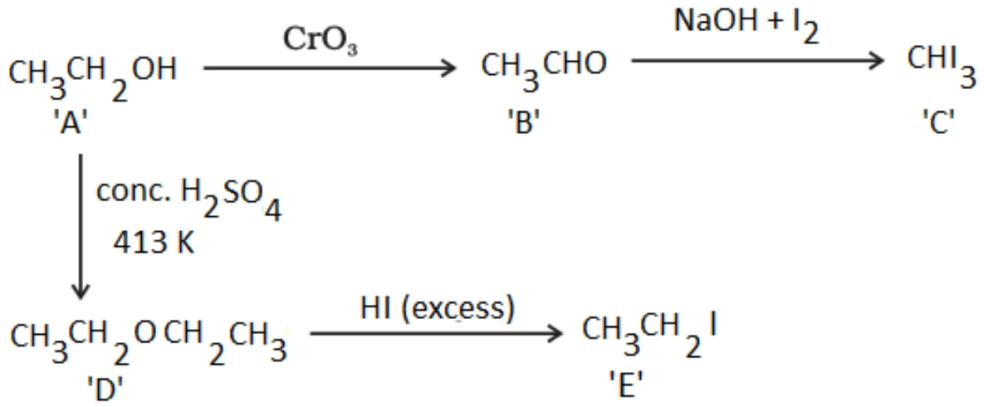
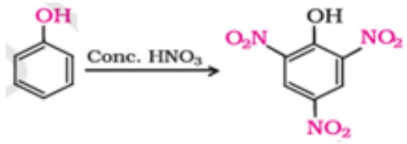
Q. No.	Value points	Mark
	SECTION A	
1	**(B)**	**1**
2	**(C)**	**1**
3	**(C)**	**1**
4	**(A)**	**1**
5	**(B)**	**1**
6	**(A)**	**1**
7	**(C)**	**1**
8	**(B)**	**1**
9	**(C)**	**1**
10	**(D)**	**1**
11	**(D)**	**1**
12	**(C)**	**1**
13	**(D)**	**1**
14	**(A)**	**1**
15	**(A)**	**1**
16	**(D)**	**1**
	SECTION B	
17	$k = \frac{[R]_0 - [R]}{t}$ $t = \frac{0.10 - 0.075}{0.0030}$ $t = \frac{0.025}{0.0030}$ $t = 8.33\ s$	½ 1 ½
	OR	
17	$\text{Rate} = \frac{-1}{2}\frac{\Delta[NH3]}{\Delta t} = \frac{\Delta[N2]}{\Delta t} = \frac{+1}{3}\frac{\Delta[H2]}{\Delta t}$ $\frac{-1}{2}\frac{\Delta[NH3]}{\Delta t} = \frac{\Delta[N2]}{\Delta t} = \frac{+1}{3}\frac{\Delta[H2]}{\Delta t} = k$ $\frac{\Delta[N2]}{\Delta t} = 2.5 \times 10^{-4}\ \text{mol L}^{-1}\ \text{s}^{-1}$ $\frac{\Delta[H2]}{\Delta t} = 3 \times 2.5 \times 10^{-4}$ $= 7.5 \times 10^{-4}\ \text{mol L}^{-1}\ \text{s}^{-1}$	½ ½ ½ ½
18	(a) The reaction that seems to be of higher order but under certain conditions is of first order. (b) The time in which the concentration of a reactant is reduced to one half of its initial concentration / The time in which half of the reaction is completed.	1 1
19	(a) Due to the presence of unpaired electron in d sub shell/ due to d-d transition. (b) Due to the presence of fully filled d- subshell in ground state and oxidized state.	1 1
20	(a) Tetraammineaquachloridocobalt(III) chloride (b) Dichloridobis(ethane-1,2-diamine)chromium(III) chloride	1 1

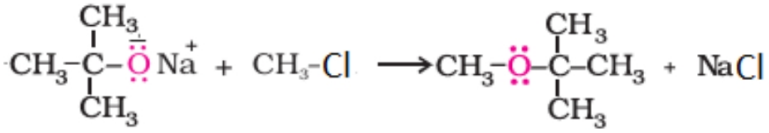
21	(a)  , due to the formation of more stable tertiary carbocation. (b) 2-Bromo-2-methylbutane < 2-Bromopentane < 1-Bromopentane.	½ , ½ 1
	SECTION C	
22	$\frac{p_1^0 - p_1}{p_1^0} = \frac{w_2 \times M_1}{M_2 \times w_1}$ $\frac{\mathbf{24} - p_1}{\mathbf{24}} = \frac{\mathbf{5} \times \mathbf{18}}{\mathbf{60} \times \mathbf{95}}$ $\frac{\mathbf{24} - p_1}{\mathbf{24}} = \frac{\mathbf{3}}{\mathbf{190}}$ $\mathbf{24} - p_1 = \frac{\mathbf{3 \times 24}}{\mathbf{190}}$ $p_1 = \mathbf{23.62\ mm\ Hg}$ / 23.64 mm Hg (Deduct ½ mark for no or incorrect unit).	1 1 1
23	$\rho = \frac{RA}{l}$ $= \frac{5 \times 10^3 \times 0.8}{40}$ $= \mathbf{100\ \Omega\ cm}$ $\kappa = \frac{1}{\rho}$ $= \frac{1}{100}$ $= 10^{-2}\ S\ cm^{-1}$ $\Lambda_m = \frac{\kappa \times 1000}{C}$ $= \frac{10^{-2} \times 1000}{0.05}$ $= 2 \times 10^2\ S\ cm^2\ mol^{-1}$	½ ½ ½ ½ ½ ½
24	(a) $5C_2O_4^{2-} + 2MnO_4^- + 16H^+ \longrightarrow 2Mn^{2+} + 8H_2O + 10CO_2$ (b) $2KMnO_4 \rightarrow K_2MnO_4 + MnO_2 + O_2$ (c) $Cr_2O_7^{2-} + 8H^+ + 3\ H_2S \rightarrow 2Cr^{3+} + 3S + 7H_2O$	1 1 1

25	(a)  Hybridization: d^2sp^3 **Magnetic character: Diamagnetic.** (b)  **Hybridization: sp^3** **Magnetic character: Diamagnetic.**	½ ½ ½ ½ ½ ½
26.	(a) (i) The stereoisomers related to each other as non-superimposable mirror images. (ii) A mixture containing dextro and laevo enantiomers in equal proportions. (b) C—Cl bond acquires a partial double bond character due to resonance / the carbon atom of benzene attached to halogen is sp^2-hybridised / Explanation through resonating structures.	1 1 1
27	(A) (a) The carbonyl group of aldehydes and ketones is reduced to CH_2 group on treatment with hydrazine followed by heating with sodium or potassium hydroxide in high boiling solvent such as ethylene glycol  (b) Chromyl chloride oxidises methyl group of toluene to a chromium complex, which on hydrolysis gives corresponding benzaldehyde.  (c) Aldehydes which do not have α-hydrogen atom, undergo self-oxidation and reduction reaction on heating with concentrated alkali gives salt of carboxylic acid and alcohol  (Or any other example)	½ ½ ½ ½ ½ ½
	OR	
27	(B) (a) A = CH_3COCl (b) CH_3CHO (c) $CH_3CH=NNH_2$	½ x 3

	(b) A = CH_3CHO (b) $CH_3CH(OH)CH_2CHO$ (c) $CH_3CH=CHCHO$	½ x 3
28	(a) The oxide linkage between two monosaccharides. (b) Hydrolysis of sucrose brings about a change in the sign of rotation, from dextro (+) to laevo (–) and the product is named as invert sugar. (c) Carbohydrates that yield two to ten monosaccharide units, on hydrolysis.	1 1 1
	SECTION D	
29	(a) • When external pressure is larger than the osmotic pressure, then the movement of solvent is from solution to solvent side through semi permeable membrane. / The direction of osmosis can be reversed if a pressure larger than the osmotic pressure is applied to the solution side. • Cellulose acetate / Or any other suitable example. (b) (i) RBC swells up / Cells swell and may even burst due to endo-osmosis. **OR** (ii) 1 M KCl, i = 2 / KCl dissociates into ions, whereas urea does not dissociate. (c) It depends upon the number of solute particles in the solution.	 1 1 ½ ½ 1
30	(a)  / Award full marks if attempted because of printing error. (b) Due to resonance in aniline the lone pair of electrons are less available while they are easily available in methyl amine. (c) (i) $NH_3 < (CH_3)_3N < CH_3NH_2 < (CH_3)_2NH$ OR (ii) A mixture of primary, secondary and tertiary amines and also a quaternary ammonium salt is formed.	 2 1 1
	SECTION E	
31	(a) But-2-enal (b) On heating with NaOH + I_2, propanone gives yellow ppt. Of iodoform (CHI_3) whereas propanal does not. (Or any other suitable chemical test) (c) (i)  (ii) 	1 1 1 1

	(iii)  (Or any other correct method)	1
	OR	
31	(B) (a)  (b)  (c)  (d)  (e) CH_3COCl / Anhy. $AlCl_3$ or $(CH_3CO)_2O$/ Anhy. $AlCl_3$	1 × 5= 5
32	(A) (a) $E^o_{cell} = E^o_{cathode} - E^o_{anode}$ = - 2.87 − 1.5 V = **- 4.37 V** $\triangle G^0 = - nF E^o c_{ell}$ = -6 x 96500 X (-4.37) = 2530.230 kJ/mol Reaction is non-spontaneous. (b) Yes, the tarnish can be removed. Aluminium has more negative standard electrode potential than silver so will reduce silver sulphide to silver, tarnish will be removed. **/** $3 Ag^+ + Al \longrightarrow 3 Ag + Al^{3+}$ $E^o c_{ell} = E^o_{cathode} - E^o_{anode}$ = - 0.71 −(-1.66) V = 0.95 V This indicates that the reaction is feasible and tarnish can be removed.	½ ½ 1 1 1 1

	OR	
32	(B) (a) (i) Potential difference between two electrodes of a galvanic cell. (ii) The galvanic cell in which combustion energy of fuels is directly converted into electrical energy. b) n =2 $E^{o}_{cell} = E^{o}_{cathode} - E^{o}_{anode}$ = - 0.40 −(-0.76) V = **0.36 V** $E_{Cell} = E^{o}_{celi} - \frac{0.059}{2} log \left[\frac{Zn^{2+}}{Cd^{2+}}\right]$ $= [0.36] - \frac{0.059}{2} log \frac{0.1}{0.01}$ $= (0 \cdot 36 - 0 \cdot 0295)$ = **0·3305 V** (Deduct ½ mark for no or incorrect unit)	1 1 1 1 1
33	**(A) A =** CH_3CH_2OH / Ethanol / Ethyl alcohol, B = CH_3CHO / Ethanal / Acetaldehyde, C = CHI_3 / Iodoform / Triiodomethane, D = $CH_3CH_2O\,CH_2\,CH_3$ / Ethoxyethane / Diethyl ether, E = CH_3CH_2I / Ethyl iodide / Iodoethane.  	½ x 5 ½ x 5
	OR	
33	(B) (a) (i)  (ii)  (iii)	1 1 1

		1
	(b) On heating with NaOH + I_2, Butan-2-ol gives yellow ppt. Of iodoform (CHI_3) whereas Butan-1-ol does not. (Or any other suitable chemical test)	1
	(c) Ethanol < Water < Phenol.	