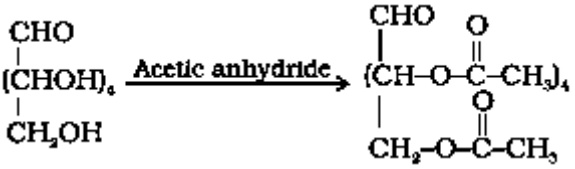
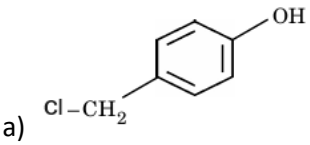
SOLUTIONS 2024-25

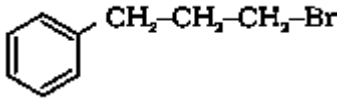
CHEMISTRY (Theory)- 043

QP CODE 56/6/2 **MM: 70**

Q.No	Value points	Mark
	SECTION A	1
1	**B**	**1**
2	**D**	**1**
3	**A**	**1**
4	**C**	**1**
5	**A**	**1**
6	**C**	**1**
7	**B**	**1**
8	**D**	**1**
9	**A**	**1**
10	**B**	**1**
11	**C**	**1**
12	**B**	**1**
13	**A**	**1**
14	**B**	**1**
15	**A**	**1**
16	**D**	**1**
	SECTION B	
17	• The partial vapour pressure of each component of the solution is directly proportional to its mole fraction present in solution. • Because glucose decreases the surface area and hence decreases the escaping tendency of water	1 1
18	a) i) Dichloridobis(ethane-1,2-diamine)cobalt(IV) sulphate ii) Potassium trioxalatoferrate(III)	1 1
	OR	
18	b) i) Double salts dissociate into simple ions while complex compounds do not dissociate completely into ions when dissolved in water. (Or any other suitable difference) ii) When a ligand binds through two donor atoms is called a didentate ligand while a unidentate ligand which has two different donor atoms and either of the two ligates in the complex is called ambidentate ligand.	1 1
19	a) First order b) Slope= k/ 2.303	1 1
20	a) Glucose gets oxidised to six carbon carboxylic acid (gluconic acid) on reaction with a mild oxidising agent like bromine water. This indicates the presence as an aldehydic group /  b) Acetylation of glucose with acetic anhydride gives glucose pentaacetate which confirms the presence of five –OH groups / 	1 1

21

a) 

b) 

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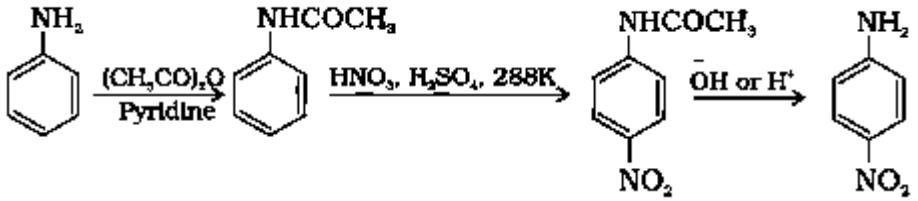
SECTION C

22

a)



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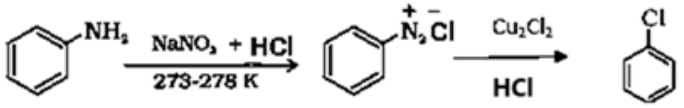
b)



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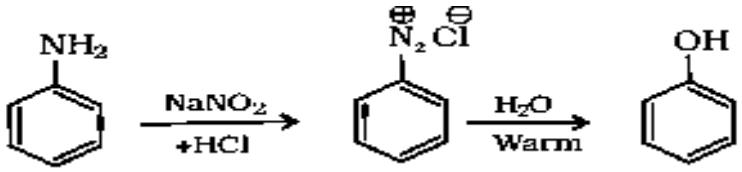
c)



1

23

A= $CH_3CH=CHCN$ / But-2-ene nitrile — 1

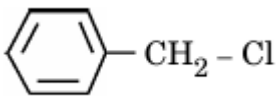
B= $CH_3CH=CHCHO$ / But-2-enal — 1

$CH_3CH=CHCN \xrightarrow[2.\ H_2O]{1.\ DIBAL\text{-}H} CH_3CH=CHCHO$ — 1

24

	S_N1	S_N2
1	Unimolecular	Bimolecular
2	It follows first order kinetics	It follows second order kinetics
3	Retention of configuration	Inversion of configuration
4.	Racemisation occurs	No racemisation is seen
5.	Takes place through formation of carbocation	Takes place through formation of transition state
6.	Occurs in polar protic solvent	Occurs in polar aprotic solvent
7.	Rate is independent of the concentration of the nucleophile.	Rate is dependent on the concentration of the nucleophile.

(Any TWO) — 1+1



, because of the stability of benzyl carbocation — ½+½

25

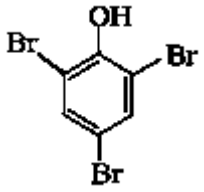
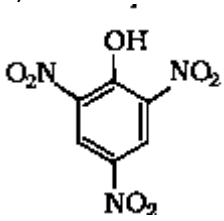
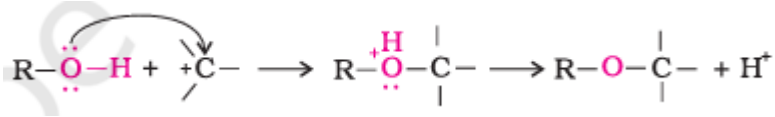
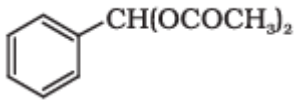
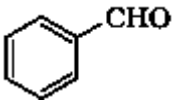
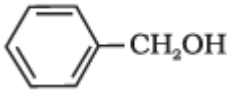
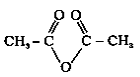
$\Delta T_f = K_f\ m$ — ½

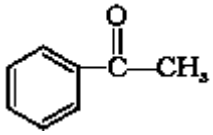
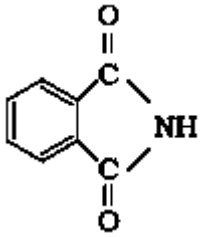
$m = \Delta T_f / K_f$

$m = 0.3/1.86$

$= 0.16m$ — ½

	m = $\frac{x_2 \text{ X } 1000}{M_A}$ x_2= $\frac{0.16\ X\ 18}{1000}$ = 2.88 X 10^{-3} $\frac{p_1^0 - p_1}{p_1^0} = x_2$ $\frac{24.8 - p_1}{24.8}$ = 2.88 X 10^{-3} $p_1^0 - p_1 = x_2\ p_1^0$ = 2.88 X 10^{-3} × 24.8 mm Hg = 0.07 mm Hg	½ ½ ½ ½
26.	a) $[FeF_6]^{3-}$ -sp^3d^2 $[Fe(CN)_6]^{4-}$ - d^2sp^3 b) $[FeF_6]^{3-}$ -outer orbital complex $[Fe(CN)_6]^{4-}$ - inner orbital complex c) $[FeF_6]^{3-}$ - paramagnetic $[Fe(CN)_6]^{4-}$ -diamagnetic	½+½ ½+½ ½+½
	OR	
26	a) It becomes colourless/ colour slowly fades away b) $t_{2g}^3e_g^2$ c) sp^3, diamagnetic	1 1 ½+½
27	a) Because of the formation of NaOH / Due to the formation of OH^- ions. b) Because the overall reaction does not involve any ion in solution whose concentration can change during its life time. c) Because the number of ions per unit volume that carry current in a solution decreases.	1 1 1
28	Rate = k [A]^p [B]^q $5 \cdot 0 \times 10^{-3}$= k [0.01]^p [0.01]^q……Eq 1 $1 \cdot 0 \times 10^{-2}$= k [0.02]^p [0.01]^q……Eq 2 $5 \cdot 0 \times 10^{-3}$= k [0.01]^p [0.02]^q……Eq 3 On Comparing (eq1) and (eq3) 1= $(2)^q$ q = 0 On Comparing (eq1) and (eq2) $(2)^1$= $(2)^p$ p = 1 Order w·r·t A = 1 Order w·r·t B= 0 From eq 1 $5 \cdot 0 \times 10^{-3}$= k [0.01]^1 [0.01]^0 k =0.5 min^{-1}	1 1 ½ ½

	SECTION D	
29	a) (i) A linkage which joins amino acids through -CO-NH- bond (ii) When a protein in its native form, is subjected to physical change like change in temperature or chemical change like change in pH, it loses its biological activity. b) Due to zwitter ion formation which can react with both acids and bases./ Due to the presence of both carboxylic group and amino group. c) (i) Fibrous protein: parallel polypeptide chain structure / insoluble in water Globular protein: spherical polypeptide chain structure/ soluble in water **(Any one difference)** OR c) (ii) α-helix and β-pleated sheet	1 1 1 1 ½ + ½
30	a) i)  / 2,4,6-Tribromophenol is formed ii)  / 2,4,6-Trinitrophenol / Picric acid is formed. b) (i)  **OR** b)(ii) due to sp^2 hybridisation leading to shorter bond length / Due to resonance leading to partial double bond character of C-OH bond c) 2-Methylpropan-2-ol gives turbidity immediately whereas butan-1-ol does not react.	1 1 1 1 1
	SECTION E	
31	**(a) (i)** **A=**  **B=**  C=  (ii) (I) Because carbon of carboxyl group is less electrophilic due to resonance with -OH group. (II) Because ethanoate ion is more stable than ethoxide ion due to resonance.	1 1 1 1 1
	OR	
31	(b)i) (I)  / $(CH_3CO)_2O$	1

	(II)  (III)  (ii) (I) $\rangle C{=}O \xrightarrow[-H_2O]{NH_2NH_2} \rangle C{=}NNH_2 \xrightarrow[heat]{KOH/ethylene\ glycol} \rangle CH_2 + N_2$ (II) $R\text{-}COONa \xrightarrow[Heat]{NaOH\ \&\ CaO} R\text{-}H + Na_2CO_3$	1 1 1 1
32	(a) (i) $E_{Cell} = (E^o_c - E^o_a) - \frac{0.059}{2} log \left[\frac{Zn^{2+}}{Pb^{2+}}\right]$ $= [(-0.13) - (-0.76)] - \frac{0.059}{2} log \frac{0.1}{0.02}$ = 0.63 – 0.0295 log 5 =0.63-0.0295 X 0.699 = 0.63-0.02 = 0.61V (Deduct ½ mark for no or incorrect unit) (ii) The amount of chemical reaction which occurs at any electrode during electrolysis by a current is proportional to the quantity of electricity passed through the electrolyte. 5F	1 1 1 1 1
	OR	
32.	(b) (i) k= G*/R G* = k X R =0.125 X 10^{-3} X 1000 =0.125 cm^{-1} (ii) $E_{Mg^{2+}/Mg} = E^0_{Mg^{2+}/Mg} - \frac{0.059}{2} \log \frac{1}{[Mg^{2+}]}$ $= 2.36\ V - \frac{0.059}{2} \log \frac{1}{10^{-4}}$ = 2.36– 0·0295 X 4 log 10 = 2.242 V (iii) It decreases with increase in temperature	½ 1 ½ 1 ½ ½ 1
33	(a) (i) (I) Due to formation of chromate /CrO_4^{2-} ion (II) Due to completely filled d-orbitals in ground state as well as oxidised state. (III) Because Mn^{2+} is more stable due to stable $3d^5$ configuration whereas Cr^{3+} is more stable due to stable t_{2g}^3 configuration. (ii) (I) it changes to permanaganate ion / MnO_4^- is formed / $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$ (II) Potassium manganate/ K_2MnO_4 is formed / $2KMnO_4 \rightarrow K_2MnO_4 + MnO_2 + O_2$	1 1 1 1 1

	OR	
33	(b) i) • An alloy of lanthanoid / an alloy of lanthanoid and iron with traces of S, C, Ca and Al. • used in making bullets/shells/ lighter flint ii) CrO_4^{2-}/ $Cr_2O_7^{2-}$ iii) variable oxidation state of vanadium / large surface area /Complex formation iv) Because of large number of unpaired electrons in their atoms they have stronger interatomic interaction or strong metallic bonding v) by acidification of Na_2CrO_4/ $2Na_2CrO_4 + 2\ H^+ \rightarrow Na_2Cr_2O_7 + 2\ Na^+ + H_2O$	½ +½ 1 1 1 1