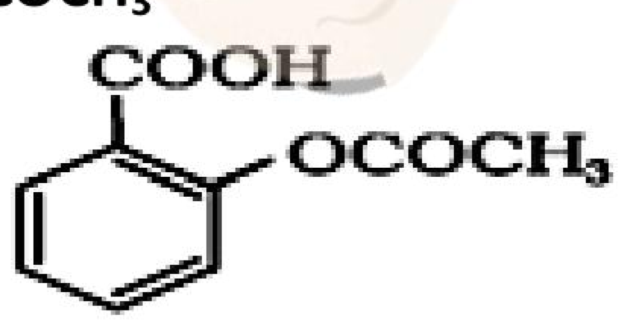
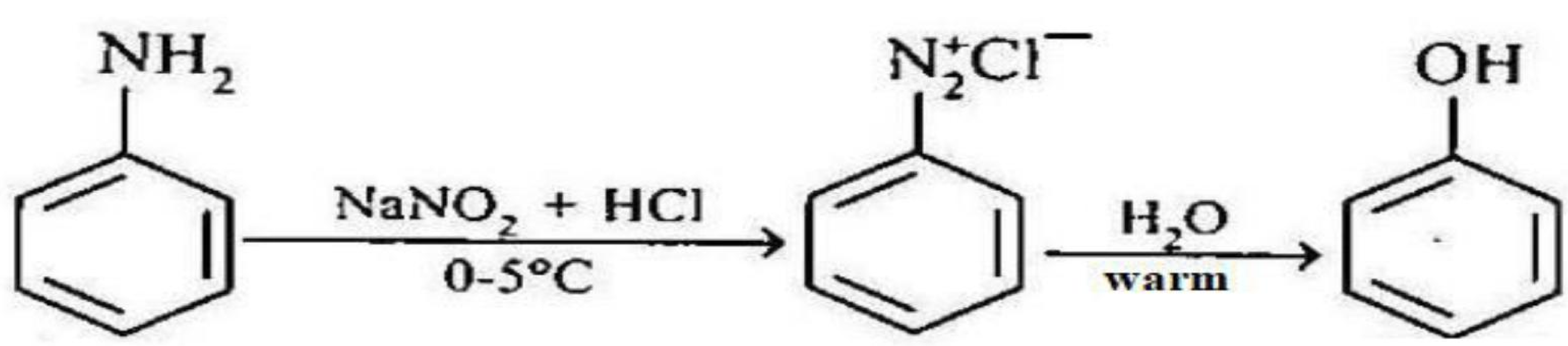
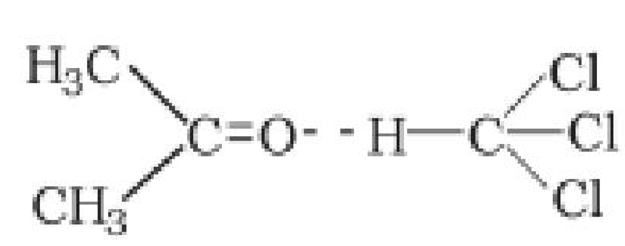
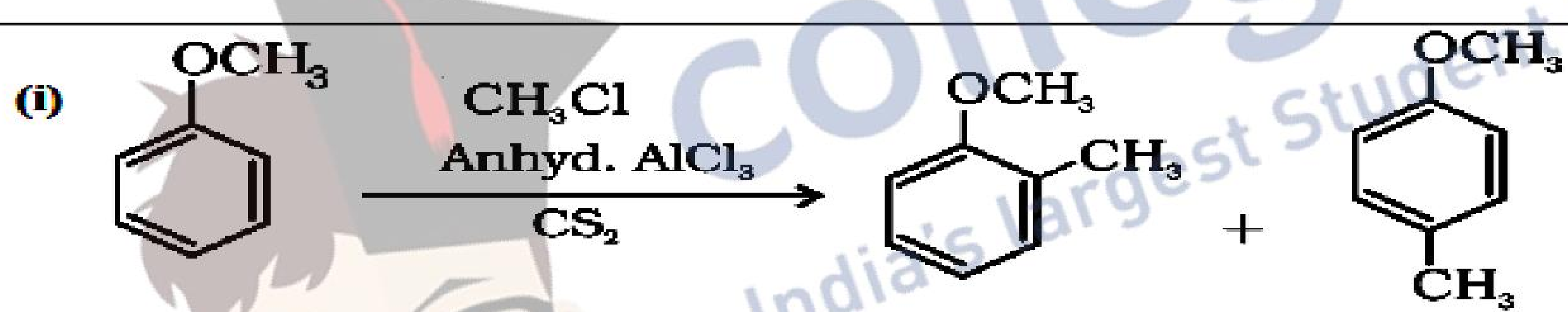
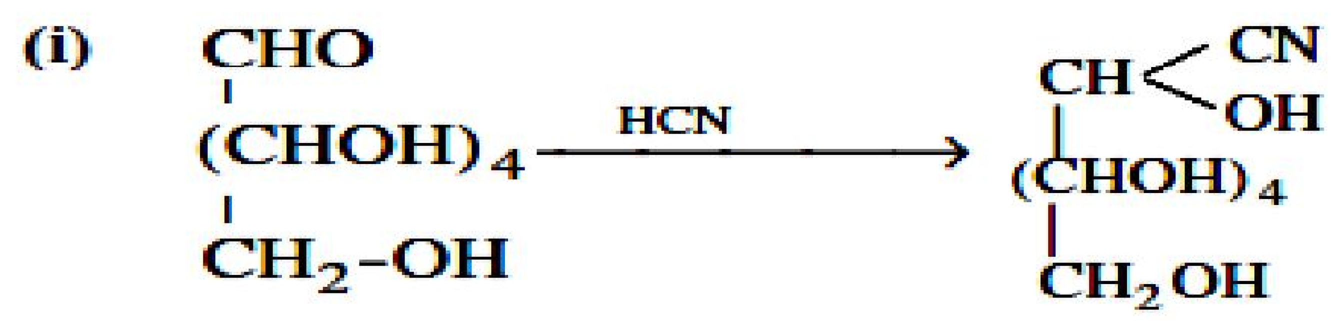
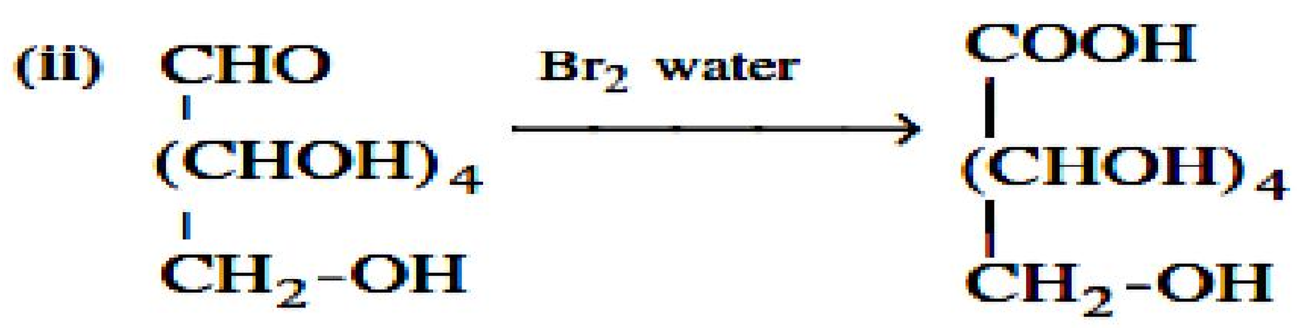
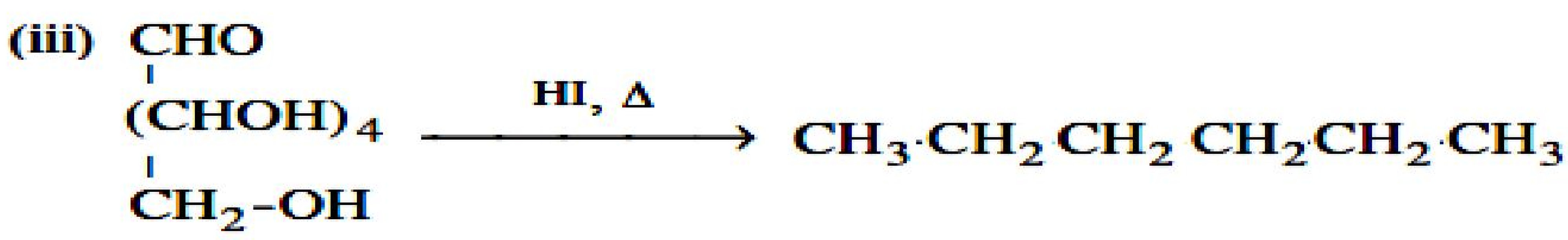
Marking scheme – 2021

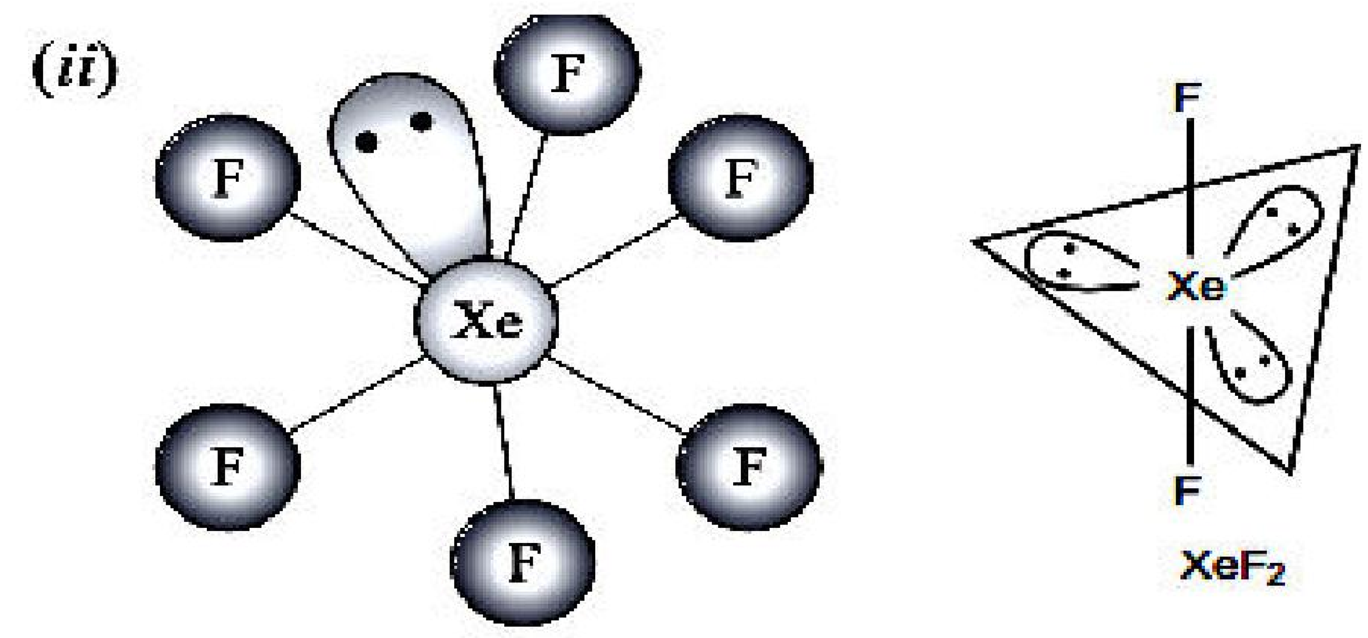
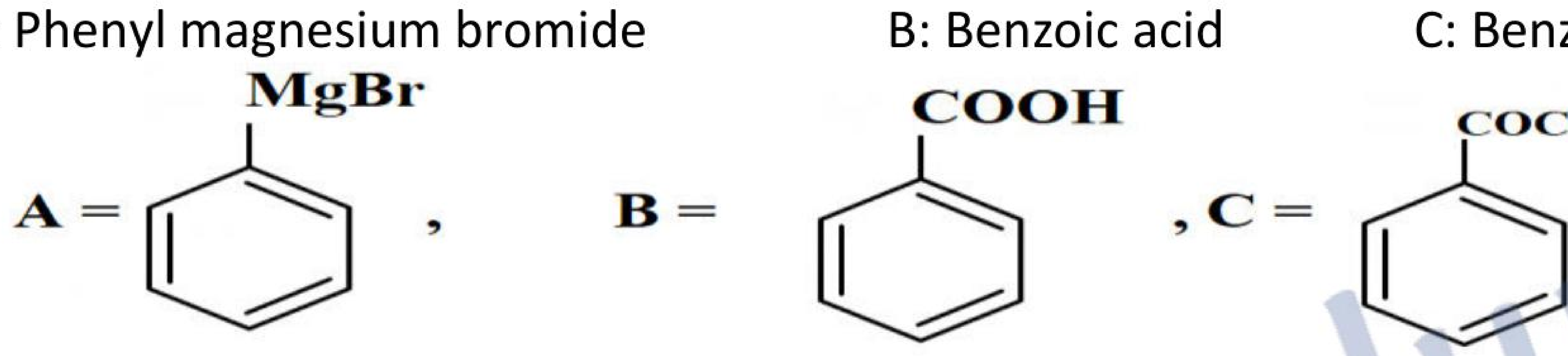
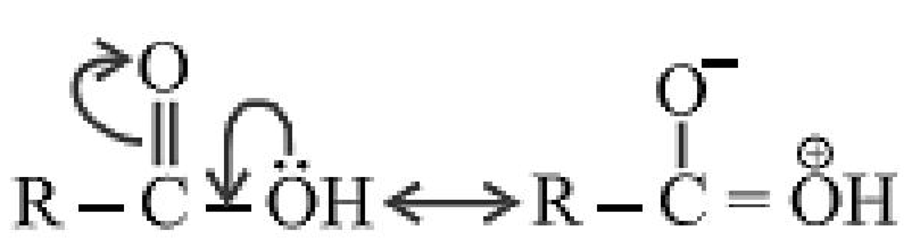
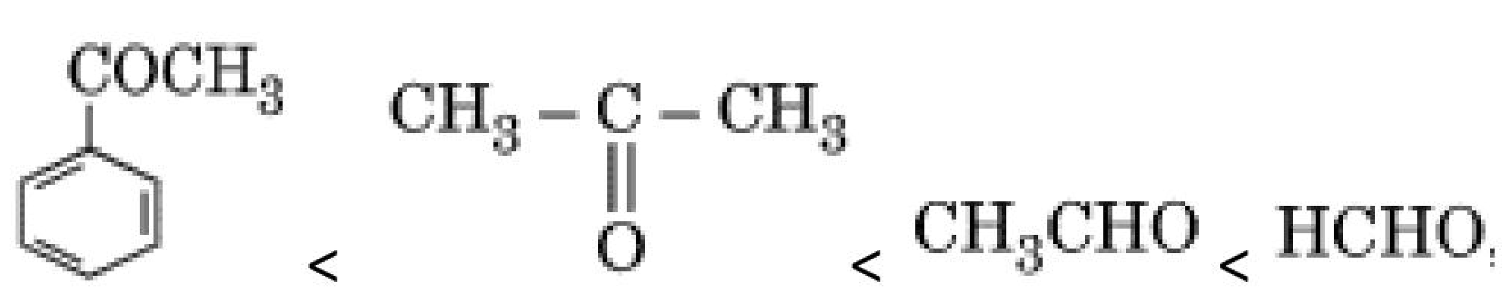
CHEMISTRY (043) / CLASS XII

56/1/1

Q. No	Expected Answer / Value Points	Marks
	SECTION-A	
1. (i)	(B)	1
(ii)	(D)	1
(iii)	(A)	1
(iv)	(C) **OR** (B)	1
2. (i)	(D)	1
(ii)	(A)	1
(iii)	(C)	1
(iv)	(A) **OR** (B)	1
3.	(B) **OR** (D)	1
4.	(A)	1
5.	(B)	1
6.	(C) **OR** (D)	1
7.	(B)	1
8.	(C) **OR** (A)	1
9.	(C)	1
10.	(B) **OR** (A)	1
11.	(C)	1
12.	(C)	1
13.	(B) **OR** (A)	1
14.	(D)	1
15.	(B)	1
16.	(A)	1
	SECTION-B	
17.(a)	**(i)** CH_3COCH_3	1
	(ii) 	1
	OR	
17.(b)	**(i)** $C_6H_5OH + NaOH \longrightarrow C_6H_5ONa \xrightarrow{CH_3I} C_6H_5OCH_3$	1
	(ii)  (Or by any other suitable method)	1
18.	Negative deviation,  due to the formation of H-bond between $CHCl_3$ and acetone / / due to strong interaction set up between $CHCl_3$ and acetone.	1 1

19. (a) 19. (b)	(i) sp^3d^2 , paramagnetic (ii) dsp^2, diamagnetic **OR** (i) hexaaquamanganese (II) sulphate / hexaaquomanganese (II) sulphate (ii) CN^- is a strong field ligand that causes the pairing of electrons while F^- being a weak field ligand cannot do pairing of electrons.	½, ½ ½, ½ 1 1
20.	**Rate of disappearing of I^- = $\frac{-d[I-]}{dt} = \frac{-(0.28-0.30)}{10-0} = \frac{0.02}{10}$ = 2 x 10^{-3} M min^{-1}** **Rate of production of I_2 = $\frac{d[I2]}{dt} = \frac{-d[I-]}{dt} = \frac{1}{2}$ x 2 x 10^{-3} = 10^{-3} M min^{-1}**	1 1
21. (a) 21. (b)	(i) Due to small size of the metal ions / high ionic charge and availability of d-orbitals. (ii) Cr is more stable in + 3 oxidation state. (Any other suitable reason) **OR** Due to incomplete filling of d- orbitals. In transition elements the oxidation states differ from each other by unity while in p-block elements it differs by a unit of two / Heavier members of transition elements are stable in higher oxidation states whereas that of p-block are stable in lower oxidation states. (Any other suitable reason)	1 1 1 1
22.	**(i)** $R-NH_2 + CHCl_3 + 3KOH \xrightarrow{Heat} R-NC + 3KCl + 3H_2O$ **(ii)** $R-C(=O)-NH_2 + Br_2 + 4NaOH \longrightarrow R-NH_2 + Na_2CO_3 + 2NaBr + 2H_2O$	1 1
23.	(i)  , due to larger size of I than Cl / I^- is a better leaving group than Cl. (ii) CH_3-CH_2-Cl , due to less steric hinderance / as it is a 1° alkyl halide.	½, ½ ½, ½
24.	 	1 1
25.	$d = \frac{Z\,X\,M}{N_A\,X\,a^3}$ $6.6\ g\ cm^{-3} = \frac{Z\ X\ 27\ g\ mol^{-1}}{(3\ X\ 10^{-8}\ cm)^3\ X\ 6.022\ X10^{23}\ mol^{-1}}$ $z = \frac{6.6\ X\ 6.022\ X10^{23}\ X\ 27\ X\ 10^{-24}}{27}$ = 3.97 ≈ 4 Unit cell is of fcc type.	½ ½ ½ ½
	SECTION-C	
26 (a). 26 (b).	Due to high enthalpy of atomization and low enthalpy of hydration. Cu^+ disproportionate in the aqueous solution / 2 $Cu^+ \longrightarrow Cu^{2+}$ + Cu. High hydration enthalpy of Cu^{2+} over Cu^+ which more than compensates for the second ionisation enthalpy of Cu. **OR** (i) Due to almost similar / comparable atomic radii. (ii) Weak metallic bonding / no unpaired electrons / weak interatomic interaction. (iii) The ability of oxygen to form multiple bonds with metals while F cannot.	1 1 1 1 1 1
27 (a).	(i) In fibrous protein, the polypeptide chains run parallel while in globular protein, the chains of polypeptides coil around to give a spherical shape / Fibrous proteins are insoluble in water while globular proteins are soluble. (ii) Amino acids which cannot be synthesized in the body and are obtained through diet are	1 1

	essential amino acids while those which can be synthesized in the body are known as non-essential amino acids. (iii) DNA has Thymine while RNA has Uracil base / DNA has deoxyribose sugar while RNA has ribose sugar / DNA has double helical while RNA has single helical structure. (or any other suitable difference)	1
	OR	
27 (b).		1
		1
		1
28.	(i) Rate = k $[X]^a$ $[Y]^b$ $0.05 = k [0.1]^a [0.2]^b$ ---------------(i) $0.10 = k [0.2]^a [0.2]^b$---------------(ii) $0.05 = k [0.1]^a [0.1]^b$---------------(iii) On solving a= 1 and b = 0. Order w.r.t X = 1 and Order w.r.t Y = 0 (ii) Rate = k $[X]^1$ $[Y]^0$ (iii) Rate = k [X] or 0.05 = k [0.1] $k = \frac{0.05}{0.1} = 0.5\ min^{-1}$	1 1 1
29.	$\frac{Po-P}{Po} = X2$ $\frac{17.536-P}{17.536} = \frac{w2}{M2} X \frac{M1}{w1}$ $\frac{17.536-P}{17.536} = \frac{20}{180}\ X\ \frac{18}{500}$ $\frac{17.536-P}{17.536} = 0.004$ 17.536 – P = 0.07 P = 17.536 – 0.07 = 17.466 mm Hg (Deduct ½ mark for no or incorrect unit).	1 1 1
30.	(i) Due to -I effect of halogen / electron-withdrawing nature of halogen. (ii) Sulphuric acid converts KI to HI and then oxidises HI to I_2. (iii) CN^- is an ambident nucleophile. KCN is ionic, so 'C' is a nucleophilic centre that give stable C—C bond to give nitrile. AgCN is mainly covalent, so 'N' is the nucleophilic centre to give isonitrile.	1 1 1
	SECTION-D	
31. (a)	(i) (I): Due to increase in atomic size and metallic character. (II): Due to lower Ionization enthalpy of Xe. (III) Due to equatorial lp-lp repulsions.	1 1 1

	(ii)  **OR**	1+ 1
31. (b)	(i) A = Chlorine, B = Nitrogen, C = Nitrogen trichloride. $MnO_2 + 4\,HCl \rightarrow MnCl_2 + 2H_2O + Cl_2$ $8\,NH_3 + 3\,Cl_2 \rightarrow 6\,NH_4Cl + N_2$ $NH_3 + 3\,Cl_2$ (excess) $\rightarrow NCl_3 + 3\,HCl$ (Ignore balancing in the above equations) (ii) (I) He < Ne < Ar < Kr < Xe (II) HI < HBr < HCl < HF	½ x 3 ½ ½ ½ 1 1
32 (a).	(i) (I) A: Phenyl magnesium bromide B: Benzoic acid C: Benzoyl chloride /  (II) A: Ethanal, B: 3-Hydroxybutanal, C: But-2-enal / A: CH_3CHO, B: $CH_3CH(OH)CH_2CHO$, C: $CH_3CH=CHCHO$ (ii) (I) On heating ethanol with NaOH and I_2, it will give *yellow ppt.* of iodoform whereas Benzaldehyde does not. (II) On adding $NaHCO_3$, acetic acid will give the brisk effervescence whereas acetone does not. (Or any other suitable chemical test) **OR**	 ½ x 6 =3 1 1
32 (b).	(i) (I) $KMnO_4$, KOH (II) DIBAL-H / $NaBH_4$ (ii) $CH_3\text{-}CH_2\text{-}CH = NOH$ (iii) Lone pairs of electrons on oxygen involved in resonance stabilization of -COOH group /Due to resonance lone pair on -OH of -COOH group decreases the electrophilicity of carbon atom to greater extent /  (iv)  	1 + 1 1 1 1
33 (a).	(i) $E_{cell} = E^0_{cell} - \frac{0.059}{6}\log\frac{[Al^{3+}]^2}{[Cu^{2+}]^3}$ $E_{cell} = 2 - \frac{0.059}{6}\log\frac{[10^{-1}]^2}{[10^{-2}]^3}$ $E_{cell} = 2 - \frac{0.059}{6}\log 10^4$ $E_{cell} = 2 - \frac{0.059}{6} X\ 4\ \log 10$ $E_{cell} = 2 - 0.039$ $E_{cell} = 1.961$ V (Deduct ½ mark, if no or incorrect unit) (ii) Molar conductivity of a solution at a given concentration is the conductance of the volume *V* of	1 1 1

	solution containing one mole of electrolyte kept between two electrodes with area of cross section *A* and distance of unit length / Conductivity observed for one molar solution.	1
	HCOOH is a weak electrolyte which dissociates into a greater or more number of ions on dilution whereas HCOONa being a strong electrolyte will not be affected much.	1
	OR	
33 (b).	$A = \pi r^2 = \frac{22}{7} \times (0.7)^2 = 1.54\ cm^2$ $\ell = 44\ cm$ $\frac{\ell}{A} = \frac{44}{1.54}\ cm^{-1}$	
	$\frac{1}{\rho} = \frac{1}{R}\frac{l}{A}$	½
	$= \frac{1}{5 \times 10^3} \times \frac{44}{1.54}\ cm^{-1}$ $\rho = \frac{5 \times 10^3}{44} \times 1.54$	
	$\rho = 175\ \Omega\ cm$	½
	$k = 1/\rho$ $= 1/175$	½
	$k = 0.0057\ \Omega^{-1}\ cm^{-1}$	½
	$\Lambda_m = \frac{k}{c} \times 1000$ $= \frac{0.0057}{0.02} \times 1000$	½
	$= 285\ Scm^2mol^{-1}$	½
	(ii) $Ni(s) \mid Ni^{2+}(aq.) \parallel Ag^{+}(aq.) \mid Ag(s)$	1
	(I): Ag (II) electrons	½ , ½

S.No.	Name	Signature
1.	Mr. D A Mishra	
2.	Ms. Preeti Kiran	
3.	Mr. Rakesh Dhawan	
4.	Mr. Rahul Tandon	