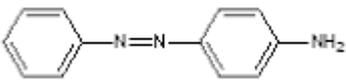
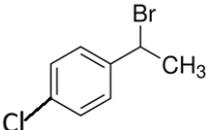
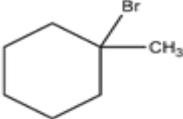
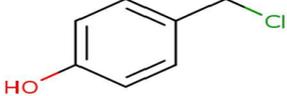
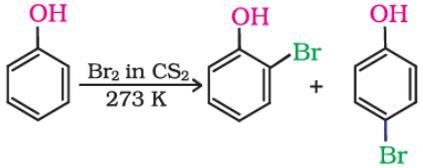
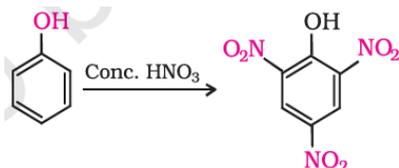
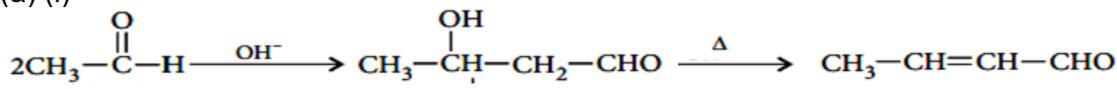
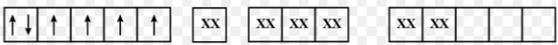


Q. No	Value points	Mark
SECTION A		
1	(B)	1
2	(B)	1
3	(A)	1
4	(C)	1
5	(C)	1
6	(B)	1
7	(A)	1
8	(D)	1
9	(A)	1
10	(D)	1
11	(D)	1
12	(C)	1
13	(B)	1
14	(C)	1
15	(B)	1
16	(A)	1
SECTION B		
17	Less reactive, The carbon atom of the carbonyl group of benzaldehyde is less electrophilic than carbon atom of the carbonyl group present in propanal./ The polarity of the carbonyl group is reduced in benzaldehyde due to resonance.	1 1
18	(a) $8\text{MnO}_4^- + 3\text{S}_2\text{O}_3^{2-} + \text{H}_2\text{O} \longrightarrow 8\text{MnO}_2 + 6\text{SO}_4^{2-} + 2\text{OH}^-$ (b) $\text{Cr}_2\text{O}_7^{2-} + 3\text{Sn}^{2+} + 14\text{H}^+ \rightarrow 2\text{Cr}^{3+} + 3\text{Sn}^{4+} + 7\text{H}_2\text{O}$	1 1
19	(A) (a) Due to high pressure inside the pressure cooker, higher is the boiling point and faster is the cooking. (b) Negative deviation Temperature increases.	1 $\frac{1}{2}$ $\frac{1}{2}$
OR		
19	(B) Same composition in liquid and in vapour phase and boil at a constant temperature. Maximum Boiling Azeotrope 68% HNO_3 + 32% H_2O (Or any other correct example) (Percentage can be ignored)	1 $\frac{1}{2}$ $\frac{1}{2}$
20	(a) A = $\text{CH}_3\text{CH}_2\text{CN}$; B = $\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$ (b) A = $\text{C}_6\text{H}_5\text{N}_2^+\text{Cl}^-$; <div style="text-align: center;">  <p>B =</p> </div>	$\frac{1}{2} \times 4$
21	a) Glucose + Fructose / Chemical equation b) Glucose + Galactose / Chemical equation	1 1
SECTION C		
22	$p_{\text{CO}_2} = K_H \chi_{\text{CO}_2}$ $K_H = 1.67 \times 10^8 \text{ Pa}$ $p_{\text{CO}_2} = 2.53 \times 10^5 \text{ Pa}$	$\frac{1}{2}$

	$\chi_{\text{CO}_2} = \frac{p_{\text{CO}_2}}{K_H}$ $= \frac{2.53 \times 10^5}{1.67 \times 10^8}$ $= 1.51 \times 10^{-3}$ $\chi_{\text{CO}_2} = \frac{n_{\text{CO}_2}}{n_{\text{H}_2\text{O}}}$ $n_{\text{H}_2\text{O}} = 500/18 = 27.78 \text{ moles}$ $n_{\text{CO}_2} = 27.78 \times 1.51 \times 10^{-3} \text{ moles}$ $= 42.0 \times 10^{-3} \text{ mol} = 0.042 \text{ moles}$	1 1/2 1/2 1/2
23	$E^\circ_{\text{Cell}} = E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$ $= -0.40 - (-0.74)$ $= +0.34 \text{ V}$ $\Delta G^\circ = -nF E^\circ_{\text{cell}}$ $= -(6 \times 96500 \times 0.34) \text{ J}$ $= -196860 \text{ J/mol}$ $\Delta G^\circ = -2.303 RT \log K_c$ $\log K_c = (196860) / (2.303 \times 8.314 \times 298)$ $= 34.576$ <p style="text-align: right;">(or any other suitable method)</p>	1/2 1/2 1 1/2 1/2
24	$\log K = -E_a / 2.303 RT$ $\log \frac{k_2}{k_1} = \frac{E_a}{2.303R} \left[\frac{T_2 - T_1}{T_1 T_2} \right]$ $\log \frac{4}{1} = \frac{E_a}{2.303 \times 8.314} \left[\frac{313 - 293}{313 \times 293} \right]$ $\log 4 = \frac{E_a}{19.147} \left[\frac{20}{313 \times 293} \right]$ $E_a = \frac{0.602 \times 19.147 \times 313 \times 293}{20}$ $= 52850 \text{ J mol}^{-1} / 52.85 \text{ kJ mol}^{-1}$	1 1 1
25	<p>(A) (a)</p>  <p>(b)</p>  <p>(c)</p> 	1 1 1
26.	<p>(a) Its high $\Delta_a H^\circ$ and low $\Delta_{\text{hyd}} H^\circ$.</p> <p>(b) Cr Cr³⁺ (d⁴ to d³) / stable half-filled t_{2g} level (c) Fully-filled d-orbitals hence no d-d transition / due to the absence of unpaired electron.</p>	1 1/2 1/2 1
27	<p>(a) (CH₃)₂NH < CH₃CH₂NH₂ < CH₃CH₂OH</p> <p>(b) (i) aromatic halides do not undergo nucleophilic substitution with the anion formed by phthalimide.</p>	1 1

	(ii)  / Due to resonance the lone pair on nitrogen is less available for donation/ Due to +R effect lone pair of electrons is not easily available on N of -NH ₂ group/ Due to -R effect of carbonyl group, electron density on N atom of -NH ₂ group decreases.	1
28	a) Protein found in a biological system with a unique three dimensional structure and biological activity. b) Nitrogenous base + Pentose Sugar + Phosphate / a unit formed when a nucleoside is linked with phosphate. c) Those acids which cannot be synthesized in the body and must be obtained through diet.	1 1 1
SECTION D		
29	(a) (i) Slowest step. (ii) Series of elementary reaction/ Reactions involving two or more steps. (b) Increases with increase in temperature OR (b) Molecularity is defined only for elementary reactions whereas order is experimentally determined hence applicable for both / Because molecularity of each elementary reaction in complex reaction may be different and hence meaningless for overall complex reaction whereas order of a complex reaction is experimentally determined by the slowest step in its mechanism and is therefore applicable for both. (c) 9 times	1 1 1 1 1
30	(a) (i)  / 2-Bromophenol and 4-Bromophenol is formed. (ii)  / 2,4,6-Trinitrophenol / Picric acid is formed. b) Due to resonance, the lone pair of electrons on oxygen is not easily available for protonation. c) Phenol Due to electron releasing effect (+I effect) of methyl group/ phenoxide ion formed is less stable in cresol. OR (c) 2-Hydroxybenzaldehyde / 2- Hydroxybenzenecarbaldehyde.	1 1 1 1 1
SECTION E		
31	(A) (a) (i)  (ii) $\text{CH}_3\text{CH}_2\text{COOH} + \text{NaOH} + \text{CaO} + \text{heat} \rightarrow \text{CH}_3\text{-CH}_3$ (b) A = (CH ₃) ₂ CH=CHCH ₃ / 2-Methylbut-2-ene B = CH ₃ CHO / Ethanal	1 1 1 1

	C = CH ₃ COCH ₃ / Acetone/ Propanone	1
	OR	
31	<p>A= C₃H₇COOC₄H₉ / Butyl butanoate</p> <p>B= C₃H₇COOH / Butanoic acid</p> <p>C= C₄H₉OH / Butan-1-ol</p> <p>C₃H₇COOC₄H₉+ dil.H₂SO₄ → C₃H₇COOH + C₄H₉OH</p> <p>C₄H₉OH + Conc. Sulphuric acid + Heat→CH₃CH₂CH=CH₂</p> <p>$C_4H_9OH \xrightarrow{CrO_3 / CH_3COOH} C_3H_7COOH$</p>	<p>1</p> <p>½</p> <p>½</p> <p>1</p> <p>1</p> <p>1</p>
32	<p>A) a)</p> <p>Formation of [Fe(H₂O)₆]²⁺</p>  <p>sp³d², octahedral, paramagnetic</p> <p>b)</p> <p>[NiCl₄]²⁻</p>  <p>sp³, tetrahedral, paramagnetic</p>	<p>1</p> <p>½ × 3</p> <p>1</p> <p>½ × 3</p>
	OR	
32	<p>B) a) (i) Aquacyanidobis(ethane-1,2-diamine) cobalt(III) ion</p> <p>(ii) Tetrachloridoplatinate(II) ion</p> <p>(iii) Tetraamminechloridonitrito-O-chromium(III)ion</p> <p>b)</p> <p>The arrangement of ligands in increasing order of field strength is called spectrochemical series /it is an experimentally determined series based on the absorption of light by complexes with different ligands.</p> <p>Δ_o < P, weak field ligand ; Δ_o > P, strong field ligand / Weak ligand form high spin complexes whereas strong field form low spin complexes. (or any other)</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
33	<p>(A) (a) The cell reaction is</p> <p>Sn(s)+2H⁺(aq)→Sn²⁺(aq)+H₂(g)</p> <p>$E_{Cell} = (E^o_c - E^o_a) - \frac{0.059}{2} \log \frac{[Sn^{2+}]}{[H^+]^2}$</p> <p>$= [(0) - (-0.14)] - \frac{0.059}{2} \log \frac{0.004}{(0.02)^2}$</p> <p>= 0.14 - 0.0295 log 10</p> <p>= 0.1105 V</p> <p>b) (i) overpotential of O₂</p> <p>(ii) Number of ions carrying current per unit volume decreases on dilution</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>

OR		
33	B) a) At anode:	
	$\text{Pb} + \text{SO}_4^{-2} \rightarrow \text{PbSO}_4 + 2\text{e}^-$	1/2
	At cathode:	
	$\text{PbO}_2 + \text{SO}_4^{-2} + 4\text{H}^+ + 2\text{e}^- \rightarrow \text{PbSO}_4 + 2\text{H}_2\text{O}$	1/2
	Overall reaction:	
	$\text{Pb} + \text{PbO}_2 + 2\text{SO}_4^{-2} + 4\text{H}^+ \rightarrow 2\text{PbSO}_4 + 2\text{H}_2\text{O}$	1
	b)	
	$E_{\text{cell}} = E^{\circ}_{\text{cell}} - \frac{0.059}{n} \log \left[\frac{[\text{Cr}^{3+}]^2}{[\text{Cr}_2\text{O}_7^{2-}][\text{H}^+]^{14}} \right]$	1
	$E_{\text{cell}} = 1.33 - \frac{0.059}{6} \log (10^{-2})^2 / (10^{-2})(1 \times 10^{-4})^{14}$	1
	$= 1.33 - \frac{0.059}{6} (54) \log 10$	
$= 1.33 - 0.059 \times 9$		
$= 1.33 - 0.531$		
$= 0.799 \text{ V}$	1	