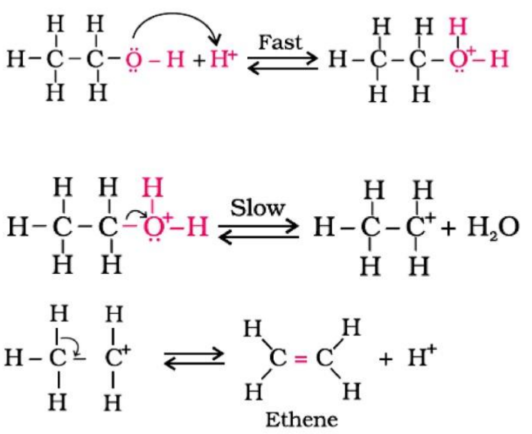
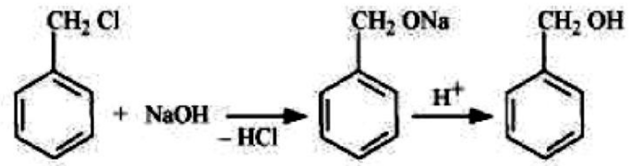
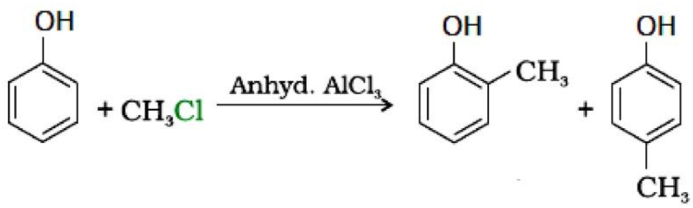
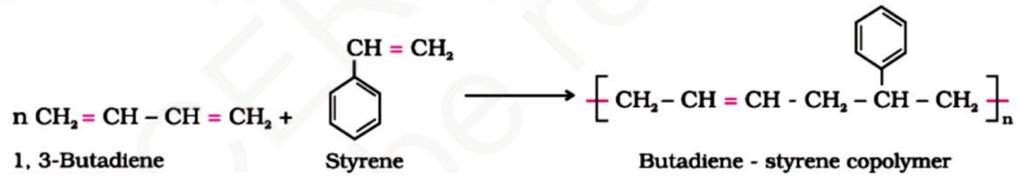
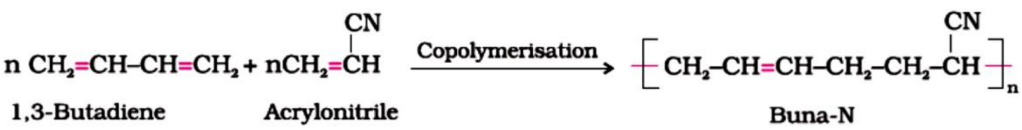
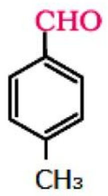
CHEMISTRY MARKING SCHEME
SET -56/3
Compt. July, 2015

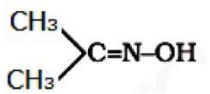
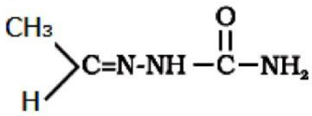
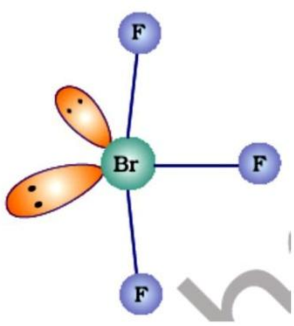
Ques.	Value points	Marks
1	Formation of stable complex by polydentate ligand.	1
2	Propanal	1
3	p-Nitroaniline < Aniline < p-Toluidine	1
4	Frenkel defect	1
5	Emulsions are liquid – liquid colloidal systems. For example – milk, cream (or any other one correct example)	½ + ½
6	Potassium permanganate is prepared by fusion of MnO_2 with an alkali metal hydroxide and an oxidising agent like KNO_3. This produces the dark green K_2MnO_4 which disproportionates in a neutral or acidic solution to give permanganate. $2MnO_2 + 4KOH + O_2 \rightarrow 2K_2MnO_4 + 2H_2O$ $3MnO_4^{2-} + 4H^+ \rightarrow 2MnO_4^- + MnO_2 + 2H_2O$ Oxalate ion or oxalic acid is oxidised at 333 K: $5C_2O_4^{2-} + 2MnO_4^- + 16H^+ \longrightarrow 2Mn^{2+} + 8H_2O + 10CO_2$ OR	1 1
6	i) Iodine is liberated from potassium iodide : $10I^- + 2MnO_4^- + 16H^+ \longrightarrow 2Mn^{2+} + 8H_2O + 5I_2$ ii) Hydrogen sulphide is oxidised, sulphur being precipitated: $H_2S \longrightarrow 2H^+ + S^{2-}$ $5S^{2-} + 2MnO^-_4 + 16H^+ \longrightarrow 2Mn^{2+} + 8H_2O + 5S$	1 1
7		½ ½ 1

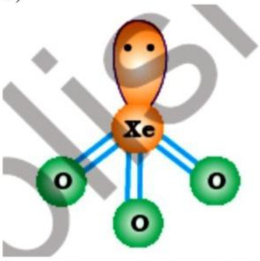
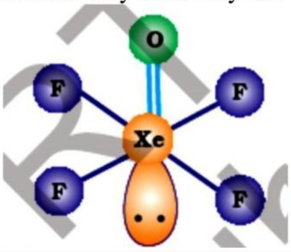
8	i) Mole fraction of a component = $\dfrac{\text{Number of moles of the component}}{\text{Total number of moles of all the components}}$ ii) Molality (m) is defined as the number of moles of the solute per kilogram (kg) of the solvent. Or $\text{Molality (m)} = \dfrac{\text{Moles of solute}}{\text{Mass of solvent in kg}}$	1 1
9	Zero order : mol $L^{-1}s^{-1}$ Second order : L $mol^{-1}s^{-1}$	1 1
10	i) Due to high bond dissociation enthalpy of $N \equiv N$ ii) Due to low bond dissociation enthalpy of F_2 than Cl_2 and strong bond formation between N and F	1 1
11	Disproportionation : The reaction in which an element undergoes self-oxidation and self-reduction simultaneously. For example – $2Cu^+ (aq) \longrightarrow Cu^{2+} (aq) + Cu(s)$ (Or any other correct equation)	1 ½ 1 ½
12	i) Hexaamminecobalt(III) chloride ii) Tetrachlorido nickelate(II) iii) Potassium hexacyanoferrate(III)	1 1 1
13	i) 2-bromobutane ii) 1, 3-dibromobenzene iii) 3-choloropropene	1 1 1
14	i)  ii) $CH_3CH_2MgCl \xrightarrow[H_2O]{HCHO} CH_3\text{-}CH_2\text{-}CH_2\text{-}OH$ $CH_3CH{=}CH_2 + H_2O \overset{H^+}{\rightleftharpoons} CH_3\text{–}CH(OH)\text{–}CH_3$	1 1 1
15	i) $CH_3\text{-}CH_2OH \xrightarrow{PCl_5} CH_3CH_2Cl$	1

	ii)  iii) $CH_3Cl + CH_3CH_2\text{-}ONa \longrightarrow CH_3CH_2\text{-}O\text{-}CH_3$	1 1
16	i) Peptide linkage – in proteins, ∝-amino acids are connected to each other by **peptide bond** or **peptide linkage (-CONH- bond).** ii) Primary structure - each polypeptide in a protein molecule having amino acids which are linked with each other in a specific sequence. iii) Denaturation - When a protein is subjected to physical change like change in temperature or chemical change like change in pH, protein loses its biological activity.	1 1 1
17	Copolymerisation is a polymerisation reaction in which a mixture of more than one monomeric species is allowed to polymerise and form a copolymer.   (or any other correct example)	1 1 1
18	$r = \frac{\sqrt{2}a}{4}$ $r = \frac{1.414 \times 4.077 \times 10^{-8} cm}{4}$ $r = 1.44 \times 10^{-8}$ cm	1 1 1
19	$\pi_{cane\ sugar} = \pi_X$ Therefore, $c_{cane\ sugar} = c_X$ (where c is molar concentration) $\frac{W_{cane\ sugar}}{M_{cane\ sugar}} = \frac{W_X}{M_X}$ $\frac{5\ g}{342\ g\ mol^{-1}} = \frac{0.877}{M_X}$ $M_X = \frac{0.877 \times 342}{5}$ $gmol^{-1}$ $M_X = 59.9$ or 60 $gmol^{-1}$	1 1 1
20	$k = \frac{2.303}{t} \log \frac{[R]_0}{[R]}$	1

<table>
<tr><td></td><td>$60\ s^{-1} = \frac{2.303}{t}\log\frac{[R]_0}{\frac{[R]_0}{10}}$
$t = \frac{2.303}{60\ s^{-1}}\log 10$
$t = \frac{2.303}{60}\ s$
t= 0.0384 s</td><td>1

1</td></tr>
<tr><td>21</td><td>i) It is a process of removing the dissolved substance from a colloidal solution by means of diffusion through a semi - permeable membrane.
ii) The movement of colloidal particles under an applied electric potential towards oppositely charged electrode is called electrophoresis.
iii) Colloidal particles scatter light in all directions in space. This scattering of light illuminates the path of beam in the colloidal dispersion.</td><td>1
1
1</td></tr>
<tr><td>22</td><td>i) It lowers the melting point of alumina / acts as a solvent.
ii)
<table><tr><th>Roasting</th><th>Calcination</th></tr><tr><td>Ore is heated in a regular supply of air</td><td>Heating in a limited supply or absence of air.</td></tr></table>(Or with equation)
iii) It is a process of separation of different components of a mixture which are differently adsorbed on a suitable adsorbent.
OR</td><td>1
1
1</td></tr>
<tr><td>22</td><td>$3Fe_2O_3 + CO \rightarrow 2Fe_3O_4 + CO_2$
(Iron ore)
$Fe_3O_4 + CO \rightarrow 3FeO + CO_2$
$CaCO_3 \rightarrow CaO + CO_2$
(Limestone)
$CaO + SiO_2 \rightarrow CaSiO_3$
(Slag)
$FeO + CO \rightarrow Fe + CO_2$
$C + CO_2 \rightarrow 2CO$
Coke
$C + O_2 \rightarrow CO_2$
$FeO + C \rightarrow Fe + CO$
(any 6 correct equations)</td><td>6 x ½ = 3</td></tr>
<tr><td>23</td><td>i) Aspartame, Saccharin (any one)
ii) No
iii) Social concern, empathy, concern, social awareness (any 2)</td><td>1
1
2</td></tr>
<tr><td>24</td><td>a) i)

ii)
$(CH_3)_2C=CHCOCH_3$
b) i)Add $NaHCO_3$, benzoic acid will give brisk effervescence of CO_2 whereas ethylbenzoate</td><td>1
1</td></tr>
</table>

	will not. ii)Add NaOH and I_2, acetophonone forms yellow ppt of iodoform on heating whereas benzaldehyde will not. iii)Add neutral $FeCl_3$, phenol gives violet colouration whereas benzoic acid does not. (or any other correct test) OR	1 1 1
24	a) i)  ii)  b) i) $CH_3CHO \xrightarrow[\text{conc HCl}]{\text{Zn-Hg}} CH_3\text{-}CH_3$ ii) $2\ CH_3\text{–}CHO \underset{}{\overset{\text{dil. NaOH}}{\rightleftharpoons}} CH_3\text{–}CH(OH)\text{–}CH_2\text{–}CHO$ iii) $CH_3CHO \xrightarrow{LiAlH_4} CH_3CH_2OH$	1 1 1 1 1
25	a) Due to relatively stable half – filled p-orbitals of group 15 elements b) i) $CaF_2 + H2SO_4 \rightarrow CaSO_4 + 2HF$ ii) $SO_2(g) + Cl_2(g) \rightarrow SO_2Cl_2(l)$ iii) $2NH_4Cl + Ca(OH)_2 \rightarrow 2NH_3 + 2H_2O + CaCl_2$ OR	2 1 1 1
25	 a) i)	1

	ii)  b) i)Due to small size of nitrogen, the lone pair of electron on nitrogen is localized/ easily available for donation. ii)Because they need only one electron to attain stable/noble gas configuration.  iii)	1 1 1 1
26	$E^0cell = E^0_{Sn2+ / Sn} - E^0_{Zn2+ / Zn}$ $= - 0.14V –(- 0.76V)$ $= 0.62V$ $\Delta_rG^0 = -n F E^0_{cell}$ $= - 2 \times 96500 \text{ C mol}^{-1} \times 0.62 \text{ V}$ $= - 119660 \text{ J mol}^{-1}$ $E_{cell} = E^0_{cell} - \frac{0.059}{n} \log \frac{[Zn^{2+}]}{[Sn^{2+}]}$ $E_{cell} = 0.62 - \frac{0.059}{2} \log \frac{[Zn^{2+}]}{[Sn^{2+}]}$ OR	1 1 1 1 1
26	a) The conductivity of a solution at any given concentration is the conductance of one unit volume of solution kept between two platinum electrodes with unit area of cross section and at a distance of unit length. Molar conductivity of a solution at a given concentration is the conductance of the volume V of solution containing one mole of electrolyte kept between two electrodes with area of cross section A and distance of unit length. Molar conductivity increases with decrease in concentration. b)$E^0cell = E^0_C - E^0_A$ $= 0.80V – 0.77V$ $= 0.03V$ $\Delta_rG^0 = -n F E^0_{cell}$ $= - 1 \times 96500 \text{ C mol}^{-1} \times 0.03 \text{ V}$ $= - 2895 \text{ J mol}^{-1}$ $\text{Log } K_c = \frac{n E^o_{cell}}{0.059}$	½ ½ 1 ½ ½ 1 ½

	Log $K_c = \frac{1 \times 0.03}{0.059}$ Log K_c= 0.508	½