<table>
<thead>
<tr>
<th>Q.N.</th>
<th>Value Points</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>(i) Inversion of configuration</td>
<td>½ + ½</td>
</tr>
<tr>
<td>2.</td>
<td>( \text{NO}_2 )</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>Due to presence of free electrons at interstitial sites, / metal excess defect</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>N-methyl-2-methylpropanamine / 2-methyl-N-methylpropanamine</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>Like Charged particles cause repulsion/ Brownian motion/ solvation</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>(i) Osmotic pressure</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(ii) Positive deviation from Raouls' law/ Positive deviation</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>(i)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(ii)</td>
<td>1</td>
</tr>
<tr>
<td>8.</td>
<td>(i) ([\text{Ni(H}_2\text{O)}_6]) \text{Cl}_2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(ii) Hexaaquanickel(II) chloride</td>
<td>1</td>
</tr>
<tr>
<td>9.</td>
<td>(i) zero order, bimolecular/ unimolecular (II) ( \text{mol L}^{-1} \text{s}^{-1} )</td>
<td>½ + ½</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
10. (i) 

\[
\text{OH} \xrightarrow{\text{NaOH}} \text{Na} \xrightarrow{\text{CO}_2} \text{2-Hydroxybenzoic acid (Salicylic acid)} \xrightarrow{\text{H}^+}\]

(ii) 

\[
\text{OCH}_3 + \text{CH}_3\text{COCl} \xrightarrow{\text{Anhyd. AlCl}_3} \text{CH}_3\text{COCH}_3 + \text{OCH}_3
\]

OR

10 (i) 

\[
\text{OH} + \text{Zn} \xrightarrow{\text{Anhyd. AlCl}_3} \text{CHCl}_3
\]

(ii) 

\[
\text{HCHO} + \text{CH}_3\text{MgX} \xrightarrow{\text{H}_2\text{O/H}^+} \text{CH}_3\text{CH}_2\text{OMgX} \rightarrow \text{CH}_3\text{CH}_2\text{OH}
\]

11. Volume of the unit cell = \(a^3\)

\[(400 \text{ pm})^3 = (4 \times 10^{-8} \text{ cm})^3 = 64 \times 10^{-24} \text{ cm}^3\]

Volume of 280 g of the element = mass / density

\[= 280/7 \text{ cm}^3 = 40 \text{ cm}^3\]

Number of unit cells in this volume = \(40 / 64 \times 10^{-24} = 6.25 \times 10^{23}\) unit cells.

Since \(z = 4\),

Therefore, total no. of atoms in 280g = \(4 \times 6.25 \times 10^{23} = 2.5 \times 10^{24}\) atoms.

(or any other correct method)

12. \[\log k = \log A - \frac{E_a}{2.303RT}\]

\[E_a / 2.303 RT = 1 \times 10^4 \text{ k/ T}\]

\[E_a = 1.0 \times 10^4 \times 2.303 \times 8.314 = 191471.4 \text{ J/mol}\]
\[ \frac{t_{1/2}}{k} = 0.693 / k = 0.693 / 200 = 0.0034 \text{ min}^{-1} / 3.4 \times 10^{-3} \text{ min}^{-1} \]

1. Oil as dispersed phase and water as dispersion medium
2. The potential difference between fixed layer and diffused / double layer of opposite charges.
3. Large number of atoms or smaller molecules of a substance aggregate together to form species having size in colloidal range.

1. Chromatography
2. To separate two sulphide ores
3. It decomposes to CaO which removes impurity (silica) as slag / acts as flux.

\[ \Delta T_b = \frac{K_b w_b \times 1000}{M_b \times w_a} \]
\[ \Delta T_b = \frac{3 \times 0.52 \times 2 \times 1000}{142 \times 50} = 0.439 \text{ K} \]
\[ \Delta T_b = T_b - T_b^0 \]
\[ T_b = 0.439 + 373 = 373.439 \text{ K} \quad \text{(OR 373.589 K)} \]

(i) Due to presence of two P-H bonds in H₃PO₂ / in H₃PO₂ O.S of P = +1 which can increase but in H₃PO₄ O.S of P = +5 (max.)
(ii) Due to stronger S-S bond than O-O bond.
(iii) Size of halogen increases / bond length increases / bond dissociation enthalpy decreases (any one)

(a) In phenols lone pair of electron on oxygen are delocalized over benzene ring due to resonance but in alcohol lone pair of electron on oxygen are localized & hence available for protonation / + R- effect in phenol but not in...
Due to intermolecular Hydrogen bonding (O-CH₃) bond and stronger(O-C₆H₅) bond, due to resonance / carbon in benzene is sp² hybridized due to which partial double bond character.

19.  
(i)  
A : C₆H₅ CONH₂  
B : C₆H₅ NH₂  
C : C₆H₅ NHCOCH₃
(ii)  
A : C₆H₅ NO₂  
B : C₆H₅ NH₂  
C : C₆H₅ NC

20.  
(i) Catalyst / initiator of free radical  
(ii) Hexamethylene diamine and adipic acid / structure / IUPAC name  
(iii) Buna-S<Polythene<Nylon 6,6

OR

20.  
Chain initiation steps  
\[ \text{Benzoyl peroxide} \rightarrow 2\text{C}_6\text{H}_5\text{C} = \text{O} \rightarrow 2\text{C}_6\text{H}_5\text{H} \]  
Phenyl radical

Chain propagating step  
\[ \text{C}_6\text{H}_5\text{H} + \text{CH}_2\text{CH} = \text{CH}_2 \rightarrow \text{C}_6\text{H}_5\text{C}H - \text{CH} - \text{CH} - \text{CH} - \text{CH} \]

Chain terminating step  
For termination of the long chain, these free radicals can combine in different ways to form polythene. One mode of termination of chain is shown as under:

\[ \text{C}_6\text{H}_5\text{H} + \text{CH}_2\text{CH} - \text{CH} = \text{CH} \rightarrow \text{C}_6\text{H}_5\text{C}H + CH - \text{CH} = \text{CH} \]

21.  
(i) Sodium Hydrogen Sulphite reaction / Pentaacetate of glucose does not react with Hydroxylamine/Schiff’s test (any one)  
(ii) Phosphodiester linkage  
(iii) Fat soluble - Vitamin A/D/E/K  
Water soluble - Vitamin B/C

22.  
(a) \( d^2sp^3 \), 
Diamagnetic, 
low spin
23. (i) Aware, concerned or any other two correct values  
    (ii) Side effects/ health problems  
    (iii) Neurologically active drugs/ stress relievers/drugs used to treat mental diseases  
        example- valium, equanil (or any other two correct example)  

24. (a) \[ E_{\text{cell}} = E_{\text{cell}}^{0} - 0.059 \log \left[ \frac{[\text{Cr}^{3+}]}{[\text{Fe}^{2+}]} \right]^{n} \]  
        \[ 0.261 \text{ V} = E_{\text{cell}}^{0} - 0.059 \log \left[ \frac{[0.01]}{[0.01]} \right]^{6} \]  
        \[ 0.261 \text{ V} = E_{\text{cell}}^{0} - 0.059 \log \frac{100}{6} \]  
        \[ E_{\text{cell}}^{0} = 0.261 + 0.0197 \]  
        \[ = 0.2807 \text{ V} \]  

(b) A\text{, due to its more negative } E^{0} \text{ value.} 

OR

24. (a).  
        \[ \Lambda^{m} = k \times \frac{1000}{C} \]  
        \[ = 3.905 \times 10^{-5} \times 1000/0.001 \]  
        \[ = 39.05 \text{ S cm}^2/\text{mole} \]  
        \[ \text{CH}_3 \text{COOH} \rightarrow \text{CH}_3\text{COO}^- + \text{H}^+ \]  
        \[ \Lambda^{0} \text{CH}_3\text{COOH} = \lambda^{0} \text{CH}_3\text{COO}^- + \lambda^{0} \text{H}^+ \]  
        \[ = 40.9 + 349.6 \]  
        \[ \Lambda^{0} \text{CH}_3\text{COOH} = 390.5 \text{ S cm}^2/\text{mol} \]  
        \[ \alpha = \frac{\Lambda^{m}}{\Lambda^{0}} \]  
        \[ = 39.05/390.5 \]  
        \[ = 0.1 \]  

(b). Device used for the production of electricity from energy released during spontaneous chemical reaction and the use of electrical energy to bring about a chemical change.  
   The reaction gets reversed / It starts acting as an electrolytic cell & vice – versa.
25. (a) (i) Ability of oxygen to form multiple bond.
    (ii) Due to lanthanoid contraction.
    (iii) Due to variable oxidation state/unpaired electrons

(b) (i) \(2\text{MnO}_2 + 4\text{KOH} + \text{O}_2 \rightarrow 2\text{K}_2\text{MnO}_4 + 2\text{H}_2\text{O}\)

(ii) \(\text{Cr}_2\text{O}_7^{2-} + 14\text{H}^+ + 6\text{I}^- \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O} + 3\text{I}_2\)

OR

25. (i) Zn, because of not having partially filled d-orbital in its ground state or ionic state.
(ii) Cr
(iii) Cu
(iv) Mn, because Mn\(^{2+}\) has extra stability due to half filled d-orbital

26. a). A : \(\text{CH}_3\text{CHO}\)  
    B : \(\text{OH}\)  
    \(\text{CH}_3\text{—CH—CH}_2\text{CHO}\)

    C : \(\text{CH}_3\text{—CH=CH—CHO}\)  
    D : \(\text{OH}\)  
    \(\text{CH}_3\text{—CH—CN}\)

b) i) Heat both the compounds with NaOH and \(\text{I}_2\), \(\text{C}_6\text{H}_5\text{CH=CH—COCH}_3\) gives yellow ppt of iodoform while \(\text{C}_6\text{H}_5\text{CH=CH—CO CH}_2\text{CH}_3\) does not.
   ii) Add ammonical silver nitrate solution (Tollens’ reagent), HCOOH gives silver mirror while \(\text{CH}_3\text{CH}_2\text{CHOH}\) does not.
   c) \(\text{CH}_3\text{COCH}_3 < \text{CH}_3\text{CH}_2\text{OH} < \text{CH}_3\text{COOH}\)

OR

26. a.)

\[
\begin{align*}
\text{Toluene} & \quad + \text{CrO}_2\text{Cl}_2 & \text{CS}_2 \quad \rightarrow \quad \text{CH(OOCRCl)}_3 & \quad \text{H}_2\text{O}^- \\
\text{Chromium complex} & \quad \rightarrow \quad \text{Benzaldehyde} \\
\end{align*}
\]

b) \(\text{C}_6\text{H}_5\text{COCH}_3 < \text{CH}_3\text{CHO} < \text{HCHO}\)

c) stronger -I effect of Cl, stronger acid less pk\(_a\) / strong electron withdrawing power of Cl.

d) \(\text{CH}_3\text{CH}_2\text{CH}=\text{CH—CH}_2\text{CHO}\)

e) A: \(\text{CH}_3\text{COCH}_3\)
   B: \(\text{CH}_3\text{CH}_2\text{CHO}\)