Q.P.Code:52044

[Time: Three Hours] **[Marks:100]**

Please check whether you have got the right question paper.

N.B. 1. All Questions are compulsory.
2. Figures to the right indicate full marks
3. The use of log-table/nonprogrammable calculator is allowed
4. Answers for the same question as far as possible should be written together

Q.1 A **Select the correct option and complete the following sentences:** **12**

(i) In Electrolytic cell, oxidation reaction takes place at..... .
(a) cathode (b) anode (c) lower oxidation potential

(ii) Quinhydrone is an equimolar mixture of.....
(a) quinine and hydroquinone, (b) quinone and hydroquinone,
(c) quinone and hydroquinine

(iii) A piece of molten ice is placed in a beaker covered with a glass, the number of phases present are ----------
(a) one (b) two (c) three

(iv) For a one phase and one component system, the degrees of freedom are equal to ----------.
(a) one (b) two (c) three

(v) Cobalt forms _____ colour bead in borax bead test.

a) blue b) green c) yellow

(vi) Ilmenite is an ore of _____.

a) Cd b) Ti c) V

(vii) The coordination no of Cr in $[Cr(C_2O_4)_3]^{3-}$ is _____.

a) 6 b) 4 c) 3

(viii) _____ among the following complexes is an outer orbital complex.

a) $[Fe F_6]^{3-}$ b) $[Fe (CN)_6]^{3-}$ c) $[Cr (CO)_6]$

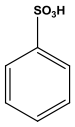
(ix) Which of the following is the strongest acid?
(a) carboxylic acid (b) phenol (c) alcohol

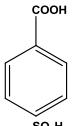
(x) 

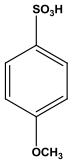
The name of this reaction is _____
(a) Dieckmann Condensation (b) Hell-Volhar- Zelinskii reaction
(c) Claisen Condensation.

(xi) Methyl benzene on oxidation using Alkaline $KMnO_4$ gives
(a) benzoic acid (b) ortho methyl benzoic acid
(c) para methyl benzoic acid

(xii) Which is the weakest of these acids?

(a) 

(b) 

(c) 

B **State whether the following sentences are True or False** **03**

(i) The Gibbs phase rule is applicable to homogeneous equilibrium

(ii) $V(CO)_6$ does not obey the effective atomic number rule.

(iii) Carbon dioxide on treatment with Grignard's reagent forms an aldehyde.

C **Match the following** **05**

Column X	**Column Y**
1) Eutectic point	a) $nFE = - \Delta G$
2) Electrolytic cell	b) Ester
3) $TiCl_3$	c) Zero degree of freedom
4) $[Co(NH_3)_6]^{3+}$	d) Anhydride
5) Reaction between sodium benzoate and ethyl bromide	e) d^2sp^3 hybridisation
	f) reducing agent
	g) dsp^3 hybridisation
	h) oxidising agent

Q.2 A i) Derive Nernst equation for the determination of an emf of a cell. **05**

ii) The basic reaction which takes place in a standard Weston Cell is **03**

$Cd + Hg_2SO_4 = CdSO_4 + 2Hg$

The emf of a cell is 1·018V at 298K. Its temperature coefficient at constant pressure is $-3{\cdot}88 \times 10^{-5}$ VK^{-1}. Calculate ΔG, ΔS and ΔH for the given cell reaction of Weston Cell.

OR

A i) Explain electrolyte concentration cell without transference reversible to cation with a suitable example. **05**

ii) To recover silver from its solution, construct an appropriate galvanic cell with the help of the given half cells and write down the reaction which takes place at respective electrodes involved in it — **03**

i) $Ag^+ + e^- \rightarrow Ag$ (E^o=0·799V) ii) $Cu^{2+} + 2e^- \rightarrow Cu$ (E^o=0·337V)

B i) State the phase rule and explain the meaning of the terms involved in it. **05**

ii) The boiling point of benzene at 352.2K is 1.013×10^5 N m^{-2}. Calculate the boiling point of benzene at 0.53×10^5 N m^{-2}. The molar heat of vaporization of benzene at its boiling point is 31.8 kJ mol^{-1}. (R= 8.314 JK^{-1} mol^{-1}) **03**

OR

B i) State and explain the condensed phase rule. **05**

ii) At 373.6 K and 372.6 K vapour pressures of water are 1.018×10^5 N m^{-2} and 0.978×10^5 N m^{-2} respectively. Calculate molar heat of vaporization of water. (R= 8.314 JK^{-1} mol^{-1}) **03**

C Define anode and cathode electrode. Which sign (positive or negative) would be assigned to anode and cathode in galvanic cell and in electrolytic cell? **04**

OR

C Derive Clapeyron equation. **04**

Q.3 A i) Name the elements of the first transition series and give their electronic configuration. **05**

ii) With the help of suitable examples, explain the rules applied to name the central metal ion in complexes. **03**

OR

A i) Explain the isomerism exhibited by the following complexes. **05**

a) $[Co(NH_3)_5 Br]SO_4$ and $[Co(NH_3)_5 SO_4] Br$

b) $[Cr(H_2O)_6]Cl_3$ and $[Cr(H_2O)_4 Cl_2]Cl. 2H_2O$

ii) Explain why Fe^{3+} and Sc^{3+} salts are stable. **03**

B i) Salts of most of the transition elements are colored. Explain with suitable examples. **05**

ii) Write a note on the industrial applications of coordination complexes. **03**

OR

B i) $[Ni(CN)_4]^{2-}$ is diamagnetic while $[Ni(Cl)_4]^{2-}$ is paramagnetic. Explain on the basis of VBT. **05**

ii) How are Cu^{2+} ions detected qualitatively? **03**

C What is the role of Ti^{3+} salts in volumetric analysis? **04**

OR

C Explain EAN rule with any two examples. **04**

Q.4 A i) Give an account on 'Claisen Condensation reaction' and give its mechanism. **05**

ii) Give any one method of preparation of **03**
a) phthalic acid b) butanoic acid

OR

A i) How will you convert: (Give reactions only) **05**
a) hexanamide from hexanoic acid.
b) Phthalic anhydride from phthalic acid
c) ethanoic acid from Ethanol
d) benzene from benzoic acid
e) propanoic acid from 1-propanol

ii) What is 'nucleophilic acyl substitution'? Explain its mechanism with an appropriate example in acidic medium. **03**

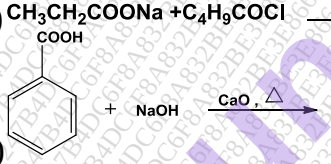
B i) Predict the products obtained on sulphonation of the following – (Give reactions only)- **05**
a)toluene
b)phenol
c)nitrobenzene
d)naphthalene
e)benzene sulphonic acid

ii) Give any one method to synthesize the following with the help of reactions only :- **03**
a) acetamide
b) methyl acetate
c) acetyl chloride

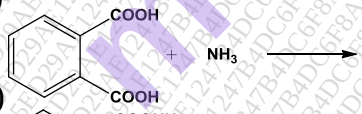
OR

B i) Complete the following reactions:- **05**

a) $CH_3CH_2COONa + C_4H_9COCl \longrightarrow$

b) 

c) $CH_3CH_2CH_2CH_2COOH \xrightarrow[ii)H_2O/H^+]{i)LiAlH_4}$

d) 

e) 

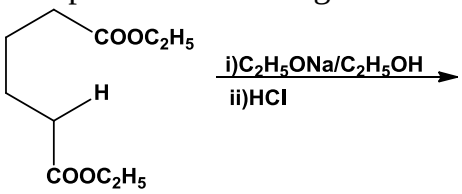
ii) What is IPSO substitution? How is picric acid prepared from phenol by IPSO method? Give reactions. **03**

C i) How will you convert the following (Give reactions only) **02**
a) propanoic acid to ethyl propanoate
b) succinic acid to succinic anhydride
c) salicylic acid to methyl salicylate
d) phenyl cyanide to benzoic acid
e) salicylic acid to acetyl salicylic acid

ii) Explain the acidity of benzoic acid .Why is salicylic acid more acidic than benzoic acid. **02**

OR

C i) Complete the following reaction. Give its name. **02**



ii) Justify both the statements :- **02**

a) Formic acid is a stronger acid than acetic acid.

b) Sulphonation of naphthalene gives α-isomer at 80 ℃ and β-isomer at 160 ℃

Q.5 Attempt any Four of the following

A Write a note on calomel electrode. **05**

B Give a brief account of metastable equilibrium in sulphur system. **05**

C Write a brief note on physical properties and applications of vanadium pentoxide. **05**

D Explain the different types of magnetic behavior exhibited by first series of transitional elements. **05**

E What are sulphonic acids? How will you convert benzene to benzene sulphonic acid? Explain with mechanism. **05**

F Explain Hell-Volhard-zelinskii reaction, give its mechanism. **05**

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