

[This question paper contains 4 printed pages.]

Your Roll No. ....

**5106**

**B.Sc. (Prog.)/III**

**B**

**CH-301 – INORGANIC CHEMISTRY**

**(Admissions of 2008 and onwards)**

**Time : 2 Hours**

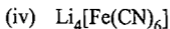
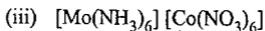
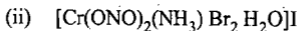
**Maximum Marks : 50**

*(Write your Roll No. on the top immediately on receipt of this question paper.)*

**Attempt any four questions.**

**All questions carry 12.5 marks each.**

1. (a) Name the following complexes according to IUPAC system. **2 × 4**



- (b) Write the formulae of the following names of complexes :  $1\frac{1}{2} \times 3$
- Sodium tris oxalato chromate (III).
  - Ethelene diamine tetracyano Aurate (III)
  - Octaamine- $\mu$ -dihydroxo dicobalt (III) chloride.
2. (a) Explain the colour phenomenon in d block compounds. 3
- (b) What is C.F.S.E. ? Calculate CFSE for  $d^4$  and  $d^6$  system in strong field and weak field (octahedral) 5
- (c) How many types of isomerism are known for complexes ? Discuss Ionization isomerism and optical isomerism with proper example. 4.5
3. (a) Complete the following chemical equations :  $2 \times 3$
- $$\text{Co}^{2+} + 7\text{NO}_2^- + 2\text{H}^+ \rightleftharpoons \text{H}_2\text{O} + \underline{\hspace{2cm}} + \underline{\hspace{2cm}}$$
  - $$\text{Na}_2[\text{Fe}(\text{CN})_5\text{NO}^+] + \text{NaOH} \rightleftharpoons \underline{\hspace{2cm}} + \text{Fe}(\text{OH})_2 + \text{NaNO}_3 + \text{H}_2\text{O}.$$
  - $$\text{K}_2\text{Cr}_2\text{O}_7 + \text{NaCl} + \text{H}_2\text{SO}_4(\text{conc}) \xrightarrow{\Delta} \underline{\hspace{2cm}} + \text{K}_2\text{SO}_4 + \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}$$

- (b) What happens when ?
- (i)  $K_4[Fe(CN)_6]$  is treated with  $H_2O_2$ .  $2 \times 2$
- (ii) Alkaline solution of  $KMnO_4$  is heated.
- (iii)  $K_3[Fe(CN)_6]$  is treated with ferrous chloride.  $2.5$

4. (a) Write a short note on separation of Lanthanides by Ion Exchange method.  $2.5$

(b) Construct the Latimer diagram for various oxidation states of Mn with following data :  $6$

$$E_{MnO_4^- / MnO_4^{2-}}^{\circ} = +.56V, E_{MnO_4^{2-} / MnO_2}^{\circ}$$

$$= +2.26V, E_{MnO_2 / Mn^{3+}}^{\circ} = +0.95V$$

$$E_{Mn^{3+} / Mn^{2+}}^{\circ} = +1.51V, E_{Mn^{+2} / Mn}^{\circ} = -1.19V$$

Calculate potential for  $Mn^{+7}$  to  $Mn^{+4}$  and  $Mn^{+7}$  to  $Mn^{+2}$  from this diagram.

(c) What are spin paired and spin free complexes ? Illustrate your answer with examples.  $4$

5. (a) What is synergic effect ? Explain with a suitable example.  $4$

(b) What is John-Teller distortion, explain and illustrate ?  $4$

(c) Calculate Effective Atomic Number for following compounds  $Ni(CO)_4$ ,  $[Fe(CN)_6]^{4-}$ ,  $Fe(CO)_5$ .  $4.5$

6. (a) Transition metals and their compounds act as catalysts in various reactions. Justify.  $3\frac{1}{2}$
- (b). Explain why compounds of  $Ti^{4+}$  &  $Zn^{2+}$  are colourless. 3
- (c) What is Lanthanide contraction and comment upon its effect on the properties of Lanthanide? 3
- (d) Ca and  $Sc^+$  are iso-electronic ions but have different electronic configurations. 3
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