(b) Calculate the CFSE values in d^7 octahedral complex in both weak and strong field ligand system.

(c) What are the important postulates of Crystal Field Theory (CFT)? (5, 5, 5)

5. (a) What is spectrochemical series? Distinguish between strong field and weak field ligand.

(b) Define organometallic compounds. How are they classified?

(c) Discuss structure and bonding of methyl lithium. (5, 5, 5)

6. (a) Draw and explain the structure of Zeise's salt.

(b) Draw the Molecular Orbital (MO) diagram of carbon monoxide CO). Discuss why it acts as π acid ligand.

(c) What is meant by the term hapticity? How it is denoted for a ligand. Give an example where the same ligand can show varying hapticity. (5, 5, 5)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1453 **I**

Unique Paper Code : 2172513501

Name of the Paper : DSC: Coordination Chemistry and Organometallics

Name of the Course : **Analytical Chemistry/ Industrial Chemistry/ Chemistry Physical Science/ Chemistry Electronics Science**

Semester : V

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll. No. on the top immediately on receipt of this question paper.
2. Attempt **any four** questions out of six questions.
3. Each question carries equal marks.

1. (a) Give the IUPAC names of any five complexes of the following:

(i) $[RhBrCl(en)_2]^+$

(ii) $K_3[Fe(CN)_6]$

(iii) $[PtCl_2(NH_3)_4][PtCl_4]$

(iv) $[Cr(PPh_3)(CO)_5]$

(v) $NH_4[Cr(NCS)_4(NH_3)_2]$

(vi) $Na[Co(CO)_4]$

(b) Write the formulae of any five complexes of the following:

(i) Tetracarbonylnickel (0)

(ii) Tris(triphenylphosphine)rhodium(I)chloride

(iii) Tetrammineaquabromidocobalt(III)nitrate

(iv) Pentaammineazidocobalt(III)sulphate

(v) Potassium tetrachloromercurate(II)

(vi) Sodium hexafluoridosilicate(IV)

(c) Name the type of isomerism exhibited by the following isomers:

(i) $[Cr(NH_3)_6][Cr(CN)_6]$ and $[Cr(CN)_2(NH_3)_4][Cr(CN)_4(NH_3)_2]$

(ii) $[PtBr_2(NH_3)_4]Cl_2$ and $[PtCl_2(NH_3)_4]Br_2$ (5, 5, 5)

2. Write short note on any three of following:

(i) Jahn-Teller distortion

(ii) Valence Bond theory

(iii) Chelating ligands

(iv) Werner's theory (5, 5, 5)

3. (a) Discuss geometrical isomerism of coordination compound with coordination number 6.

(b) Explain any two of the following:

(i) Coordination isomerism

(ii) Linkage isomerism

(iii) Structure and bonding of ferrocene

(c) Explain the structure of $K_4[Fe(CN)_6]$ on the basis of Valence Bond Theory (VBT). (5, 5, 5)

4. (a) Calculate the number of unpaired electrons in $[Co(NH_3)_6]^{3+}$ and $[Ni(CN)_4]^{2-}$ ions.