# RAMAKRISHNA MISSION VIDYAMANDIRA

**(Residential Autonomous College under University of Calcutta)**

**THIRD YEAR**

**B.A./B.SC. FIFTH SEMESTER (July – December) 2014**

**Mid-Semester Examination, September 2014**

Date : 17/09/2014 **CHEMISTRY (Honours)**

Time : 2 pm – 4 pm Paper : VI Full Marks : 25

**[Use a separate answer book for each Unit]**

## Unit – I & IV

(*Answer **any one** question*)

1. a) The compound $[Mn(dmso)_6](ClO_4)_3$ exhibits $\gamma_{s-o}$ stretches at $915cm^{-1}$ and $960cm^{-1}$. Intensity of the $915cm^{-1}$ band is found to be twice that of $960cm^{-1}$ band. Explain. [Given, $\gamma_{S-O}$ stretch for free dmso is $1055cm^{-1}$.]

   b) Low spin Co(III) complexes are usually inert towards ligand substitution. Explain.

   c) For the reaction, $[Fe(H_2O)_6]^{2+} + 3phen \rightarrow [Fe(phen)_3]^{2+} + 6H_2O$

   $K_1 > K_2 << K_3$ Justify the fact.

   d) Explain why the energy barrier to rotation in ferrocene molecule is very small. Give evidence in favour of the fact that the cyclopentadienide rings in ferrocene rotate freely in solution. [3+2+3+(1+2)]

2. a) For the reaction, $[Cu(H_2O)_6]^{2+} + 3en \rightarrow [Cu(en)_3]^{2+} + 6H_2O$

   $\log K_1 = 10{\cdot}72$

   $\log K_2 = 9{\cdot}32$

   $\log K_3 = -0{\cdot}90$

   Explain why $K_3$ is so low.

   b) Co – C distances in $Cp_2Co$ and in $[Cp_2Co]^+$ are 2·10Å and 2·03 Å respectively. Explain.

   c) $K_3CoF_6$ is paramagnetic while $K_2NiF_6$ is diamagnetic though both are $d^6$ system. Explain.

   d) $K_2Pb[Cu^{II}(NO_2)_6]$ is tetragonally distorted at –78°C but is perfectly octahedral at room temperature. Explain. [3+3+2+3]

## Unit - II

(*Answer **any one** question*)

3. a) What is complementary and non-complementary redox reactions? Give example(s) [2]

   b) Write down the detailed mechanism of the reaction between $[Co(NH_3)_5Cl]^{2+}$ and $[Cr(H_2O)_6]^{2+}$ to form $[Co(H_2O)_6]^{2+}$ and $[Cr(H_2O)_5Cl]^{2+}$. How can you establish your proposed mechanism. [3]

   c) What are the bariers to electron transfer between two redox partner? Give example [2]

4. a) Define with example— (i) cis-effect, (ii) trans effect [2+2]

   b) The substitution reaction at squareplanar site proceed with complete retention of stereochemistry, explain with example. [3]

## Unit - III

(*Answer **any one** question*)

5. a) Explain the term "Essential and 'Beneficial' elements- in Bio-inorganic chemistry. [2]

   b) Write a brief account on Ionophores. [2]

   c) What do you mean by chelation Therapy. Name two chelating drugs and their mode of action. Write the limitations of chelation therapy. [3]

6. a) Write notes on (**<u>any one</u>**) [3]
   i) Hemoglobin
   ii) Iron-Sulphur Protein
   b) What do you mean by (**<u>any one</u>**) [2]
   i) Gold drugs
   ii) Cis Platin
   c) What are cytochromes, Write down their functions. [2]

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