**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BANGALORE-27**

**B.Sc. CHEMISTRY- VI SEMESTER**

**SEMESTER EXAMINATION- APRIL 2018**

**CH- 6115- Inorganic Chemistry**

Time: 2 ½ hrs Maximum marks: 70

**Note:** This question paper **2** printed pages and **3** parts.

Element Sc Ti V Cr Mn Fe Co Ni Cu Zn

At. no. 21 22 23 24 25 26 27 28 29 30

**PART A**

Answer any **six** questions. (6 x 2= 12)

1. Which one is coloured, Cu+ or Cu2+? Why?
2. Write the IUPAC names of the following coordination compounds:
3. [CrCl2(H2O)4]+ b) [Ag(NH3)2][Ag(CN)2]
4. Write the structure of [Ni(EDTA)]2- complex.
5. What is Monsanto acetic acid process? Give the formula of the catalyst used.
6. What is meant by hapticity of a ligand? Give an example of a pentahapto ligand.
7. Write the general valence electronic configuration of lanthanides. Mention their common oxidation state.
8. Give two biological functions of Zn.
9. What are Pourbaix diagrams?

**PART B**

Answer any **eight** questions. (8 x 6= 48)

1. a) With suitable examples explain coordination isomerism. (3+3)

b) Calculate the EAN of the following complexes.

i) K4[Fe(CN)6] ii) [Co(NH3)6]Cl3

1. The complex ion [Ni(CN)4]2─ is square planar and diamagnetic whereas [NiCl4]2─ is tetrahedral and paramagnetic. Explain this observation using valence bond theory.
2. Draw the structures of the stereoisomers of complex of the type i) [M(aa)2b2]n+and ii) Ma3b3. Indicate the optically active isomer in the first type.
3. a) [Fe(H2O)6]3+ has a magnetic moment value of 5.92 BM whereas [Fe(CN)6]3─ has a value of 1.74 BM. Explain using crystal field theory. (3+3)

b) Draw the d-orbital splitting pattern in a tetrahedral crystal field.

1. Show the electron arrangement of d4 and d5 systems in strong and weak octahedral ligand fields and calculate the crystal field stabilization energy in each case.
2. Discuss the bonding in metal carbonyls. What is meant by synergic effect?
3. a) Give the preparation of K[PtCl3(η2-C2H4] and deduce its valence electron count. (3+3)
4. Compare f- block elements and transition elements with respect to their electronic spectra and ii) magnetic properties.
5. Discuss the ion exchange method of separation of lanthanide ions from their solution.
6. Explain the mechanism of cooperativity in the binding of oxygen to haemoglobin.
7. Discuss the extraction of uranium from pitchblende ore. Give two applications of Ellingham’s diagram in the extraction of metals.

**PART C**

Answer any **two** questions. (2 x 5= 10)

1. When 1 mole of CrCl3.6H2O is treated with excess of AgNO3, two moles of AgCl are obtained. i) Write the structural formula of the complex ii) write its IUPAC name iii) write three structural isomers of this complex.
2. Two octahedral complexes of Co3+ A and B are blue and yellow respectively. One complex is formed by CN¯ and the other by F¯ ligands. Identify the complexes with proper explanation and calculate their magnetic moment values.
3. Construct Frost diagram for Cl2 from the following Latimer diagram in acidic medium:



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