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

**B.Sc. CHEMISTRY – VI SEMESTER**

**SPECIAL SUPPLEMENTARY EXAMINATION – JUNE 2018**

CH 6115: INORGANIC CHEMISTRY

Time- 2½ hrs Max Marks- 70

This paper contains **two** printed pagesand **three** parts.

Attach the question paper to the answer booklet

Atomic Number: 21 22 23 24 25 26 27 28 29 30

Elements: Sc Ti V Cr Mn Fe Co Ni Cu Zn

**PART A**

Answer any **SIX** of the following questions. **6×2 = 12**

1. Explain why ZnSO4 is colourless.
2. Calculate the EAN of Cu in [Cu(CN)4]3-
3. What is a chelating ligand? Give an example.
4. What is meant by hapticity? Give an example for a pentahapto ligand.
5. Give any two applications of Co in biological systems.
6. Explain why cerium exhibits a stable +4 oxidation state.
7. Give the role of KCl in the extraction of Lithium by the electrolysis of LiCl.
8. What is disproportionation? Give an example.

**PART B**

Answer any **EIGHT** of the following questions. **8×6 = 48**

1. Both Ni(CO)4 and [NiCl4]2- are tetrahedral complexes. Ni(CO)4 is diamagnetic while [NiCl4]2- is paramagnetic. Explain using Valence Bond Theory.
2. Draw the d- orbital electronic arrangements in (i) the high spin and (ii) the low spin octahedral complexes of Mn2+. Calculate (i) the CFSE of high spin octahedral Mn2+ complex and (ii) the magnetic moment of the low spin octahedral Mn2+ complex.
3. In each of the following pairs identify the complex with higher 10 Dq value and justify your answer.
4. [MnCl6]4-, tetrahedral [MnCl4]2-
5. [Fe(CN)6]3-, [Fe(CN)6]4-
6. [Co(NH3)6]3+, [Rh(NH3)6]3+ (Given, both Co and Rh belong to the same group in the periodic table).
7. With the help of a neat diagram explain the d- orbital splitting pattern in an octahedral crystal field.
8. A) Draw the structures of all the stereoisomers of the complex [Co(en)2(H2O)2]3+.

B) Give the IUPAC names of the following complexes:

1. [Co(NH3)5 (ONO)]SO4
2. (NH4)3[Cr(NCS)6]
3. [(NH3)5Co-NH2-Co(NH3)4(H2O)]Cl5.
4. Draw the structures of (i) Mn2(CO)10 and (ii) Zeise salt. Calculate the valence electron count in each of them.
5. A) Write the chemical formula of Wilkinson’s catalyst. Give its application.

B) What is lanthanide contraction? Give any two of its consequences.

1. Discuss the differences between lanthanides and transition metals with respect to the following: (i) magnetic properties (ii) electronic spectra and (iii) complex formation.
2. Draw the structure of a haem unit. How do the structures of haemoglobin and myoglobin differ? What are the functions of haemoglobin and myoglobin?
3. What is Ellingham’s diagram? Explain why Metal→ Metal oxide lines slope upwards whereas C→ CO line slopes downwards in this diagram.

**PART C**

Answer any **TWO** of the following questions. **2×5 = 10**

1. The magnetic moment measurement cannot distinguish between the square planar and tetrahedral complexes of Cu (II) but the magnetic moment value can distinguish between the square planar and tetrahedral complexes of Ni(II). Explain.
2. The two octahedral coordination compounds PtCl4.2NH3 and PtCl4.2KCl do not give precipitate of AgCl when treated with excess of AgNO3. The aqueous solution of one of them is an electrolyte whereas the other one is a non- electrolyte. Write the formulae of these coordination compounds. Draw the structures of the possible geometrical isomers of these complexes.
3. Based on the given Latimer diagram answer the following questions:
4. Identify the species that undergo disproportionation.
5. Calculate the E⁰ value for the reduction from MnO42- to MnO2
6. Explain the use of KMnO4 as a titrant in volumetric analysis.

