



EASTERN UNIVERSITY, SRI LANKA

COND EXAMINATION FIRST SEMESTER IN SCIENCE-2015/2016

(November/December' 2017)

CH 201-COORDINATION CHEMISTRY & MAIN GROUP CHEMISTRY

(Repeat)

Answer all questions

Time Allowed: One hour

1 (a) Describe the postulates of Werner's theory of co-ordination compounds.

(20 Marks)

(b) Define the terms "Ligand" and "Co-ordination numbers" with suitable examples.

(20 Marks)

(c) What is the coordination number and oxidation state of the metal ion in the following complexes?



(20 Marks)

(d) Write down the structures of following polynuclear complexes.

(i) Tetrakis(ethylenediamine)- μ -amido- μ -hydroxodicobalt(III) sulphate

(ii) Tetrammine- μ -dihydroxo bis(ethylenediamine)dicobalt(III) chloride

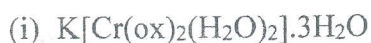
(iii) Sodium tetraiodozincate(II) ion

(iv) Dichlorotetrathiocyanatochromium(III) ion

(20 Marks)

Contd...

(e) Write down the systematic name for each of the following complexes



2 (a) Discuss the following with reference to coordination compounds.

(i) Coordination position isomerism

(ii) Nephelauxetic effect

(b) Give the names and illustrate all types of isomers that are possible in an octahedral complex compound of one cobalt(III) ion, two *en* molecules two chloride ions and one nitrate ion.

(c) Draw the possible isomer(s) for each of the following coordination complexes

(i) Linkage isomer of $[\text{Cr}(\text{H}_2\text{O})_5(\text{NO}_2)]\text{I}$

(ii) Coordination-sphere isomer of $[\text{Co}(\text{o-phen})_2(\text{NH}_3)(\text{SCN})]\text{Cl}$

(iii) Stereoisomer of the octahedral complex, $[\text{Fe}(\text{en})(\text{C}_2\text{O}_4)\text{Br}_2]^-$

(iv) Stereoisomer of the square planar complex, $[\text{Pd}(\text{PPh}_3)_2\text{BrCl}]$

(Hint: $\text{PPh}_3 = \text{triphenylphosphine}$, a monodentate ligand that bonds through the P atom)

(d) (i) Write down the electron configuration of $\text{Fe}(\text{CN})_6^{3-}$ as $t_{2g}^x e_g^y$ (give x and y).

(ii) Calculate the CFSE (in units of Δ_o) for $d^0 - d^5$ high spin complexes and draw a plot of CFSE Vs. d -count.

(iii) For which electron configurations have Zero CFSE in high/low-spin?

(20 Marks)

(e) Explain the given magnetic moment of the following compound on the basis of VBT and CFT.

Compound	Magnetic moment (B.M)
$\text{K}_3[\text{Fe}(\text{CN})_6]$	5.9
$[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$	0.0
$[\text{Ni}(\text{H}_2\text{O})_6]\text{Cl}_2$	2.9

(f) Hydrogen can be placed with alkali metals or with halogens. Give four reasons for each and explain why it is placed in period I.

(20 Marks)
