EASTERN UNIVERSITY, SRI LANKA
SECOND EXAMINATION IN SCIENCE 1998/99 RE-REPEAT
EXCH201 MAIN GROUP CHEMISTRY, CO-ORDINATION CHEMISTRY AND ANALYTICAL CHEMISTRY

TIME: 02 Hours

Answer **FOUR** questions only

1) Answer **all** parts (a), (b) and (c).

a) Write down the general properties of group VII A elements

b) Write brief account on the similarities and dissimilarities between elements of sub-groups IA and IIA.

a) Give a comparative account of the hydrides, oxides and chlorides of C, Si, Sn and Pb.

2) Answer **all** parts (a), (b) and (c).

a) i) What is meant by the term 'Crystal Field Stabilization Energy (CFSE)'?
ii) Calculate the CFSE of octahedral and tetrahedral complexes with d^4, d^6 and d^8 electrons.

b) Explain, using examples what do you mean by the following.

i) Quenching of orbital contribution to the magnetic moment of transition metal complex.
ii) Jahn-Teller effect

c) Explain the variation of ionic radii and lattice energy for weak field octahedral M^{2+} ions of first raw transition elements.

3) Answer **all** parts (a), (b) and (c).

a) Write the IUPAC names of the following co-ordination complexes.

i) $[CoClCNNO_2(NH_3)_3]$
ii) $Na_3[Ag(S_2O_3)_2]$
iii) $K_2[OsCl_5N]$

Contd.

b) Write the formulas of the following complexes

i) bis(cyclopentadienyl)iron(II)

ii) tetraamminecobalt(III)-μ-amido-μ-peroxotetraamminecobalt(III)

iii) triamminechlorocyanonitrocobalt(III)

c) One pink solid has the formula $CoCl_3.5NH_3.H_2O$. A solution of this salt is also pink and rapidly gives 3 moles AgCl on titration with silver nitrate solution. When the pink solid is heated, it loses one mole H_2O and give a purple solid with the same ratio of NH_3:Cl:Co.

i) Deduce the structures of the two octahedral complexes.

ii) Draw and name the structures of the deduced complexes.

4) Answer **all** parts (a), (b) and (c).

a) What is the difference between emission and absorption of radiation?

b) Draw a labeled diagram to show the basic components of an atomic absorption unit. Briefly describe the function(s) of each component

c) Discuss the following

i) The effect of a continuous source such as a deuterium lamp on the response of the detector of an atomic absorption spectrophotometer.

ii) The effect of temperature on atomic emission signal

5) Answer **all** parts (a), (b) and (c).

a) Discuss the principles and theory of colorimetry.

b) Describe a method to determine the concentration of Fe^{3+} in an unknown solution.

c) Discuss the advantages of colorimetric and spectrophotometric methods than visual colorimetric method.

6) Answer **all** parts (a), (b) and (c).

a) Describe the method of ion exchange chromatography in analysis.

b) Discuss with examples the uses of ion exchange chromatography.

c) Explain the basic principles involved in solvent extraction.

End