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GCB-3851 Seat No._____

M. Sc. (Sem. I) Examination

November / December – 2013

Chemistry : Paper - I - CHN - 401

(Inorganic Chemistry)

Time : 3 Hours] [Total Marks : 70

Instruction : All questions carry equal marks.

1 (a) Answer any two of the following : **10**

(i) Predict and draw the structure/shape of following molecules on the basis of VSEPR theory.

CCl_4, SF_6, $TeF_5^{\ominus}$

(ii) By taking suitable examples, explain Bent Rule ar. Energy of Hybridization.

(iii) Explain atomic inversion by proper illustration.

(b) Answer any one of the following : **4**

(i) Derive the wave function for sp^2 hybridized orbitals and also determine the angle of sp^2 hybrid orbitals.

(ii) Discuss the Walsh Diagram by giving proper example of tri-atomic molecule.

2 (a) Answer any two of the following : **10**

(i) Write a note on factors affecting the stability of metal complexes.

(ii) Describe Job's method to determine Binary formal constant.

(iii) Discuss the concept – overall formation constant.

(b) Answer any one of the following : 4

(i) Give a brief account of transitional metal nitrocyl complexes.

(ii) Describe the relationship between stepwise and overall stabilty constant.

3 (a) Answer any two of the following : 10

(i) Write a note in detail on – Trans Effect.

(ii) Write the synthesis of Cis and tran isomers of [Pt Cl_2 (NH_3) (PPh_3)]

(iii) Explain the substitution reactions in square planner Pt (II) complexes.

(b) Answer any one of the following : 4

(i) Discuss the Marcus-Hush theory.

(ii) Give a brief account on Inner Sphere and outer sphere reactions.

4 (a) Answer any two of the following : 10

(i) Explain Tanabe-Sugano diagram for the d^2-configuration.

(ii) Explain M.O. diagram for Octahydral Complexes.

(iii) Draw the M.O. diagram for $[CoF_6]^{-3}$ ion complex.

(b) Write any one of the following : 4

(i) Write a note on π-bonding.

(ii) Explain the factors affecting acid hydrolysis.

5 Answer any seven of the following : 14

(i) Complete the following reaction

$$\underset{\text{one mole}}{\left[Pt(NH_3)Cl_3\right]} \xrightarrow{C_2H_4} ?$$

(ii) Which of the following is more stable ? Why ?

(a) $\left[Cu(NH_3)_4\right]^{+2}$ $\log\beta = 12.7$

(b) $\left[Cu(en)_2\right]^{+2}$ $\log\beta = 19.7$

(c) $\left[Cu(trien)\right]^{+2}$ $\log\beta = 20.5$

(iii) Write the limitations of VSEPR theory.

(iv) Give the three examples for each – acidic, basic and neutral ligands.

(v) Using the MO theory, predict the bond order and magnetic property of O^{-2}.

(vi) Write the limitations of CFT.

(vii) Write the number of loan pair and Bonding pair electrons in ClF_3, Br F_5 and XeF_4 molecules.

(viii) Predict the shape of H_2O molecule on the basis of Walsh diagram.

(ix) Calculate the CFSE for [Co $(H_2O)_6$]Cl_2 complex.

(x) Write the definition and one example of Redox reaction.