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GDE-1751 Seat No._____

M. Sc. (Sem. I) Examination

December – 2015

Chemistry - I

(CHN-401) (Inorganic)

Time : 3 Hours] [Total Marks : 70

Instruction : All questions carry equal marks.

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

(1) Using VSEPR theory predict and draw the structure of No_2^+, No_2^- and NO_2.

(2) Discuss Walsh diagram for AB_2 molecule.

(3) Explain : $d\pi - p\pi$ bond.

(b) Answer any one of the following : 4

(1) Explain free radical reation in covalently bonded molecules.

(2) Explain automic inversion by giving suitable example.

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

(1) Discuss how the following factors affecting on the stability of complex.

(i) Properties of metal ion

(ii) Properties of ligand

(2) Discuss the chelate effect and thermodynamics origin for metal complex.

(3) Explain : Stepwise formation constant and overall stability constant.

(b) Answer any one of the following : 4

(1) Describe pH-metric method to determine binary formation constant.

(2) Determination of stability constant of a metal complex by spectrophotometric absorbance method.

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

(1) Explain : SN^1 conjugate base mechanism in complex.

(2) What is truns-effect ? Explain electrostatic polarization theory of truns-effect.

(3) Explain substitution reactions in square planar Pt(II) complexes.

(b) Answer any one of the following : 4

(1) Explain : Labile and Inert complexes.

(2) Explain the following terms affecting the rate of reaction.

(i) Trans effect

(ii) Leaving group.

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

(1) Explain : The limitation of CFT.

(2) Draw the M.O. diagram for $[CO(F)_6]^{-3}$ complex and explain.

(3) Calculate CFSE for following complexes.
$[Fe(CN)_6]^{-3}$ and $[Co(F)_6]^{-3}$
(z = 26)
(z = 27)

(b) Answer any one of the following : 4
(1) Explain the effect of π-bonding on the value of splitting of d-orbitals.
(2) Explain the factor affecting the value of Δ.

5 Answer any seven of the following : 14
(1) Why the bond angles in NF_3 and (F_2O) are less than those in NH_3 and H_2O ? Explain.
(2) Why the bond length decreasing in the following ions ?
SiO_4^{-4}, PO_4^{-3}, SO_4^{-2} and ClO_4^-
(3) What is thermodynamic stability ?
(4) Why $[Fe\ F]^{+2}$ complex more stable than that $[Fe\ Cl]^{+2}$?
(5) Complete the reaction

$$\left[pt(cl)_3\,NH_3\right] \xrightarrow[product]{+B\bar{r}} X \xrightarrow[(product)]{+P_y} Y$$

(6) What is steric effect ?
(7) What is ligand ? Give an example of hexadentate ligand.
(8) Calculate the CFSE for $[Fe(H_2O)_6]^{+3}$ complex.
(9) Which orbitals are involved in t2g and eg ?
(10) State the bond order of CO.
