Code No.: **8635**

FACULTY OF SCIENCE

M.Sc. I Semester Examination, May/June 2012

CHEMISTRY

Paper I

(Inorganic Chemistry)

Time : 3 Hours] [Max. Marks : 80

Answer **all** *questions.*

Section A– (Marks : 4 × 8 = 32)

(Short Answer Type)

1. (a) Present the salient features of crystal field theory.

   (b) How are magnetic susceptibility and magnetic moment related? Calculate the spin only magnetic moment of $[Ti(H_2O)_6]3+$ and $[ZnCl_4]^{2-}$.

2. (a) Differentiate between SN^1 and SN^2 reaction mechanisms of an octahedral complex.

   (b) What is trans effect? How is it applied in the preparation of cis and trans isomers of $[Pt(NH_3)_2Cl_2]$.

3. (a) Explain the factors that influence the trend in step-wise stability constants of metal complexes.

   (b) State HSAB rule and give its applications.

4. (a) Explain the structural and bonding aspects of $Mn_2(CO)_{10}$ and $Fe_2(CO)_9$.

   (b) Discuss the bonding modes of NO in its metal complexes.

Section B – (Marks : 4 × 12 = 48)

(Essay type question)

5. (a) Explain the factors that influence the magnitude of crystal field splitting in octahedral complexes.

   (b) What is Jahn-Teller distortion? Explain it in the case of Cu(II) Octahedral system.

Or

[P.T.O.

(c) Outline Gouy's method of determining magnetic susceptibility of a paramagnetic system.

(d) Explain with examples, various applications of magnetic moment data.

6. (a) What is an acid-hydrolysis reaction? Discuss the factors that effect these reactions.

(b) Explain inner sphere electron transfer reaction mechanism with a suitable example.

Or

(c) Explain the mechanism of a substitution reaction involving no breakage of metal ligand bond.

(d) Square planar complexes normally react by SN^2 mechanism.- Explain.

7. (a) Explain any two types of stability with respect to metal complexes.

(b) Discuss the principle involved in the spectrophotometric determination of stability constant of a metal complex.

Or

(c) Discuss the metal ion factors that influence the stability of metal complexes.

(d) Explain the stepwise and simultaneous equilibria involved in the formation of ternary metal complexes.

8. (a) Carbon monoxide acts as a sigma donor and pi acceptor in its metal complexes - present evidence for this.

(b) Discuss the structural aspects of Ir and Ru nitrosyl complexes.

Or

(c) Write an account of chemical nitrogen fixation.

(d) Explain the application of 18-electron rule to metal carbonyls.
