



**KK-5901**

Seat No. \_\_\_\_\_

**M. Sc. (Sem. I) Examination**

November / December - 2014

**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 questions : 10

- (1) Discuss  $\text{BeF}_2$  and  $\text{BCl}_3$  by using VSEPR theory and write limitations of this theory.
- (2) Derive the wave functions and bond angles in  $\text{CH}_4$ .
- (3) Explain 'Bent rule' for  $\text{H}_2\text{O}$  and  $\text{NH}_3$ .

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

- (1) Explain Walsh diagram for  $\text{AB}_2$  triatomic molecule.
- (2) Write about  $d_{55} - p_{55}$  bond.

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

- (1) Discuss the chelate effect on the stability of metal complexes.

- (2) Explain the spectrophotometric method for determination of binary formation constant.
- (3) Discuss the determination of stepwise stability constants by pH metric method.
- (b) Answer any one of the following questions : 4
- (1) Describe the importance and properties of chelates.
- (2) Give the difference between stepwise and overall formation constants.
- 3 (a) Answer any **two** of the following questions : 10
- (1) Explain the kinetic applications of crystal field theory.
- (2) Write a short note on 'Acid hydrolysis'.
- (3) Discuss synthetic applications of trans effect.
- (b) Answer any one of the following questions : 4
- (1) Discuss the reactions without metal ligand bond cleavage.
- (2) Short note on 'Marcus - Hush theory'.
- 4 (a) Answer any **two** of the following questions : 10
- (1) Explain the limitations of CFT.
- (2) Discuss  $[\text{Co}(\text{NH}_3)_6]^{+3}$  by M. O. Theory.
- (3) Describe the effect of  $\pi$  bond in complex compounds.

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

(1) Write the similarities and dissimilarity in CFT and LFT.

(2) Explain the MOs diagram for Td-complexes.

5 Answer any seven of the following : 14

(1) Write the limitations of V. B. Theory.

(2) What are the Labile and Inert complexes ?

(3) Define : (i) Primary and secondary valence of metal ion, (ii) Coordination number.

(4) Chelates formation of complex compounds provide extra stability to complex. Why ?

(5) Calculate the CFSE for  $(\text{Ni}(\text{CO})_4]$  and  $[\text{Ni}(\text{CN})_4]^{-2}$  complex.

(6) How CFT explain the colours of complex compound ?

(7) Calculate the  $\mu_S$  for strong and weak field of  $d^4$  system.

(8) Define  $d\pi - p\pi$  bond.

(9) Write any two method for the determination of geometrical isomers of complex.

(10) Give the limitation of Walsh diagram.