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**AI—11—2017**

**FACULTY OF SCIENCE**

**M.Sc. (First Year) (First Semester) EXAMINATION**

**MARCH/APRIL, 2017**

**(CBCS Pattern)**

**CHEMISTRY**

**Paper I (CH-411)**

**(Inorganic Chemistry)**

**(Thursday, 20-4-2017)**

**Time : 10.00 a.m. to 1.00 p.m.**

*Time—Three Hours*

*Maximum Marks—75*

*N.B. :— (i) Attempt All questions.*

*(ii) Use of calculator is allowed.*

*(iii) Figures to the right indicate full marks.*

*(iv) Solve MCQs once only.*

1. Solve any *three* out of five : 15

(a) What is  $S_N^2$  mechanism ? Give the characteristics of  $S_N^2$  mechanism in complexes.

(b) Explain anation reaction with suitable example.

(c) Explain 'Co ligand acts as  $\pi$ -acceptor ligand.'

(d) Explain dinitrogen complexes with suitable examples.

(e) Calculate number of microstates for  $p^1$  and  $d^8$  configurations.

2. Attempt any *three* out of five : 15

(a) Explain oxidative addition reaction with suitable example.

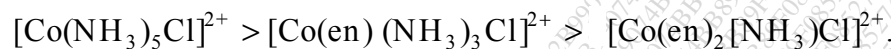
(b) Determine term symbol for state where  $L = 2$  and  $S = 1/2$ .

(c) What are the rules for determining ground state term symbols.

(d) Explain outer sphere mechanism of electron transfer reaction with suitable examples.

P.T.O.

- (e) Explain the following order of rate of aquation of complexes on the basis of solvent effect :



3. (a) Explain metal-metal bonding in metal cluster with suitable examples. 8

Or

Explain the following properties of Ferrocene :

- (i) Carboxylation
- (ii) Friedel-Crafts alkylation
- (iii) Vilsmeier reaction.

- (b) Draw and explain Tanabe-Sugano diagram for  $d^3$  configuration. 7

Or

Find out number of unpaired electrons and magnetic moment of the following ions :

- (i)  $[\text{CuCl}_4]^{2-}$
- (ii)  $[\text{CoF}_6]^{3-}$ .

4. (a) What is base hydrolysis ? Explain the importance of conjugate base formation in base hydrolysis with suitable examples. 8

Or

- (a) Explain mechanism of acid hydrolysis when the inert ligand is  $\pi$ -donor.

- (b) How will you prepare metal clusters by : 7

- (i) Thermal expulsion of Co from a metal carbonyls.
- (ii) Condensation method.

Or

What is difference between Orgel and T-S diagram.

5. (A) Select the correct alternative from the following : 5

- (i) Number of microstates for  $p^2$  configuration is .....
- (a) 10
- (b) 20
- (c) 18
- (d) 15
- (ii) Mulliken spectroscopic term symbol for S in octahedral field is

.....

- (a)  $A_{1g}$
- (b)  $T_{1g}$
- (c)  $T_{2g}$
- (d) eg

(iii)  $Ni(CO)_4$  is .....

- (a) Diamagnetic
- (b) Paramagnetic
- (c) Ferromagnetic
- (d) Antiferromagnetic

(iv) Find out  $\pi$ -acceptor ligand from the following :

- (a)  $H_2O$
- (b)  $NH_3$
- (c) CO
- (d) Ethylenediamine

P.T.O.

- (v) Rate of electron transfer through inner sphere mechanism increases if :
- (a) Nucleophilic character of bridging ligand increases.
  - (b) Electrophilic character of bridging ligand increases.
  - (c) Bridging ligand is  $\pi$ -acceptor
  - (d) Both (a) and (c)
- (B) Write short notes on any *two* : 10
- (a) Complementary electron transfer reactions
  - (b) Spin-cross over
  - (c) 16-electron rule.