

M.Sc. - I (Chemistry) (NEP Pattern) Semester-II
02MSCCH01 - Paper-VI : Inorganic Chemistry-II

P. Pages : 2

Time : Three Hours



GUG/S/25/15350

Max. Marks : 80

Notes : 1. All **five** questions are compulsory and carry equal marks.

1. a) Explain electronic spectra and structure of tetrahalocobalt (II) complex. **8**
- b) Explain the electronic spectra of d^3 and d^7 metal ion in weak octahedral field with suitable example using Orgel diagram. **8**

OR

- c) Explain abnormal magnetic properties in octahedral complex. **4**
- d) Define charge transfer spectra with suitable example. **4**
- e) Explain high spin and low spin crossover. **4**
- f) Explain Racah parameter. **4**
2. a) What are trans effect? Discuss theories of trans effect with suitable example. **8**
- b) What are the types of electron transfer mechanism? Explain outer sphere mechanism. **8**

OR

- c) Discuss the mechanism of substitution reaction in Pt(II) square planar complex. **4**
- d) Discuss the solvent effect, effect of leaving group in nucleophilic substitution reaction in square planar complexes. **4**
- e) Explain complementary and non-complementary reaction with suitable example. **4**
- f) Discuss the bridge activated complex mechanism for electron transfer reaction. **4**
3. a) What are metal carbonyls? Explain structure and bonding in $[\text{Fe}_2(\text{CO})_9]$ and $[\text{Fe}_3(\text{CO})_{12}]$. **8**
- b) i) Give an account of four important chemical reactions of metal carbonyls. **8**
- ii) Explain vibrational spectra of metal carbonyl.

OR

- c) Explain synergic bonding in metal carbonyls. **4**

- d) Calculate EAN of the metal in following metal carbonyl. 4
 i) $\text{Fe}_3(\text{CO})_{12}$ ii) $\text{Ru}_2(\text{CO})_9$
 iii) $\text{Co}_4(\text{CO})_{12}$ iv) $\text{Os}_2(\text{CO})_9$
- e) What are metal carbonyl cluster? Give their classification with suitable example. 4
- f) Explain $\pi(\text{Pi})$ -back bonding in metal carbonyl. 4
4. a) Explain different type of bonding by nitrosyl in metal nitrosyl complex with Example. 8
- b) Discuss the structure and bonding in metal dinitrogen and dioxygen complex. 8

OR

- c) Discuss the nitrosylating agent for the synthesis of metal nitrosyls. 4
- d) Explain Wilkinson's catalyst. 4
- e) Explain how vibrational spectra is use in the study of structure and bonding in metal nitrosyls. 4
- f) Give important reaction of metal nitrosyls. 4
5. a) What are the term symbol for d^2 -configuration. 2
- b) Explain Hole formulation with example. 2
- c) Arrange the following ligand in order to their trans effect NO , PR_3 , CH_3 , Br , Cl , H_2O . 2
- d) Explain cross reaction with example. 2
- e) Draw the structure of 2
 i) $\text{Ru}_3(\text{CO})_{12}$
- f) Write the method of preparation of metal carbonyl. 2
- g) Write a note on Vaska's compound. 2
- h) Give the IUPAC name of $[\text{RhCl}(\text{PPh}_3)_4]$. 2
