

M.Sc. - I (Chemistry) (CBCS Pattern) Semester-II
PSCCHT05 - Paper-VI : Inorganic Chemistry

P. Pages : 2

Time : Three Hours



GUG/S/25/11228

Max. Marks : 80

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

1. a) Explain Tanabe-Sugano diagrams of octahedral complexes with d^2 & d^8 configuration. 8
- b) Explain the electronic spectra and magnetic property of octahedral complex by using suitable example. 8

OR

- c) Explain abnormal magnetic properties in octahedral complex. 4
- d) Define charge transfer spectra with suitable example. 4
- e) Explain how the magnetic and spectral data can be used for determination of structure of tetra halo-cobalt (II) complexes. 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 reactions 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 $\text{NO}, \text{PR}_3, \text{CH}_3, \text{Br}, \text{Cl}, \text{H}_2\text{O}$. 2
- d) Explain cross reaction with example. 2
- e) Draw the structure of. 2
- 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 $[\text{RhCl}(\text{PPh}_3)_4]$ and $[\text{IrCl}(\text{CO})(\text{PPh}_3)_2]$ 2
