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## **MSCCH-506**

### **Inorganic Chemistry-II**

M.Sc. Chemistry (MSCCH)

2nd Semester Examination, 2023 (June)

**Time : 2 Hours]**

**Max. Marks : 70**

**Note :** This paper is of Seventy (70) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein. Candidates should limit their answer to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

### **SECTION-A**

#### **(Long Answer Type Questions)**

**Note :** Section 'A' contains Five (05) long answer type questions of Nineteen (19) marks each. Learners are required to answer any Two (02) questions only.

(2×19=38)

1. What is the Orgel diagram? Gives its limitations. Draw and explain Orgel diagram of  $d^3$  and  $d^7$  electronic configurations.

2. What is the charge transfer complexes? Classify the charge transfer complexes with the example.
3. What is the crystal field splitting? Discuss the crystal field splitting in octahedral complexes.
4. Define the term magnetic susceptibility ? Give any one method to determine the magnetic susceptibility.
5. What is the molecular orbital theory ? Explain why MOT is superior over the VBT and CFT. Discuss the molecular orbital diagram for octahedral complex.

## **SECTION-B**

### **(Short Answer Type Questions)**

**Note :** Section 'B' contains Eight (08) short answer type questions of Eight (08) marks each. Learners are required to answer any Four (04) questions only. (4×8=32)

1. What are the factors that affect the rates of electron transfer reactions?
2. Derive the relationship between stepwise stability constant and overall stability constant.
3. What is the chelate effect? Discuss the factors which affect the stability of the Chelate.

4. Attempt any *two* of the following :
- (a) Russell-saunders coupling.
  - (b) Spin cross over.
  - (c) Microstate.
5. Discuss briefly  $S_N^1$ (CB) mechanism for the reaction :
- $$[\text{Co}(\text{en})_2\text{NH}_3\text{Cl}]^{+2} + \text{OH}^- \rightarrow [\text{Co}(\text{en})_2\text{NH}_3(\text{OH})]^{+2} + \text{Cl}^-.$$
6. Why in octahedral complexes nucleophilic substitution reaction prefer the dissociation mechanism over the association mechanism, explain.
7. Write short note on :
- (a) Limitation of the crystal field theory.
  - (b) Define the term Magnetic permeability.
8. What are inner sphere reactions? Discuss the basic requirements for inner transfer reactions.
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