

**K-396**

Total Pages : 3

Roll No. ....

## **MCH-501**

### **INORGANIC CHEMISTRY-I**

M.Sc. Chemistry (MSCCH)

1st Semester Examination, 2023 (Dec.)

**Time : 2 Hours]**

**[Max. Marks : 35**

**Note :** This paper is of Thirty Five (35) 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 answers 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 Nine and Half (9½) marks each. Learners are required to answer any Two (02) questions only.

(2×9½=19)

1. Explain the following :
  - (a) L-S coupling.
  - (b) Orgel diagrams.
  - (c) Microstates.
2. Discuss the all Symmetry element present in  $\text{H}_2\text{O}$  molecules. Draw the Character Table of  $\text{C}_2\text{V}$  point group.
3. What is Jahn Teller distortion? Discuss the Jahn-Teller distortion in  $\text{Cu}^{2+}$ .
4. Discuss element of symmetry in detail with suitable example.
5. Give the postulates of crystal field theory. Explain CFT in tetrahedral complexes.

## SECTION-B

### (Short Answer Type Questions)

**Note :** Section 'B' contains Eight (08) short answer type questions of Four (04) marks each. Learners are required to answer any Four (04) questions only. (4×4=16)

1. Find out the spectroscopic ground state symbol for  $[\text{Ti}(\text{H}_2\text{O})_6]^{2+}$  and explain the total number of possible electronic transitions.

2. Discuss the selection for electronic configuration.
3. Find the ground state free ion terms for the metal ions in the following cases :
  - (a)  $\text{Ti}(\text{NH}_3)_6] \text{Cl}_3$ .
  - (b)  $[\text{Cu}(\text{H}_2\text{O}_6)] \text{Cl}_2$ .
4. Discuss the various limitations of crystal field theory.
5. Discuss MO diagram for an octahedral complex.
6. Discuss the factor affecting of the Crystal Field Splitting Energy (CFSE).
7. Write short notes on the following :
  - (a) Abelian group.
  - (b) Axis of symmetry with examples ( $-\text{C}_n$ ).
8. Explain improper axis of symmetry in octahedral structure with an example.

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