Roll No.

Total No. of Questions : 11

# M.Sc. (Chemistry) (Sem.-1) INORGANIC CHEMISTRY-I Subject Code : CHL-401-18 M.Code : 75113 Date of Examination : 10-01-2023

Time : 3 Hrs.

Max. Marks : 70

Total No. of Pages : 02

## INSTRUCTIONS TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains EIGHT questions carrying FIVE marks each and students have to attempt any SIX questions.
- 3. SECTION-C will comprise of two compulsory questions with internal choice in both these questions. Each question carries TEN marks.

## **SECTION-A**

- 1. Answer briefly :
  - a) Define magnetic susceptibility.
  - b) How will you differentiate between ferro-magnetism and anti-ferromagnetism?
  - c) Define Enantiomers with one example.
  - d) Explain Jahn-Teller effect.
  - e) What is bend rule?
  - f) Role of CFSE value in transition metal chemistry.
  - g) A square planar complex of Cu<sup>2+</sup> was formed with (i) ammonia and (ii) ethylene. Which one will be more stable and why?
  - h) Principal of IR spectroscopy.
  - i) What are transition metal ions?
  - j) Define semi-bridging.

## **SECTION-B**

- 2. Write a short note on Werner's coordination theory.
- 3. Define R-S term splitting. Explain effect of weak to strong cubic fields on R-S.
- 4. Explain out of A, E and T state, which will show the orbital contribution in magnetic moment and why?
- 5. Give a brief note on spin orbit coupling.
- 6. Write a short note on lattice energies of first row transition metal ions.
- 7. Explain why, the  $d \rightarrow d$  absorption band in complex  $[Fe(H_2O)_6]^{2^+}$  was found to be splitted into two overlapping bands.
- 8. Discuss the origin of paramagnetic in transition metal complexes. How it is different from diamagnetism and ferromagnetism, explain?
- 9. Out of the following molecules which will be expected to yield the white precipitate of AgCl on treating with AgN O<sub>3</sub> and why?

a)  $Co(NH_3)_3C_3$  b)  $CO(NH_3)_6C1_3$ 

### **SECTION-C**

10. a) What is MOEL diagram? Explain pi- acceptor character of CO, N<sub>2</sub> and NO molecules in terms of MOEL diagrams.

### OR

- b) Explain how the stability of the coordination complexes will be influenced by the nature/charge of ligand, size/charge of metal?
- 11. a) What do you understand by symbiosis and antisymbiosis, explain? With the help of an example, discuss the formation of pi complexes of ethylene molecule.

### OR

b) Write a detail note on magnetic behavior of transition metal complexes.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.