ID—2402

B. Sc. (Pass Course)

EXAMINATION, 2022

(Fifth Semester)

CHEMISTRY—I

Code : CH-501

Inorganic Chemistry

Time : 3 Hours *Maximum Marks : 29*

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) State spin multiplicity rule.

(b) What is Laporte rule ?

(c) Define intensity of magnetisation.

(d) What is Curie's point ?

(e) Calculate CFSE for tetrahedral complex.

Section A

2. (a) On the basis of crystal field theory calculate spin only magnetic moment of :

(i) $[CoF_6]^{-3}$

(ii) $[Fe(CN)_6]^{-4}$

(b) Give the salient features of crystal field theory.

3. (a) Discuss the splitting of *d*-orbitals of metal ion in octahedral complexes.

(b) Explain, why Ni^{+2} form tetrahedral complex with CO whereas square planar with CN^- ?

Section B

4. (a) Derive a relation between overall stability constant and stepwise stability constant.

(b) Explain thermodynamic and kinetic stability of complexes with example.

5. (a) Explain trans effect and trans directing ligands with example.

(b) What is log β? How is it related to the stability of metal complexes ? Explain with example.

Section C

6. (a) Discuss Gouy's method for measuring magnetic susceptibility.

(b) Calculate the magnetic moment μ_{L-S} for :

(i) Cr^{+3} (ii) Co^{+3} in absence of crystal field.

7. (a) Explain spin and orbital contribution to the magnetic moments.

(b) Calculate expected magnetic moment in Bohr magneton for the following ions (spin magnetic moment only) :

(i) Fe^{+3}

(ii) Mn^{+2}

(iii) Ni^{+2}.

Section D

8. (a) Discuss the Orgel diagram and absorption spectra for d^1 system.

(b) Explain the following :

(i) No. of microstates for d^1 configuration

(ii) Term symbol for s^1p^1 and d^1s^1.

9. (a) Why is $KMnO_4$ violet in colour while Mn does not contain any electron in d-orbital ?

(b) Explain the following :

(i) Vibronic coupling

(ii) Term symbol for $3p^2$ configuration.