UTTARAKHAND OPEN UNIVERSITY, HALDWANI (NAINITAL)
उत्तराखंड मुक्त विश्वविद्यालय, हल्द्वानी (नैनीताल)

M.Sc.First Year Chemistry

Last Date of Submission: ***15 May, 2016***

Course Title: Inorganic Chemistry
Course Code: CHE501
Year: 2015-16 **Maximum Marks: 40 Marks**

Section 'A'

Section 'A' contains 08 short answer type questions of 5 marks each. Learners are required to answers 4 questions only. Answers of short answer-type questions must be restricted to 250 words approximately.

Briefly discuss the following:

1. The electron transfer from $[C_0(NH_3)_6]^{2+}$ to $[C_0(NH_3)_6]^{3+}$ is extremely slow while from $[Fe\ (CN)_6]^{4-}$ to $[Fe\ (CN)_6]^{3-}$ is very rapid, Explain.
2. What is Point group symmetry? Give detail C_3V and D_3d Symmetry.
3. What are Orgel diagrams? How they are used? Explain with the example of d^1 metal ion in octahedral environment.
4. Define "step-wise stability constants" and "over-all stability constants". How are they related? Explain.
5. Determine the point groups of the following: $SOCl_2$, ClO_4, OH^-, H_2S, NO_3-, $S_2O_3^{-2}$
6. What is a microstate? Calculate the number of microstates for p2 and d^2 configurations.
7. Explain the following:
   (a) L-S coupling
   (b) Polarization theory of Trans-Effect
8. What are cross reaction? Discuss the significance of Marcus- Hush theory.

Section 'B'

Section 'B' contains 04 long answer-type questions of 10 marks each. Learners are required to answers 02 questions only.

1. (a) What is crydtal field splitting? How it is determined.
   (b) Discuss the mechanism of outer- sphere electron transfer reactions.
   (c) State HSAB rule and explain the applications of this rule.

2. (a) Discuss in detail, the structure and bonding feature of halide clusters with quadruple and double bond.

(b) What are iron sulphur proteins? Describe their typical characteristics.

3. Define symmetry elements and symmetry operations with the help of examples. Discuss point group of H_2O molecule.

4. Discuss the limitations of valence bond theory. Explain on the basis of crystal field theory (CFT) that $[Ni(CN)_6]^{2-}$ is diamagnetic but $[NiCl_4]^{2-}$ is paramagnetic. What are law and high spin complexes?