

B.Sc. (Part-II) (CBCS Pattern) Semester-IV  
**USCCHT07 - Chemistry Paper-I - Inorganic Chemistry**

P. Pages : 3

Time : Three Hours



**GUG/W/24/12000(S)**

Max. Marks : 50

- Notes :
1. All questions carry equal marks.
  2. Diagrams and Chemical equation should be given wherever necessary.
  3. Illustrate your answers wherever necessary with the help of neat sketches.
  4. Use of slide rule, Logarithmic tables, Steam tables, Mollier's chart, Drawing instruments, Thermodynamic tables for moist air, Psychrometric charts and Refrigeration charts is permitted. Non programmable electronic calculator is allowed.
  5. Discuss the reaction, mechanism wherever necessary.

1. a) What is isomerism? Discuss Ionization and Linkage isomerism with suitable example of each. 5
- b) Give the important postulates of Werner's theory of complexes and Explain the structure of following Co(III) ammine complexes on the basis of Werner's theory. 5
- i)  $\text{CoCl}_3 \cdot 5\text{NH}_3$
- ii)  $\text{CoCl}_3 \cdot 3\text{NH}_3$

**OR**

- c) Write the difference between Double salt and Co-ordination compound. 2½
- d) What are Chelates? Describe the any two types of Chelates? 2½
- e) Write a note on EAN concept? Calculate EAN in the following complexes ion 2½
- i)  $[\text{Co}(\text{NH}_3)_6]^{3+}$
- ii)  $[\text{Co}(\text{CN})_6]^{4-}$
- f) On the basis of V.B.T. explain why  $[\text{NiCl}_4]^{2-}$  ion is paramagnetic in nature and  $[\text{Ni}(\text{CN})_4]^{2-}$  ions is diamagnetic in nature. 2½

2. a) What are Latimer diagram? How are they represented? Explain with suitable example? 5
- b) What is the Pearson's SHAB principle? Describe any three application of this principle. 5

**OR**

- c) What is Pourbaix diagram? Draw it for iron species? 2½
- d) How hardness of an acids or bases depends on electronegativity? 2½
- e) Write a short notes on redox stability in water? 2½
- f) What are comproportionation and disproportionation reaction. Give one example of each. 2½
3. a) What are the postulates of crystal field theory? Discuss crystal field splitting of d-orbitals in octahedral complexes. 5
- b) Discuss the electronic spectra of  $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$  complex in details. 5

**OR**

- c) Explain John-Teller effect with suitable example. 2½
- d) Calculate the CFSE for high spin and low spin  $[\text{CoF}_6]^{3-}$  complex ion given that  $\Delta_0$  is  $13,000 \text{ cm}^{-1}$  and mean pairing energy is  $21,000 \text{ cm}^{-1}$ . 2½
- e) Explain the effect of nature of ligand on crystal field splitting. 2½
- f) Explain Hole formalism principle? 2½
4. a) Explain the stepwise and overall stability constant with suitable example. 5
- b) State Beer-Lamberts Law? Give it's deviation. Draw the well labelled diagram of single beam photoelectric colorimeter. 5

**OR**

- c) Describe the mole ratio method of determination of composition of Fe(III)-SSA complex. 2½
- d) Explain the principle of double beam photoelectric colorimeter with suitable diagram. 2½
- e) Explain the term thermodynamic stability of complexes with examples? 2½
- f) How does the metal ion affects the stability of the metal complexes? 2½

5. Attempt **any ten**.

**1x10  
=10**

- i) Define coordination number.
- ii) Write IUPAC name of the following complexes:
  - a)  $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]^+$
  - b)  $[\text{Fe}(\text{CN})_6]^{3-}$
- iii) Define bidentate ligand with suitable example.
- iv) What is symbiosis.
- v) What are Frost diagram.
- vi) Classify the following into hard and soft acid.  
 $\text{NH}_3, \text{H}^-, \text{CN}^-, \text{SO}_4^{2-}$
- vii) Define Spectrochemical series.
- viii) Why crystal field splitting energy of tetrahedral is less than octahedral.
- ix) What is Spin selection Rule.
- x) Define
  - a) Absorbance
  - b) Transmittance
- xi) Write the principle of Job's method.
- xii) What are inert and labile complexes.

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