B.Sc. (Part-II) CBCS Pattern Semester-IV

USCCHT07 - Chemistry Paper-I : Inorganic Chemistry

P. Pages : 2 **GUG/W/23/12000**

Time : Three Hours * 6 8 9 4 * Max. Marks : 50

Notes : 1. All **five** questions are compulsory and carry equal marks.
2. Write chemical equations and draw diagrams where necessary.

1. a) Write the postulates of Werner's theory? Explain the bonding in $CoCl_3.3NH_3$ and $CoCl_3.5NH_3$ **5**

b) What is geometrical isomerism? Explain geometrical isomerism shown by Four coordinated complexes. **5**

OR

c) Give the steps for nomenclature of co-ordination compounds. **2½**

d) Define EAN? Calculate effective atomic number of following complex. **2½**
i) $\left[Ni(CO)_4\right](z = 28)$ ii) $\left[Fe(CN)_6\right](z = 26)$

e) What are ligands? How they are classified? **2½**

f) What are Optical Isomerism? Give the conditions for a complex to show optical isomerism? **2½**

2. a) What is SHAB principle? By using SHAB principle Explain the following: **5**
i) HgS is insoluble where as $Hg(OH)_2$ is soluble in dil.HCl.
ii) Calcium and Magnesium exist in nature in the form of carbonates.

b) What are Frost diagram? Discuss Frost diagram for Oxygen. **5**

OR

c) Write a short note on Redox stability in water. **2½**

d) Explain Latimer diagram with example. **2½**

e) What are comproportionation and disproportionation reaction. Give one example of each. **2½**

f) How hardness of an acid or bases depend on electronegativity. **2½**

3. a) What is crystal field theory? Explain crystal field splitting of d-orbitals in octahedral complexes. **5**

b) Discuss the electronic spectra of $\left[Ti(H_2O)_6\right]^{3+}$ with respect to position, intensity, width and symmetry of absorption band. **5**

OR

c) The value of Δ_0 for the complex ion $\left[Cr(H_2O)_6\right]^{3+}$ is found to be $17400\,cm^{-1}$. Calculate the CFSE of the complex ion if the mean pairing energy is $21000\,cm^{-1}$. **2½**

d) Discuss the limitation of VBT for Coordination compounds. **2½**

e) Explain the following- **2½**
i) Spin selection rule ii) Laporte selection rule

f) Explain John- Teller effect? **2½**

4. a) What is stepwise and overall stability constant? How are they related to each other? Explain with suitable example? **5**

b) Explain the instrumentation used in double beam spectrophotometer? **5**

OR

c) Explain the Job's method of determination of composition of Fe (III) – SSA complex. **2½**

d) Give the application of calorimeter and spectrophotometer in quantitative analysis with reference to estimation of Cu (II). **2½**

e) How does the metal ion affects the stability of meatal complexes. **2½**

f) Explain the principle of single beam spectrophotometer with suitable diagram. **2½**

5. Attempt **any ten.** **10**

i) Define polymerization isomerism.

ii) What is double salt?

iii) Write IUPAC name of $\left[Cu(NH_3)_4\right]SO_4$

iv) What is Pourbaix diagram?

v) What is symbiosis?

vi) Write Nernst's equation of single electrode potential.

vii) Which one show strong distraction? Why?
d^5, d^8, d^9, d^{10}.

viii) Give the relationship between Δ_0 and Δ_t.

ix) What is hole formalism principle?

x) What are inert and labile complexes?

xi) What is principle of photometry?

xii) Define thermodynamic stability of metal complexes.

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