

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

P. Pages : 2

Time : Three Hours



GUG/S/25/12000

Max. Marks : 50

- Notes : 1. All five questions are compulsory and carry equal marks.
2. Write chemical equation and draw diagram whenever necessary.

1. a) What are the postulates of Werner's Theory? Discuss Werner's Theory with suitable example. 5

b) what is isomerism? Discuss the types of structural isomerism with one example of each. 5

OR

c) Write a note on EAN concept? Calculate EAN of $[\text{Fe}(\text{CN})_6]^{4-}$ complex ion ($Z=26$). 2½

d) On the basis of VBT, explain why $[\text{Ni}(\text{CN})_4]^{2-}$ is square planar while $[\text{NiCl}_4]^{2-}$ is tetrahedral. 2½

e) Explain geometrical isomerism shown by four coordinated complexes. 2½

f) What are chelates? Describe the various types of chelates. 2½

2. a) What is the SHAB principle? Describe any three applications of SHAB principle. 5

b) What are Latimer diagram? How are they represented? Explain with suitable example. 5

OR

c) Explain the term symbiosis with a suitable example. 2½

d) Explain the electronic theory of hardness and softness. 2½

e) What are comproportionation and disproportionation reactions? Give one example each. 2½

f) Discuss the frost diagram for Nitrogen in acidic and basic medium. 2½

3. a) What are the postulates of crystal field theory? Explain the splitting of d-orbitals in octahedral complexes. 5

b) Discuss the electronic spectrum of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ with respect to position, intensity, width and symmetry of absorption band. 5

OR

c) Explain John-Teller effect with a suitable example. 2½

d) Explain, how nature of central metal ion affected to the crystal field splitting energy. 2½

- e) Write the limitations of Valence Bond theory of coordination compounds. 2½
- f) The crystal field splitting energy (Δ_0) for $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$ is 17400 cm^{-1} and mean pairing energy (P) is 21000 cm^{-1} . Calculate the CFSE for this complex ion. 2½
4. a) Explain the stepwise and overall formation constant. How they are related with each other? Explain with suitable example. 5
- b) Draw a well labelled diagram of double beam photoelectric colorimeter. Discuss its quantitative application. 5

OR

- c) State Beer-Lambert Law. Explain its deviation. 2½
- d) Discuss the single beam spectrophotometer with well labelled diagram. 2½
- e) Explain the Job's method for determination of composition of FE (III)-SSA complex. 2½
- f) How does the nature of metal ion affect the stability of the complexes? 2½
5. Attempt **any ten** questions. **1x10**
=10
- i) Write the IUPAC name of following complexes
- a) $\text{K}_4[\text{Fe}(\text{CN})_6]$ b) $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$
- ii) what is chelate effect?
- iii) Define co-ordination number.
- iv) Define terms Oxidation and Reduction.
- v) Classify the following into hard and soft acids.
 H^+ , Li^+ , Ag^+ , Au^+
- vi) What is Pourbaix diagram?
- vii) Draw the splitting diagram of tetrahedral complex.
- viii) What is the relation between Δ_o , Δ_t and Δ_{sp} ?
- ix) What is hole formalism?
- x) What is λ_{max} ?
- xi) What is principle of photometry?
- xii) Define labile and inert complex.
