

B.Sc. (with Credits)-Regular-Semester 2012 Sem VI
B.Sc.4510-Chemistry (Inorganic Chemistry) Paper - I

P. Pages : 2

Time : Three Hours



GUG/W/16/5627

Max. Marks : 50

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

1. a) Explain Jahn-Teller theorem with suitable examples. Explain why $[\text{Cu}(\text{H}_2\text{O})_6]^{3+}$ has distorted structure even though all the six ligands are same. **5**
- b) What are the postulates of crystal field theory? Explain crystal field splitting of d-orbital in square planar complexes with suitable examples. **5**
- OR**
- c) Why the tetrahedral complexes are high spin whereas octahedral complexes are low as well as high spin. **2½**
- d) The value of Δ_o for $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$ Complex is 17400 cm^{-1} calculate the crystal field stabilization energy for this complex in KJ/mol. **2½**
- e) Explain why intensity of absorption spectra of $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ and $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$ is low. **2½**
- f) Explain any two factors affecting the magnitude of Δ_o . **2½**
2. a) What is magnetic susceptibility? explain the principle and procedure for the determination of magnetic susceptibility by Guoy's method. **5**
- b) What is stability constant? Discuss various factors affecting stability of complexes. **5**
- OR**
- c) Describe the mole ration method for the determination of Fe (III)- SSA Complex. **2½**
- d) How does CFT explains diamagnetic character of $[\text{Fe}(\text{CN})_6]^{4-}$ and paramagnetic character of $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$. **2½**
- e) Discuss the effect of chelation on stability of complexes. **2½**
- f) Calculate spin only magnetic moment for d^8 ion in octahedral, square planar and tetrahedral crystal field. **2½**
3. a) Describe the principle and techniques involved in ascending paper chromatography. **5**
- b) What is meant by double beam spectrophotometer? Explain instrumentation used in double beam spectrophotometer. How it differs from single beam spectrophotometer. **5**
- OR**
- c) Describe the various reasons for deviation from Beer's – lambert's law. **2½**
- d) Draw well labelled diagram of a single beam spectrophotometer. Discuss its applications. **2½**
- e) The R_f value of two metal ions 'A' and 'B' are 0.55 and 0.85 respectively. In chromatographic separation 'A' travels 11 cm from starting point. calculate distance travelled by 'B' and solvent front. **2½**

- f) Describe various factors affecting extraction efficiency. 2½
4. a) Explain structure and bonding in tetra alkyl and dialkyl tin. Give application of metal alkyls and aryls. 5
- b) Describe the role of any two essential trace elements in biological system with examples 5
- OR**
- c) Explain structure of hemoglobin. 2½
- d) Give the classification of organometallic compounds. 2½
- e) Explain in detail how soil pH and soil salinity is determined. 2½
- f) Explain 2½
- i) Entisols
- ii) Aridisols
5. Attempt **any ten**. 10
- i) How Δ_o is related to Δ_t .
- ii) Define crystal field stabilization energy.
- iii) Give any two drawbacks of valence Bond theory.
- iv) What is meant by steric hindrance.
- v) Calculate the magnetic moment of Co^{2+} ion.
- vi) Give the relationship between free energy change and overall stability constant.
- vii) Give any two differences between colorimeter and spectrophotometer.
- viii) State Beer's – Lambert's law
- ix) Define Ion exchange capacity.
- x) Write a note on hyper calcemia.
- xi) What is sodium pump.
- xii) Explain Vertisols.
