

Bachelor of Science (B.Sc.) Semester—IV Examination
CH-401 : CHEMISTRY (Inorganic Chemistry) (Old & New)
Paper—I

Time : Three Hours]

[Maximum Marks : 50

- N.B. :—** (1) All **FIVE** questions are compulsory and carry equal marks.
 (2) Write equations and draw diagrams wherever necessary.

1. (A) What are the postulates of Valence Bond Theory of complexes ? On the basis of V.B.T. discuss the structure of $[\text{Co}(\text{NH}_3)_6]^{3+}$. 5

(B) In what respect chelates differ from ordinary complexes ? Explain bidentate chelating ligand giving one example of each type. Give any two industrial applications of chelates. 5

OR

(C) Explain EAN concept. Calculate EAN in the following :

(i) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ and

(ii) $[\text{Cr}(\text{NH}_3)_6]^{3+}$ 2½

(D) Write IUPAC name of the following complexes :

(i) $[\text{Cr}(\text{en})_3]\text{Cl}_3$ and

(ii) $[\text{Ni}(\text{CN})_4]^{2-}$ 2½

(E) Explain the structure and paramagnetic nature of $[\text{NiCl}_4]^{2-}$ using VBT. 2½

(F) On the basis of Werner's theory, explain how $\text{CoCl}_3 \cdot 5\text{NH}_3$ is different from $\text{CoCl}_3 \cdot 3\text{NH}_3$. 2½

2. (A) Define Stereoisomerism. Mention various types of isomerism exhibited by complexes. Explain geometrical isomerism in 6-coordinated complexes. 5

(B) What are Frost diagrams ? Draw the Frost diagram for Nitrogen in acidic condition (PH = 0). 5

OR

(C) Explain :

(i) Ionisation isomerism and

(ii) Linkage isomerism with one example of each. 2½

(D) Draw a simplified Pourbaix diagram for naturally occurring compounds of iron. 2½

(E) Discuss optical isomerism exhibited by complexes with coordination number 6. 2½

(F) What is Latimer diagram ? Give Latimer diagram indicating conversion of $\text{CO}_{4(\text{aq})}^-$ to $\text{Cl}_{(\text{aq})}^+$ in acidic solution. Write balanced reaction. 2½

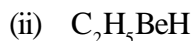
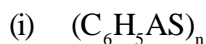
3. (A) What are Organometallic compounds ? What is the action of (i) CO and (ii) CO_2 on alkyl lithium ? Write any two applications of organo-metallic compounds. 5

(B) What are the Carbonyls ? How are they classified ? Discuss the structure and bonding in iron penta carbonyl. 5

OR

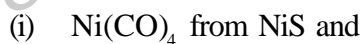
(C) Explain the structure of metal ethylenic complex with suitable example. 2½

(D) Write IUPAC name of the following compounds :



(E) Discuss the structure of $Cr(CO)_6$ and its diamagnetic nature. 2½

(F) How are following compounds prepared :



4. (A) Write the role of the Na^+ , K^+ and Ca^{2+} ion in living systems. 5

(B) What is Pearson's SHAB principle ? What are important applications of SHAB principle ? 5

OR

(C) Explain the role of Haemoglobin in transfer of oxygen. 2½

(D) Write a note on sodium pump. 2½

(E) Draw the structure of haemoglobin and myoglobin. 2½

(F) Classify the following into soft and hard acids and bases :



5. Solve any **TEN** from the following :

(i) Draw the structure of Metal-EDTA Chelate.

(ii) Define coordination number.

(iii) What is double salt ?

(iv) What is optical isomerism ?

(v) What is stability field of water ?

(vi) What is disproportionation ?

(vii) Give any two methods of preparation of alkyl lithium.

(viii) What happens when methyl lithium is treated with formaldehyde ?

(ix) What do you mean by back bonding ?

(x) Define hard acid and soft acid.

(xi) Name the metal present in chlorophyll.

(xii) Define hypocalcemia. 1×10=10