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Class – B.Sc. (Bio–Tech) Sem - II
Subject -- Inorganic Chemistry
Paper – BT–3

Time Allowed : 3 Hours **Maximum Marks : 40**

SECTION-A

Note:– All questions are compulsory. Each question carries 1-mark.

1. Define π-acidity and give one example.
2. Both $Mn(CO)_5$ and $V(CO)_6$ do not obey the EAN rule. $Mn(CO)_5$ achieves EAN of 36 by forming metal-metal bond $Mn_2(CO)_{10}$. However $V(CO)_6$ does not dimerize to give $V_2(CO)_{12}$. Explain.
3. Draw the structure of Dicyclohexyl-18-Crown-6.
4. What is macrocyclic effect?
5. Give one example of hexadentate ligand. Draw its structure.
6. Define thermodynamic and kinetic stability of complexes.
7. What do you understand by Bohr's effect?
8. What are aminoacids? Draw the structure of $[Cu(gly)_2]$.

(8 × 1=8)

SECTION-B

Note : Attempt any five questions. Each question carries 4 marks.

1. Write a short note on metal carbonyl halides.

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2. **Discuss the structure of following binuclear metal carbonyls.**

   (i) $Fe_2(CO)_9$ (ii) $Mn_2(CO)_{10}$

3. Write a short note on dinitrozen complexes of ruthenium.

4. **(a)** What are podands? Give two examples.

   (b) Explain difference between crown ethers and cryptands.

5. Write short note on cryptand and their complexes.

6. **(a)** Out of $[Cd(en)_2]^{2+}$ and $[Cd(CH_3NH_2)_4]^{2+}$ which is more stable and why?

   (b) Derive the relation between stepwise and overall stability constant for the following reaction

   $M + 3L \rightleftharpoons ML_3$

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7. How do the nature of central metal ion and nature of ligand affect the stability of complexes?

8. (a) What is Co-operativity effect?

   (b) Iron (II) salts undergo easy oxidation in air but it is not so in hemoglobin and Myoglobin.

(5 × 4 = 20)

SECTION-C

Note:– Attempt any two questions. Each question carries 6 marks.

1. (a) Give two methods for preparation of metal carbonyls Also discuss the nature of bonding involved in metal carbonyls.

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(b) Compare the C - O bond order in the following $Ni(CO)_4$, $[Co(CO)_4]^-$ and $[Fe(CO)_4]^{2-}$ 4, 2

2. (a) Give one method of preparation each for crown ether and cryptand.

(b) Write short note on Sandwich formation in complexes. 4, 2

3. (a) Write short note on Metalloporphyrins.

(b) Draw the structure of adenosine triphosphate.

(c) Discuss the Irving-William's order of stability for first row transition metal ion. 3, 1, 2

4. Illustrate the structure of myoglobin and hemoglobin. Discuss in detail the roles played by these bioinorganic compounds in biological systems. 6

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