Exam. Code : 107402
Subject Code : 2272

B.Sc. (Bio-Technology) 2nd Semester

INORGANIC CHEMISTRY—B

Paper—BT-3

Time Allowed—Three Hours] [Maximum Marks—40

SECTION—A

Note :— **ALL** questions are compulsory. Each question carries **1** mark.

1. Give two examples of metal carbonyls which undergo dimerisation in order to obey 18-electron rule.
2. N_2 is isoelectronic with CO, but it is poor σ-donor than CO. Give suitable reason.
3. Draw the structure of [18] crown-6 and cryptand [3.3.3].
4. What do you understand by macrocyclic ligand ? Give one example.
5. What do you understand by thermodynamic stability of a complex ?
6. Draw the structure of porphyrin.
7. What is Hill constant ? Give its significance.
8. Write chemical equations involved in photosynthesis.

SECTION—B

Note :— Attempt any **FIVE** questions. Each question carries **4** marks.

1. What are metal carbonyls ? Also discuss bonding in linear M-CO group in metal carbonyls.
2. How will you prepare $Fe(CO)_5$? Write the possible products obtained when $Fe(CO)_5$ reacts with :
   (i) OH^-, (ii) C_5H_6 and (iii) PPh_3.
3. What do you understand by phase transfer catalysis ? Also discuss its applications.
4. Define cryptands. Give two examples. Also give two methods to prepare cryptands.
5. Chelation increases the stability of the complex. Explain with suitable examples.
6. Derive relationship between stepwise and cumulative stability constants.
7. Briefly describe the role of zinc containing enzymes in the biological systems.
8. Discuss the role of following metals in the biological systems :
   (a) Calcium
   (b) Chromium
   (c) Magnesium
   (d) Cobalt.

SECTION—C

Note :— Attempt any **TWO** questions. Each question carries **6** marks.

1. Write brief notes on :—

   (a) Metal complexes containing dinitrogen as ligands. 3

   (b) Metal carbonyl hydrides. 3

2. Discuss in detail various types of cation-binding hosts with two examples each. Also briefly describe various interactions responsible for binding of host molecules and metal ions.

3. (a) What is the difference between the terms kinetic stability and thermodynamic stability ? 3

   (b) How does the nature of ligands affect the stability of complex ? 3

4. Draw and discuss the structure of hemoglobin. Describe the important role of hemoglobin in biological systems.