Exam. Code : 107402
Subject Code : 1839

B.Sc. (Biotechnology) 2nd Semester
INORGANIC CHEMISTRY—B
Paper—BT-3

Time Allowed—3 Hours] [Maximum Marks—40

Note :– Attempt any five questions, selecting at least one from each Section. Each question carries 8 marks. The fifth question may be attempted from any Section.

SECTION—A

1. (a) What do you understand by :
   (i) mononuclear
   (ii) dinuclear
   (iii) trinuclear
   (iv) tetranuclear metal carbonyls ?
   Give one example of each. 3
   (b) Discuss bonding in linear MCO group in metal carbonyls. 3
   (c) Can infrared spectroscopy differentiate between the terminal and bridging CO groups in metal carbonyls ? Explain. 2
2. (a) Draw the structure of $Fe_2(CO)_9$ and $Ir_4(CO)_{12}$. Also mention the number of terminal and bridging carbonyls present in these metal carbonyls. 3

(b) Write brief notes on :

(i) metal carbonyl hydrides

(ii) Complexes of N_2 with Ru. 5

SECTION—B

3. (a) Draw the structure of 2,2,2-crypt and dicyclohexano[18] crown-6. 2

(b) Write a short note on ion-cavity concept. 2

(c) What do you understand by phase transfer catalysis? Also discuss its applications. 4

4. (a) Define cryptand. Give two examples. 2

(b) Discuss two methods to prepare crown ethers. Also discuss the factors affecting the selectivity of crown ethers. 6

SECTION—C

5. (a) Draw the structure of porphyrin. 1

(b) What is the difference between the terms kinetic stability and thermodynamic stability ? Explain with the help of suitable examples. 3

(c) Derive relationship between stepwise and cumulative stability constants. 4

6. (a) $[Ni(en)_3]^{2+}$ is more stable than $[Ni(NH_3)_6]^{2+}$. Explain. 2

(b) Write brief note on trans effect. 3

(c) Explain the stability of complex with reference to

(i) nature of metal ion and

(ii) nature of ligands. 3

SECTION—D

7. (a) What do you understand by essential trace elements ? Name two essential trace elements. Also discuss their roles in biological systems. 3

   (b) Draw the structure of chlorophyll. Also discuss its important role in photosynthesis. 5

8 (a) Briefly discuss the mechanism of oxygen binding by hemoglobin. 4

   (b) Briefly discuss the role of zinc based enzymes in biological systems. 4