

**B.Sc. 6<sup>th</sup> Semester (Honours) Examination, 2022 (CBCS)**  
**Subject: Chemistry**  
**Paper: CC-13**

Time: 2 Hours

Full Marks: 40

*Candidates are required to give their answers in their own words as far as practicable*

1. Answer any five questions 5 × 2 = 10
  - i) What do you mean by essential metals and beneficial metals? Give one example each.
  - ii) Point out two biological function of zinc.
  - iii) What is chelation therapy? Name one chelating drug.
  - iv) Draw the structure and propose magnetic behaviour of Fe<sub>2</sub>(CO)<sub>9</sub>.
  - v) Write the toxic effects of cadmium on human body.
  - vi) What do you mean by thermodynamically stable and kinetically inert complex.
  - vii) Define the term hapticity with suitable example.
  - viii) What is synergic effect? Give example.
  
2. Answer any two questions 2 × 5 = 10
  - i) Describe briefly the different factors affecting the rate of substitution reactions in octahedral complex. 5
  - ii) Give a brief introduction of photosynthesis with PS-I and PS-II systems. 5
  - iii) What is heme and globin parts in hemoglobin? Note down the function of globin protein in O<sub>2</sub> – transportation. 5
  - iv) What is the significance of 18-electron rule? Sketch the molecular orbital energy level of Cr(CO)<sub>6</sub> and give brief discussion. 5
  
3. Answer any two questions 2 × 10 = 20
  - i)
    - a) Distinguish between *cis*- and *trans*- effect. Discuss the synthesis of *cis*-platin and *trans*-platin following the *trans* effect. (2+3)
    - b) What is hydroformylation process? Write the different steps involved to synthesize RCH<sub>2</sub>CH<sub>2</sub>CHO using cobalt catalyst. (1+4)
  - ii)
    - a) Draw different bonding motifs of CO in metal carbonyl complexes. Briefly describe with suitable examples the effect of the metal ion, oxidation state, and coligand on  $\nu_{CO}$  values. (2+3)
    - b) What is Zeise salt? Write down its synthesis and structure. What is the nature of metal-olefin interaction in Zeise's salt? (1+2+2)
  - iii)
    - a) Discuss the poisoning effects of lead and mercury. Mention at least two remedial measures of each. (3+2)
    - b) Give a short account on Fischer-Tropsch process. Write its importance. (3+2)
  - iv)
    - a) What are hemocyanin and hemerythrin? Mention their role in biological system very briefly. (3+2)
    - b) What do you mean by biological nitrogen fixation? Which enzyme is required for biological nitrogen fixation? Name the main metal ions present in this enzymes. Write briefly the importance of biological nitrogen fixation. (1+1+1+2)