

**U.G. 6th Semester Examination - 2022**

**CHEMISTRY**

**[HONOURS]**

**Course Code : CHEM-H-CC-T-13**

**(Inorganic)**

Full Marks : 40

Time : 2½ Hours

*The figures in the right-hand margin indicate marks.*

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

**Answer all the questions.**

1. Answer any **five** from the following questions:

2×5=10

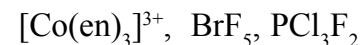
- Starting from  $K_2PtCl_6$  how would you prepare Zeise's salt?
- Write down the symmetry operation for  $S_5$  and prove that if  $S_5$  exists,  $C_5$  and  $\sigma_h$  exist by their own right.
- Why organomercury compounds are more fatal?
- 'Presence of  $C_6$  symmetry element confirms the presence of  $C_3$ '—Justify.
- What happens when ferrocene reacts with formaldehyde and diethylamine in the presence of acetic acid?

[Turn Over]

- Draw the structure of Heme-b group.
- Determine the point group of  $SF_4$  molecule showing all the symmetry elements present in it.
- Define insertion reaction with example.

2. Answer any **two** questions: 5×2=10

- Define dihedral plane of symmetry ( $\sigma_d$ ). Determine the symmetry point groups of the following molecules indicating all the symmetry elements and necessary criteria:



2+3

- Define hydroformylation reaction and write down the general reaction indicating catalyst. Show the catalytic cycle for hydroformylation reaction. 1+1+3
- On the basis of valence electron count (18 electron rule) identify the first row transition metal ions in the following:  
 $[M(CO)_7]^+$  and  $[(H_3C)M(CO)_5]$ .
  - What do you mean by hapticity? Give examples of complexes where at least one of the  $\eta^2$ ,  $\eta^3$ - type of binding modes is present. 2+(1+2)

- d) i) Discuss on the calcium ion transport across the cell membrane indicating the enzyme associated with these process.
- ii) Discuss the enzymatic activity of carbonic anhydrase in the formation of bicarbonate from water and carbon dioxide. 3+2
3. Answer any **two** questions: 10×2=20
- a) i) Discuss the structure and function of haemoglobin.
- ii) What are the similarities and differences between haemoglobin and myoglobin?
- iii) What is met-haemoglobin?
- iv) What is known as salt-bridge interactions in haemoglobin. (2+2)+(3)+1+2
- b) i) Prove that  $S_2$  is nothing but an inversion operation.
- ii) Does the mer-[Ru(CO)<sub>3</sub>Cl<sub>3</sub>] possesses  $C_3$  axis? Give reason.
- iii) Write down all the symmetry operation in a regular octahedron
- iv) Give example of two molecules of  $C_s$  and  $C_{2h}$  point groups respectively.
- 3+2+3+2

- c) i) How many Fe-Fe bond do you expect in  $Fe_2(CO)_9$ ? Give Reason.
- ii) Discuss the mechanism of Wacker oxidation process catalysed by Pd complexes.
- iii) Differentiate between Fischer and Shrock type of metal carbene complexes. .
- 2+5+3
- d) Write a brief notes on:
- i) Chelation therapy
- ii) Role of  $Mg^{2+}$  ion in the activity of Chlorophyll
- iii) Anticancer activity of cis-Platin 4+3+3