UNIT – 4082-I

8. Write short notes on: 2×5

   a) The application of Se in xerography.

   b) Sulfur-nitrogen compounds

   c) Similarity and differences between C_6H_6 and $P_3N_3Cl_6$

   d) Hydrolytic behavior of NCl_3 and PCl_3

   e) Polythionic acids

9. a) What are polyhalide ions and polyhalides? Describe the preparation of polyhalide ions and polyhalides.

   b) What do you mean by zeolites? Write their general formula.

   c) Draw the structure of six different types of silicates and give the name and formula of one example of each.

   d) What do you mean by Freon? How are they made, what are they used for, and how do they damage the environment?

   e) Write short note on 'Interhalogen compounds'.

   2+1+2+2+3

B. Sc. (Chemistry) Examination, 2022

(2nd Year, 2nd Semester)

CHEMISTRY (CORE)

### Paper – Core/Chem/TH/08

Time : Two hours   Full Marks : 40

Use a separate answer script for each Unit.

UNIT – 4081-I

1. Write down the IUPAC name of the following species (*any three*): 3

   i) $[Cu(NH_3)_4][PtCl_4]$ 3

   ii) $Li[AlH_4]$

   iii) $[Ni(CO)_4]$

   iv) $[PtCl_2(NH_3)_4]^{2+}$

2. Give an example of an optically active square-planar complex. 1

3. How do you expect $(C_6H_5)_3PO$ and $(C_6H_5)_2SO$ to behave as coordinating ligands? 1

4. Predict the structure of the complex ion, $[Ni(CN)_4]^{2-}$. 1

5. What will be the product(s) when both cis- and trans-$[Pt(NH_3)_2Cl_2]$ is treated with thiourea separately? 2

6. Starting from $[PtCl_4]^{2-}$, how will you synthesize both cis-$[Pt(NH_3)Cl_2(C_2H_4)]$ and trans-$[Pt(NH_3)Cl_2(C_2H_4)]$? 2

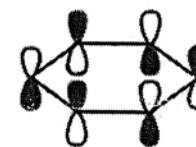7. a) Determine the **point group** of the following molecules (*any two*) with justification: 2

i)

OR

ii)

OR

iii)

OR
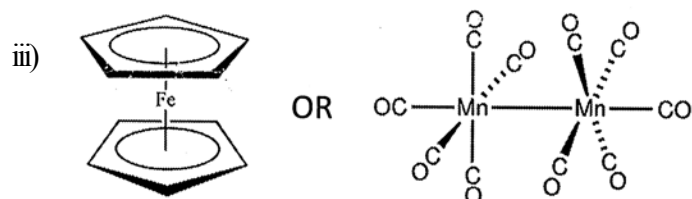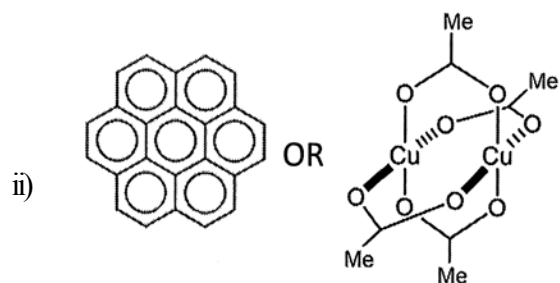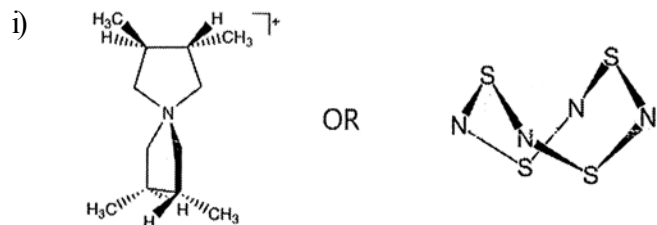
b) Assign optically active molecules from the following cobalt complexes and give a reason in favour of your answer (en - ethylenediamine) 2

(i) *cis*-$[CoCl_2(en)_2]^+$, (ii) *trans*-$[CoCl_2(en)_2]^+$,
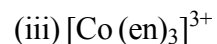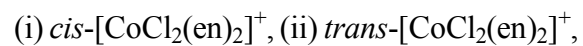
(iii) $[Co(en)_3]^{3+}$

c) Find out the Mulliken notation of the π^* MO of *benzene* 2

OR

Is the mixing between 2s and $2p_z$ valence AOs of B atom feasible in BF_3? Justify with the aid of symmetry arguments.

d) Determine the product $\left\{ (C_3^2)^{-1} \otimes \sigma_v'' \otimes C_3^2 \right\}$ under C_{3v} point group with reasoning (where $(C_3^2)^{-1}$ is the inverse of C_3^2). 2

OR

Determine the product $\left\{ C_2 \otimes i \otimes \sigma_h \right\}$ under D_{2h} point group with reasoning.

e) How do you transform a trigonal planar BCl_3 (D_{3h}) molecule to C_{2v} point group by substitution of Cl with F atom? 2

OR

What will be the point group if one includes centre of inversion, i, to D_2 point group? Write the symmetry operations of the new point group. Justify your argument.

[Turn over