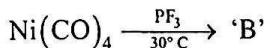
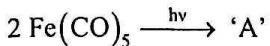


**B.Sc. 6th Semester (Honours) Examination, 2024 (CBCS)****Subject : Chemistry****Course : CC-XIII****Time: 2 Hours****Full Marks: 40***The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words  
as far as practicable.*

**1. Answer any five questions:** 2×5=10

- (a) Differentiate between oxidative addition and reductive elimination reactions with examples.
- (b) What do you mean by chelation therapy?
- (c) Show the structure of  $\text{Co}_2(\text{CO})_8$  molecule in solid state.
- (d)  $\text{Ni}(\text{CO})_4$  is stable but  $[\text{Zn}(\text{CO})_4]^{2+}$  does not exist, why?
- (e) What do you mean by thermodynamically stable and kinetically labile complexes?
- (f) The five coordinate intermediate in square planar substitution might also have a square pyramid geometry with higher LFSE. What factors favour the trigonal bipyramidal geometry?
- (g) Identify the products 'A' and 'B' in the following reactions:



- (h) Write the IUPAC name of Wilkinson's catalyst. Mention the hybridisation of its central metal ion.

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

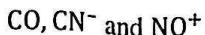
- (a) (i) What do you mean by the term hapticity of organic ligands? Give suitable example(s).  
 (ii) Find the value of 'x' and 'y' assuming validity of 18e rule:  $\text{Fe}(\eta^5 - \text{C}_p)(\text{CO})_x(\text{NO})_y$ .  
(2+1)=2

- (b) (i) What happens when finely divided iron metal reacts with carbon monoxide directly at high temperature and pressure?  
 (ii) Comment on the following observed values of  $\nu_{\text{C}-\text{O}} (\text{cm}^{-1})$  2+3

$\text{Cr}(\text{CO})_6$	$[\text{Mn}(\text{CO})_6]^+$	CO
1984	2094	2143

- (c) (i) Compare the relative rates of hydrogenation using Wilkinson's catalyst of the following compounds:  
Cyclohexene and 1-methyl cyclohexene — justify your answer.
- (ii) Write one synthetic route to obtain Zeise's salt. (1+2)+2

- (d) (i) Compare the  $\sigma$ -donor ability and  $\pi$ -acceptor effectiveness (with justification) of the following:



- (ii) Write the difference(s) between Photosystem I and Photosystem II. 3+2

3. Answer *any two* questions: 10×2=20

- (a) (i) Write briefly the functions of hemocyanine and hemerythrin.  
(ii) What is hydroformylation reaction? How can you obtain  $\text{R}_2\text{CH}-\text{CH}_2-\text{C}(=\text{O})\text{H}$  from  $\text{R}_2\text{C}=\text{CH}_2$ ? Show the different steps involved in this process. (2+2)+(1+2+3)

- (b) (i) Give one suitable example of each of 1,1-insertion and 1,2-insertion reactions in organometallic complexes.

- (ii) What do you mean by crystal field activation energy (CFAE)? Mention its importance.

- (iii) Mention the factors favouring the associative path in inorganic reaction mechanism.

(2+2)+(1½+1½)+3

- (c) (i) Compare the strengths of *cis*-effect and *trans*-effect with suitable examples. Mention one application of *trans*-effect.

- (ii) What do you mean by the term Reaction Profile? Show the Reaction Profile for dissociative or 'D' mechanism of substitution reaction.

- (iii) Briefly explain the term co-operativity in hemoglobin. (3+1)+(1+2)+3

- (d) (i) What do you mean by essential elements? Mention one biological role of potassium.

- (ii) What is Bohr effect?

- (iii) In between hemoglobin and myoglobin which has more affinity for oxygen? Comment.

- (iv) Mention the toxic effects of cadmium.

- (v) Give an example of naturally occurring M-C  $\sigma$ -bonded species.

- (vi) Draw the structure of a metalloporphyrin framework and count the number of  $\pi$ -electrons. (1+1)+1+2+2+1+2

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