

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION MO/22)

CLASS: IMSC /MSC/PRE-PHD
BRANCH: CHEMISTRY

SEMESTER: VII/I
SESSION: MO/2022

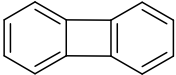
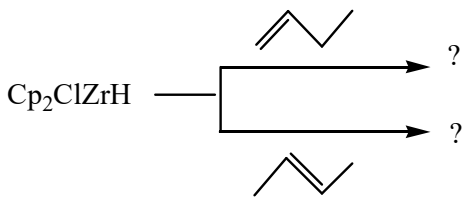
SUBJECT: CH404/CH404R1 (ORGANOMETALLIC CHEMISTRY)

TIME: 03 HOURS

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

	Marks	CO	BL
Q.1(a) Count the electron in the following compound. (i) $\text{Ti}(\text{CH}_3)\text{Cl}_3$ (ii) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$ (iii) $\text{Cr}(\text{CO})_6$	[3]	CO1	2
Q.1(b) Different types of hapticity can be obtained from cyclopentadienyl group. Explain with example.	[3]	CO1	2
Q.1(c) Which conformational isomer of 1, 3 butadiene is more stable and why? Discuss the structure and bonding in butadiene ligand.	[4]	CO1	3
Q.2(a) Explain the structure and bonding in Fischer carbene. State one preparation method and one reaction of Fischer carbene	[5]	CO2	2
Q.2(b) What are carbyne complex? Discuss the classification of carbyne complex	[5]	CO2	1
Q.3(a) With example write the characteristic feature of oxidative addition.	[3]	CO3	2
Q.3(b) For the following transformation $\text{IrCl}(\text{CO})\text{L}_2 \xrightarrow{\text{AB}} \text{Ir}(\text{A})(\text{B})\text{Cl}(\text{CO})\text{L}_2$ where, $\text{AB} = \text{D}_2, \text{HCl}, \text{C}_2\text{F}_4, \text{I}_2$ Explain how can you estimate the oxidising power of AB experimentally?	[5]	CO3	3
Q. 3(c) Complete the following reactions	[2]	CO3	3
<p>1. $\text{PtCl}_2 \xrightarrow{\Delta} ? \xrightarrow{\text{Pyridine}} ?$</p> <p>2. $[(\text{cod})\text{IrCl}_2] +$  $\xrightarrow{(\text{Ph})_3\text{P}} ?$</p>			
Q.4(a) give example of 1,1 insertion and 1,2 insertion reaction.	[2]	CO4	1
Q.4(b) Discuss the kinetics for the metal alkyl to metal acyl conversion	[4]	CO4	2
Q.4(c) Complete the following reactions:	[4]	CO4	3
			
Q.5(a) What is alkene metathesis? Give example. Draw the structure of Grubbs catalyst and Schrock catalyst for alkene metathesis.	[5]	CO5	2
Q.5(b) Write short note on nucleophilic addition to CO.	[5]	CO5	3