

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION MO/24)

CLASS: IMSc /MSc
BRANCH: CHEMISTRY

SEMESTER: VII/I
SESSION: MO/2024

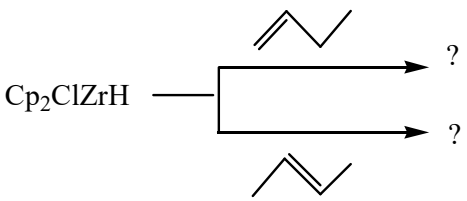
SUBJECT: CH404R1 ORGANOMETALLIC CHEMISTRY

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) Explain why are d^8 square planar complexes stable although they do not follow 18 electron rule? Find out whether these complexes follow 18 e^- rule or not: (i) $[\text{Mn}(\text{CO})_5\text{CH}_3]$ (ii) $[\text{PtCl}_4]^{2-}$	[3+2]	CO1	2
Q.1(b) Explain the structure of Ferrocene molecule? Give any one method of synthesis of cyclopentadiene complexes?	[2]	CO1	2
Q1(c) Explain the mechanism for Beta elimination reaction in transition metal alkyls?	[3]	CO1	3
Q.2(a) What are Carbenes? Distinguish between singlet and triplet carbenes?	[5]	CO1	2
Q.2(b) What are transition metal carbene complexes? Differentiate between Fischer and Schrock carbene complexes?	[5]	CO2	1
Q.3(a) Give example of oxidative addition of $\text{Ir}(\text{Ph}_3\text{P})_2\text{COCl}$ with: MeI , Agostic species, C-C bond (ring strain driven)	[3]	CO3	2
Q.3(b) $\text{IrCl}(\text{CO})\text{L}_2 \xrightarrow{\text{AB}} \text{Ir}(\text{A})(\text{B})\text{Cl}(\text{CO})\text{L}_2 \quad \text{where, AB} = \text{D}_2, \text{HCl}, \text{C}_2\text{F}_4, \text{I}_2$ For the above reaction estimate the oxidising power of AB experimentally.	[5]	CO3	3
Q.3(c) Discuss $\text{S}_\text{N}2$ mechanism for the oxidative addition of L_nPd with chiral alkyl halide to prove the inversion of configuration of the substrate.	[2]	CO3	3
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 insertion of CO with $\text{Mn}(\text{Me})(\text{CO})_5$.	[5]	CO4	2
Q.4(c) Complete the following reactions:	[3]	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) Explain the structure and application of any one commercial catalyst like Zeigler Natta or Wilkinson's catalyst?	[5]	CO5	4