MANIPAL UNIVERSITY

Reg No										

DEPARTMENT OF SCIENCES

III SEMESTER M.Sc (CHEMISTRY) END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: ADVANCED ORGANIC CHEMISTRY 1 [CHM-701]

REVISED CREDIT SYSTEM

Time: 3 Hours Date: 24/11/2016 MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Write chemical equations wherever necessary.

1A. Describe the chemical properties, two synthetic applications and structure of organomagnesium compounds. **3**

1B. **i)** What is migratory insertion? Explain the migratory insertion reaction in metal-carbonyls. **2**

ii) Explain transmetallation with an example. **1**

1C. **i)** Discuss the aromaticity and electrophilic substitution reactions of ferrocene. **2**

ii) Predict the product in the following reactions **2**

a. $Na_2Fe(CO)_4 \xrightarrow{RCOCl} ? \xrightarrow{R^1X} ?$

b. $CH_3\text{-}CH{=}CH_2 + CO + H_2 \xrightarrow{Co_2(CO)_8} ?$

2A. Give two synthetic methods for the following metal complexes. **3**

i) Metal-arene complexes

ii) Metal-akyl complexes

iii) Metal-allyl complexes

2B. Differentiate between Fischer and Schrock carbenes. Explain the bonding in Fischer carbens. **3**

2C. **i)** Give chemical properties of organoaluminium compounds. Explain the applications of organolithium compounds in organic synthesis. **2**

ii) Discuss the general properties of main group organometallics. **2**

3A. **i)** Describe the chemical properties and applications of metal-hydrides. **2**

ii) Explain the structural features of metal-allyl complexes **1**

3B. **i)** Explain the common routes of decomposition of transition metal alkyls. **2**

ii) What is Tebbe's reagent? Mention its uses. **1**

3C. **i)** Explain two synthetic applications of organoboron compounds. **2**

ii) Describe the reaction of metal-carbynes with double bonded compounds. **2**

4A. Explain the catalytic cycle for the hydrogenation of alkenes catalyzed by $[RuCl_2(PPh_3)_4]$. **3**

4B. Explain the structures of following metal clusters using EAN and Wade rules. **3**

a) $Os_3(CO)_{12}$ b) $Rh_4(CO)_{12}$ c) $Ni_8(CO)_8(PPh)_6$

4C.	**i)** Describe 16 electron rule with the help of a molecular orbital diagram.	**2**
	ii) Define olefin metathesis. Explain it with a catalytic cycle.	**2**
5A.	Describe the catalytic cycle for carbonyl catalyzed hydroformylation of alkenes.	**3**
5B.	Explain the mechanism of reductive elimination. How does the geometry of the square planar complexes change upon oxidative addition reaction?	**3**
5C.	**i)** Explain in orbital terms why the maximum coordination number decreases as the number of d electrons increases?	**2**
	ii) Describe the factors affecting the ligand substitution reactions in organometallics with suitable examples.	**2**
6A	Explain the catalytical cycle for the conversion of propylene to acetone using Wacker process.	**3**
6B	Which reaction forms the heart of the Ziegler-Natta polymerization for alkenes? Explain the catalytic cycle.	**3**
6C	**i)** Write the different preparative methods for the synthesis of metal clusters.	**2**
	ii) Give reasons for the following:	**2**
	a) Fluxionality complicates the ^{1}H NMR spectrum of some molecules.	
	b) After the oxidative addition reaction, the co-ordination number of the metal increases by two in Vaska's reagent.	

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