MANIPAL UNIVERSITY

Reg No										

DEPARTMENT OF SCIENCES

III SEMESTER M.Sc (CHEMISTRY) END SEMESTER EXAMINATIONS, NOV/DEC 2017

SUBJECT: ADVANCED ORGANIC CHEMISTRY I [CHM-701]

REVISED CREDIT SYSTEM

Time: 3 Hours Date: MAX. MARKS: 50

Instructions to Candidates:

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

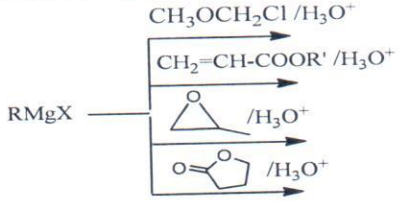
A. i) Describe the chemical properties and two important applications of metal-hydrides. **3**

ii) Give reason: Metal carbonyls undergo nucleophilic attack readily while they resist electrophilic attack.

1B. i) Explain the reactivity, structure and bonding of aluminum alkyls. **3**

ii) What product is obtained when excess ethylene is treated with triethylaluminium?

1C. i) Predict the product in the following. (R=Alkyl) **2**



ii) Explain two synthetic applications of organosilicon compounds. **2**

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

a. Metal-alkyl complexes **b.** Metal-alkene complexes

ii) Explain the use of Metal-carbonyls in metallurgy

2B. Describe two synthetic methods, structure and bonding of Fischer carbenes. How are they different from Schrock carbenes? **3**

2C. i) Explain the chemical properties and important synthetic applications of organolithium compounds **2**

ii) Discuss the aromaticity and electrophilic substitution reactions of metal cyclopentadiene complexes **2**

3A Discuss industrial importance and laboratory applications of organometallic compounds **3**

3B Give Dotz reaction. Explain the mechanism **3**

3C i) Explain two general methods of preparation of main group organometallics with an example **2**

ii) Reactivity of metal-arenes depends upon the functional groups on arenes. Explain. **2**

4A. Describe the catalytic cycle for the hydroformylation of alkenes. **3**

4B. Define hydrocyanation. Explain its mechanism. **3**

4C. **i)** Explain the catalytical cycle proposed for the Fe $(CO)_5$ catalyzed water gas shift reaction. **2**

ii) Give reasons for the following:

a) Strained alkenes such as cyclopropene or norbornene bind unusually strongly to metals. **2**

b) Wilkinson's catalyst unable to hydrogenate some of the alkenes.

5A. What is hydrosilylation of olefins? Describe its mechanism. **3**

5B. Determine the value of 'n', assuming that the 18 electron rule is obeyed by the following complexes; **3**

a) $Ni(C_nH_n)_2$ **b)** $Mn(CO)_nCl_2$ **c)** $[Mo_2(CO)_n]^{2-}$

5C. **i)** Explain the following:

a) Alkyne migratory insertion. **2**

b) Trans effect

ii) Describe 16 electron rule with suitable examples.

6A. Explain three applications of metal clusters in organic synthesis. **2**

6B. **i)** Differentiate 1, 1 and 1, 2 migratory insertion reactions with suitable examples. **3**

ii) Explain dissociative and associative interchange mechanisms to explain ligand substitution reactions. **2**

6C. **i)** Describe the mechanism of olefin isomerization in converting alcohol to aldehyde. **1**

ii) Explain in orbital terms why the maximum coordination number decreases as the number of d electrons increases. **2**

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