M. Sc. Chemistry Examination, 2017

(3rd Semester)

ORGANIC CHEMISTRY SPECIAL

PAPER - XII-O

Time: Two hours Full Marks: 50

(25 marks for each unit)

Use a separate answerscript for each unit.

UNIT - O-3121

Attempt all the questions.

1. a) Predict the product(s) of the following reaction and explain with mechanism. 1+2+1

How can you prepare the above substrate?

b) Predict the product(s) and explain the mechanism of formation.

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c) Predict the product(s) and draw the mechanism of the reaction.

2. a) How can you carry out following transformations? (Mechanism not required) $2\frac{1}{2} + 2\frac{1}{2} + 2\frac{1}{2}$

i)
$$CHO$$

$$Ts$$

$$Ts$$

$$Ts$$

$$Ts$$

$$Ts$$

$$Ts$$

$$Ts$$

b) Identify the products **A** and **B** in the following reaction sequence and indicate the name of the reactions happening. Explain the mechanism invovled in each step.

$$1+1+4$$

OMe

6. Identify and in the following scheme (any one)

a)
$$n - BuLi + 2 Se \xrightarrow{THF/hexane} L \xrightarrow{n - BuBr} M$$

b) O

$$\begin{array}{c}
 & \text{O} \\
 & \text{O} \\
 & \text{O} \\
 & \text{O} \\
\hline
 & \text{O} \\
 & \text{Catecholborane}
\end{array}$$

$$\begin{array}{c}
 & \text{O} \\
 & \text{DI} \\
 & \text{CBr}_4, \text{PPh}_3, \text{Zn} \\
 & \text{2) n-BuLi(2·1 eqv)} \\
 & \text{C} \\
 & \text{Catecholborane}
\end{array}$$

$$\begin{array}{c}
 & \text{Br} \\
 & \text{Pd(PPh}_3)_4(5 \text{ mol}\%) \\
 & \text{NaOEt, benzene}
\end{array}$$

c)
$$\xrightarrow{\text{Thexyl-BH}_2} \mathbf{L} \xrightarrow{\text{1) CO-H}_2O} \mathbf{M}$$

iii)
$$SiMe_3 \xrightarrow{100^{\circ}C} \mathbf{E}$$

V)
$$\longrightarrow$$
 SiMe₃ \longrightarrow HO \longrightarrow TFA \longrightarrow H

vi) HO SiMe₃
$$R_{1}$$
 $C_{2}H_{5}$ $C_{2}H_{5}$ R_{1} R_{1} R_{1} R_{2} R_{3} R_{2} R_{3} R_{1} R_{2} R_{3} R_{1} R_{2} R_{3} R_{2} R_{3} R_{2} R_{3} R_{3} R_{2} R_{3} R_{3} R_{4} R_{3} R_{4} $R_{$

- 4. Answer *any one* of the following questions :
 - a) Discuss the differences between Fischer and Schrock type carbenes with respect to the nature of metals and ligands.
 - b) Draw MO diagram for Fischer carbenes and Schrock carbenes. Indicate HOMO and LUMO.
- 5. Answer *any two* of the following questions: 2x2
 - a) Fischer carbene behaves as compounds with ester type functionality - explain.
 - b) Discuss the mechanism of the following reactions indicating reaction condition.

$$CH_3 + R_3B \longrightarrow R$$

$$CH_3 + R_2B(OH)$$

- c) Discuss the reaction condition and mechanism of synthesising E and Z-alkenes by organoboron chemistry.
- d) Carry out the following reaction

$$B(OH)_2 + Br \longrightarrow R$$

[Turn over

 $2\frac{1}{2}$

- 6. Answer *any two* of the following questions : $2 \times 2 \frac{1}{2}$
 - a) Predict the product(s) and stereoselectivity of the following reaction.

b) Justify with proper reasons the following observation.

OM OH OH OH OH OH Ph Ph Ph
$$B(C-Phenyl)$$
 $32/68$ Li $50/50$

c) Perform the following reaction with necessary reagent, condition and mechanism.

$$(OC)_5 Cr = C$$

$$Ph$$

$$(OC)_4 Cr$$

$$Y = Ph$$

$$X$$

$$X$$

$$OMe$$

$$Y = Ph$$

d) Explain the methodology of cyclopropanation using Fischer carbenes.

$$Ph - C \equiv C \xrightarrow{Me} Me \xrightarrow{i) Co_2(CO)_{8,}} A \xrightarrow{TMANO} I$$

$$\xrightarrow{Me} Me \xrightarrow{i) BF_3, Et_2O} A \xrightarrow{Dichloromethane, 1h} I$$

$$H \xrightarrow{Ts}$$

c) Describe the role of base in Suzuki coupling reaction.

 $1\frac{1}{2}$

UNIT - O-3122

3. a) Write a method for the preparation of trimethylsilyl diazomethane. Why is it superior to diazomethane?

 $2 + \frac{1}{2}$

b) Predict the product(s) of the following reactions with plausible mechanism, where applicable. (any five) 2×5

i)
$$\frac{1. \text{ Me}_3\text{SiCHN}_2}{2. \text{ H}_2\text{O}} \bullet \mathbf{C}$$

ii)
$$\xrightarrow{\text{SiMe}_3} \mathbf{D}$$

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