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**University Examinations 2016/2017**

THIRD YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE CHEMISTRY, BACHELOR OF SCIENCE EDUCATION SCIENCE (MATHS & CHEMISTRY AND BIOLOGY AND CHEMISTRY OPTIONS AND BACHELOR OF SCIENCE CHEMISTRY OPTION

**SCH 3301: SYNTHETIC ORGANIC CHEMISTRY I**

**DATE: December, 2016 TIME: HOURS**



**INSTRUCTIONS:** *Answer questions* ***one*** *and any other* ***two*** *questions .*

**QUESTION ONE - (30 MARKS)**

1. Define the following terms; (4 Marks)
2. Directed aldol reaction
3. α , β- unsaturated carbonyl compound
4. Catalytic hydrogenation
5. Acylic hydrocarbon
6. Determine the starting materials that are required to synthesize the alkene below by a witting reaction. Show the retrosynthetic analysis.



1. The synthesis of crossed aldol products by using two different aldehydes having hydrogen atoms is not a useful reaction in organic synthesis. Explain. (4 Marks)
2. Determine the starting materials that are needed to synthesize the following compounds by a Robinson annulations method. (6 Marks)
3. 
4. 
5. 
6. Show the mechanism involved in the reduction of pentene using di-imide, HN = NH

(4 Marks)

1. Complete the following reaction by indicating the mechanism involved. (4 Marks)



**QUESTION TWO (20 MARKS)**

1. Give the structure and the name of the products formed in the following reactions.

(8 Marks)









b ) Show the stepwise mechanism of intramolecular aldol reaction for the conversion of 2,6-heptanedione to 3- methyl-2- cyclohexenone with NaOEt and EtOH (10 Marks)

c) Give the names and structures of two esters without hydrogen atoms that are used in crossed claisen reactions. (2 Marks)

**QUESTION THREE (20 MARKS)**

1. Show the various methods and determine the starting material used to synthesize the compounds below by a Grignard reaction. (10 Marks)





1. Using protecting groups show how the product B below can be synthesized from the starting material A. (5 Marks)



1. (i) What is catalytic hydrogenation? (1 Mark)

(ii) Determine the products formed when each of the alkenes are treated with H2 and palladium (Pd). Give their names and structures. (4 Marks)





**QUESTION FOUR (20 MARKS)**

1. Determine the starting material that are required to prepare the following compound by an aldol reaction. (4 Marks)





1. Determine the product and show the mechanism involved in the following directed aldol reaction. (5 Marks)



1. (i) What is a Dieckmann reaction? (2 Marks)

(ii) Show the mechanism involved in the following intramolecular claisen reaction.



(10 Marks)