



MAASAI MARA UNIVERSITY

**REGULAR UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
FOURTH YEAR SECOND SEMESTER**

**SCHOOL OF SCIENCE
DEPARTMENT OF MATHEMATICS AND PHYSICAL
SCIENCES
BACHELOR OF SCIENCE AND BACHELOR OF
EDUCATION SCIENCE**

COURSE CODE: CHE 416

COURSE TITLE: CONCEPTS OF ORGANIC SYNTHESIS

DATE: 24TH APRIL 2018

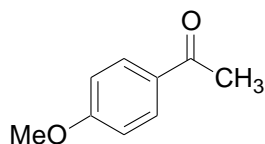
TIME: 0830 – 1030HRS

INSTRUCTIONS:

Answer question **ONE** and any other **TWO** questions

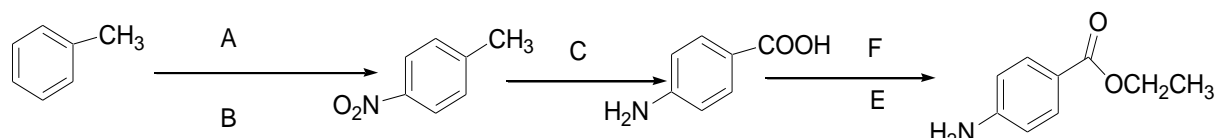
QUESTION ONE (30 MARKS)

1. (a) (i) State two reasons why organic synthesis is possible (2 Marks)
- (ii) State four reasons why should synthesize natural products (2 Marks)
- (b) Explain the steps involved in designing an organic synthesis (5 Marks)
- (c) (i) State two types of synthetic routes (2 Marks)
- (ii) How could 2-Chlorohexane be synthesized from a hydrocarbon and any other necessary reagents (2 Marks)
- (d) Identify the synthons and their synthetic equivalents



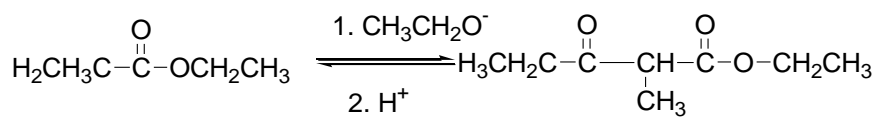
(4 Marks)

- (e) Identify all the reagents marked as A,B,C,D,E and F in the conversion Below



(7 Marks)

- (f) (i) State two types of Claisen reactions (1 Marks)
- (ii) Give the mechanism for the reaction below

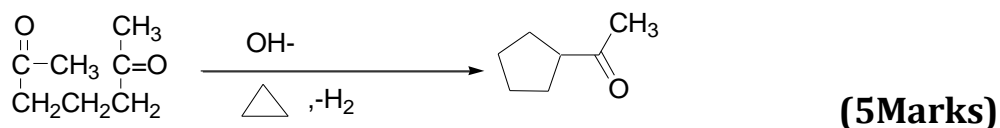


(5 Marks).

QUESTION TWO (20 MARKS)

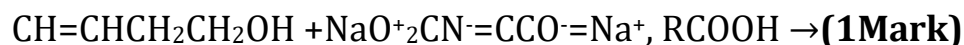
2. (a) What is Michael addition reaction **(1 Mark)**

(b) Give the mechanism for the reaction below



(c) (i) What is Claisen-Ester condensation reaction **(2 Marks)**

(ii) Complete the reaction below



(1 Mark)

(d) (i) Define a Ylide **(2 Marks)**

(ii) Describe how a Ylide is prepared **(3 Marks)**

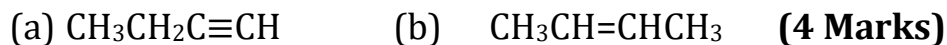
(e) Using a reaction mechanism show how 5,5-dimethyl cyclohexane - 1,3-dione is synthesized from 4-methyl pent-3-en-2-one and diethylmalonate **(5 Mark)**

QUESTION THREE (20 Marks)

3. (a) (i) State three qualities of a protecting group **(3 Marks)**

(ii) What is Clemensen's reduction? **(1 Mark)**

(iii) Starting with acetylene, how would you synthesize the following



(b) Using a specific example show the Baeyer-Villiger Oxidation **(3 Marks)**

(c) (i) Consider Benzocaine **(5 Marks)**

(ii) Write its synthesis **(5 Marks)**

QUESTION FOUR (20 Marks)

4. (a) Starting with phenol show how Aspirin is synthesized **(6 Marks)**
- (b). What is Diels-Alder reaction **(2 Marks)**
- (c) Show how the amine group is protected in the conversion below **(3 ½ Marks)**
- (d) Complete the reactions below
- (i)
- (ii)
- (iii) **(3 Marks)**
- (e) (i) Write the synthetic tree **(1 Mark)**
- (ii) By carrying out retrosynthesis of the target molecule given below. Propose possible methods of synthesizing the compound using the starting material containing not more than 7 carbons and triphenyl phosphene **(5 Marks)**

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