UNIVERSITY OF ESWATINI
MAIN EXAMINATION 2018/2019

TITLE OF PAPER	:	Methods of Organic Synthesis
COURSE NUMBER	:	CHE603
TIME	:	Three Hours
INSTRUCTIONS	:	Answer any **Four Questions**. Each question carries 25 Marks.

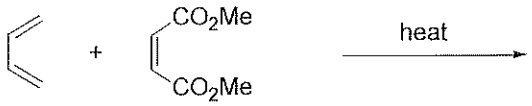
This Paper contains five (4) pages.

You must not open this paper until the Chief Invigilator has granted permission to do so.

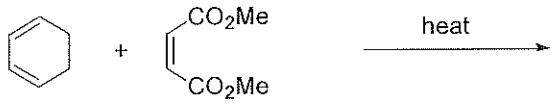
Question 1

(a) Draw the structure of the major product [10]

(i)



(ii)



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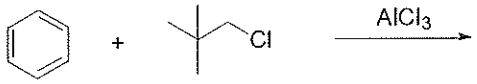

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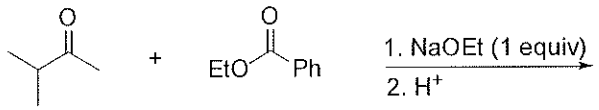

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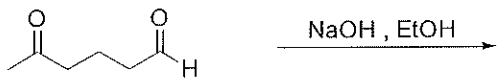


(b) Discuss the Buchwald-Hartwig amination. Use appropriate reactants and reagents to propose a plausible mechanism for the reaction. [15]

Question 2

Discuss the reactions named *vide infra* using suitable examples.

(a) Epoxidation reaction
(b) Robinson Annulation reaction
(c) Wittig reaction
(d) Michael addition reaction
(e) Aldol condensation reaction

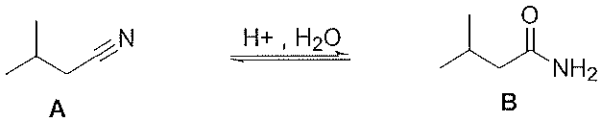
[25]

Question 3

(a) Discuss five (5) properties of a good protecting group. [5]
(b) The Hydrolysis of a nitrile **A** to a carboxylic acid **C** involves the initial formation of amide **B**. Provide a mechanism for each of the following transformations.

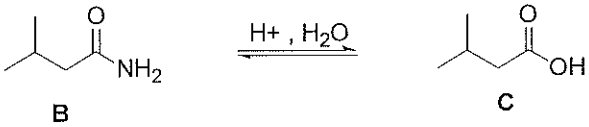
[20]

(i)



A B

(ii)

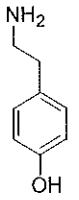


B C

Question 4

Tyramine is an alkaloid found, among other places, ripe cheese. Outline a scheme with all the necessary reagents and conditions, for the synthesis of Tyramine from benzene.

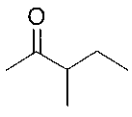
[25]



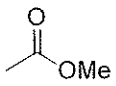
Tyramine

Question 5

(a) Please provide a synthesis of the indicated target compound. All of the carbon atoms should be derived from methyl acetate. **[9]**

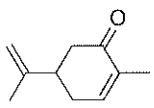


Target compound



methyl acetate

(b) Carvone is the major constituent of spearmint oil. Draw the products would you expect from a reaction of carvone with the following reagents? **[16]**

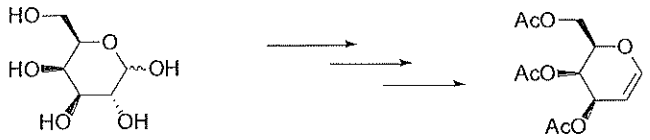


Carvone

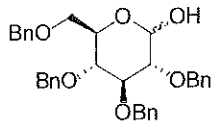
(i) $(CH_3)_2Cu^-Li^+$, then H_3O^+
(ii) $LiAlH_4$, then H_3O^+
(iii) CH_3NH_2
(iv) C_6H_5MgBr, then H_3O^+
(v) H_2/Pd
(vi) CrO_3, H_3O^+
(vii) $(C_6H_5)_3P^+C^-CHCH_3$
(viii) $HOCH_2CH_2OH$, HCl

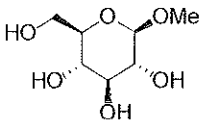
Question 6

(a) Outline a scheme with all the necessary reagents and conditions, for the synthesis of 3,4,6-tri-*O*-acetyl-D-galactal from from D-galactose. **[10]**



(b) How would you convert D-glucose into the following compounds? **[10]**





(i) 2,3,4,6-tetra-*O*-benzyl-D-glucose (ii) β-methylglucopyranoside

(c) Discuss the term "Mutarotation". **[5]**