TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT MEDICAL SCIENCES

UNIVERSITY EXAMINATION FOR:

BACHELOR OF MEDICAL LABORATORY SCIENCE, BACHELOR SCIENCE IN FOOD QUALITY, BACHELOR OF SCIENCE ENVIRONMENTAL HEALTH

BMLS 2016/S, BSFQ 2016S, BSEH 2016S

ACH 4118: ORGANIC CHEMISTRY

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES:AUGUST 2017

TIME:2 HOURS

DATE: Pick DateSep2017

Instructions to Candidates

You should have the following for this examination

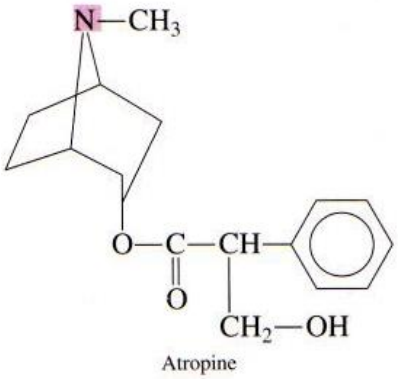
-Answer Booklet, examination pass and student ID

This paper consists of five questions. Answer question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

(a) Consider the following molecule:

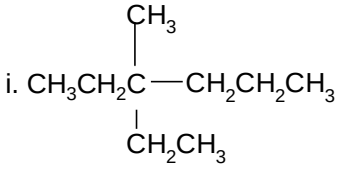


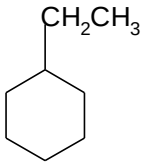
Atropine

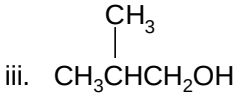
(i) Identify all the functional groups present in Atropine. (3 marks)

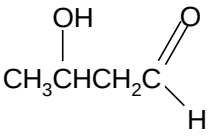
(ii) Determine the molecular formula of Atropine
(1 mark)

(b) Assign IUPAC names to each of the following compounds.
(4 marks)

i. 

ii. 

iii. 

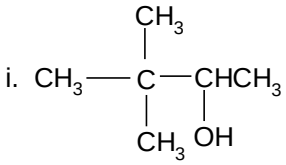
iv. 

(c) i) Combustion of a 5.17 mg of a sample of a compound gives 10.32 mg of CO_2 and 4.23 mg of water.

Given that the molecular weight of the compound is 88, determine its molecular formula. (6 marks)

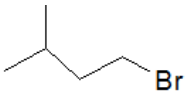
ii) Identify the major alkene obtained on dehydration/dehydrohalogenation of each of the following

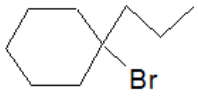
compounds.
(3 marks)

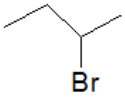
i. 

ii. $CH_3CH_2CHBrCH_3$

iii) Classify the following alkyl halides as primary secondary or tertiary
(3 marks)

i. 

ii. 

iii. 

ii) State with a reason which of the alkyl halides in (c) iii) above will be more reactive towards:

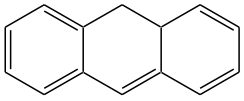
(I) S_N2?

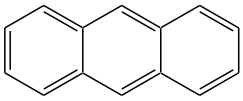
(II) S_N1

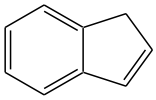
(2 marks each)

(d) i) Identify which compounds are non-aromatic.
(2 marks)

(I) 

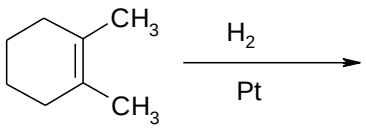
(II) 

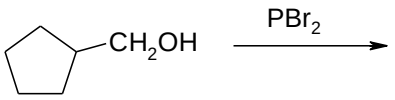
(III) 

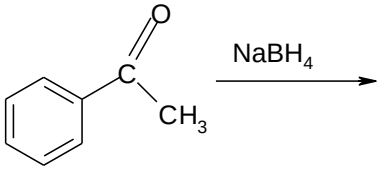
(IV) 

ii) Draw the structure of the major organic product in the following reactions:
(4 marks)

i. 

ii. 

iii. 

iv. 

Question TWO

(a) i) State the following

i. FOUR unique features of carbon.
(4 marks)
ii. FOUR physical properties of alcohols
(4 marks)

ii) Define chain isomerism and give ONE example.
(4 marks)

(b) Give the product formed when HBr reacts with 2-methyl-2-butene in presence of peroxide and in the
absence of peroxide.
(4 marks)

(c) Explain with the aid of an equation how you would prepare 1-butanol starting from methanal and Grignard
reagent.
(4 marks)

Question THREE

(a) State THREE uses of alkynes.

(3 marks)

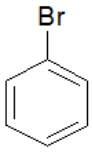
(b) i) State with a reason which compound between butanoic and 2-butanone will be expected to have a higher

boiling point.

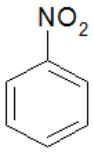
(4 marks)

ii) Indicate whether the group on the benzene ring is a meta or ortho/para director.

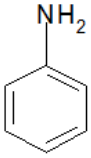
(3 marks)



i

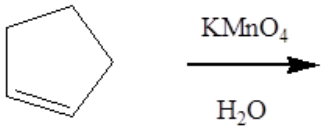


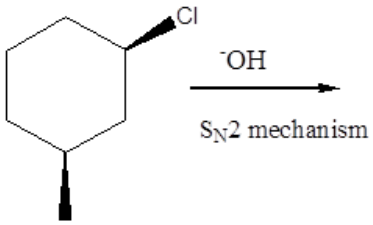
ii.

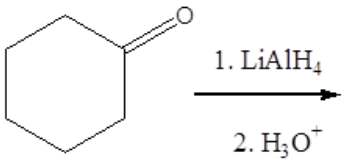


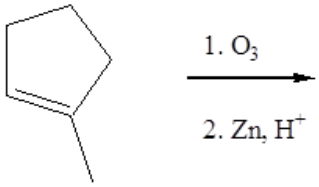
iii.

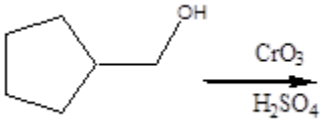
(c) Draw the structure of the product for the following transformations
(10 marks)

i. 

ii. 

iii. 

iv. 

v. 

Question FOUR

(a) Account for the following observations:

i) Branching decreases the boling point in alkanes.
(3marks)

ii) Aldehydes are more reactive toards nucleophilic addition than ketones towards nucleophilic addition.
(3 marks)

(b) i) Arrange the following molecules in order of increasing boiling points. Give reason for this trend.

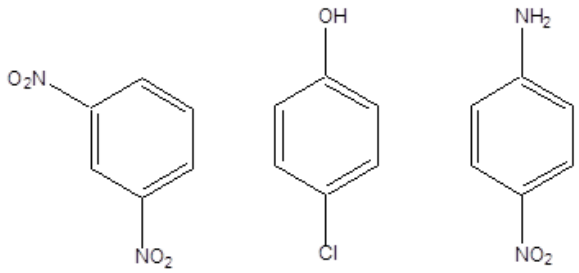
$CHCl_3$, CH_2Cl_2, CCl_4, CH_3Cl

(4 marks)

ii) Write a chemical equation to show the preparation of alkyl halide from Grignard reagent and an halogen.

(4 marks)

(c) Indicate with an arrow where an electrophile would add on the following molecules.
(6 marks)

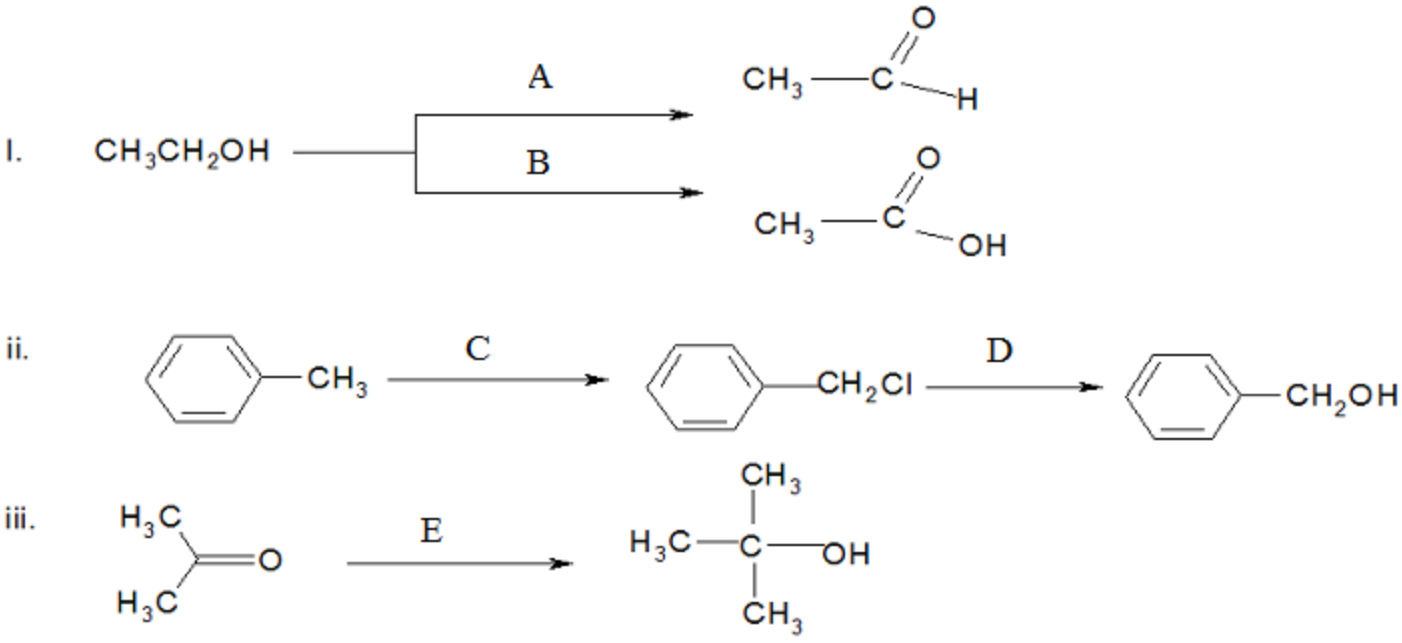


Question FIVE

(a) Using the concept of hybridization explain how sp^2 hybrid atomic orbitals are formed in carbon. (4 marks)

(b) Identify the reagents and conditions (A to E) necessary to accomplish the following transformations.

(10 marks)



(c) Draw the structure of the organic product in each of the following reactions, (6 marks)