# KIBABII UNIVERSITY

## UNIVERSITY EXAMINATIONS
## 2017/2018 ACADEMIC YEAR

### SECOND YEAR SECOND SEMESTER
### MAIN EXAMINATIONS

**FOR THE DEGREE OF BSC (CHEMISTRY)**

**COURSE CODE:** SCH 231

**COURSE TITLE:** ORGANIC CHEMISTRY II

**DURATION:** 2 HOURS

**DATE:** 8/8/2018 **TIME:** 2-4PM

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**INSTRUCTIONS TO CANDIDATES**

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

This paper consists of **6** printed pages. Please Turn Over

**Question One**

a) Give reasons for the following observations in organic reactions;

i) Steric factors contribute to the greater reactivity of both aldehyde and ketones.**(2 marks)**

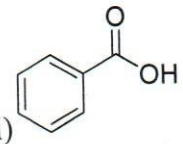
ii) Aldehydes more reactive than a ketones **(2 marks)**

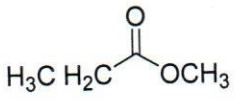
iii) The melting points and boiling points of carboxylic acids are higher than those of hydrocarbons of comparable size and shape.

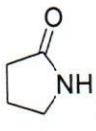
**(2 marks)**

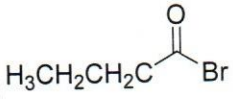
iv) Amides do not react with halide ions or carboxylate ions **(1 mark)**

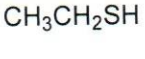
b) Give the IUPAC names of the following compounds **(5 marks)**

i) 

ii) 

iii) 

iv) 

v) 

c) Draw the structures of the following compounds: **(5 marks)**

i) Methylbenzoate

ii) Ethylthioethane

iii) Propenenitrile

iv) Ethanamide

v) Ethanoic anhydride

d) Define the following terms:

i) Chromophore **(1 mark)**

ii) Spectroscopy **(1 mark)**

iii) Wavenumber **(1 mark)**

iv) Frequency **(1 mark)**

v) Photon **(1 mark)**

e) Which will occur at a larger wavenumber?

i) C≡C Streach or C=C Streach **(1 mark)**

ii) C—O or C=O **(1 mark)**

iii) C—N Streach or C=N Streach **(1 mark)**

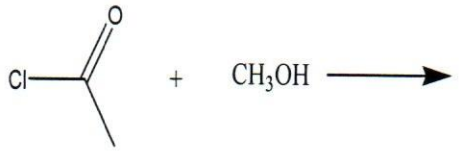
iv) Give reasons for i-iii above **(2 marks)**

f) Carboxylic acids have relatively high boiling points. Uses a diagram to show this phenomenon **(3 marks)**

**Question Two**

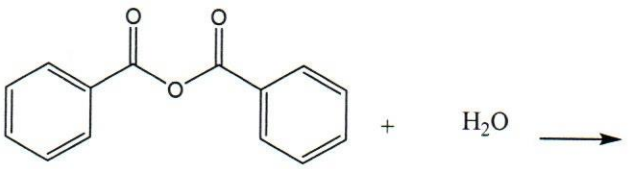
a) Give the products and reagents of the following reactions;

i)



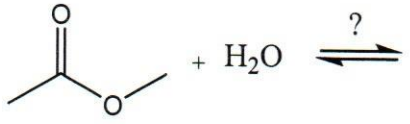
**(1 mark)**

ii)



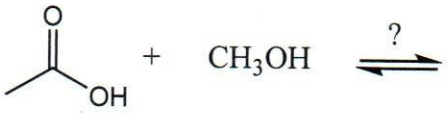
**(1 mark)**

iii)

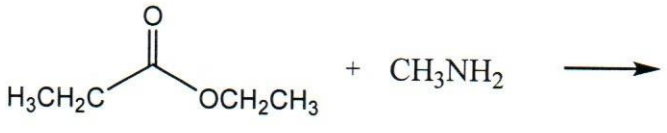


**(2 marks)**

iv)



v) **(2 marks)**



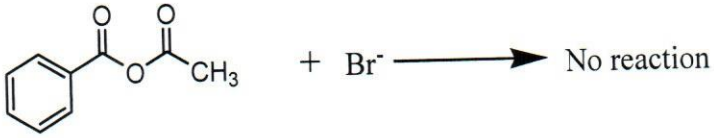
**(1 mark)**

b) What name is given to the reaction in the equation (v) above? **(1 mark)**

c) Give the mechanism of theacid catalyzed reaction in equation (iii) above **(7 marks)**

d) Give the mechanism of the reaction in equation below. **(4 marks)**

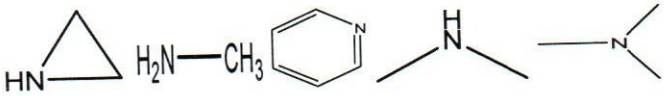

e) Explain why the reaction in equation below cannot occur.




**(1mark)**

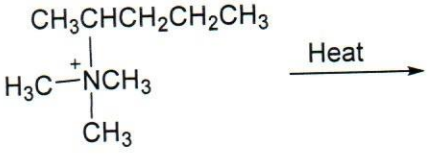
**Question Three**

a) Classify the following compounds as either primary, secondary or tertiary amines. **(5 marks)**



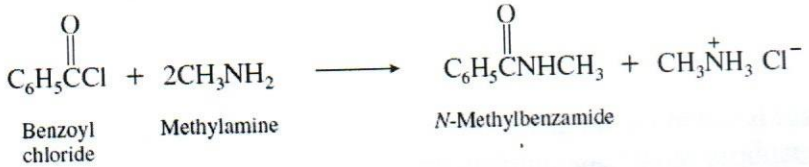

A BCD E

b) Holfmann elimination involves a reaction of quaternary ammonium ion with a hydroxide ion. Complete the equation on a reaction below indicating the major and the minor products **(4 marks)**




c) Use examples in each case to show the movement of delocalized electrons movement in the structures of carboxylic acid, esters and amides **(6 marks)**

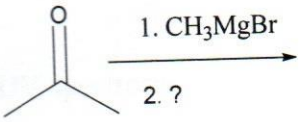
d) Establish the mechanism of the reaction below **(5 marks)**




**Question Four**

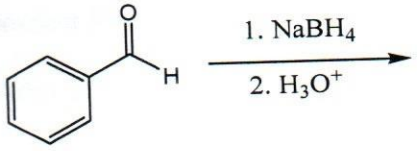
a) Give the products and/or reactants of the following nucleophilic addition reactions;

i.

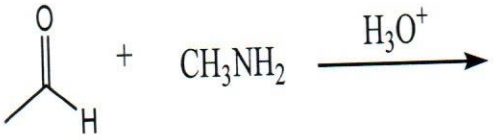



**(2 marks)**

ii.

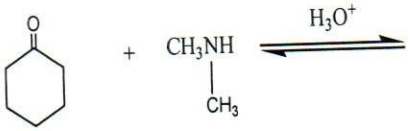



**(2 marks)**iii)



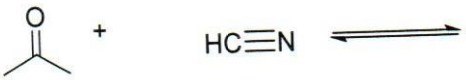

**(2 marks)**

(iv)




**(2 marks)**

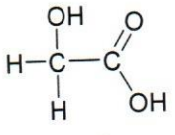
v)




**(2 marks)**

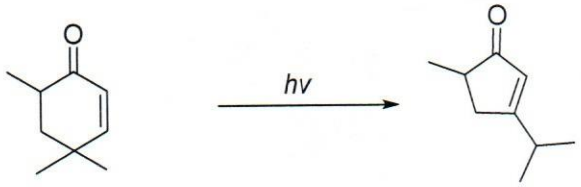
c) State two methods in which amines can be prepared. **(2 marks)**

d) i) The structure of compound X is shown below, show how Infra-red spectroscopy is used to confirm this structure. **(2 marks)**




X

ii) UV-Vis and IR were used to follow the following photochemical reaction. By giving a brief explanation show how the reactants can be distinguished from products by:

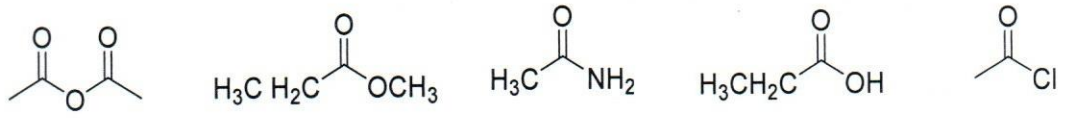



A) UV spectroscopy **(3 marks)**

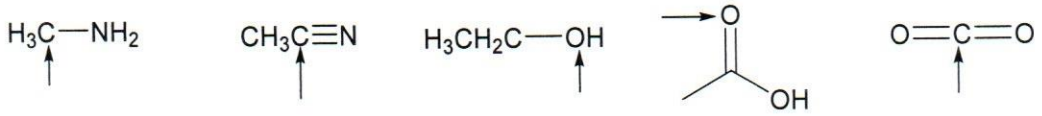
B) IR spectroscopy **(3 marks)**

**Question Five**

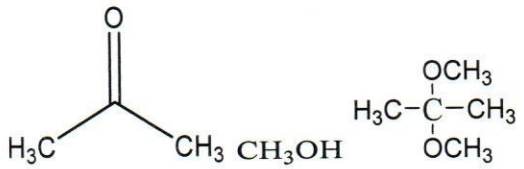
a) Arrange the following in order of reactivity from the most reactive. **(2 marks)**




b) State the hybridization of the indicated atom. **(5 marks)**




c) Using A and B as starting materials, illustrate by use of mechanism how C can be prepared using acid as a catalyst. **(7 marks)**







A B C

d) The acid increases the rate of this reaction in two ways. Name them **(2 marks)**

e) Draw the enol tautomer of the compound A using a base as catalyst. **(4 marks)**