



# UNIVERSITY OF EMBU

2016/2017 ACADEMIC YEAR

SECOND SEMESTER EXAMINATION

FIRST YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE

SCH 102: ORGANIC CHEMISTRY I

**DATE: APRIL 7, 2017**

**TIME: 2:00-4:00PM**

**INSTRUCTIONS:**

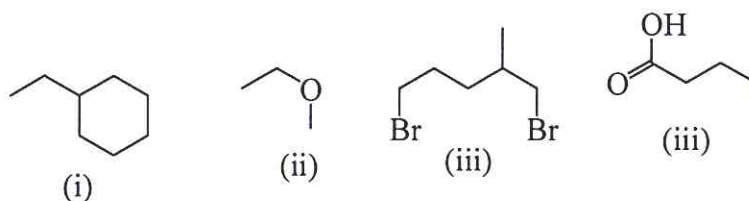
**Answer Question ONE and ANY Other TWO Questions**

**QUESTION ONE (30 MARKS)**

- a) Explain why alkanes are considered the least reactive hydrocarbons (3 marks)
- b) Geometric isomers (cis/trans) are possible in alkenes but not alkanes. Explain (3 marks)
- c) Arrange the following compounds in order of the increasing boiling points (4 marks)
- (i)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{Br}$  (ii)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$  (iii)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
- (iv) 
$$\begin{array}{c} \text{CH}_3 \\ | \\ \text{H}_3\text{C}-\text{C}-\text{H} \\ | \\ \text{CH}_3 \end{array}$$
- d) Explain the effect of peroxides on free radical halogenations of alkanes (4 marks)
- e) Illustrate the keto-enol equilibrium during hydration of alkynes (4 marks)

f) With a specific example, illustrate Williamson synthesis of ethers (4 marks)

g) Give systematic IUPAC name of the following compounds (4 marks)



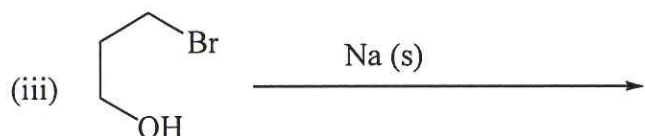
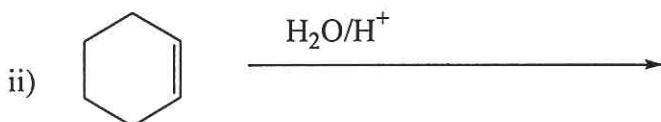
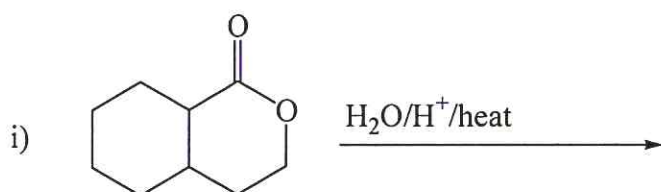
h) Using a specific example, explain the concept of hydrogen bonding in alcohols (4 marks)

**QUESTION TWO (20 MARKS)**

a) Explain the three steps of a free radical halogenations reaction in alkanes (6 marks)

b) Using the reaction of methane with molecular chlorine in presence of UV light as an example, explain the effect of peroxides on the rate of free radical halogenations reactions (4 marks)

c) Predict major products in the following reactions (6 marks)

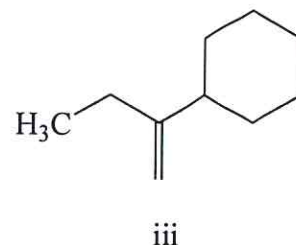
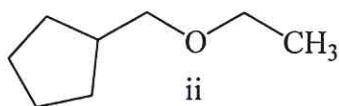
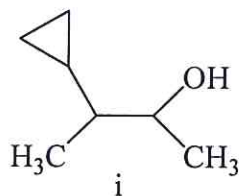


d) Explain two applications of esters in food industry (4 marks)

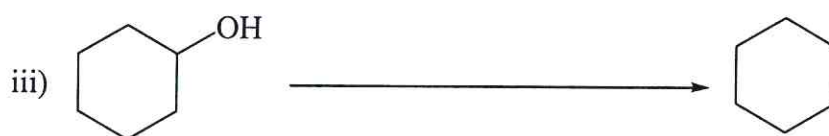
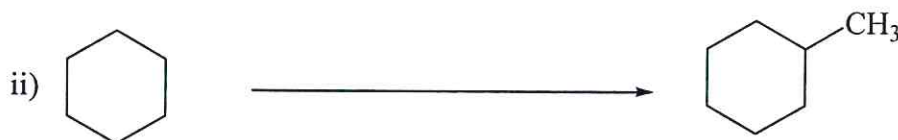
**QUESTION THREE (20 MARKS)**

a) Explain the high boiling point in alcohols (4 marks)

b) Provide systematic IUPAC names of the following compounds (6 marks)



c) Show the synthetic routes of achieving the following conversions in the lab (6 marks)



d) Describe an analytical laboratory test for esters (4 marks)

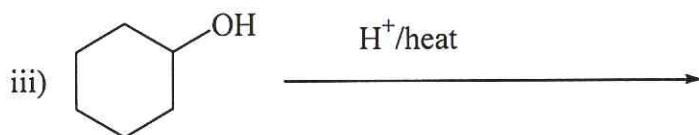
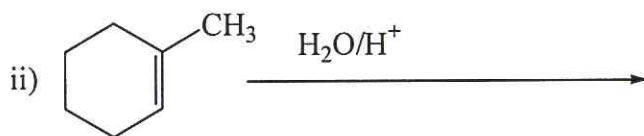
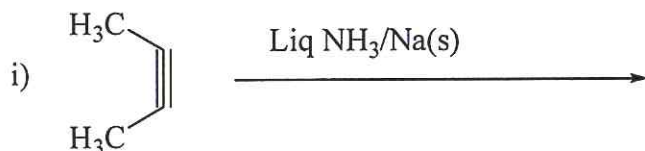
**QUESTION FOUR (20 MARKS)**

a) Alkenes are considered basic in nature. Explain (3 marks)

b) Give the structures of the following organic compounds (8 marks)

- i) 1,4-diisobutylcycloheptane
- ii)  $\alpha,\beta$ -dihydroxyl pentanoic acid
- iii) Lithium pentoxide
- iv) Cyclopropylcyclohexane

c) Predict major products in the following reactions (6 marks)



d) List three industrial uses of alcohols (3 marks)

### QUESTION FIVE (20 MARKS)

a) Explain an analytical test for alkynes in the lab (5 marks)

b) During free radical undesirable side products are common. Explain. (5 marks)

c) Additions of electrophilic reagents to alkenes in presence of free radicals reverses Markovnikov's rule. Explain. (5 marks)

d) The dipole moment in alkanes is lower than alkylhalides. Explain (5 marks)

--END--