



# **KARATINA UNIVERSITY**

## **UNIVERSITY EXAMINATIONS 2018/2019 ACADEMIC YEAR**

### **FIRST YEAR FIRST SEMESTER EXAMINATION**

#### **FOR THE DEGREE OF**

#### **BACHELOR OF SCIENCE (SC, SCE, EDS)**

**COURSE CODE: CHE 111**

**COURSE TITLE: ORGANIC CHEMISTRY I**

**DATE: /12/2018**

**TIME: 3 HOURS**

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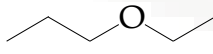
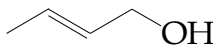
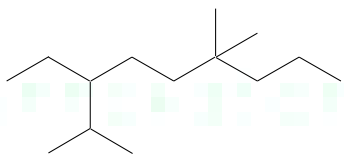
#### **INSTRUCTION TO CANDIDATES**

- SEE INSIDE

## INSTRUCTIONS

- ✓ Answer **ALL** questions
- ✓ Attached is t test table & Periodic table

## QUESTION ONE

- a) State,
- i. Zaitsev's rule.
  - ii. Markovnikov's
- (4 marks)**
- b) Define the following terms as used organic chemistry
- i. Electrophile
  - ii. Carbocation
- (2 marks)**
- c) Outline two uniqueness of carbon.
- (2 marks)**
- d) Draw the Lewis structure of the compounds below and calculate the formal charge for the element in bracket in "i" (Note: show how you arrived at your answer)
- i.  $\text{NH}_4^+(\text{N})$
  - ii.  $\text{N}_2$
  - iii.  $\text{BF}_3$
- (3 marks)**
- e) Briefly explain heterolytic bond cleavage.
- (2 marks)**
- f) Convert the structures below to condensed form.
- i. 
  - ii. 
  - iii. 
- (3 marks)**
- g) Draw four possible structural isomers for  $\text{C}_6\text{H}_{14}$ .
- (2 marks)**

## QUESTION TWO

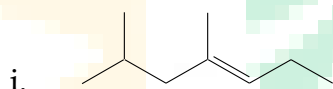
- a) Compound X, isolated from lanolin (sheep's wool fat), has the pungent aroma of dirty sweat socks. A careful analysis showed that compound X contains 62.0% carbon and 10.4% hydrogen. No nitrogen or halogen was found.
- Compute an empirical formula for compound X.
  - A molecular weight determination showed that compound X has a molecular weight of approximately 117. Find the molecular formula of compound X.

(4 marks)

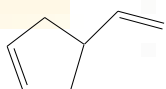
- b) Write brief notes on hydrogen bonding.

(2 marks)

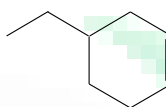
- c) Suggest the IUPAC names for the compounds below.



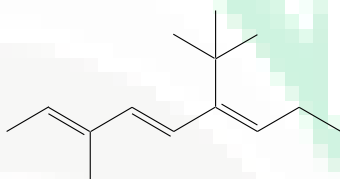
i.



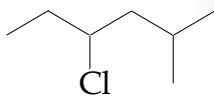
ii.



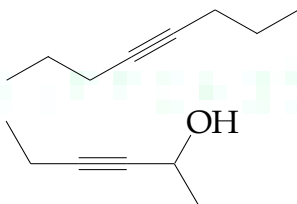
iii.



iv.



v.



vi.

vii.

(7 marks)

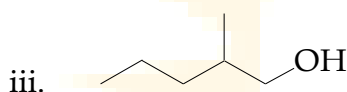
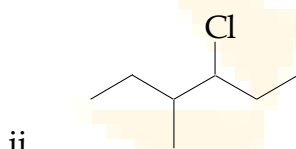
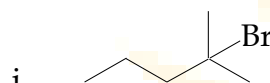
- d) Draw the structures for the following compounds;

- i. 2-methylpropanol
- ii. 1-cylobutyl-2-propanol
- iii. 2-butenol
- iv. 3-Ethyl-5-isobutylheptane
- v. Methoxymethylethane

(5marks)

### QUESTION THREE

a) Classify alkyl halides and alcohols below as primary or secondary or tertiary

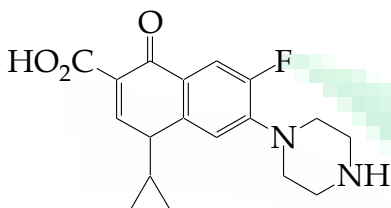


(3 marks)

b) Outline two applications **each** of alkanes and alcohols.

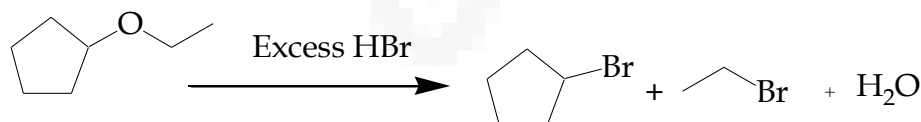
(2 marks)

c) Cipro is an antibiotic; identify all families of organic compounds present other than alkanes



(3 marks)

d) Suggest a reaction mechanism for the reactions below



ii.

Sulfuric acid-catalyzed dehydration of 2,2-dimethylethanol. (5 marks)

e) Suggest which of the pair of compounds below has a higher boiling point. Justify your Choice.

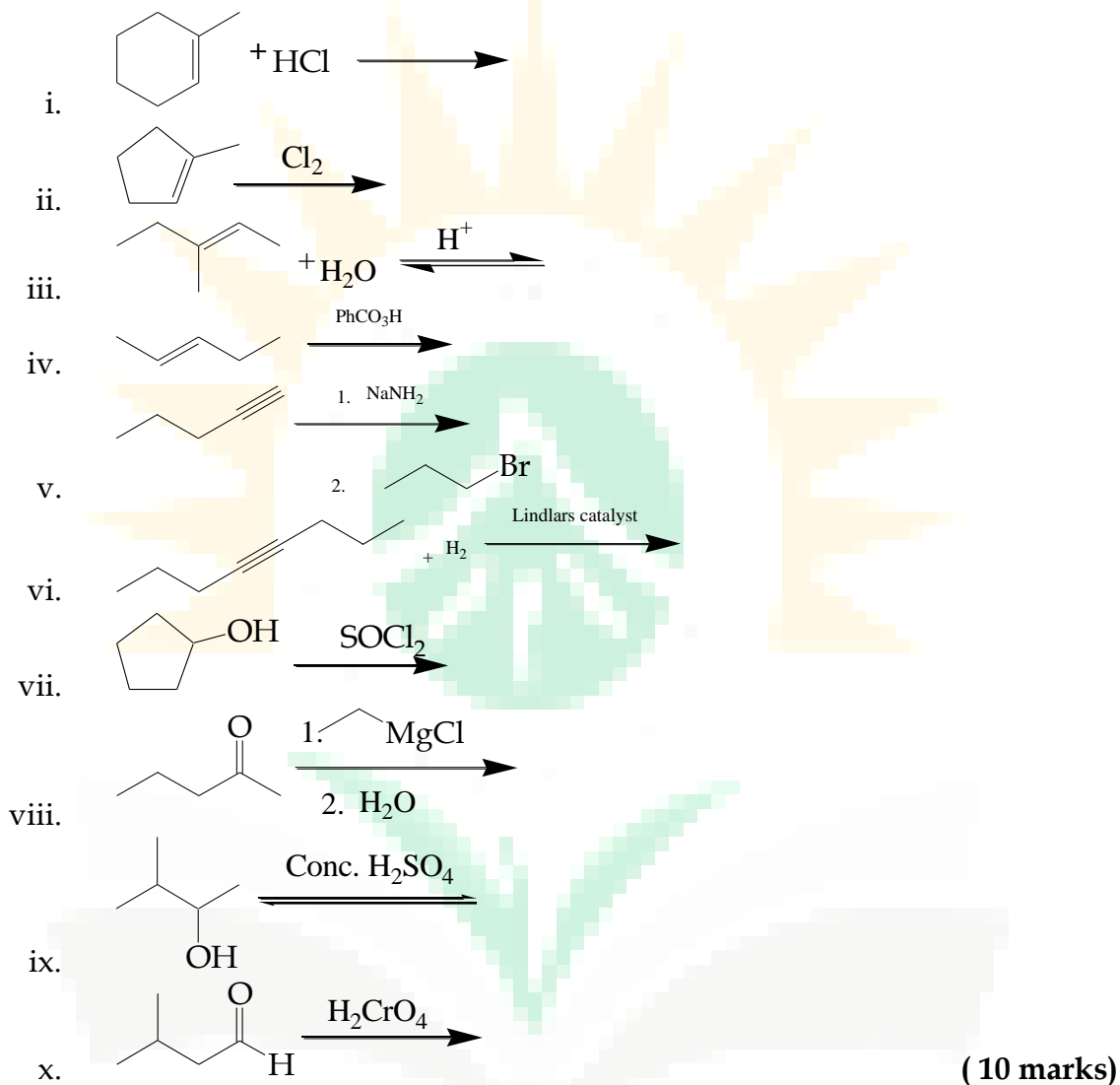
- i. Butane or Octane
- ii. 2-methylbutane or pentane

- iii. Ethoxypentane or Octanol
- iv. Trans-2-butene or cis-2-butene

(4 marks)

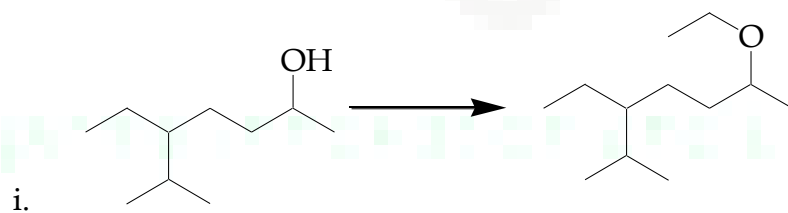
### QUESTION FOUR

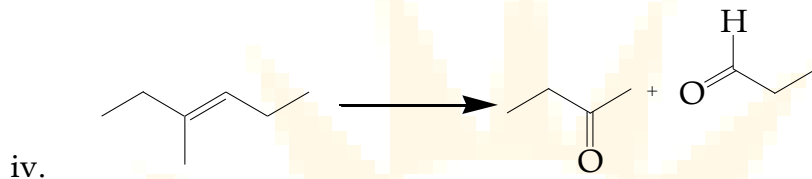
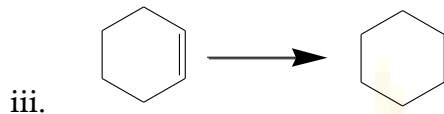
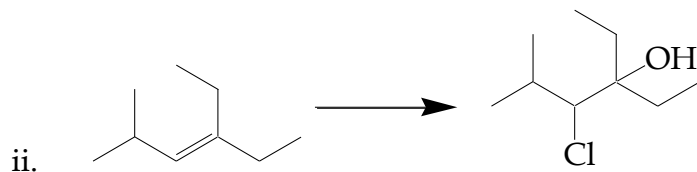
a) Provide the structure of major compound(s) formed in the following reactions.



(10 marks)

b) What reagents are required to achieve the reactions below;





(5 Marks)

c) Briefly explain the Lucas test.

(2 marks)