



Technical University of Mombasa

Faculty of Applied and Health Sciences

DEPARTMENT OF PURE AND APPLIED SCIENCES
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF
BUILDING & CIVIL, ELECTRICAL & ELECTRONICS AND
MECHANICAL & AUTOMOTIVE ENGINEERINGS
BSC/BENG

SCH 2108 : CHEMISTRY II

SUPPLEMENTARY/SPECIAL EXAMINATION

JULY 2013 SERIES

2 HOURS

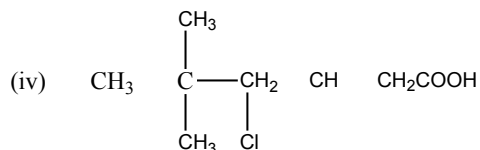
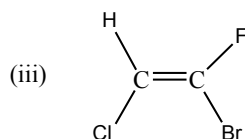
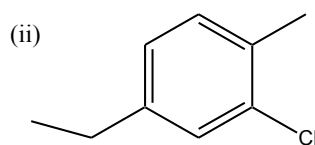
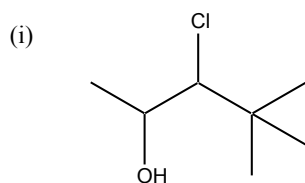
Instructions to candidates:

This paper consist of **FIVE** questions

Answer question **ONE** (compulsory) and any other **TWO** questions

Question ONE

- Provide IUPAC names of the following compounds, indicating the stereochemistry where appropriate:



(4marks)

b) Draw the structure of each of the following compounds:

- (i) (E) -2-Bromo-1-chloro-1-floroethene
- (ii) 4-Hydroxy-3-methyl pentanal
- (iii) 2-Ethyl-3-methyl but -1-ene
- (iv) 2-Bromo -4,6-dinitrophenol

(4marks)

c) State the three types of hybridization which can be adopted by a carbon atom. **(3marks)**

d) Draw the structural types of hybridization which can be adopted by a carbon atom.

(3marks)

e) Give THREE simple visual chemical test you would perform to differentiate between the pair of compounds below. Explain what happens in each case. **(3marks)**

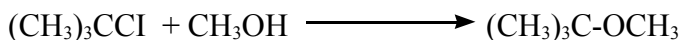
f) Compare the reactivity of aldehydes and ketones, stating with reasons, which one is more reactive towards nucleophilic addition. **(3marks)**

g) Name any two alkylhalides and give one use for each **(2marks)**

h) Write the formula and name of product formed from the reaction of ethanol with sodium metal. **(2marks)**

i) An organic compound contains 48.7% carbon, 8.2% hydrogen and the rest oxygen. Write its empirical formula. (C=12, O =16, H =1) **(3marks)**

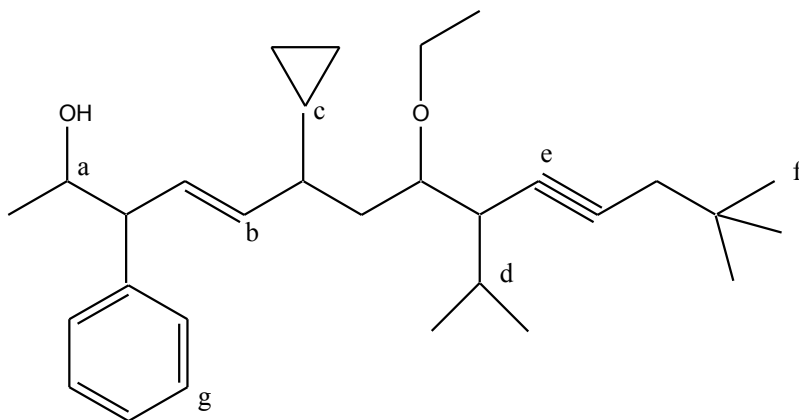
j) Write the reaction mechanism for the following transformation using curly arrows:



(3marks)

Question TWO

- a) Differentiate between σ -bonds, giving one example in each case. **(3marks)**
- b) You are provided with the structure of an organic compound 1 below.



Compound I

- (i) Indicate the type of hybridization present on the carbon labeled b and e. **(3marks)**
- (ii) Show diagrammatically how electrons are hybridized in carbon f. **(3marks)**
- (iii) Using letters, name tertiary and primary carbons. **(1mark)**
- (iv) Draw and label all functional groups in compound 1. **(2marks)**
- (v) State the type of bonds in f and g. **(2marks)**
- c) Complete combustion of 0.1g of a sample of a compound Z gives 0.228g of carbon dioxide (CO₂) and 0.0931g of water (H₂O). The molecular mass of the compound is 174. (C = 12.01, H = 1.008, O = 15.99)
- (i) Calculate the mass of oxygen in compound Z. **(5marks)**
- (ii) Determine the empirical formula of compound Z. **(2marks)**

Question THREE

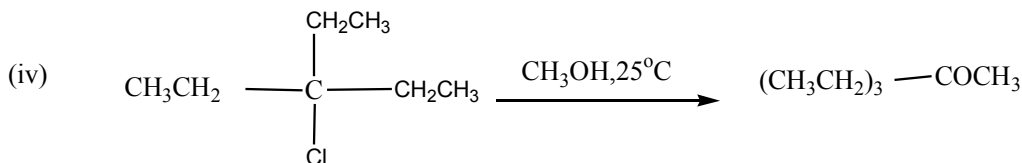
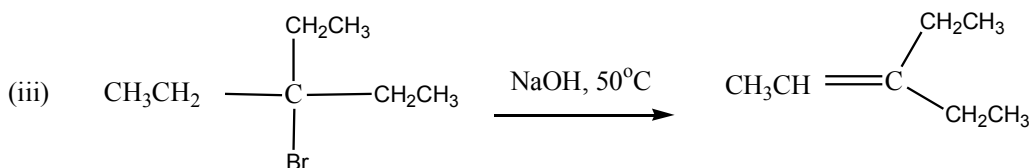
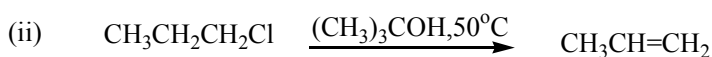
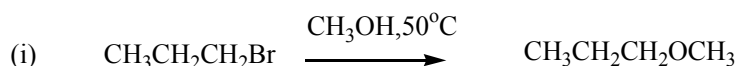
- a) Define the following terms as used in organic chemistry:
- (i) Pyrolysis
- (ii) Homologous series

(4marks)

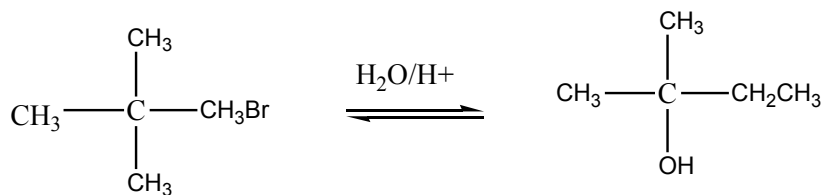
- b) State TWO important properties of C=C double bonds **(2marks)**
- c) Differentiate between nucleophile and electrophile. **(2marks)**
- d) Indicate by using δ^+ and δ^- the polarity of the C and Cl atoms in CH₃Cl. **(1mark)**
- e) List the following aldehydes in terms of increasing reactivity and give reasons for your choice.



- f) Study the following reactions and predict the predominant reaction mechanism whether it is S_N1, S_N2, E1 or E2.



- (g) Write the reaction mechanism for the transformation below using curly arrows:



(3marks)

- g) Give three simple visual chemical tests you would perform to distinguish between n-butane and 1, 3-butadiene. **(3marks)**

Question FOUR

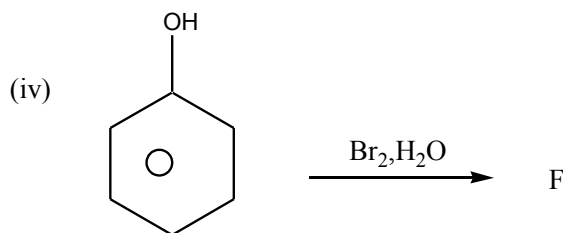
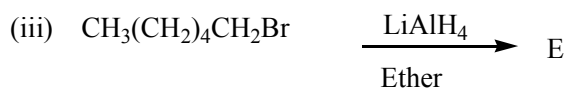
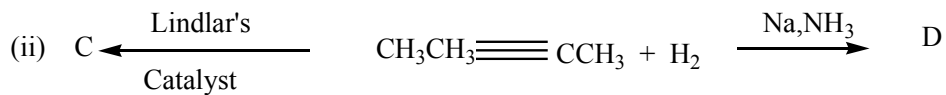
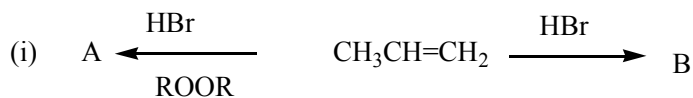
- a) Explain why tertiary carbonations are more compared to other classes of carbonations.

(3marks)

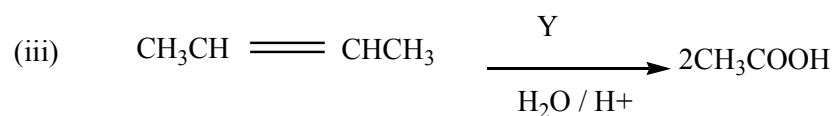
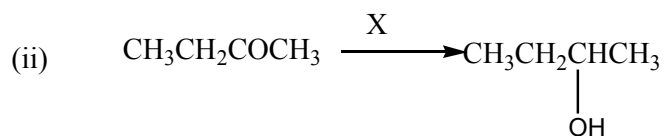
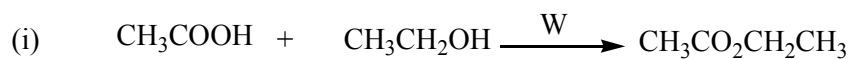
- b) Give THREE simple visual chemical tests, including observations that would differentiate the following compounds:



- c) Provide the structures A to F of the major organic compounds that are expected in the following reactions. Indicate stereochemistry where necessary:



- d) Give the reagents (w, x, y) required to carry out the following transformations:-



(3marks)

e) Explain the following observations:

(i) Ester is formed from the reaction of alcohols and carboxylic acid in acidic solution and not in basic solution. **(2marks)**

(ii) The b.p. of ethanedioic acid is higher compared to ethanoic acid. **(3marks)**

Question FIVE

a) Name the TWO monosaccharide write that make up each of the following disaccharides.

(i) Maltose **(2marks)**

(ii) Lactose **(2marks)**

(iii) Sucrose **(2marks)**

b) Draw the structures of glucose and fructose, showing the difference in their structures. **(4marks)**

c) Give THREE important properties of monosaccharide's **(3marks)**

d) State the FOUR main components that make up the general structure of amino acid.

(2marks)

e) Classify the following amino acids as aromatic, aliphatic acidic or basic:

(i) Alanine

(ii) Tryptophan

(2marks)

f) Give any THREE functions of protein.

(3marks)

