EMBU UNIVERSITY COLLEGE

(A CONSTITUENT COLLEGE OF THE UNIVERSITY OF NAIROBI)

FIRST SEMESTER EXAMINATION 2014/2015

FIRST YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE AND BACHELOR OF EDUCATION SCIENCE

ACH101/AWM103: CHEMISTRY FOR AGRICULTURAL SCIENCES

DATE: DECEMBER 10, 2014   TIME: 13:30 – 15:30

INSTRUCTIONS:

Answer Question ONE and ANY Other TWO Questions.

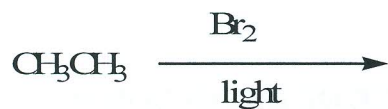**QUESTION ONE**

a) Define the following concepts.   (5 marks)

   i) Molecularity

   ii) Order of reaction

   iii) Colloidal state

b) Differentiate between the

   i)   Bronsted Lowry acid from the Lewis acid   (3 marks)

   ii)   Buffer solution from a weak acid   (2 marks)

c) Provide structural formulae of the following compounds

   i)   2 – Methyl – 1 – Propanol

   ii)   2 – Methoxy – 2-Methylpropane

iii)   3 – Methylpent- 1-ene

iv)   Ethyl-3,4- dinethylpentannoate

v)   1 – Brotmo – 2- chlorocyclohexane
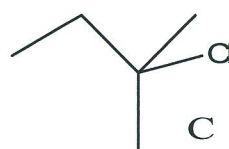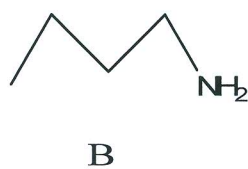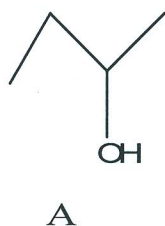
(5 marks)

d) Provide the products for the following reactions.   (5 marks)

CH_3CH_3 $\xrightarrow[\text{light}]{\text{Br}_2}$

  $\xrightarrow{\text{HCL}}$

  $\xrightarrow{\text{H}_2, \text{Pd}}$

$CH_3CH_2CH_2Br$ $\xrightarrow[\text{heat}]{\text{KOH}}$

d) Classify the following compounds as secondary, primary or tertiary and name   them

(5 marks)

A

B

C

e) Give rate laws for the following orders of reactions. Explain all symbols used. (5 marks)

    i) First order

ii) Second order

f) Give the electron configuration of the following elements

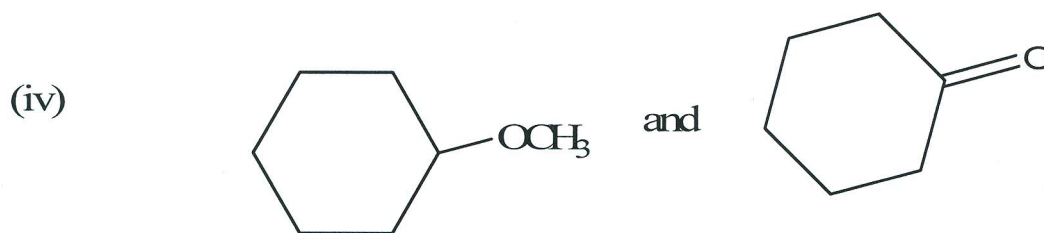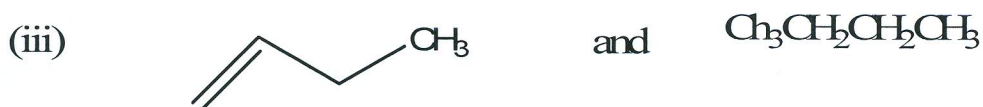   i) Na

    ii) Cl

    iii) Al

    iv) Ar

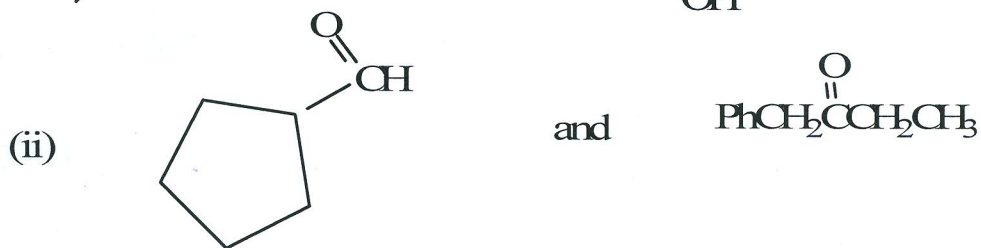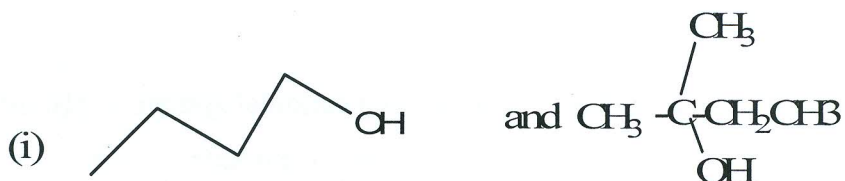   v) F   (5 marks)

QUESTION TWO

a) With examples give the industrial uses of carbohydrates, alcohols, alkanes, alkenes, esters and alkyl halides.   (10 marks)

b) How can you differentiate visually the following pairs of compounds.   (10 marks)

QUESTION THREE

a) Calculate the order of reaction from the following data.   (10 marks)

Expt No.	$[A]_{initial}$	$[B]_{initial}$	Initial rate
1	0.005	0.0025	4×10^{-5}
2	0.005	0.005	8×10^{-5}
3	0.010	0.0025	16×10^{-5}

b) Explain four uses of radiochemistry. Give suitable example.   (10 marks)
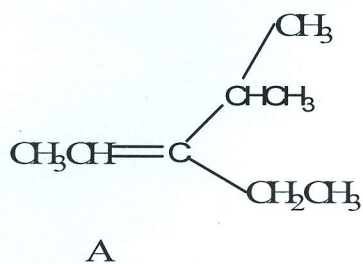

QUESTION FOUR

a) Describe four characteristics, with suitable examples, of a colloidal system.   (10 marks)

b) The value of rate constant for the decomposition of nitrogen pentoxide $(N_2O_5 \rightarrow N2O4 + \frac{1}{2}O_2)$ is 3.46×10^{-5} at 25^0C and 4.87×10^{-3} at 65^0C. Calculate

   i)   the energy of activation for the reaction
   ii)   the pre-exponential factor at $25\ ^0C$ (10 marks)

QUESTION FIVE

a) Arrange the following in the order of increasing bond strength.   (3 marks)

C—C   C═C   C≡C

b) The following compounds have different isomers. Draw all the isomers

CH₃CH=C with branches: CH(CH₃)CH₃ (top, with CH₃) and CH₂CH₃

A   Cl-CH=CH-Br C_3H_8O

               B   C

c) When alkyl halide T is treated with a strong base , three alkenes are formed.   (6 marks)

$CH_3CH_2CHBrCH_3$

T

i)   Provide their structures and their names.   (5 marks)

ii) Which alkene is most stable.   (2 marks)

d) Compound X , C4H₁₀O yielded compound Y ,C_4H_8O on oxidation . compound Y gives a positive Tollens test . what structures are compound X and Y.   (4 marks)

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