EMBU UNIVERSITY COLLEGE

(A CONSTITUENT COLLEGE OF THE UNIVERSITY OF NAIROBI)

FIRST SESTER EXAMINATIONS 2014/2015

SECOND YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE

SCH 202: CHEMISTRY OF ALKYL HALIDES, ALCOHOLS, ETHERS, ALKYNES AND AROMATIC COMPOUNDS

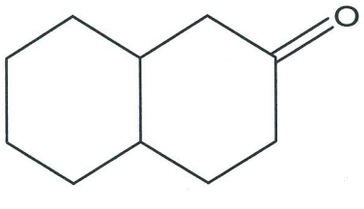
DATE: DECEMBER 18, 2014 **TIME: 16:00 – 18:00**

INSTRUCTIONS:

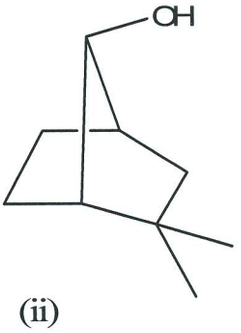
Answer Question ONE and ANY Other TWO Questions.

QUESTION ONE

a) Write systematic names for the following compounds. (10 marks)



(i)



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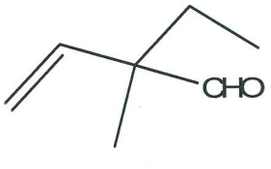

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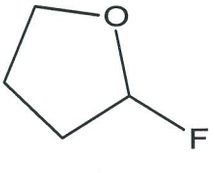

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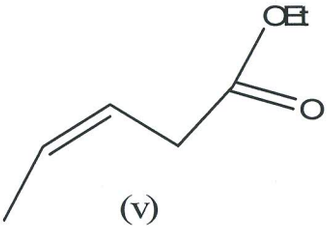


(v)

b) Draw structures of each of the following compounds (10 marks)

i) 4 – Chloro – 5 – hydroxy– 2 – phenyl – 3 – hexanone.

ii) (Z) – Ethyl – 2 – butenoate

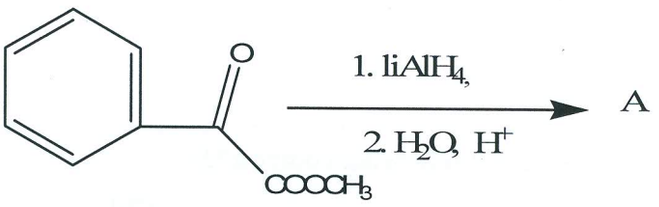
iii) 3 – Methylpentanoic propanoic anhydride.

iv) 2- Chloro – 5 – Methoxy – 4 – methyl cyclohexa – 2, 4 – dienone.

v) 7 – N, N- dimethylamino – 3 – oxabicyclo [4.3.0] nonane

c) Identify the major products in the following transformations (10 marks)

(i)



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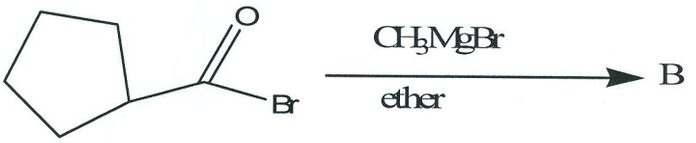

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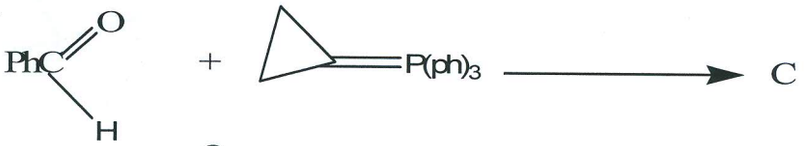

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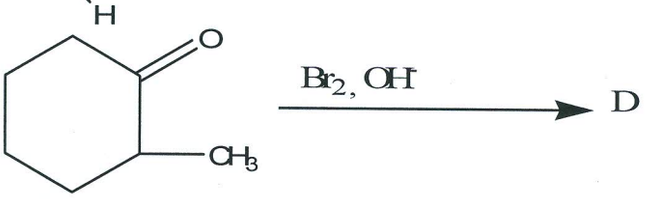

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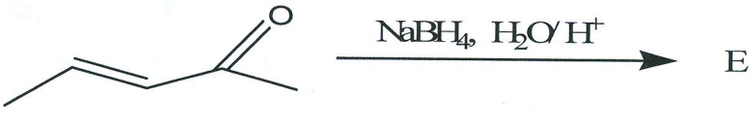
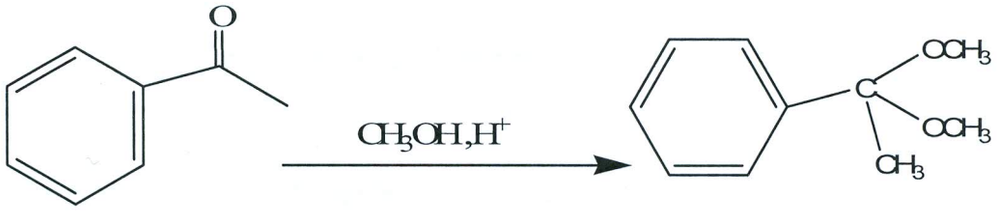


QUESTION TWO

a) Using curly arrows write possible mechanism for the reactions. (9 marks)

(i)



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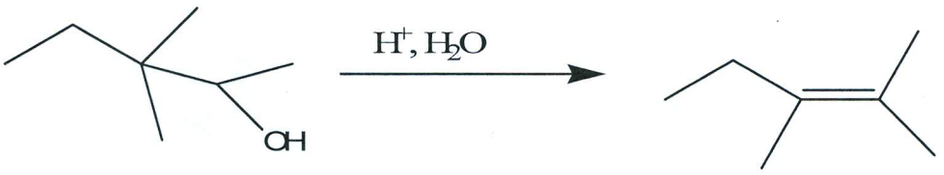


(ii)

b) Compound X, $C_4H_{10}O$, yielded on oxidation compound Y, C_4H_8O, compound Y reacts with 2, 4 – nitro phenyl hydrazine and also gives a positive iodoform test and negative tollens reagent test. Compound X on dehydration gives two isomers, Q (trans) and Z (cis) . Identify compounds X, Y, Q and Z and state your reasons. (6 Marks)

c) Two amides are formed from the reaction of Ethanoyl Chloride with a mixture of ethylamine and propylamine. Draw the structures of the amides and give their systematic names. (3 marks)

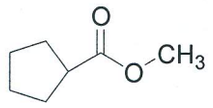
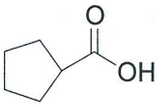
d) Why is only one amide obtained from the reaction of Ethanoyl Chloride with a mixture of ethylamine and triethylamine? (2 marks)

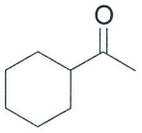
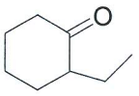
QUESTION THREE

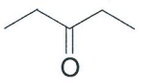
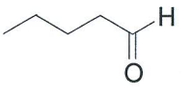
a) Arrange, with reasons, the following compounds in increasing order of acidity.

3-Chloropropanoic acid; 1-Propanol; 2,2-Dichloropropanoic acid; Propanoic acid; 2-Chloropropanoic acid. (4 marks)

b) Give a simple visual chemical test, including the observations, you would use to differentiate between the following pair of compounds. (8 marks)

(i)  and 

(ii)  and 

(iii)  and 

c) In aldol condensation of butanal and acetone in presence of a base, four different products are obtained.

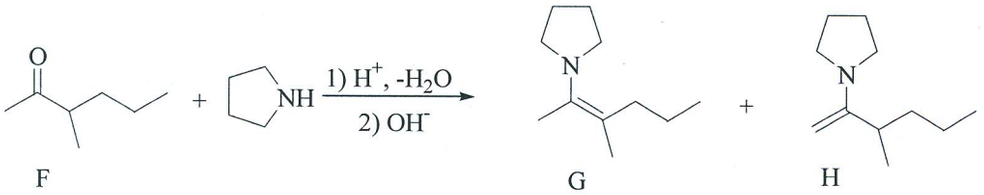
i) Draw structures these products and give systematic names.

ii) By use of reaction mechanism, show how the one of products in b (i) is formed.

(8 marks)

QUESTION FOUR

a) The reaction between a ketone with a secondary amine in acidic medium is outlined below.



F G H

i) In the above reaction, which is the major product? Give a reason for your answer.

ii) Write a possible reaction mechanism for the above transformation.

iii) Give the product of bromination of G followed by acid hydrolysis.

(8 marks)

b) You are provided with a mixture of three organic compounds, phenol, benzoic acid and 1-decanol in a diethyl ether solution. You are also provided with dilute solutions of Sodium hydroxide and Sodium bicarbonate By use of a flow chart, outline how you would separate the three compounds in their pure forms. (6 marks)

c) Explain the following using the appropriate equations and or structures

i) Esters have lower solubility in water when compared with alcohols of comparable molecular weight.

ii) In tautomerism the keto form is generally favoured over the enol form. However, the enol form of 2,4-pentanedione is favoured over the keto form.

iii) Ethanedioic acid has a higher boiling point than ethanoic acid. (6 marks)

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