TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT MEDICAL SCIENCES

UNIVERSITY EXAMINATION FOR:

BACHELOR OF MEDICAL LABORATORY SCIENCE, BACHELOR SCIENCE IN FOOD QUALITY, BACHELOR OF SCIENCE ENVIRONMENTAL HEALTH

BMLS 2016/S, BSFQ 2016S, BSEH 2016S

ACH 4118: ORGANIC CHEMISTRY

SEMESTER EXAMINATION

SERIES:DECEMBER 2016

TIME:2 HOURS

DATE: Pick DateSelect MonthPick Year

Instructions to Candidates

You should have the following for this examination

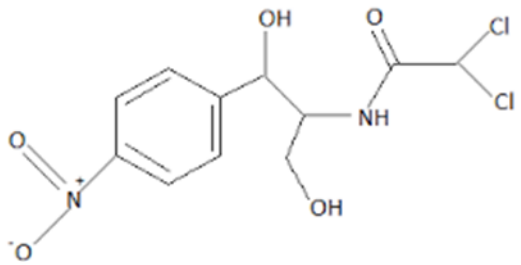
-Answer Booklet, examination pass and student ID

This paper consists of five questions. Answer question ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

(a) Consider the following molecule:



(i) Identify all the functional groups (4 marks)

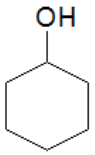
(ii) Determine the molecular formula of this molecule. (2 marks)

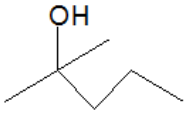
(b) Provide the correct structures for the following molecules. (4 marks)

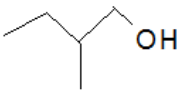
i. 2,3,4-trimethyl pentane iii. 1-bromo-2,2-dimethylpropane

ii. Propanone (iv) Oxalic acid

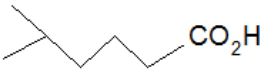
(c) i) Classify the following alcohols as primary secondary or tertiary (3 marks)

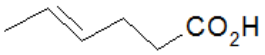
i. 

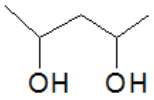
ii. 

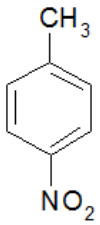
iii. 

ii) Assign IUPAC names to each of the following compounds. (4 marks)

i. 

ii. 

iii. 

iv. 

(d) i) Combustion of a 6.51 mg of a sample of a compound gave 20.47 mg of CO_2 and 8.36 mg of H_2O.
If the molecular weight of the compound is 84, determine:

I. % composition (3 marks)
II. Empirical formula (3 marks)
III. Molecular formula (3 marks)

(e) State any FOUR physical properties of carboxylic acids. (2 marks)

Question TWO

(a) i) Define the following terms, (2 marks each)

i. Hybrid orbitals

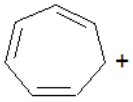
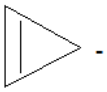
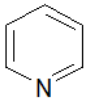
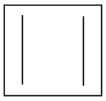
ii. Isomers

ii) Give the bond-line formulas for the following molecules: (2 marks each)

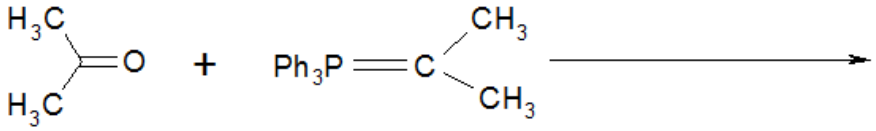
i. $CH_3CH(CH_3)CHCH_3$ (Cl, OH)

ii. $CH_3CH(CH_3)CH_2CH_3$

(b) Classify the following chemical species as aromatic or anti-aromatic. (4 marks)

i.  ii.  iii.  iv. 

(c) i) Give the chemical structure of the product in the reaction shown below. (2 marks)



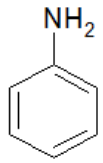
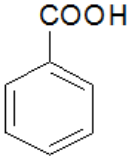
ii) State the condition which favor E2 reactions and S_N1 reactions respectively. (4 marks)

iii) Provide any TWO uses of alkanes. (2 marks)

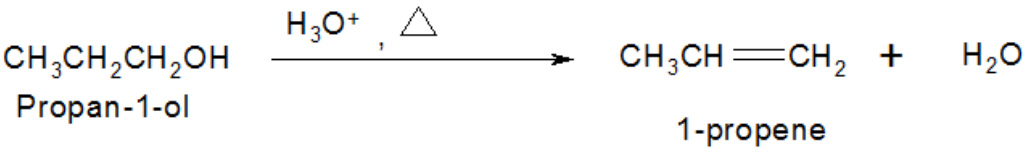
Question THREE

(a) i) Draw all structures that will satisfy the formula C_6H_6. (6 marks)

ii) Indicate whether the group on the benzene ring is a meta or ortho/para director. (2 marks)

i.  ii. 

(b) Write down the mechanism for the following reaction using curly arrows: (6 marks)



(c) Draw the structure of the product for the following reactions of 1-butyne: (2 marks each)

i. $CH_3CH_2C{\equiv}CH \xrightarrow[2.\ CH_3CH_2Br]{1.\ NaNH_2}$

ii. $CH_3CH_2C{\equiv}CH \xrightarrow[2.\ H_2O_2,\ ^-OH]{1.\ BH_3}$

iii. $CH_3CH_2C{\equiv}CH \xrightarrow[2.\ Hg^{2+},\ H_2O]{1.\ H_2SO_4}$

Question FOUR

(a) Describe a simple visual chemical test you would use to distinguish between the following pair of compounds.

$CH_3CH_2CH_3$ (with OH) and $CH_3CH_2CH_2OH$

(4 marks)

(b) i) Use sketch diagrams to show hybridization of carbon and orbital overlap in benzene ring. (4 marks)

ii) Write down the S_N1 mechanism for the hydrolysis of 2-chloro-2-methylpropane with water to form 2-methyl-2-propanol. (6 marks)

(c) Define the following terms and give one example in each case.

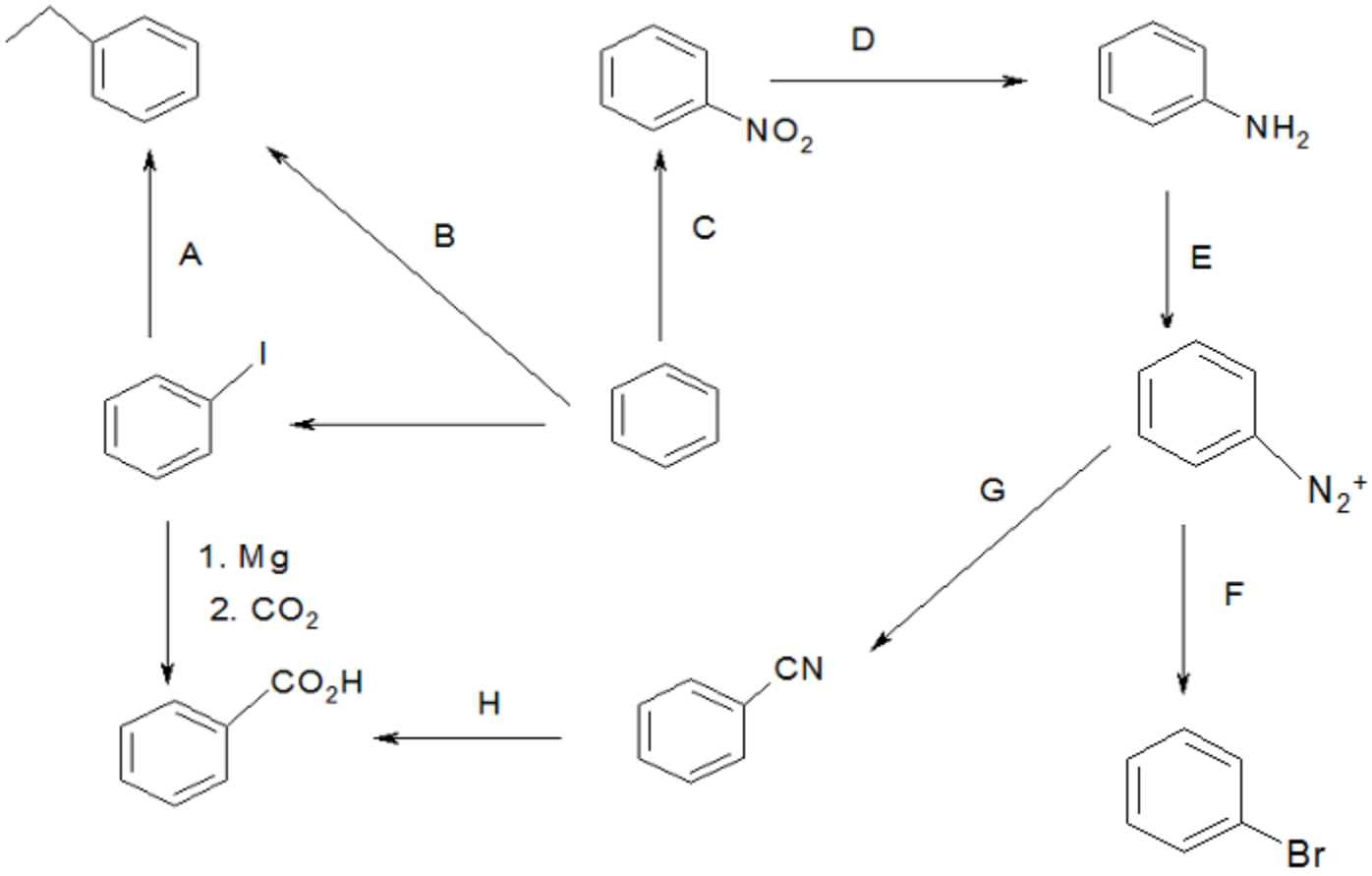
I. Free radical. (3 marks)

II. Nucleophile. (3 marks)

.

Question FIVE

(a) Identify the necessary reagents for each of the following steps. (2 marks each)



A_____ B_____

C_____ D_____

E_____ F_____

G_____ H_____

(b) Give a simple chemical test to distinguish between an alkene and an alkyl halide. (4 marks)