KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2015/2016 ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER
SUPPLEMENTARY/SPECIAL EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE

COURSE CODE: SCH 332

COURSE TITLE: ALICYCLIC AND HETEROCYCLIC CHEMISTRY

DURATION: 2 HOURS

DATE: 25TH SEPTEMBER2017 TIME: 3 – 5PM

INSTRUCTIONS TO CANDIDATES

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.
- Start every question on a new page and make sure question's number is written on each page.

This paper consists of **5** printed pages. Please Turn Over

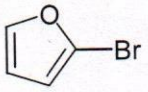
SECTION A (Answer Question one)

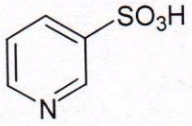
QUESTION ONE (30 Marks).

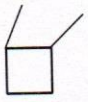
a) How will you distinguish between cyclopentane and 2-pentene. (2 marks)

b) Outline the synthesis of 1, 3-cyclohexadiene from cyclohexane. (3 marks)

c) Name the following compounds(3 Marks)

i) 

ii) 

iii) 

d) For each of the following molecules, giving reasons draw the conformation that fit the following descriptions.

i) Least stable conformation. (2 marks)

ii) Most stable conformation. (2 marks)

e) Draw structures of the following molecules (3 marks)

i) Cis-1, 2-dimethyleyclohexane.

ii) Trans-1, 3-dibromocyctohexane

iii) Cis-1, 4-Diethylcyclohexane

f) Explain why cyclopropane is more reactive than cyclohexane. (4 marks)

g) (i) Alkaloids have profound physiological effects on humans. Give any four of these effects. (4 marks)

(ii) Write chemical equations for the reactions between furfural

with (A) sodium hydroxide solution. (1 marks)

(B) potassium permanganate. (1 marks)

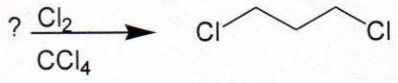
(C) catalytic Hydrogenation. (1 marks)

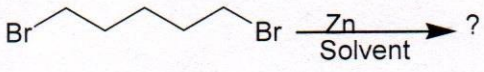
h) Explain whyPyridine is more basic than pyrrole. (4 Marks)

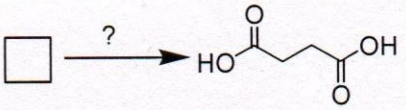
SECTION B(Answer any TWO questions from this section)

QUESTION TWO (20 Marks)

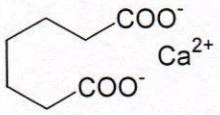
a) Insert the missing reagents, reaction or products as may be appropriate in the reactions below. (3 Marks)

i) 

ii) 

(iii) 

(b) Using suitable reagents outline a possible synthetic route for the conversion of reagent I to II, shown below: (3 marks)



Reagent I

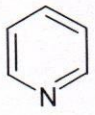
Reagent II

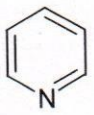
Explain why pyridine undergoes electrophili c substitution atposition – 3 on the ring, and not position 2. (8 marks)

b) i) Explain why pyridine does not undergo the Fredel-Crafts reactions. (2 marks)

ii) Write the products for the reactions below, indicating theirnames.

(6 Marks)

I.  $\xrightarrow[100^{o}C]{KNH_2}$?

II.  $\xrightarrow{H_2/Ni}$?

III.  $\xrightarrow[BF_3]{CH_3COBr}$?

QUESTION THREE (20 Marks)

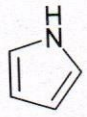
a) Calculate the angle strain in each of the following cyclic hydrocarbons- according to Baeyer's theory.

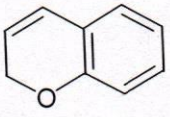
(i)  (2 marks)

(ii)  (2 marks)

iii) The angle strain predicted by Baeyer's theory deviates greatly from the actual angle strain of the cyclic hydrocarble in 3 (a)(ii) above. Explain. (2 marks)

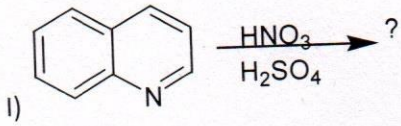
b) Use Huckel's rule to classify whether the following compounds are aromatic or non-aromatic.

i.  (1 mark)

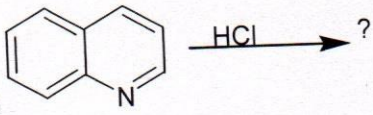
ii.  (1 mark)

c) I) Quinoline is obtained by the Skraup Synthesis.
Briefly describe this process, using equations where necessary. (3 marks)

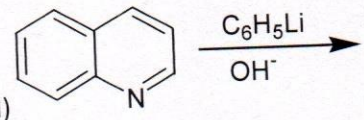
ii) Indicate the product(s) for the reactions of quinoline in the chemical equations below;

I) 

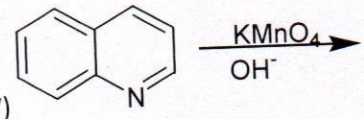
(1 mark)

II) 

(1 mark)

III) 

(1 mark)

V) 

(1 mark)

iii)State FOUR uses of quinoline. (4 marks)

QUESTION FOUR (20 Marks)

a) State any FIVE classes of alkaloids. (5 marks)

b) Conine is an alkaloid, known for its paralyzing and toxic effects.

I. Draw the structure of coniine. (1 mark)

II. How will you synthesize coniine from α -picoline. (6 marks)

c) i. Draw the structure of the following alkaloids

I) Quinine

II) Atropine

III) State applications of the alkaloids in (c(I) above. (4 marks)

d) Draw the structural formulae of

I) Piperidine

II) Imidazole