

**W1-2-60-1-6**

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2015/2016**

**SCH 2411: ADVANCED HETEROCYLIC CHEM**

**DATE:DECEMBER 2015 TIME: 2 HOURS**

**INSRUCTIONS:** Answer question one and any other two questions

QUESTION ONE

(a) Give the IUPAC names of the following compounds;

 (9 marks)

b. Give suitable explanations of the following observations.

i. Quinoline on treatment with phenylithium forms 2-quinoline where as isoquinoline on similar treatment gives 1-phenylisoquinoline. (4 marks)

ii. 1-methylisoquinoline condenses readily with benzaldehyde whereas 3-methylisoquinoline fails to do so. (3 marks)

iii. In the electrophilic substitution of isoquinoline the electrophile attacks at 5- position.

 (3 marks)

iv. In benzofuran the electrophilic substitution takes place at 2- position whereas in indole and benzothiophen it takes place at 3-position. (4 marks)

v. Quinoline on treatment whith iodomethane forms 1-methylquinolinum halide.

 (3 mark)

QUESTION TWO

a.

i. Show the resonating structures of indole. (2.5 marks)

ii. The reaction scheme below represents the Reissert indole synthesis. Study the scheme and then answer the questions that follow.

i. Identify the products I, II, III and IV. (6 marks)

ii. What is the purpose of NaOEt, HCl and Zn/CH3COO2H in their respective steps of convertion? (1.5 marks)

b. State the products of the following reactions.

 [10 marks)

QUESTION THREE

i. Show that the aziridine molecule shown below can exist as optical isomers. (3 marks)

ii. Show the mechanism for the conversion below. (5 marks)

b. State the products in the following reactions. (7 marks)

c. Draw the structures of the compounds named below

i. 2-phenylquinoline

ii. 1-methylisoquinoline

iii. 2-methyloxitane

iv. 3-Aminothietane

v. 1-methylazetidine. (5 marks)

QUESTION FOUR

a. The reaction scheme shown below is Pictet-Spengler synthesis of isoquinoline. Study the scheme and then answer the questions that follow.

i. Identify the products I, II, III and IV. (6 marks)

ii. Show the mechanism for formation of product II. (3 marks)

iii. State an alternative reagent for Pd-C in the conversion of products III to IV.

 (0.5 mark)

b. State the principle resonance forms contributing to hybrid forms of isoquinoline.

 (2.5 marks)

c. State the products in the following reactions.