



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF BIOLOGICAL & PHYSICAL SCIENCES
UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF EDUCATION
SCIENCE
4th YEAR 1st SEMESTER 2018/2019 ACADEMIC YEAR
REGULAR

COURSE CODE: SCH 401

COURSE TITLE: HETEROCYCLIC CHEMISTRY

EXAM VENUE:

STREAM: (BEd. Science)

DATE:

EXAM SESSION:

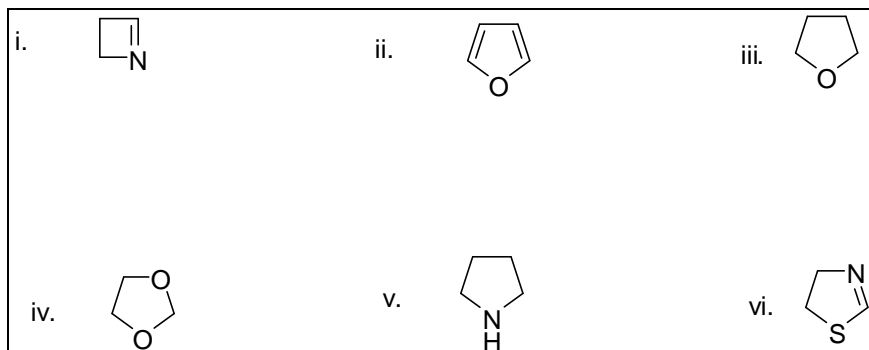
TIME: 2.00 HOURS

Instructions:

- 1. Answer question 1 (Compulsory) in Section A and ANY other 2 questions in Section B.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

Section A - Compulsory
Question one [30 marks]

- A. carbohydrate chemistry depends on heterocyclic frameworks: state two groups of carbohydrates and name and draw the structures of a six membered carbohydrate and a five membered one. (8 marks)
- B. Give the name of an amino acid precursor of the quinoline alkaloids. (2 marks)
- C. There is an important family of heterocycles based on the porphin ring system. Name two that are found plants and another in animals and state their important roles respectively. (6 marks)
- D. Following the Hantzsch – Widman Nomenclature, give names of the structures drawn below. (6 marks)

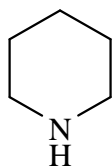


- E. Name four sulfonamides that are currently in use as medicines. (4 marks)
- F. Draw the structures of for heterocyclic Vitamins (4 marks)

Section B

Question 2 (Optional - 20 marks)

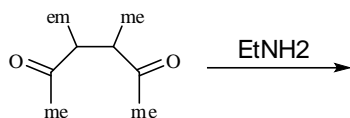
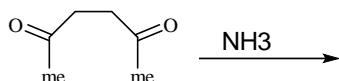
- A. Using a general scheme exemplify how the aza-wittig reaction can be used to form a heterocyclic compound. (4 marks)
- B. Describe and Illustrate the Hofmann exhaustive methylation process for the identification of cyclic amines using piperidine as an example. (10 marks)



- C. Name three (3) pharmaceuticals that contain the pyrimidine ring and what they treat (6 marks)

Question 3 (Optional - 20 marks)

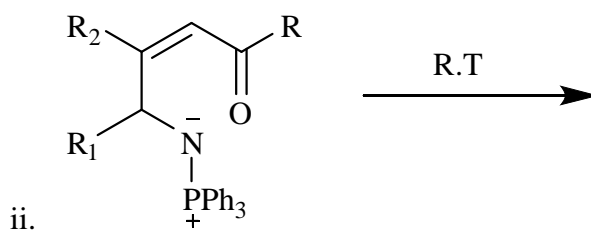
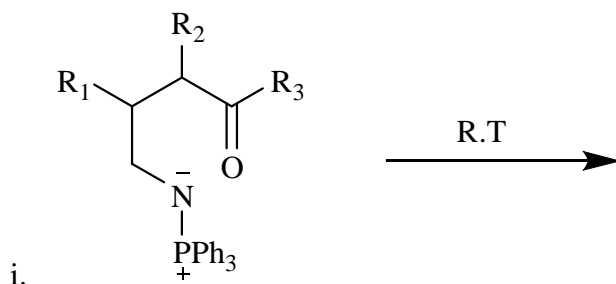
- A. Few heterocycles are known in nature where sulfur is the sole heteroatom in the ring. Draw the structure of two such compounds of thiophene derivative. (4 marks)
- B. Give a brief description of the Paal Knor synthesis of pyroles and give the expected products in the following scheme. (6 marks)



- C. What are the names of the five nucleobases that form the monomeric building blocks found in living systems? Draw the structures of their nucleosides. (10 marks)

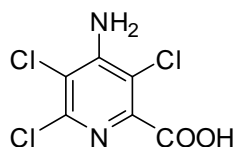
Question 4 (20 marks)

- A. Predict the products of the following Aza-Wittig reactions: (6 marks)



- B. The only phosphorus-containing ring system found in nature is a cyclic derivative of phosphoric acid.

1. Give its name (1 mark)
 2. Give the name of its phosphoric cyclic ring system (2 marks)
 3. Briefly Outline its activity in humans (3 marks)
- B. Outline its synthesis of picloram (**a**) which is a pyridine based herbicide that selectively kills broad leaf weeds starting with 2-methylpyridine. (6 marks)



a

- G. Azepines are commonly seven membered rings such as the benzodiazepines. Give four examples that can be used to treat seizures, insomnia, depression, and anxiety. (3 marks)