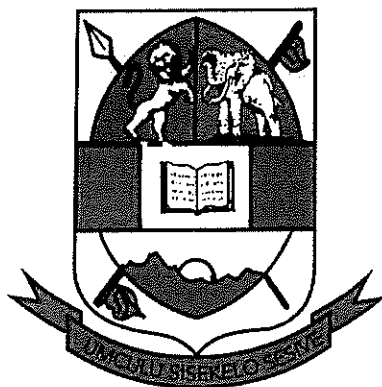


UNIVERSITY OF ESWATINI



Resit Examination– 2021

TITLE OF PAPER:	Heterocyclic Chemistry
COURSE NUMBER:	CHE 431
TIME ALLOWED:	Three Hours

INSTRUCTIONS:

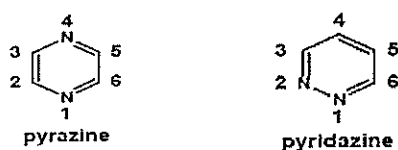
Answer any four (4) questions of the six (6) questions and every question holds 25 marks.
NB: all questions are to be answered in a separate answer sheet.

Question 1

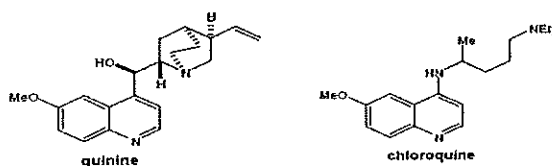
- a) Compare the electrophilic reactions of quinoline and naphthalene? (10)



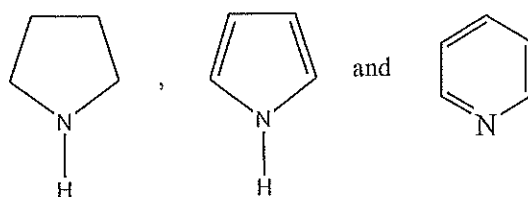
- b) Compare the reactivity of pyrazine and pyridazine. (5)



- c) The following bioactive compounds were used in medicinal use. What were these compounds used for and to what class of natural products these compounds belong? (5)

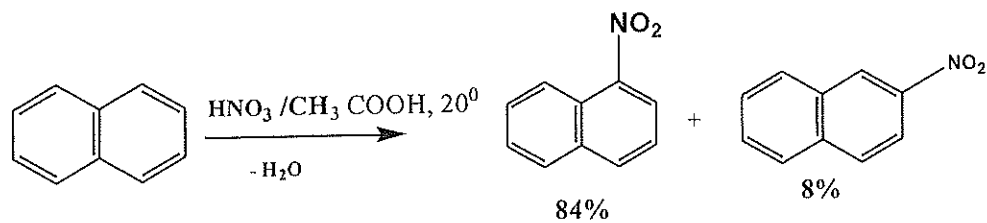


- d) Compare the reactivity of the following heterocyclic compounds and explain your choice. (5)

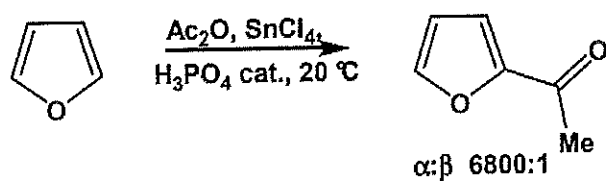


Question 2

- a) How would compare the stability of 3 and 4 as well as 5 and 6 membered heterocyclic rings in nature and their ease of formation in the laboratory? Explain the reasons for your answer. (10)
- b) Explain what causes the difference in yield between the two nitration products? (5)



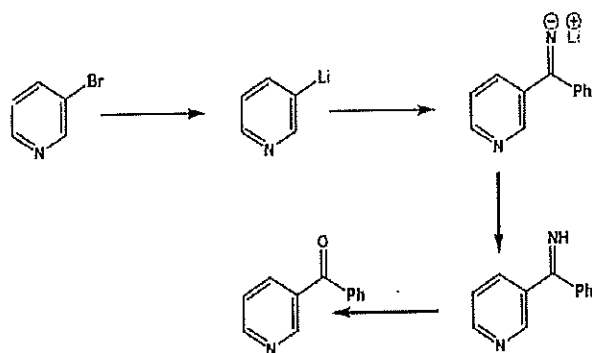
- c) What is the main reason that the reaction rate of furan gives big difference between of α , and β positions? Explain using the scheme below. (5)



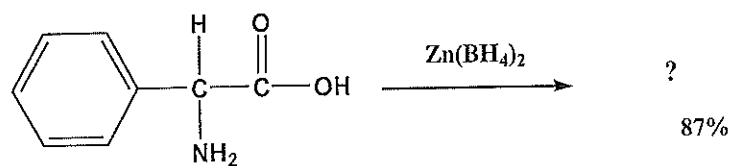
- b) Why do we study heterocyclic compounds of Nitrogen, oxygen and sulphur?
(5)

Question 3

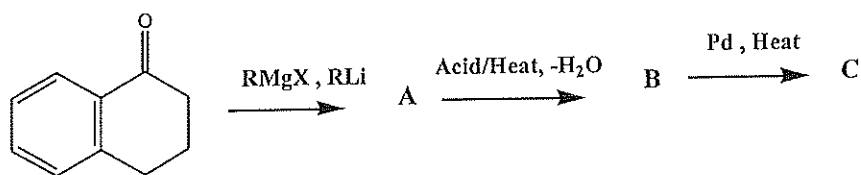
- a) What are the reaction reagents of the metallated pyridines reactions? (6)



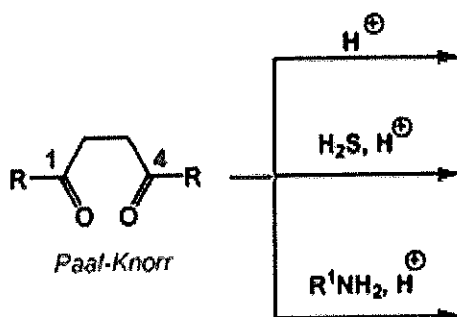
- b) Complete the following reaction which is common with amino acids. (4)



c) Give the structure of A, B and C in the sequence of reactions below. (6)

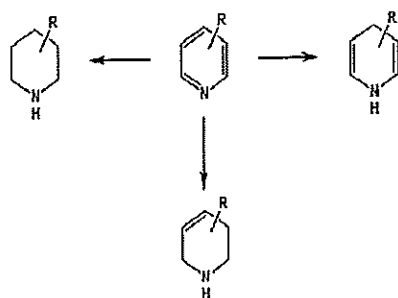


c) Complete the following synthesis reactions. (9)



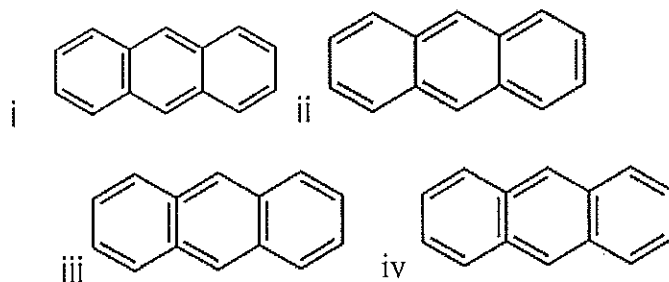
Question 4

a) Complete the reagents in the partial or full reduction of Pyridines. (9)

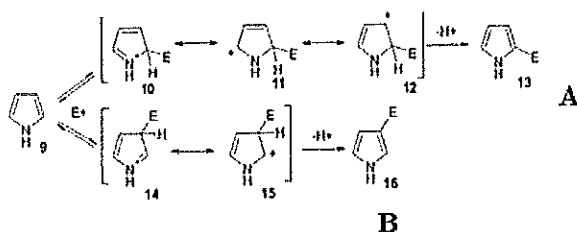


b) Show the skraup synthesis of quinolone. (5)

- c) Which of the following structures is not a resonance contributor of Anthracene? Why? (6)

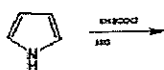
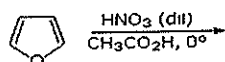


- d) Which of the following equilibrium reaction products is a major or minor product (B or A? Give reasons. (5)

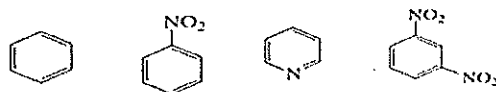


Question 5

- a) Draw the orbital structure of the heterocyclic five membered rings pyrrole, furan and thiophene and compare their aromaticity. (6)
- b) Which is more reactive between pyridine and imidazole? (5)
- c) Fill the missing reaction products in the following reaction scheme. (6)

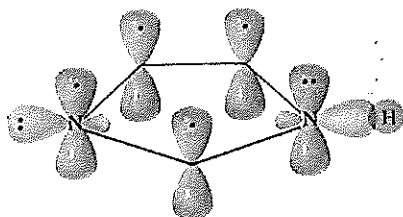


d) Arrange the relative reactivity in electrophilic aromatic substitution of the following compounds and justify the order by giving reasons. (8)

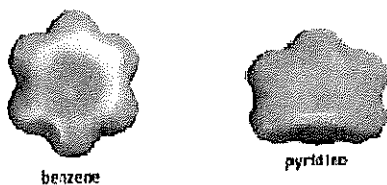


Question 6

- a) What is the reason that oxidation of alkyl pyridine takes place under mild conditions as compared to pyridine? (5)
- b) To which molecule does the following orbital structure belong? (5)



- c) Compare the structures and determine what you see regarding electron density of the two structures. Explain why? (8)



- d) The following orbital diagram is for a heterocyclic compound A. Determine the structure and reactivity. (7)

