

UNIVERSITY OF ESWATINI
FINAL EXAMINATION – 2019

TITLE OF PAPER : Natural Products Chemistry

COURSE NUMBER : CHE432

TIME : Three Hours

INSTRUCTIONS:

Answer any four (4) questions of the six (6) questions and every question holds 25 marks.

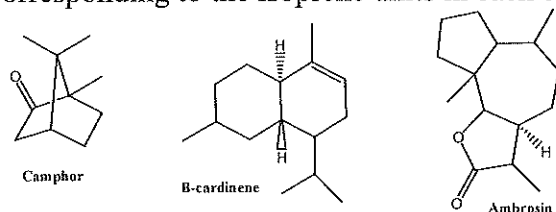
NB: all questions are to be answered in a separate answer sheet.

QUESTION 1

- A) Write a short essay on natural alkaloids, carbohydrates, terpenoids and flavonoids with specific focus on the following general aspects. (25)
- Definition
 - Occurrence and distribution
 - Properties
 - Importance in human health care
 - Importance in chemical synthesis

QUESTION 2

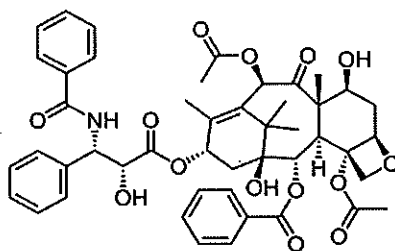
- a) The following Terpenes are made up of more than one isoprene units. Draw the compounds and with dotted lines identify the five carbon units corresponding to the isoprene units in each compound. (6)



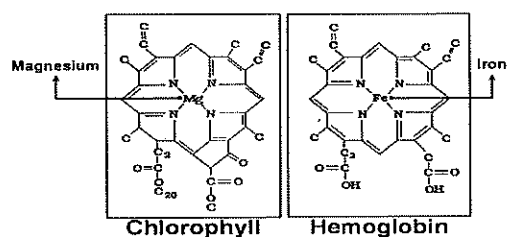
- b) Differentiate between Primary, secondary, tertiary and quaternary structures of proteins. (10)
- c) What makes proteins so variable while the functional group is only an amino acid? (5)

QUESTION 3

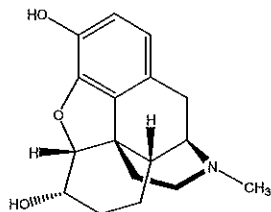
- a) Significant amount of labor, time and financial resources have been channeled to natural products research. Why are natural products important? Explain Taxol as an example. (9)



- b) What are the roles of these heterocyclic compounds in life and what similarities do you see in their chemical composition and action? (7)

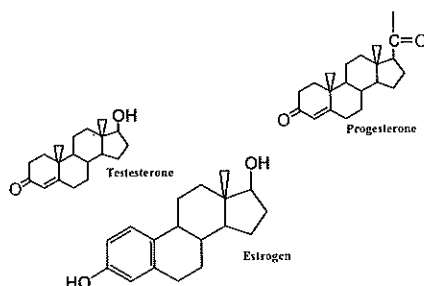


- c) Morphine is a natural product that is psychoactive chemical and it is an opioid analgesic drug that directly acts on the nervous system. Compare the bioactivity between morphine, codeine and heroin. What is responsible for the difference in bioactivity? (9)



QUESTION 4

- a) Can we use α -hydroxy sterols instead of β -hydroxy sterols as a starting material in the synthesis of the sex hormones? If not why? (6)
- b) What is the precursor of the following physiologically active compounds and what could be said about the structure of the carbon polycyclic compounds? (10)



- c) Why do we study the biosynthesis of natural products? (5)
- d) Which class of natural products is more used medicinally and how are the stabilities of these compounds in the atmosphere. (4)

Question 5

- a) How are carbohydrates biosynthesized? (5)
- b) Indicate what type of linkage is exercised by the monomer in building starch. (4)
- c) How would you differentiate between the structures of starch, glycogen and cellulose? Explain. (8)
- d) What difference is found in the function of these three polymers? (4)
- e) What are the uses of carbohydrates in animals? (4)

Question 6

- a) Among the reducing and non-reducing sugars, which one is more reactive? Give an example of each? (5)

- b) Compare and contrast between enzyme catalysed natural synthesis and laboratory synthesis of bioactive chemicals. (10)
- c) Why do chemists and biologists want to study biosynthesis of natural products? (10)