UNIVERSITY OF SWAZILAND
Faculty of Health Sciences
Department of Environmental Health Science
BACHELOR OF SCIENCE IN NURSING SCIENCE

MAIN EXAMINATION PAPER 2017

TITLE OF PAPER : ORGANIC CHEMISTRY AND BIOCHEMISTRY FOR NURSES
COURSE CODE : GNS 112
DURATION : 2 HOURS
MARKS : 100

INSTRUCTIONS : READ THE QUESTIONS & INSTRUCTIONS CAREFULLY
 : ANSWER ANY FOUR QUESTIONS
 : EACH QUESTION CARRIES 25 MARKS.
 : WRITE NEATLY & CLEARLY
 : NO PAPER SHOULD BE BROUGHT INTO OR OUT OF THE EXAMINATION ROOM.
 : BEGIN EACH QUESTION ON A SEPARATE SHEET OF PAPER.

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION IS GRANTED BY
THE INVIGILATOR.
QUESTION ONE

a. Give the molecular formula of a hydrocarbon containing five carbon atoms that is:
   (i) An alkane
   (ii) Cycloalkane
   (iii) An alkene
   (iv) An alkyne.

   [Marks 8]

b. Explain why the molecular formulae of the answers given in a. (i) and (ii) are different.

   [Marks 4]

c. Using appropriate examples, explain the difference between
   (i) Alkane and an alkyl group
   (ii) $sp^2$ and $sp^3$ hybridization
   (iii) A branched and a straight chain hydrocarbon
   (iv) A hydroxyl group and alcohol group

   [8 Marks]

d. Write a balanced chemical equation for the reaction of 2-pentene and bromine.

   [5 Marks]

   [Total: 25 Marks]

QUESTION TWO

a. Explain what is meant by the term 'anticoagulant' and give three examples of anticoagulants.

   [7 Marks]

b. What are the main components of blood?

   [6 Marks]

c. Discuss the following terms and give an example for each;
   i. Oxidative damage
   ii. Reactive oxygen species
   iii. Antioxidant enzymes

   [3 x 4 Marks]

   [Total: 25 Marks]
QUESTION THREE

a. Account for the following facts:
   (i) The dehydration of alcohols cannot occur for alcohols that do not have $\beta$ hydrogens. [5 Marks]
   (ii) A fatty acid molecule has a hydrophilic and a hydrophobic part. [4 Marks]

b. MATCH a structure below to each of the following descriptions (i-iv) and place the letter corresponding to the structure next to each description.

   (i) An amino aldehyde
   (ii) A tertiary chloride.
   (iii) A cyclic silane with two trans methyl groups
   (iv) A cyclic ketone. [16 Marks]

   [Total: 25 Marks]

QUESTION FOUR

a. Draw structures of the compounds described below and give the IUPAC name for each structure

   (i) An aromatic compound containing one benzene ring, a bromine which is meta to an alcohol group and para to a hydroxyl group. [5 marks]
(ii) A straight chain of seven carbons with two methyl groups on the second carbon, an ethyl group on the fourth carbon and a carboxylic acid group on the seventh carbon.

[5 marks]

(iii) An alcohol, C₅H₁₂OH, undergoes a dehydration reaction to produce an unsaturated product, A. Derive all possible molecular structures of Product A.

[6 marks]

b. Draw the structures of primary, secondary and tertiary alcohol examples. You may use generalized structures.

[9 marks]

[Total: 25 marks]

QUESTION FIVE

a. Define the following types of reactions:

(i) Dehydration reactions

(ii) Addition reactions

(iii) S_n2 reactions

(iv) Hydrogenation reactions

[4×3 marks]

b. Explain how enzymes function in biological systems and state the factors that affect their activity.

[5 marks]

c. Why are tertiary carbocations the most stable class of carbocations?

[5 marks]

[Total: 25 marks]