UNIVERSITY OF SWAZILAND
Faculty of Health Sciences
Department of General Nursing
BACHELOR OF SCIENCE IN NURSING SCIENCE

RESIT 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.

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QUESTION ONE
a. Hydrocarbon A has the formula C₂H₁₂ and absorbs 3 equivalents of hydrogen to
yield B, C₆H₁₆, when hydrogenated over a Pd/C catalyst. Give the structures of
both A and B [4 Marks]
b. __________________ is the ability of carbon to form long chains with itself
therefore creating millions of organic compounds. [2 Marks]
c. Organic compounds contain heteroatoms such as H, N, O, S, P and
________________. [2 Marks]
d. Benzene contains only __________ hybridised carbons. [2 Marks]
e. Draw saturated structures for the following compounds and fill in non-bonding
valence electrons where they can be found.
   i) Bromo, chloroethane
   ii) Carbon monoxide
   iii) Methanal
   iv) 2,4 dichloro bipheny1
   v) 2-chloro-4-ethoxyhexanal [5 x 3 Marks]
[Total: 25 Marks]

QUESTION TWO
a. Explain what is meant by the term 'anticoagulant' and give three examples of
anticoagulants. [6 Marks]
b. What is the difference between blood serum and blood plasma? [5 Marks]
c. Steroids are a class of biomolecules made up of three six-membered carbon rings
and one five-membered ring with an aliphatic chain attached on the five carbon
ring. Give three examples of steroids and give the function of each example. [6 Marks]
d. Draw all structural isomers of hexene, C₆H₁₂, that have unbranched carbon chains.
[8 marks]
[Total: 25 Marks]
QUESTION THREE

a. Account for the following facts:
   (i) Primary carboxylates do not undergo S_N 1 type of reactions.
   (ii) Terminal alkenes form minor products of reactions involving the
dehydration of alcohols.  

   [2.5 Marks]

b. Draw structures of the compounds described below and give the IUPAC name for
each structure
   (i) An aromatic compound containing one benzene ring and a single carboxyl
       group which is ortho to a bromo group and para to a hydroxyl group.
   (ii) A straight chain of eight carbons with two methyl groups on the second
        carbon, an isopropyl group on the fourth carbon and a carbonyl group on
        the eighth carbon.
   (iii) An unsaturated compound, C_9H_8O, undergoes a halogenation reaction to
        produce dichloride product A. Draw the molecular structure of Product A.

   [15 Marks]

QUESTION FOUR

a) Consider the structure of urea shown below and do the following:

\[ \text{H}_2\text{N} - \text{C} - \text{NH}_2 \]

i) Fill in the non-bonding valence electrons that are missing from the line
   bond structure  
   [4 Marks]

ii) Determine the hybridization of the carbon atom.  
   [2 Marks]

iii) Predict the bond angle of \text{NH}_2-C=\text{O} in urea.  
    [3 Marks]

b) There are two molecules with the molecular formula C_3H_6N. Draw them and describe
   how they differ.  
   [6 Marks]

c) What is the difference between S_N 1 and S_N 2 reactions? Give examples of each
type of reaction.  
   [10 Marks]
QUESTION FIVE

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.  [4 × 2 Marks ]

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) A saturated and unsaturated hydrocarbon
   (iii) A branched and a straight chain hydrocarbon
   (iv) Benzene and cyclohexane [8 Marks]

d. Write a balanced chemical equation for the reaction of 2-butene and bromine. [5 Marks]

[Total: 25 Marks]