



**NATIONAL OPEN UNIVERSITY OF NIGERIA**  
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA  
**FACULTY OF SCIENCES**  
**DEPARTMENT OF PURE & APPLIED SCIENCES**  
**OCTOBER /NOVEMBER 2019\_2 EXAMINATION**

**COURSE CODE: CHM305**

**COURSE TITLE: ORGANIC CHEMISTRY III**

**CREDIT: 3 UNIT**

**TIME ALLOWED: 3 HOURS**

**Instruction: Answer question 1 and any other four questions.**

**QUESTION 1 (22 MARKS)**

- ai) Define alcohols and give example of each of the following classes of alcohol;  
ii) primary ( $1^\circ$ ) and ii) secondary( $2^\circ$ ) **(5 marks)**
- b) Draw the structure of the following alcohols; i) Propan-2-ol, ii) ethan-1,2-diol, iii) benzyl alcohol **(6 marks)**
- ci) Show the structure of 3 named simple heterocyclic compounds **(6 marks)**
- ii) List 4 physical properties of pyridine **(2 marks)**
- iii) write the structure and name of the product formed when malonic acid is treated with excess ethanol. **(3 marks)**

**QUESTION 2 (12 MARKS)**

- a) Explain the term 'isoelectric point' of an amino acid **(4 marks)**
- b) Differentiate between simple proteins and chromoproteins **(4 marks)**
- c) Describe the following tests for proteins;  
i) Biuret test, ii) Liberman's test **(4 marks)**

**QUESTION 3 (12 MARKS)**

- a) Distinguish between fats and oil, give one example of an oil **(6 marks)**

b) List four (4) physical properties of fat and oils (**2 marks**)

c) Explain the following chemical properties of fat and oils;

i) Rancidification ii) Hydrolysis (**4 marks**)

#### QUESTION 4 (12 MARKS)

a) Distinguish between monosaccharides, disaccharides and polysaccharides (**7 marks**)

b) Draw the structure of the following sugars; i)  $\beta$ -glucose,  $\alpha$ -galactose (**5 marks**)

#### QUESTION 5 (12 MARKS)

a) Show the equation for the following chemical reactions of glucose;

i) oxidation ii) reduction iii) fermentation (**7 1/2 marks**)

b) Write the general equation for the saponification of fat/oil to give soap and glycerol

(**4 1/2 marks**)

#### QUESTION 6 (12 MARKS)

(a)(i). Differentiate between symmetrical and unsymmetrical ethers. (**5 marks**)

(ii). Draw the structure of the following: (**4 marks**)

- Oxetane
- Oxane
- Oxalane
- 1,4-Dioxane

(b). Complete the table below: (**3 marks**)

Formula, IUPAC names, Common names and Sources of Some Carboxylic acids

Formula	IUPAC Name	Common Name	Source
HCOOH	Methanoic acid	Formic acid	Vinegar Plant
CH <sub>3</sub> COOH	Ethanoic acid	_____	Animal Products
_____	Propanoic acid	Propanionic acid	_____
CH <sub>3</sub> (CH <sub>2</sub> ) <sub>2</sub> COOH	_____	n-Butyric acid	Rancid butter
CH <sub>3</sub> (CH <sub>2</sub> ) <sub>14</sub> COOH	Hexadecanoic acid	_____	_____
_____	Octadecanoic acid	Stearic acid	_____