**NATIONAL OPEN UNVERSITY OF NIGERIA**
**PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESSWAY, JABI - ABUJA**
**FACULTY OF SCIENCES**
**DEPARTMENT OF PURE & APPLIED SCIENCES**
**APRIL/MAY, 2019 EXAMINATIONS**

**CHM 305-Organic Chemistry III SEMESTER (3 UNITS)**
**INSTRUCTION: Answer Question 1 and any 4 Questions**
**TIME: 2 ½ HOURS**

**QUESTION 1**

(a). Show how ethanol can be prepared by hydration of alkene. *(9 marks)*
(b). Write short note on preparation of ether using Williamson synthesis *(6 marks)*
(c). Using appropriate reagents and catalyst, discuss how aromatic alkanone can be prepared by Friedel-Craft acylation? *(3 marks)*
(d). Give the structure of 3-hydroxypropanal and phenylethanal *(4 marks)*

**QUESTION 2**

(a). Explain the process of production of alcohol in large and concentrated quantity from Maize starch. *(6 marks)*
(b). Water is more acidic than alcohol discuss. *(5 marks)*
(c). Using Lucas test differentiate between primary, secondary and tertiary alcohols. *(1 marks)*

**QUESTION 3**

(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 |
| $CH_3COOH$ | Ethanoic acid | | Animal Products |
| | Propanoic acid | Propanionic acid | |
| $CH_3(CH_2)_2COOH$ | | n-Butyric acid | Rancid butter |
| $CH_3(CH_2)_{14}COOH$ | Hexadecanoic acid | | |
| | Octadecanoic acid | Stearic acid | |

**QUESTION 4**

(a). Predict the type of alcohol formed when these carbonyl compounds are treated with Grignard reagent. *(3 marks)*

- Aldehyde ----------→
- Ketone ----------→

(b). Write short note on Michael nucleophlic addition to α, β-Unsaturated carbonyl compound. Take Benzalacetophenine and ethylmanoate as the Michael donor and acceptor. *(9 marks)*

**QUESTION 5**

(a). Write the equation for electrophilic substitution reactions of thiophene with:

$H_2SO_4$, $CH_3COCl$ and $HNO_3$. *(3 marks)*

(b). Give five medicinal/ physiological uses of pyridine derivatives. *(6 ½ marks)*

(c). List four industrial uses of Oxalic acid. *(1 mark)*

(d). Classify these amino acids into Neutral, Acidic and Basic amino acids.

*(1 ½ marks)*

- Aspatic and Glutamic acid.
- Glycine and Cystine
- Lysine and Arginine

**QUESTION 6**

(a). Discuss the Oxidation and Acylation reactions of glucose. *(6 marks)*

(b). Write on the classification of carbohydrate. *(6 marks)*