



**NATIONAL OPEN UNIVERSITY OF NIGERIA PLOT 91, CADASTRAL ZONE,
NNAMDI AZIKIWE EXPRESSWAY, JABI – ABUJA**
FACULTY OF SCIENCES
DEPARTMENT OF CHEMISTRY
2025_1 EXAMINATION

COURSE CODE: CHM 305

COURSE TITLE: ORGANIC CHEMISTRY III

COURSE UNIT: 3

INSTRUCTION: Answer question one (1) and any other three questions

Time: 3 hours

Q1(a). What is an alcohol and give two examples with their IUPAC name? **(4 marks)**
(b). Explain the classes of alcohol and give one example of each. **(4 marks)**
(c). Monohydric alcohols can be classified into three classes - primary (1°), secondary (2°) and tertiary alcohol (3°) according to the number of alkyl groups attached to the hydroxyl-bonded carbon atom, explain each of the classes and give one example of each. **(9 marks)**
(d). List 4 different methods of preparing alcohols. **(4 marks)**
(e) Discuss the production of alcohol from fermentation. **(4 marks)**
(Total Marks = 25 marks)

Q2(a) Give the structural formulae of the following alcohols and identify each of the alcohols as primary, secondary and tertiary. (i) 3-Chloro-1-propanol (ii) 2-methyl-4-heptanol (iii) 2-Butanol (iv) 3- methyl-3-pentanol (v) Cyclohexanol. **(10 marks)**
(b). Outline (5) physical properties of alcohol. **(5 marks)**

Q3. Using equation, explain the preparation of aldehydes and ketone from:

- Dehydration of alcohols **(3 marks)**
- Oxidation of alcohols **(5 marks)**

b. Discuss the Dehydration of alcohols and Williamson Synthesis methods of preparing ethers. **(5 marks)**
c. Explain how fats and oils are formed, including the chemical components involved. **(2 marks)**

Q4. Discuss the reactions of aldehydes and ketones under the following headings –

- Nucleophilic addition reaction ii. Condensation reaction **(10 marks)**
- Draw the structure of the following Aldehyde and Ketones.
i. 3-hydroxylpropanal ii. Phenylethanal iii. Butanone iv. Phenylethanone v. Diphenyl ketone **(5 marks)**

Q5a. What do you understand by the term ‘heterocyclic compounds? **(2 marks)**

b. Heterocyclic compounds may be divided into three main categories, list them. **3 marks**
c. draw the structures of the following heterocyclic compounds.
i. Pyridine ii. γ -Pyran iii. Pyridazine iv. Pyrimidine v. furan. **(10 marks)**

Q6.a. Explain any one Methods of synthesis of α -amino acids **(5 marks)**

b. State five General Physical Characteristics of amino acid. **(10 marks)**