



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF APPLIED AND HEALTH SCIENCES:

Department of Pure & Applied Sciences

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN ANALYTICAL CHEMISTRY

ACH 2107: ORGANIC CHEMISTRY I

SUPPLEMENTARY EXAMINATION

SERIES: MAR 2025

TIME: 2 hours

DATE: Pick Date Mar 2025

Instructions to Candidates

You should have the following for this examination

Answer Booklet, examination pass and student ID

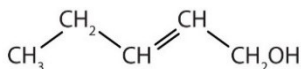
This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

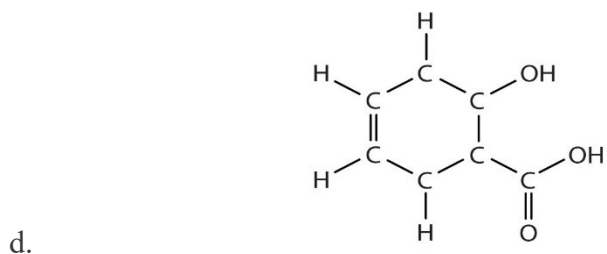
Do not write on the question paper.

Question ONE (30 marks)

- a. State and explain two characteristics of covalent bonds (6 marks)
- b. i. List the three different ways of drawing organic molecule structures (3 marks)
- ii. $\text{H}_3\text{CNHCH}_2\text{COOH}$ is the representation of a molecule's structure in one form. Draw the two other forms (4 marks)
- c. i. List 5 (FIVE) families of functional groups (5 marks)
- ii. Identify **ALL** the functional group(s) in each molecule. (8 marks)

a.





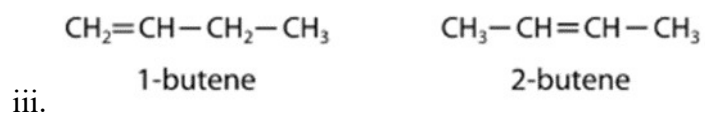
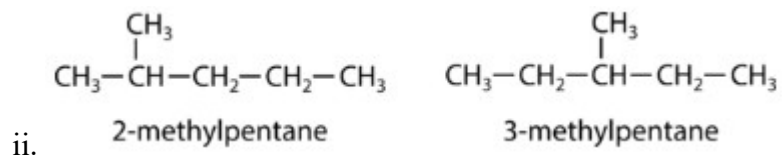
- d. A compound of carbon and hydrogen contains 92.3% C and has a molar mass of 78.1 g/mol. What is its molecular formula? (4 marks)

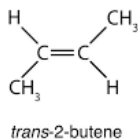
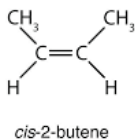
Question TWO (15 Marks)

- a. Define the terms: (6 marks)

- i. Isomers
- ii. Conformational isomers
- iii. Stereo isomers

- b. Identify the type of isomerism demonstrated by the molecules below: (3 marks)





- c. List the three types of stereo isomers (3 marks)
- d. Explain chirality in carbon giving two example (3 marks)

Question THREE (15 marks)

- a. State the relationship between percentage composition, empirical formula and molecular formula (3 marks)
- b. Analysis of a 12.04-g sample of a liquid compound composed of carbon, hydrogen, and nitrogen showed it to contain 7.34 g C, 1.85 g H, and 2.85 g N. What is the percent composition of this compound? (3 marks)
- c. The bacterial fermentation of 100g of grain to produce ethanol forms a gas with a percent composition of 27.29% C and 72.71% O. What is the empirical formula for this gas? (4 marks)
- d. A major textile dye manufacturer developed a new yellow dye. The dye has a percent composition of 75.95% C, 17.72% N, and 6.33% H by mass with a molar mass of about 240 g/mol. Determine the molecular formula of the dye. (5 marks)

Question FOUR (15 marks)

- a. i. All atoms are made up of three components. List them (3 marks)
 ii. State the characteristic of each component listed (3 marks)
- b. i. Define the term atomic orbital (2 marks)
 ii. List the four different orbitals (2 marks)
- c. Demonstrate Hund's rule using the non-bonded atoms of nitrogen and oxygen (5 marks)

Question FIVE (15 marks)

- a. List three alkanes and their uses (3 marks)
- b. i. Describe the general solubility of alkanes in water and organic solvents, and their characteristic as solvents (3 marks)
 ii. Describe what happens when a molecular substance dissolves in water (4 marks)
- c. Give three reasons why carbon is the central element in organic chemistry. (3 marks)
- d. Are organic compounds based more on ionic bonding or covalent bonding? Explain. (2 marks)