



UNIVERSITY EXAMINATIONS

FIRST SEMESTER 2025/2026 ACADEMIC YEAR

**SECOND YEAR EXAMINATION FOR THE DEGREES OF
BACHELOR OF EDUCATION (SCIENCE) BACHELOR OF
SCIENCE (GEN) AND BIOMED**

CHEM 212: ORGANIC CHEMISTRY II

STREAMS: *BEd(Sc), BSc (Gen) &BIOMED*

TIME: *2 HRS*

DAY: *MONDAY [14.30 – 16.30 P.M]*

DATE: *02/02/2026*

THIS QUESTION PAPER CONSISTS OF FOUR (4) PAGES

PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.

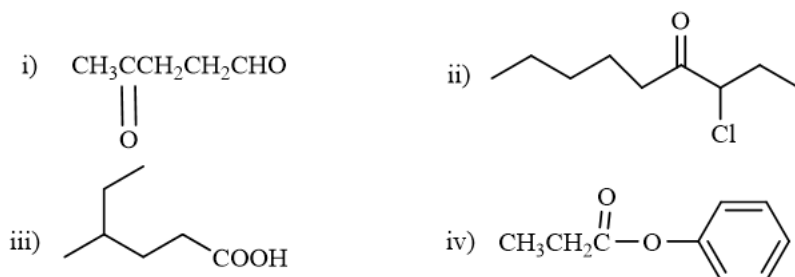
Attempt ALL the Questions**QUESTION ONE (30 MARKS)**

a) Draw the structural formula of the following compounds

- i) 2-methylpentanal
- ii) 4-chloropentan-2-one
- iii) 3-hydroxypropanoic acid
- iv) N-methylpropanamide

(8 Marks)

b) Give the IUPAC names of the following compounds

**(8 Marks)**

c) Arrange the following molecules with increasing boiling points

**(2 Marks)**

d) Give a simple chemical test for carboxylic acid

(2 Marks)

e) Using equations, explain how **primary alcohols** can be oxidized to aldehydes without further oxidation to carboxylic acids.

(2 Marks)

f) Write the **mechanism** for the reduction of ketones using NaBH_4 .

(3 Marks)

g) Describe the **Cannizzaro reaction**, clearly showing the oxidation and reduction steps. **(4 Marks)**

QUESTION TWO (20 MARKS)

a) Define the following terms

- i. Nucleophile
- ii. Electrophile
- iii. Peptides

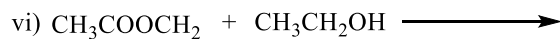
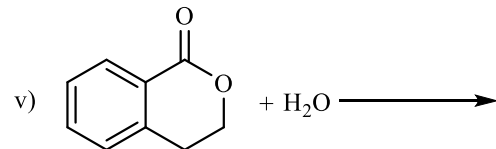
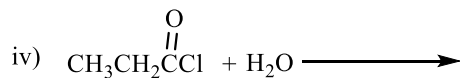
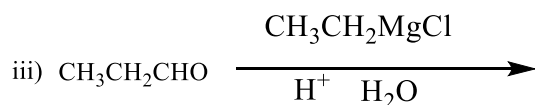
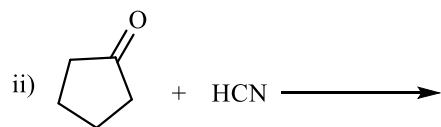
(6 Marks)

b) Identify the nucleophile in the following reagents

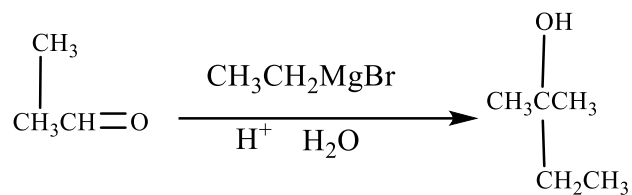
- i) $\text{CH}_3\text{CH}_2\text{MgI}$ ii) LiAlH_4 iii) H_2NNH_2
- iv) CH_3OH v) $\text{CH}_3\text{CH}_2\text{ONa}$ vi) $\text{CH}_3\text{C}\equiv\text{N}$

(12 Marks)c) Explain and illustrate why lower aldehydes and ketones are appreciably soluble in water **(2 Marks)****QUESTION THREE (20 MARKS)**

a) Give the major products in the following reactions

**((14 Marks))**

- b) Write the complete stepwise mechanisms for the reaction below, clearly showing the formation of the products. Show the electron flow with arrows and draw all intermediate structures.

**(6 Marks)**