TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF APPLIED AND HEALTH SCIENCES

DEPARTMENT OF PURE & APPLIED SCIENCES

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN APPLIED CHEMISTRY (BTAC) BTAC 2024S

ACH4202: ANALYTICAL CHEMISTRY I

SPECIAL SUPPLEMENTARY EXAMINATION

SERIES: JULY 2025

TIME: 2HOURS

DATE: 20**Jul2025**

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE**Question(s).Attemptquestion ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

QUESTION ONE

a) **With the help of a well labelled diagram illustrate a common example of signal modulation process. (4 marks)**

b) **Differentiate between aliasing and anti-aliasing filter as used in the context of analytical chemistry (4 marks)**

c) **Define the following terms as used in explaining noise in analytical instrumentation:**

   i. **Shot noise (4 marks)**

   ii. **Flicker noise (4 marks)**

   iii. **Signal to noise ratio (4 marks)**

d) **Differentiate how ground shielding and boxcar averaging is applied in noise reduction in analytical instrumentation. (6 marks)**

e) **Differentiate between passive and electromechanical basic components in Fourier transform for analytical instrumentation. (4marks)**

QUESTION TWO

a) **Discuss the principle of Reverse flow injection analysis outlining three major advantages that supports this concept. (12marks)**

b) **Discus the purpose and the damage signs of the following basic components.**

i. **Potentiometers (2 marks)**
ii. **Transformers (2 marks)**
iii. **Variable capacitor (2 marks)**
iv. **Switches (2 marks)**

QUESTION THREE

a) **With the aid of a schematic diagram, discuss the data acquisition system involved in the conversion of analogue signal to digital information (8 marks)**

b) **Differentiate between the following terms as used in analytical instrumentation;**

i. **P-type semiconductors and semiconductor diode (4 marks)**
ii. **Reverse biased and forward biased diode (4 marks)**
iii. **Static and dynamic resistance (4 marks)**

QUESTION FOUR

a) **Discuss the four main functions of an interface in simple computer systems.**

(12 marks)

b) **Differentiate the following terms used in determining analytical signal:**

i. **Noise and dark noise (4 marks)**
ii. **Sampling and Nyquist sampling rate (4 marks)**

QUESTION FIVE

a) **Differentiate between continuous flow injection and segmented flow injection analysis. (12 marks)**

b) **Discuss the working principles of Relays and their functions as optoelectronic devices. (8 marks)**