



TECHNICAL UNIVERSITY OF MOMBASA

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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

ORDINARY EXAMINATION

SERIES: DECEMBER 2024

TIME: 2HOURS

DATE: 20Dec2024

**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). Attempt question ONE (Compulsory) and any other TWO questions.

**Do not write on the question paper.**

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**QUESTION ONE**

- a) With the help of a well labelled diagram illustrate design of an experiment process. (4 marks)
- b) Differentiate between chemical and instrumental noise as used in the context of analytical chemistry. (4 marks)
- c) Differentiate between the following terms as used in explaining noise in analytical instrumentation:
- i. Johnson and Shot noise (4 marks)
  - ii. Flicker and environmental noise. (4 marks)
  - iii. Signal to noise ratio and dynamic range (4 marks)
- d) Discuss four hard ware devices applied in noise reduction in analytical instrumentation. (6 marks)

- e) Outline giving examples any four basic components in Fourier transform for analytical instrumentation. (4marks)

## QUESTION TWO

- a) Discuss the principle of flow injection analysis outlining three major combinations that supports this concept. (12marks)
- b) Discuss the purpose and the damage signs of the following passive components.
- i. Fuse (2 marks)
  - ii. Capacitor (2 marks)
  - iii. Resistor (2 marks)
  - iv. Coils (2 marks)

## QUESTION THREE

- a) With the aid of a schematic diagram, discuss the basic components involved in the conversion of analogue signal to digital information (8 marks)
- b) Differentiate between the following terms as used in analytical instrumentation;
- i. Intrinsic and extrinsic semiconductors (4 marks)
  - ii. Continuous time signal and discrete time signal (4 marks)
  - iii. Electrical and mechanical compatibility (4 marks)

## QUESTION FOUR

- a) With the aid of a schematic of functional diagram of an interface, discuss the three advantages of computer interfacing. (12 marks)
- b) Explain the following terms used in determining analytical signal:
- i. Sampling (4 marks)
  - ii. 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 and functions of the following optoelectronic devices.
- i. Light emitting diode (LED) (4 marks)
  - ii. Light dependent resistors (LDR) (4 marks)