



MACHAKOS UNIVERSITY

University Examinations for 2021/2022

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (ANALYTICAL CHEMISTRY)

BACHELOR OF EDUCATION

SCH 207: INTRODUCTION TO ANALYTICAL INSTRUMENTATION

SAN 207: ANALYTICAL INSTRUMENTATION

DATE: 16/12/2021

TIME: 2.00-4.00 PM

INSTRUCTIONS:

This paper consists of **FIVE** (5) questions.

Answer **QUESTION ONE** (1) and any other **TWO(2)** questions.

Marks for each question are as indicated

You should have the following for this examination:-

1. Answer booklet;
2. Non-programmable scientific calculator;
3. Writing instruments.

SECTION A (COMPULSORY): ANSWER ALL QUESTIONS

QUESTION ONE (30 MARKS)

- | | | |
|----|---|-----------|
| a) | What are the factors to consider when choosing an instrument | (4 marks) |
| b) | Differentiate between Detector, Actuator and transducer | (4 marks) |
| c) | Define Guard Time, what's the significance | (2 marks) |
| d) | Can a hundred percent accuracy be achieved, support your answer | (4 marks) |
| e) | Define mean an error and discuss TWO types of Errors | (4 marks) |
| f) | Define S/N ratio, what's the significance of the ratio | (4 marks) |
| g) | With an aid of a diagram explain the operation of an oscillator | (8 marks) |

SECTION B: ANSWER ANY TWO (2) QUESTIONS

QUESTION TWO (20 MARKS)

- a) Using appropriate diagram discuss main instrumentation system components (10 marks)
- b) Discuss any FIVE (5) static Characteristics of an instrument (10 marks)

QUESTION THREE (20 MARKS)

- a) Expected value across a given fluorimeter is 80g/l. However, the measurement value is 78g/l. Calculate
 - i. Absolute Error
 - ii. Percentage Error
 - iii. Relative Accuracy
 - iv. Percentage Accuracy (12 marks)
- b) Why is calibration important from time to time (8 marks)

QUESTION FOUR (20 MARKS)

- a) Discuss Operation of an Op-Amplifier and show one of its applications (10 marks)
- b) Discuss the various factors that are considered during choosing of an instrument (10 marks)

QUESTION FIVE (20 MARKS)

- a) With an aid of a diagram show a lab information management system (10 marks)
- b) Show how internet has enhanced the management of industrial application of an instrumentation system (10 marks)