



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology

Department of Mechanical Engineering

UNIVERSITY EXAMINATION FOR:

Diploma in plant Engineering

ECI 2330: INSTRUMENTATION SYSTEM

END OF SEMESTER EXAMINATION

SERIES: NOVEMBER 2024

TIME: 2 HOURS

DATE:

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** and any **TWO** Questions.

Do not write on the question paper.

QUESTION ONE. (COMPULSORY)

(a) Explain the following terms as used in instrumentation systems

(i) Reproducibility

(ii) Stability

(iii) Transducer.

(iv) Consistency

(8 marks)

(b) Using a block diagram, State the functions of various elements of an instrumentation

system.

(12 marks)

QUESTION TWO

(a) (i) State and explain the steps involved in conversion of an analog signal to digital signal.

- (ii) Give **THREE** applications of analog to digital signal conversion. (9 marks)
- (b) (i) Briefly explain the operation of magnetic tape recorders.
- (ii) Highlight any **THREE** advantages of magnetic tape recorders. (6 marks)
- (c) (i) Highlight any **THREE** advantages of X-Y recorders
- (ii) Give **TWO** applications of X-Y recorders. (5 marks)

QUESTION THREE

- (a) (i) Differentiate between analogue and digital display devices.
- (ii) State any **THREE** advantages of digital display devices over analog devices. (5 marks)
- (b) (i) Briefly differentiate between the following types of instruments.
- I. Null and deflection type
 - II. Analog and digital.
- (ii) Highlight any **TWO** advantages of null type instruments as compared to deflection type instruments. (5 marks)
- (c) (i) Explain the term filter.
- (ii) With aid of diagrams, show the functional difference between band pass and band stop filters
- (iii) State any **THREE** applications of filters. (9 marks)

QUESTION FOUR

- (a) (i) Explain the term transducer
- (ii) State any **FOUR** factors to consider when choosing a sensor for level measurement. (6 marks)
- (b) Using a well labelled diagram, explain the principle of operation of a single point level sensing. (6 marks)
- (c) (i) Differentiate between positive temperature coefficient and negative temperature coefficient thermistors.

- (ii) Using a diagram, briefly explain the principle of operation of a thermocouple sensor. (8 marks)

QUESTION FIVE

- (a) (i) Explain the term signal processing

- (ii) Outline the steps involved in signal processing (9 marks)

- (b) (i) State and explain any **FOUR** signal processing techniques

- (ii) Give Three areas where signal processing is applied. (11 marks)