



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE IN ELECTRICAL AND ELECTRONICS ENGINEERING

EEE 414 INSTRUMENTATION

DATE: 13/11/2020

TIME: 8.30-10.30 AM

INSTRUCTIONS

Answer Question One and Any Other Two Questions

QUESTION ONE (30 MARKS)

- a) Today instruments are of immense importance to most of facets human civilization. Explain their classification (4 marks)
- b) Explain the characteristic performance of a simple S/H circuit state its advantages, disadvantages and possible application. (4 marks)
- c) Differentiate the static and dynamic characteristic of instrument hence describe various performance types that associate with dynamic (6 marks)
- d) Data acquisition requires a media to transmit to the actuators, explain how is through optical wireless telemetry. (4 marks)
- e) Describe various functionality that are don n signal conditioning system in line to analogue signal processing operation. (4 marks)
- f) Explain the logical operation of the USB in between HUB and HOST (4 marks)
- g) Explain two types of ports used in interfacing. (2 marks)
- h) Explain the principle of serial interface between DCE and DTE. (2 marks)

QUESTION TWO (20 MARKS)

- a) Explain the four key factors that are used in transducer selections. (4 marks)
- b) Discuss four ways of reducing system error in measurement instruments. (4 marks)
- c) Data acquisition undergoes various stages. Explain the stages that are involved in signal processing. (8 marks)
- d) Explain four functions performed by intelligent instruments. (4 marks)

QUESTION THREE (20 MARKS)

- a) Discuss four devised techniques involved in reducing noise in the measuring instruments (8 marks)
- b) Explain three bodies that are involved in authorization of instrument Calibrations hence describe the criteria used by those bodies. (6 marks)
- c) Explain various attributes, limitations and advantages of using smart transmitters. (6 marks)

QUESTION FOUR (20 MARKS)

- a) Explain the characteristics of a good instrument amplifier and illustrate its performance with a suitable interface on temperature measures (6 marks)
- b) Using illustration explain the principle of operation of a Binary weighted resistor (DAC) (6 marks)
- c) Explain the elements of a data supervisory system used in automation (4 marks)
- d) Why do we filter the signal? Explain the mechanism of signal lock, voltage comparator, signal multiplication. (6 marks)

QUESTION FIVE (20 MARKS)

- a) Explain the principle involved in measuring low quantities (12 marks)
 - i. Temperature
 - ii. Pressure
- b) Interfacing from a data acquisition system is done in two ways: asynchronous and synchronous. Distinguish between the two. (4 marks)
- c) Storage is a global issue for intelligent instruments. Explain four kinds of storage devices used in storing data. (4 marks)

