



MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
FOURTH YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR
BACHELOR OF SCIENCE (ELECTRICAL AND ELECTRONICS ENGINEERING)
EEE 414: INSTRUMENTATION

DATE:

TIME:

Instructions to candidates:

This paper consists of FIVE Questions.

Answer Question ONE [30 Marks] and any other TWO Questions [20 Marks Each].

Write your college number on the answer sheet.

This paper consists of 3 printed pages

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

QUESTION ONE [30Marks]

- a) Explain the basic element of measuring instruments [3 marks]
- b) Describe how intelligent instruments operates. [2 marks]
- c) Remote sensing techniques is one of the advance technology in data acquisition. What are the possible mean of transmitting its data to the respected servers for further analysis and broadcast Explain their merits and demerits for each media? [5 marks]
- d) State the characteristic of an instrumentation amplifier [4 marks]
- e) Data acquisition through sensor undergoes various stages of processing. Explain what happens at signal conditioning stage [3 marks]
- f) Explain the devised techniques for reducing noise in the measuring instruments. [4 marks]
- g) Explain the principle of temperature measurement using thermocouple device [4 Marks]
- h) Describe how two device DTE and DCE are connected using serial and parallel cable. [5 marks]

QUESTION TWO [20 MARKS]

- a) Discuss various factors that an Engineer could settle on before procuring an instrument for defined purpose [8 marks]
- b) Bridge network are interface with transducer to measure certain parameter in our environment. Using illustration, explain one of the application achievement in instrumentation amplifier. [8 marks]
- c) State the criteria used in transducer selection hence distinguish between passive and active of the same. [4 marks]

QUESTION THREE [20 MARKS]

- a) Using illustration, explain the role played by dual slope (ADC) and binary weighted (DAC) at data conversion [8 marks]
- b) Explain the principle of sample and hold circuit (S/H) it play during data conversion through ADC /DAC system. [4 marks]
- c) Measuring instrument are not 100% efficiency. Discuss various kind of measurement errors occur during measurement process and their remedies. [8 marks]

QUESTION FOUR [20 MARKS]

- a) In the production unit, use of smart sensor has optimized the production in what ways? Discuss the functionality of the same. [8 marks]
- b) Using illustration, explain the principle of digital computation in the measurement system unit [8 marks]
- c) Describe how General Purpose Interface Bus GPIB enhanced super highway streaming of data. [4 marks]

QUESTION FIVE [20 MARKS]

- a) Differentiate between synchronous and asynchronous RS-232 hence highlight the benefits of universal serial bus (USB) as one of the system interface to data acquisition system [10 marks]
- b) Explain the functional units of a data acquisition system [10 marks]