



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

ELECTRICAL ENGINEERING DEPARTMENT

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN TECHNOLOGY ELECTRICAL AND ELECTRONIC ENGINEERING

ECI 2306 INDUSTRIAL MEASUREMENT II

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2019

TIME: 2 HOURS

DATE: Pick Date Select Month Pick Year

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **five** Questions; Question ONE is compulsory. In addition attempt any Other TWO Questions.

Do not write on the question paper.

QUESTION FOUR

- a) i) With the aid of a block diagram describe the components of a DC position control system.
- ii) Describe the operation of a synchro system **(10 Marks)**
- b) i) Define "Synchro Transmitter"
- ii) Describe with the aid of a sketch the principle of operation of an Industrial Absolute Encoder
- iii) State any **TWO** industrial applications of an encoder **(10 Marks)**

QUESTION ONE

- a) i) Define Mass Spectrometry
- ii) Describe basic components and principle of operation of (i) **(10 Marks)**
- b) i) Explain the working principle of the following

- I) Magnetic resonance spectroscopy (NMR)
- II) Spin-spin coupling
- ii) State any **FOUR** uses of NMR spectroscopy

(10 Marks)

QUESTION TWO

- a) i) Define the following as applied in chromatographic measurement:
 - I) Adsorption
 - II) Stationary phase
 - III) Chromatograph
 - IV) Eluent
 - V) Analyte
 - ii) Give any **TWO** important industrial examples of chromatography
 - iii) With the aid of a sketch explain Thin Layer Chromatography (TLC)
 - iv) State any **TWO** advantages and **TWO** disadvantages of TLC
- (10 Marks)**
- b) i) Explain with the aid of a block diagram a typical gas chromatograph system for composition measurement
 - ii) State any **TWO** advantages and **TWO** disadvantages of gas chromatograph

(10 Marks)

QUESTION THREE

- a) i) Define PH of a solution and state Nernst's equation
 - ii) Explain with simple sketches the construction of measuring electrode and reference electrode as used in PH measurement
- (10 Marks)**
- b) i) Draw and explain moisture measurement using resistive techniques
 - ii) Explain the following methods of humidity measurement
 - I) Dew point method
 - II) Psychometric method

(10 Marks)

QUESTION FIVE

- a) Describe the construction and operation of Light Emitting Diode (LED)
- (6 Marks)**
- b) i) Explain with the aid of block diagrams the following types of optical measurement system :
 - I) Fixed source, variable transmission medium system
 - II) Variable source, fixed transmission medium system

(14 Marks)