



# TECHNICAL UNIVERSITY OF MOMBASA

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FACULTY OF ENGINEERING AND TECHNOLOGY

MECHANICAL AND AUTOMOTIVE ENGINEERING DEPARTMENT

## UNIVERSITY EXAMINATION FOR:

Diploma in Marine Engineering

EMR 2303 MARINE INSTRUMENTATION AND CONTROL I

## SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEPTEMBER 2018

TIME: 2HOURS

DATE: SEPTEMBER 2018

### 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 any THREE questions.

Do not write on the question paper.

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### **Question ONE**

- a) What are classification of temperature measuring Devices? (4 marks)
- b) Mention FOUR elements of liquid in glass thermometer. (4 marks)
- c) Describe measurements of temperature using RTD and Wheatstone bridge. (6 Marks)
- d) State THREE laws of thermocouple. (6 Marks)

### **Question TWO**

- a) Define Flow. (2 Marks)
- b) Mention Merits and Demerits of Rotameter. (6 Marks)
- c) State FOUR types of positive displacement meters. (4 Marks)
- d) With an aid of a diagram briefly describe working principle of Electromagnetic Flow meter.

(8 Marks)

### Question THREE

- a) Describe the following Level Measurement Methods:
  - i. Direct Methods
  - ii. Indirect Methods (4 Marks)
- b) Describe with the aid of diagram the Air Bubble Liquid Level Sensor. (6 Marks)
- c) Describe the Use of Resistive tapes in Level Measurements. (6 Marks)
- d) A pressure gauge located at the base of an open tank containing a liquid with a specific weight of  $13.6 \text{ KN/m}^3$  registers 1.27 MPa. What is the depth of the fluid in the tank? (4 Marks)

### Question FOUR

- a) Define the following terms:
  - i. Atmospheric Pressure
  - ii. Gauge Pressure
  - iii. Vacuum Pressure. (3 Marks)
- b) Mention Six Factors to be considered when selecting Pressure Gauge. (6 Marks)
- c) With the aid of a labelled diagram, describe pressure measurement using bellows and a potentiometer. (7 Marks)
- d) What are different types of manometers Used? Sketch each of them. (4 Marks)

### Question FIVE

- a) Mention FOUR types of mechanical tachometer. (4 Marks)
- b) Explain with diagram the operation of a AC tachogenerator. What is the reason for its range limitation? Where is it commonly used. (10 Marks)
- c) Briefly describe Drag cup type electrical Tachometer. (6 Marks)