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# TECHNICAL UNIVERSITY OF MOMBASA

*Faculty of Engineering and Technology*

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING (DICE 5)

INDUSTRIAL MEASUREMENT I

ECI 2302

END OF SEMESTER EXAMINATION

**SERIES: MAY 2016**

**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;. Attempt any **THREE** Questions.

**Do not write on the question paper.**

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### QUESTION ONE

- a. Define the following terms:
- Non-Newtonian fluids.
  - Viscosity.
  - Dynamic viscosity.
  - Newtonian fluids. (8 marks)
- b. Distinguish between:
- Ideal fluid and kinematic viscosity.
  - Shear thickening and shear thinning. (4 marks)
- c. State **FOUR** distinct advantages of pneumatics. (4 marks)
- d. A capillary Tube Viscometer of suitable head of 10cm is provided to the liquid so that it can flow freely through the capillary tube of length 30cm in to a collection tank. If the flow rate of the liquid Q is 2000Litres/hour and the specific weight of the liquid is 5000N, calculate the viscosity of the liquid. (take the diameter of the capillary tube to be 15cm) (4 marks)

### QUESTION TWO

- a. With the aid of a diagram explain the operation of the flapper nozzle as used in the measurement of pressure. (6 marks)
- b. State and describe any **TWO** techniques used in moisture measurement. (8 marks)
- c. Explain the following terms:
- Absolute pressure.
  - Saturation vapour pressure.
  - Vapour pressure. (6 marks)

### QUESTION THREE

- a. Define the following terms :
- Absolute humidity.
  - Relative humidity.
  - Specific humidity.
  - Dew point temperature. (4 marks)
- b. Describe with the aid of a diagram the operation principle of a Capillary Tube viscometer. (6 marks)
- c. With the aid of a diagram, explain the principle of operation of the relay amplifier. (6 marks)
- d. State and explain any **TWO** types of Pneumatic valves. (4 marks)

### QUESTION FOUR

- (a) i. What is a load cell? (2 marks)

- ii. Describe the construction and operation of industrial strain gauge load cell for weight measurement. (6 marks)
- (b) With the aid of a diagram describe the operation of a fluidic amplifier. (4 marks)
- (c) i. Define the term tachometer.
- ii. Distinguish between mechanical and electrical tachometers. (4 marks)
- (d) i. Explain the term stroboscope.
- ii. Explain any **TWO** applications of stroboscope. (4 marks)

### QUESTION FIVE

- (i) a. State **TWO** advantages of electronic stroboscope over mechanical stroboscopes. (2 marks)
- b. Describe “industrial load cell” and state any **TWO** applications. (8 marks)
- (ii) a. Define the term Ultrasound. (2 marks)
- b. Describe the various parts of a ultrasound transmission system. (8 marks)