PAPER 1I

TECHNICAL UNIVERSITY OF MOMBASA

School of Engineering & Technology

Department of Electrical & Electronics

UNIVERSITY EXAMINATION FOR:

Diploma in Electrical and Electronic Engineering

ECI 2203 MEASUREMENT TECHNOLOGY II

END OF SEMESTER EXAMINATION

SERIES: JULY 2025

TIME: Two HOURS

Instructions to Candidates

You should have the following for this examination
Answer Booklet, examination pass and student ID, Scientific Calculator & No Mobile Phone.
This paper consists of five questions. Attempt any THREE questions.
Maximum marks for each part of a question are as shown.
This paper consists of THREE printed pages

Do not write on the question paper.

QUESTION ONE

(a) Define and or state the following as applied in temperature measuremen

(i) Standard

(ii) Temperature

(iii) Six thermometric properties

(iv) Three fctors on choice of a thermometer

(11mks

)

(b) (i)State Bimetal strips characteristics taken into account on their applications and explain thermal expansion phenomenon

(ii)Describe the operational principles of a Bimetallic sensor and where they are used.
(9mks)

QUESTION TWO

(a) (i)How do relative tempeature scales differ from the absolute scales and how do calibration define the temperature scales?
(ii)State atleast four standard calibration points
(iii)A material has a temperature of 335K.Find the temperature in ^{o}R. (9mks)
(b)(i)State and explain the uses,advantage and disantvantage of gas thermometer Sensor
(ii)With aid of a diagram explain an industrial filled syatem thermometer that responds to To volume change
(iii)Explain the Reaumur scale commonly known as the Rankine scale degrees (^{o}R)
(11mks)

QUESTION THREE

(a) With reference to thermocouple principle define and or in detail explain the following terms

(i) seebeck effect

(ii) Peltier effect

(iii) Thormson effect (9mks)

(b) (i)Explain in detail the general principle used in Resistance temperature Detectors (RTDs) and show a complete diagram of an industrail resistance thermometer

(ii)State atleast three requirements of a conductor material to be used in RDTs
(11mks)

QUESTION FOUR

(a) (i)With aid of a diagram explain the turbine flow meter
(ii)Enumerate three advantages and atleast two limitations of Turbine meters (10mks)
(b)(i)Explain the two principles used for construction of radiation temperature measuring devices

(ii)The emitted Radiant energy from a piece of metal is measured and the temperature is found to be 1065^0c assuming a surfaceemissivity is 0.75,calculate the error in temperature measurement. (10mks)

QUESTION FIVE

(a) (i)With the aid of a diagram explain the principle of operation of a positive displacement meter.

(ii)Show a schematic venturi pipe installation diagram and explain its major advanta ge as a constant area -variable head device of differential pressure flow measurement. (12mks)

(b) (i)Define a thermister and state three of therir applications

(ii)A temperature alarm unit with a time constant of 120s is subjected to a sudden in temperature of 50^0c because of fire.If an increase of 30^0c is required to actuate the alarm,what will be the delay in sudden tempperstur increase? (8mks)