# MURANG'A UNIVERSITY OF TECHNOLOGY

## SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ENGINEERING TECHNOLOGY

UNIVERSITY ORDINARY EXAMINATION

2020/2021 ACADEMIC YEAR

**SECOND** YEAR **SECOND** SEMESTER EXAMINATION FOR, DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT CODE: 063

UNIT TITLE: MEASUREMENT AND FAULT DIAGNOSIS

DURATION: 2 HOURS

DATE:

TIME:

**Instructions to candidates:**

1. Answer question One and Any Other Two questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

**SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION**

**QUESTION ONE (30 MARKS)**

a) Define the following terms. (6marks)
   i. Measurand
   ii. Fundamental units
   iii. Derived units

b) Using block diagram show the order of getting working units in electrical measurement (5marks)

c) Explain the differences between analogue and digital type instrument (4marks)

d) Using a labelled diagrams describe the following terms as used in instruments
   i. Spring control
   ii. Eddy current control (6marks)

e) Using E.S.U system of units, derive the charge equation (4marks)

f) Explain any two types of errors and indicate how to minimize them (5marks)

**SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION**

**QUESTION TWO (20 MARKS)**

a) State any three precautions to be taken when using sphere gaps method. (3marks)

b) With the aid of labelled diagram, describe the operation of potentiometric recorder (7marks)

c) Describe with the aid of a diagram the measurements of flux density in a ring specimen (10marks)

**QUESTION THREE (20 MARKS)**

a) State any three advantages of using high frequency in a.c. bridges (3marks)

b) Outline any three types of detector in a.c. bridges (3marks)

c) With the aid of circuit diagram and phasor diagram, drive the equation of L1 and RI in Owen's bridge (10marks)

d) An A.C bridge has the following parameters:
R2=35Ω, L2=0.2H, R3=4.5Ω, R4 = 2Ω

Using a.c. general bridge formulae, calculate L1 and R1 (4marks)

**QUESTION FOUR (20 MARKS)**

a) State three advantages of instrument transformers over shunt and multiplier for the extensions of instrument range. (6marks)

b) Explain three classifications of resistors (3marks)

c) Describe two methods of determining B-H curve (8marks)

d) A moving coil instrument having a resistance of 10Ω, gives full scale deflection when the current is 8 mA. Calculate the value of multiplier resistor to be connected in series with the instrument so that it can be used as voltmeter of measuring p.d.'s up to 100V (3marks)