KIBABII UNIVERSITY
(KIBU)

UNIVERSITY EXAMINATIONS
2020/2021 ACADEMIC YEAR

FOURTH YEAR SECOND SEMESTER
SPECIAL/SUPPLEMENTARY EXAMINATIONS

FOR THE DEGREE
OF
BACHELOR OF SCIENCE IN PHYSICS

COURSE CODE: **SPH 443E**

COURSE TITLE: MEASUREMENTS AND INSTRUMENTATION

DATE: 11/1/2022 **TIME:** 8-10am

INSTRUCTIONS TO CANDIDATES

TIME: 2 Hours

Answer question ONE and any TWO of the remaining.
Symbols used bear the usual meaning.

KIBU observes ZERO tolerance to examination cheating

Question One (30 marks)

a) Define the following terms: (i) Accuracy (ii) Precision (iii) Resolution (iv) Drift (4marks)

b) Derive the dimension of the following quantities using fundamental units of L M T I system (2marks)
(i) E.M.F. (ii) Magnetic flux density

c) The expected value of voltage across a resistor is 50V; however the measurement yield a value of 49V. Calculate: (i) absolute error (ii) percentage error (iii) relative accuracy (iv) percentage accuracy. (4marks)

d) Explain the principle of capacitive transducer. (4marks)

e) Give classification of measuring instruments on the basis of operating principle. (5marks)

f) List three advantages which electronics instruments have over electrical instruments. (3marks)

g) In a d.c. potentiometer, balance is obtained at a length of 400mm when using a standard cell of 1.0186 volts. Determine the e.m.f. of a dry cell if balance is obtained with a length of 650mm (2marks)

h) Discuss briefly the working of radiation sensors. (4marks)

Question Two (20 marks)

a) List various operating forces in instruments. Explain the need for each. (6marks)

b) Explain construction and working of a D' Arsonval Galvanometer (8marks)

c) Describe the construction and working of LCDs (6marks)

Question Three (20 marks)

a) Draw the block diagram of CRO and explain the various sections (9marks)

b) Sketch a circuit diagram of a Wheatstone bridge, explain its operation, and derive an equation for the unknown resistance. (7marks)

c) Discuss the working of Hygrometer (4marks)

Question Four (20 marks)

a) Write the classifications of transducers? (5marks)

b) Describe working of three phase wattmeter and draw the diagram showing its connection to measure power in three phase circuit. (7marks)

c) Write a detail notes on Atomic absorption Spectroscopy. (8marks)

Question Five (20 marks)

a) Explain the basic elements of a magnetic tape recorder. (8marks)

b) Describe construction and working of PMMC instrument. (8marks)

c) A moving-coil instrument gives a f.s.d. when the current is 40mA and its resistance is 25Ω. Calculate the value of the shunt to be connected in parallel with the meter to enable it to be used as an ammeter for measuring currents up to 50A (4marks)