THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Applied & Health Sciences

DEPARTMENT OF PURE AND APPLIED SCIENCES

DIPLOMA IN SCIENCE LABORATORY TECHNOLOGY (DSLT10S)

END OF SEMESTER EXAMINATION

EHE 2140: INSTRUMENTAL FAULT DIAGNOSIS AND MAINTENANCE I

SERIES: AUGUST/SEPTEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer booklet*

This paper consists of **FIVE** questions. Answer question **ONE (COMPULSORY)** and choose any other **TWO** questions

This paper consist of **THREE** printed pages

QUESTION ONE – (30 MARKS)

a) (i) State **FOUR** uses of a cathode ray oscilloscope (4 marks)

(ii) List **THREE** advantages of a cathode ray oscilloscope (3 marks)

b) (i) With the aid of a block diagram, describe the operation of a cathode ray oscilloscope (11 marks)

(ii) If one cycle of a waveform on an oscilloscope occupies **FIVE** division of the graticule and the time base speed set to $10\ \mu$ s/cm, determine the frequency of the waveform (2 marks)

c) Differentiate between powered and non-powered multimeters (4 marks)

d) Explain **THREE** errors associated with signal source generators (6 marks)

QUESTION TWO – 20 MARKS

a) Define the following terms as applied to testing instruments
   i) Static sensitivity
   ii) Accuracy
   iii) Precision (6 marks)

b) Explain the disadvantage of using a potential divider network over a T-network in reducing the level of an a.c. signal (2 marks)

c) State **FOUR** characteristics of an audio frequency signal source (4 marks)

d) With the aid of a block diagram, explain the operation of a crystal calibrator (8 marks)

QUESTION THREE – 20 MARKS

a) (i) Explain the term "instrument calibration" (2 marks)
   (ii) Outline the steps for calibrating an instrument (8 marks)

b) Differentiate between the direct and indirect types of thermocouples (4 marks)

c) With the aid of a diagram, explain the operation of the attraction type moving iron instrument. (6 marks)

QUESTION FOUR – 20 MARKS

a) State **FOUR** characteristics of test signals (4 marks)

b) (i) Illustrate the basic digital technique of frequency measurement (4 marks)
   (ii) Explain the disadvantages of the technique in c(i) (2 marks)
   (iii) Describe how the problem in c(ii) can be overcomed (4 marks)

c) With the aid of a diagram, explain the operation of an a.c. amplifier type electronic voltmeter (6 marks)

QUESTION FIVE – 20 MARKS

a) Explain the use of test signals (2 marks)

b) Distinguish between static and dynamic characteristics of a test instrument (4 marks)

c) State **THREE** advantages and **TWO** limitations of a permanent magnet moving coil ammeters and voltmeters (5 marks)

d) (i) The T- type attenuator shown in figure 1.0 has an input resistance of R_o Ω when a resistance of R_o Ω is connected across the output terminals. Determine the value of R_o (4 marks)

(ii) If a constant signal source of amplitude IV is applied at the input terminals, determine the Output signal amplitude when the output terminals are:-

a) Open circuit (2 marks)

b) Terminated in a resistance of R_o Ω (3 marks)

OUTPUT

Fig 1.0