



MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

P.O. Box 972-60200 – Meru-Kenya.

Tel: 020-2069349, 061-2309217. 064-30320 Cell phone: +254 712524293, +254 789151411

Fax: 064-30321

Website: www.must.ac.ke Email: info@must.ac.ke

University Examinations 2013/2014

FIRST YEAR, SECOND SEMESTER EXAMINATION FOR CERTIFICATE IN
ELECTRICAL INSTALLATION

EEE 0104: ENGINEERING PRINCIPLES II

DATE: APRIL 2014

TIME: 1 ½ HOURS

INSTRUCTIONS: Answer question *one* and any other *two* questions

QUESTION ONE – (30 MARKS)

- (a) Define the following terms, giving their units;
- (i) Magnetic flux density
 - (ii) Magnetomotive force
 - (iii) Magnetizing force (6 Marks)
- (b) Explain the functions of the following devices in an analogue measuring instruments.
- (i) Deflecting device
 - (ii) Controlling device
 - (iii) Damping device (6 Marks)
- (c) Define the following terms as used in a.c systems.
- (i) Frequency
 - (ii) Peak to peak value
 - (iii) Amplitude (3 Marks)
- (d) An alternating current is given by $i = 246 \sin 628t$ Amperes. Calculate the following:
- (i) RMS value
 - (ii) The frequency
 - (iii) The mean value (6 Marks)
- (e) Determine the reluctance of the material whose length is 420mm, cross-sectional area of 120mm^2 with relative permeability of 920. (5 Marks)
- (f) Moving coil instrument with full scale deflection current of 40mA is required to measure current of 40Amperes. Calculate the value of the shunt resistor required. (4 Marks)

QUESTION TWO – (15 MARKS)

- (a) Using a well labelled diagram, explain the construction and operation of a basic analogue moving coil instrument. (8 Marks)
- (b) A ferrous material gives magnetic flux density of 1.85Teslas when subjected to magnetixing force of 1540AT/M. Calculate the relative permeability of the material. (4 Marks)
- (c) State three types of Errors in measuring instruments. (3 Marks)

QUESTION THREE – (15 MARKS)

- (a) Define the following terms giving their units;
- (i) Reluctance
 - (ii) Inductance (4 Marks)
- (b) A conductor 19.38 metres is wound with 4200 turns and has current of a 0.87 amperes passed through it. Calculate.
- (i) Magnetomotive force
 - (ii) Magnetic field strengths (5 Marks)
- (c) A moving coil instrument having coil resistance of 9Ω have fullscale deflection current of 20mA. Calculate;
- (i) Shunt resistance required to measure current 25 amperes
 - (ii) Multiplier resistance to measure voltage of 50 volts. (6 Marks)

QUESTION FOUR – (15 MARKS)

- (a) For the above circuit, derive the expression to calculate unknown resistance R_X
(3 Marks)
- (b) Given the values $R_1 = 27\Omega$, $R_3 = 14$ and $R_4 = 30\Omega$, Calculate the unknown resistance R_X .
(2 Marks)
- (c) Explain the two Faradays laws of electromagnetic induction.
(4 Marks)
- (d) A conductor with a 16metres experiences a force of 20 Newtons when subjected to 200mT flux density. Calculate the amount of current flowing in the conductor.
(4 Marks)
- (e) State Lenz law.
(2 Marks)