MACHAKOS UNIVERSITY

University Examination 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

CERTIFICATE IN ELECTRICAL AND ELECTRONIC ENGINEERING

1601/102: EEEP II

DATE: 25/4/2019 **TIME: 8.30-11.30 AM**

INSTRUCTIONS:

Answer question one and any other two questions

QUESTION ONE (30 MARKS)

a) i Define a magnet

ii State three properties of magnetic lines of force (4 marks)

iii A flux density of 1.2T is produced in a piece of cast steel by a magnetizing force of 1250A/m. Find the relative permeability of the steel under these conditions. (5 marks)

b) i State ohms law (1 mark)

ii Explain the following terms as applied in conductors

i) Atomic structure

ii) Valence (4 marks)

c) i Four equal capacitors each of 30μF are connected in parallel. Calculate the effective capacitance across the network. (4 marks)

ii With an aid of a labeled diagram derive the formula for total capacitance of three capacitors connected in series. (3 marks)

d) Differentiate

i. Wet from dry cell

ii. A cell from a battery. (4 marks)

iii. A cell of 60V and internal resistance of 5Ω is connected in series with a parallel combination of two 30Ω resistors. Calculate

i) The total current flowing

ii) The energy consumed by one resistor in 22 minutes 34 seconds by one resistor (4 marks)

QUESTION TWO (20 MARKS)

a) Define the following terms as used in electrostatics

i. Capacitance

ii. Electric field intensity (2 marks)

b) i Name **four** (4) uses of capacitors (4 marks)

ii Explain the factors that determine capacitance of a capacitor (3 marks)

c) i Explain "relativity permittivity" as used in capacitors. (3 marks)

ii A parallel plate capacitor has a plates of A=1000cm^2 separated by a dielectric material of thickness 1.4mm whose ϵ_r=6 the potential difference across it is 100V. Determine:-

i) the capacitance of the capacitor

ii) the charge stored

iii) the electric field intensity

iv) electric flux density (8 marks)

QUESTION THREE (20 MARKS)

a) Explain the differences between series and parallel circuits (5 marks)

b) A coil of wire has a resistance of 80 Ω at 20^{o}C. If the temperature coefficient of resistance of copper at 0^{o}C is 0.0043/^{o}C, calculate the resistance of the coil at 50^{o}C. (5 marks)

In the circuit below calculate:

i. The total current

ii. The voltage across the RL

iii. The energy dissipated by R4 in 1 hour 42seconds. (10 marks)

QUESTION FOUR (20 MARKS)

a) Define the following terms:

i. magnetomotive force

ii. magnetic field intensity (4 marks)

b) Using diagrams, explain how domains in an unmagnetized piece of iron differ from those of a magnetized one. (3 marks)

c) i List three advantages of electromagnetism over permanent magnet (3 marks)

ii Name three applications of electromagnetism (3 marks)

d) i Explain the difference between hysteresis of soft iron from that of steel (3 marks)

ii Name four factors that affect inductance (4 marks)

QUESTION FIVE (20 MARKS)

a) i Explain, using examples, what electrolysis is. (3 marks)

ii Draw the lechlanche cell and label its essential parts. (5 marks)

a) Explain two disadvantages of primary cell. (4 marks)

b) i Differentiate primary from a secondary cell (2 marks)

ii Explain, using a diagram, how the lead acid cell works. (6 marks)