



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 $30\mu\text{F}$ 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 “relative permittivity” as used in capacitors. (3 marks)
- ii A parallel plate capacitor has a plates of $A=1000\text{cm}^2$ separated by a dielectric material of thickness 1.4mm whose $\epsilon_r=6$ 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 80Ω at 20°C . If the temperature coefficient of resistance of copper at 0°C is $0.0043/^\circ\text{C}$, calculate the resistance of the coil at 50°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)