



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT: ELECTRICAL AND ELECTRONICS ENGINEERING

END OF SEMESTER EXAMINATIONS:

APRIL 2025

CERTIFICATE IN TECHNOLOGY: ELECTRICAL ENGINEERING

UNIT CODE: EEE 1150

UNIT NAME: ELECTRICAL ENGINEERING SCIENCE

TIME: 2 HOURS

INSTRUCTIONS.

This Paper Contains **Five** Questions. Answer any **Three** Questions. All Questions carry equal marks

QUESTION ONE

- a) Define the following
- 1) Conductance
 - 2) Capacitance
 - 3) Resistance
- 3 Marks
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- b) 1) Define Ohm's law
- 2 Marks
- 11) Derive the formula for the connection of four Resistors connected in Parallel
- 5 Marks
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- c) Define 1) Kirchhoff's Voltage law
- 4 Marks
- 11) Kirchhoff's Current law
- 4 Marks

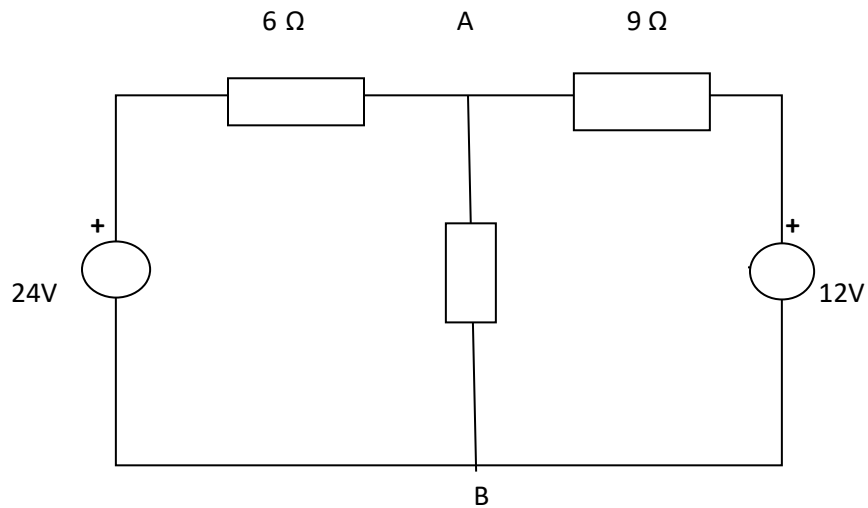


FIGURE 1

- c) 111) For the Circuit of Fig 1 above, calculate using Kirchhoff's laws
- 1) The Current through the $3\ \Omega$ Resistor (The resistor between A and B) 6 Marks

QUESTION TWO

- a) Define
 - 1 Cell 2 Marks
 - 2 Battery 2 Marks
 - 3 Polarization 2 Marks
 - 4 Local Action 2 Marks
- b) State the difference between Primary and Secondary Cells 2 Marks
- c) With the aid of diagrams describe the Construction and operation of Dry Leclanche Cell. 7 Marks
- d) List three applications of Cells. 3 Marks

QUESTION THREE

- a) With the aid of diagrams, describe the effect of
- 1) Length of conductor on resistance 2 Marks
 - 2) Cross-sectional area of conductor on resistance 2 Marks
- b) A wire of 0.5mm diameter has a resistance of 1000Ω. Find the Resistance of the same Length of a similar Cable if its diameter is doubled 6 Marks
- c) A resistance wire has a length of 20M and a Cross-sectional Area of 4mm². The wire is then drawn out until its length is increased four times. The resistance of the wire is now measured and found to be 160Ω, find the value of its resistance at the original dimensions 6 Marks
- d) Define 1 Resistivity 2 Marks
- 11) Two resistors 3 and 2 are connected in parallel, find
- 1) Their total Conductance
 - 11) Their total Resistance 2 Marks

QUESTION FOUR

- a) Define the following magnetic materials
- 1) Reluctance (S) 2 Marks
 - 2) Magnetomotive Force (Mmf) 2 Marks
 - 3) Magnetic Field Intensity (H) 2 Marks
- b) Give four Comparisons between Magnetic and Electric Circuit. 4 Marks
- c) A magnetic Circuit has a reluctance 5 X 10⁶ At/Wb. Find the current which is required to flow in a solenoid of 10,000 turns of wire if the desired level of flux is 5mWbs. 4 Marks

- d) A magnetic Field Intensity of 8000 At/m is applied to a circular magnetic circuit of mean diameter 50 cm by passing a current through a coil wound on the circuit. If the coil is uniformly wound around the circuit and has 850 turns, find the current in the coil
6 marks

QUESTION FIVE

- A) 1) Give an expression relating to the Charge and Pd for a Capacitor stating the units involved.
4 Marks

11) Calculate the Capacitance needed to store a charge of 8 mC when the Capacitor is connected across a 200 V source
4 Marks

- B) A $0.05 \mu\text{F}$ Capacitor is charged from 0 to 50 V by a constant charging current of 1.2 A mps. When the Pd is 50 V , Find:

1) The Charge on the Capacitor

6 Marks

11) The Energy stored by the Capacitor

6 Marks

