



(The University of choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

**UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR**

**YEAR TWO SECOND SEMESTER EXAMINATIONS
(Main examination)
ODEL**

BACHELOR OF SCIENCE IN FOOD SCIENCE AND TECHNOLOGY

COURSE CODE: AET 203

COURSE TITLE: Principles of Electrical and Electronic Engineering

DATE: 24TH April 2024

TIME: 11:30AM-2:30PM

Instructions: This paper consists of 6 questions

Answer all questions in section A, and any other 3 questions

Ensure your answers are clearly and logically written

All line diagrams drawn should be clear and clearly labelled

SECTION A (25 marks)

Question One

- (a) Define the following terms as used in circuit theory
- i. Network Elements
 - ii. Network
 - iii. Circuit
 - iv. Branch
 - v. Node
 - vi. Loop
 - vii Mesh or Independent Loop
- (7 marks)**
- (b) Distinguish between electromotive force and potential difference **(3 marks)**
- (c) Differentiate between Kirchoff's Current law and Kirchoff's voltage law. **(2 marks)**

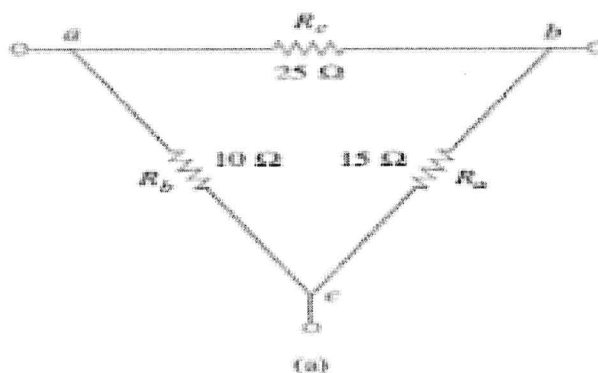
Question Two

- (a) Distinguish between active and passive elements of an electrical circuit current. **(4 marks)**
- (b) Sketch a DC motor and describe its principle of operation **(4 marks)**

SECTION A (45 marks)

Question Three

Convert the Delta network in the figure to an equivalent star network **(5 marks)**



(b) Explain the difference and advantage of the three-phase electrical system over the single-phase electrical system **(5 marks)**

(c) Show and explain with the aid of a diagram the VI characteristics of Ideal independent current and voltage source. How do they differ from the practical independent sources and why? **(5 marks)**

Question Four

(a) Distinguish between

- Pnp transistor and npn transistor
- Full wave and half wave rectification
- Common base and common emitter transistor configuration

(6 marks)

(b) Show that for a circuit having two resistors in parallel

$$i_2 = \frac{iR_1}{R_1 + R_2}$$

(6 marks)

(c) State the different methods used in categorization of electric cables **(3 marks)**

Question Five

A 240V, 250/π Hz supply is connected in series with 60R, 180mH and 50μF. Take the emf as the reference phase and find:

- the complex impedance of the circuit
- the complex, real (i.e. physical) and rms currents, and
- the complex, real (i.e. physical) and rms potential differences across each element.

(15 marks)

Question Six

(a) Explain with equations and diagrams where applicable, the following terms that are used in alternating current theory;

- Peak to peak value
- Instantaneous value
- RMS Value
- Peak value
- Form factor
- Average value
- Admittance
- Reactive power

- ix. Power factor
- x. Apparent power.

(10 marks)

(b) Find the power delivered to an element at $t = 5 \text{ ms}$ if the current entering its positive terminals is $i = 5\cos 60\pi t \text{ A}$ and the voltage is:

(a) $v = 3i$,

(b) $v = 3di/dt$.

(5 marks)