

071306T4EEN

ELECTRICAL ENGINEERING (POWER OPTION) LEVEL 6

ENG/OS/PO/CC/03/6

Apply Electrical Principles

March/April 2026



**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION
COUNCIL (TVET CDACC)**

WRITTEN ASSESSMENT

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATE

1. Marks for each question are indicated in the brackets.
2. Attempt **ALL** questions in section A and **ANY THREE** (3) questions in section B.
3. This paper consists of **TWO** sections: **A** and **B**.
4. Candidates are provided with a separate answer booklet
5. **DO NOT** write on this question paper.

This paper consists of FOUR (4) printed pages

Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.

SECTION A (40 MARKS)**Answer ALL questions in this section.**

1. Electrical quantities are the foundation of electrical engineering, understanding their definitions and SI units helps in analyzing and designing circuits. Define the following basic electrical quantities giving their SI units. (4 marks)
 - i. Force
 - ii. Work
 - iii. Power
 - iv. Energy.
2. A dry cell transfers electric charge from one terminal to another through conductor. Define the term electric charge. (2 marks)
3. Laws are applied in electrical circuits to show relationship between various quantities. State the following laws. (4 marks)
 - i. Ohms law
 - ii. Kirchhoff's voltage law.
4. Three phase systems are commonly used in many electrical systems. State FOUR advantages of three phase systems over single phase systems. (4 marks)
5. The resistance of a conductor depends on several factors. Explain the effects of variations of temperature on the resistance of conductors and semiconductors. (4 marks)
6. Trainees constructed the circuit shown in Figure 1 when carrying out an experiment on Ohms Law. Calculate the current passing through resistors R_1 . (5 marks)

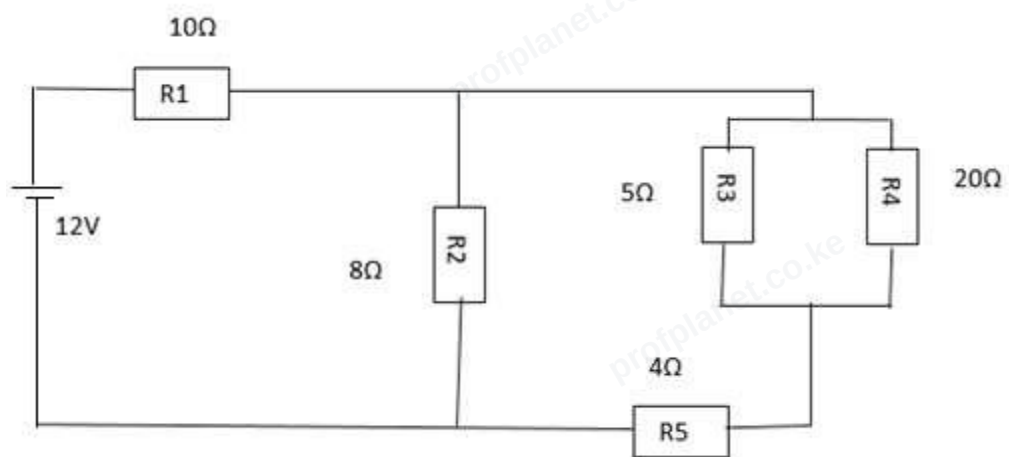


Figure 1: Ohms law circuit

7. Magnetism is the fundamental study of source of electric energy, which plays a significant role in our industries as a whole. Differentiate between. (4 marks)

- i. Magnetic flux and,
 - ii. Magnetic flux density.
8. Kirchhoff's laws are fundamental in the study of current and voltage in electrical circuits. Use Kirchhoff's Laws to determine the currents flowing in each branch of the network in the Figure 2 shown. (5 marks)

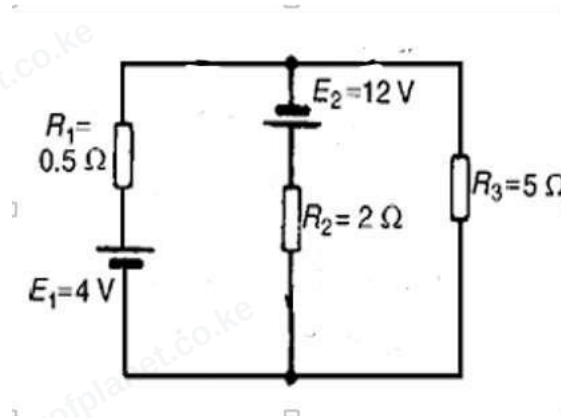


Figure 2: Kirchhoff's law circuit

9. There are many theories that supports the study of electricity as a science in real life situations. State the following theorems; (4 marks)
- i. Thevenin's theorem.
 - ii. Superposition theorem.
10. Lightning protection measures are essential safety systems designed to protect buildings, structures, and electrical systems from damage caused by lightning strikes. List FOUR components used in lightning protection systems. (4 marks)

SECTION B (60 MARKS)

Answer Any THREE questions in this section.

11. AC and DC circuits have similarities and differences that guide engineers, technologists and technicians on their choice during design.
- a) Compare D.C circuits and A.C circuits (14 marks)
 - b) Explain three applications of D.C circuits in electrical installation. (6 marks)
12. a) A single-phase motor takes 50A at a power factor of 0.6 lagging from 240V, 50Hz supply. Draw the phasor diagram and determine;
- i. The current taken by a capacitor connected in parallel with the motor to correct the power factor to unity. (7 marks)
 - ii. The value of the supply current after power factor correction. (3 marks)
- b) During a dual program, a student identified a transformer as one of the most critical equipment in power transmission and distribution networks. Explain FIVE functions of a transformer in an electrical power system (10 marks)
13. a) There are different types of single-phase induction motors extensively used in home and commercial appliances. With the aid of a diagram, describe the working principle of a capacitor-start capacitor-run induction motor. (10 marks)
- b) A manufacturing workshop operates several inductive loads and is experiencing high electricity costs and equipment overheating. Tests show that the system has a low power factor. As an electrical engineering trainee, explain FIVE devices used to correct low power factor. (10 marks)
14. Earthing in electrical installations is a safety measure that protects people and equipment from electrical hazards by providing a safe path for fault currents to flow to the ground, preventing exposed metal parts from becoming live.
- a) Explain FOUR components of an earthing system. (8 marks)
 - b) Describe SIX methods of earthing in an electrical installation. (12 marks)