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071306T4EEN**ELECTRICAL ENGINEERING (POWER OPTION) LEVEL 6****ENG/OS/PO/CR/ 03 / 6****Install Electrical Machine****July/August 2025**Printed By: Technical And Vocational College Date: 29.07.2025
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**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION
COUNCIL (TVET CDACC)****WRITTEN ASSESSMENT**

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Time: 3 HOURSPrinted By And Vocational College Date: 29.07.2025 10:49
AM**INSTRUCTIONS TO CANDIDATE**

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

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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)

Attempt ALL the questions in this section.

1. Before commissioning is safe and functional. State FOUR such tests. (4 marks)
2. During the design of the machine control panel for a heavy-load industrial installation, there are. State FOUR factors to consider when designing this machine's control panel. (4 marks)
3. Electrical design and cable sizing are critical in n. List THREE operational implications of using incorrect cable sizes in a machine installation. (3 marks)
4. It is necessary to verify the manufacturer's technical specifications before the commencement of electrical machine installation. Give TWO justifications (4 marks)
5. Proper mounting of an electrical machine is essential to ensure safety, performance, and durability. List THREE critical factors that must be considered when mounting an electrical machine. (3 marks)
6. For each of the following, list TWO relevant safe working procedures during machine installation:
 - a. Personnel safety (2 marks)
 - b. System safety (2 marks)
7. State FOUR significances of using only calibrated and certified instruments when testing installations. (4 marks)
8. To initiate synchronous motor operation in industrial settings, several methods are used. Name FOUR of these methods of starting a synchronous motor. (4 marks)
9. Machine layout should be designed in line with its standard operating procedures. List FOUR importance of conducting a proper electrical machine layout design before installation. (4 marks)
10. Several activities are undertaken to ensure correct electrical machine installation. State the FOUR essential steps for laying electrical cables for the machine installation, in line with IEE and EHS standards. (4 marks)
11. When selecting the appropriate mechanical transmission system for motors, the type of drive systems is a crucial factor to consider. List TWO reasons why the use of belt drive systems is discouraged in Series DC motor applications. (2 marks)

SECTION B (60 MARKS)*Attempt Any **THREE** Questions in This Section*

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12. The XYZ Biotech Plant is commissioning a new automated fermenter system. As the electrical technician on site, you're responsible for mounting and wiring a 30kW motor control panel intended to regulate three-phase motor operations in a high-humidity, corrosive

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- a) Describe FIVE key considerations that must be adhered to when mounting a machine control panel in this industrial setting. (10 marks)

- b) Describe the systematic procedure for terminating electrical cables in this industrial installation. (10 marks)

13.

- a) A maintenance technician was found unresponsive while servicing a motor control panel during a scheduled shutdown. Initial reports confirmed the technician had suffered an electric shock. An investigation was launched to determine the root cause

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ty systems in place at the time of the incident.

- i. Explain THREE possible technical causes that could have led to the technician's electrocution. (6 marks)

- ii. Recommend THREE corrective measures to be implemented to eliminate such electrical hazards in future installations. (6 marks)

- b) Plant layout is a crucial aspect of industrial design, determining the arrangement of

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- machines and equipment for optimal efficiency. Explain the FOUR key types of plant layouts used in industrial setups. (8 marks)

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14.

- a) An industrial panel supply line at Shanzu Industrial Park has recently failed to operate. Your team is conducting an inspection to identify the cause of failure. Explain FIVE critical items you would assess during this exercise

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(10 marks)

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b) You are installing a 15kW pump motor at the XY Water Treatment Plant. The system uses a Direct-On-Line (DOL) starter method. Sketch;

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i. Power circuit for this installation.

(5 marks)

ii. Control circuit for the diagram for the same installation.

(5 marks)

15. A manufacturing company in Kenya recently installed a new 3-phase industrial

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compressor motor to support an increased production demand. The installation was expedited to meet an urgent operational deadline. A preliminary checklist was provided to the junior technician handling the task. During the initial test run, the motor emitted high-frequency vibrations and unusual noise, causing the circuit breaker to trip. Upon investigation, it was found that no alignment tools were used, electrical cables were stressed, and foundation bolts were loose, while the commissioning checklist had not been signed off.

a) Based on the scenario, explain THREE critical installation-related errors that contributed to the machine's poor performance. (6 marks).

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b) From a mechanical perspective, explain FOUR possible consequences of operating a machine that has not been correctly aligned with its driven load.

(4 marks).

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c) Before powering on a newly installed electrical machine, describe the preparatory steps that should have been carried out to ensure both safety and proper

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lity. (6 marks).

d) Recommend any TWO relevant long-term preventive strategies that the company should adopt to improve the quality and safety of future electrical machine installations. (4 marks)

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