071305T4EOP

ELECTRICAL OPERATION (POWER OPTION) LEVEL 5

ENG/OS/PO/CR/ 03 / 5

Install Electrical Machine

November/December 2025.

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

WRITTEN ASSESSMENT

Time: 3 HOURS

INSTRUCTIONS TO CANDIDATE

1. This paper consists of **TWO** sections: **A** and **B**.
2. Attempt **ALL** questions in section A and **ANY THREE**.

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 papers.

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 switching on achines, technicians must be confident about performance. State TWO reasons why machines undergo testing after installation. (2 marks)
2. Speed control is essential in many industrial applications, such as conveyors and machine tools, to ensurend precision. State THREE methods of controlling the speed of a DC machine. (3 marks)

3. Single-phase induction motors are widely dustrial applications, but they require additional components to start. State FOUR reasons why single-phase induction motors are not self-starting. (4 marks)

4. Safety is a critical concern when working with electrical machines to prevent accidents and equipment damage. State FOUR safety measures that a technician should observe when installing an electrical machine. (4 marks)
5. Proper mounting of an electrical machine ensures optimal performance, reliability, and long HREE factors considered when mounting an electrical machine. (3 marks)

6. In industrial machine installations, secure cable connections are vital. List THREE reasons why it is advisable to use cable lugs. (3 marks)

7. Motor control devices play a vital role in protecting and regulating electric motors in industrial applications. Name the function of each of the following motor control devices. (4 marks)

   i. Overload Relay

   ii. Start Button
   iii. Stop Button
   iv. Auxiliary Contacts

8. During industrial installations, adherence to international quality standards is essential. Identify FOUR roles that International Electrotechnical Commission (IEC) standards play in ensuring safe and effective electrical machine installation. (4 marks)

9. Sele r for a specific application is crucial for efficiency, performance, and cost-effectiveness. List FOUR factors to be considered when choosing a motor for a particular application. (4 marks)
10. The design of electrical machines is subject to various limitations that affect their efficiency and application. List THREE limitations of the design of an electrical machine. (3 marks)

11. While testing a newly installed machine, you are asked to conduct an insulation resistance test. Name the purpose of performing the test and the instrument used. (3 marks)
12. In planning industrial electrical installations, safety must be prioritized. List THREE key design considerations for the layout of electrical machines that contribute to enhanced safety in the workplace. (3 marks)

SECTION B (60 MARKS)

Attempt Any THREE Questions in This Section

13.

(a) You have been contracted by Blue Nile Textiles Ltd to mount a 5Hp induction motor. Discuss FIVE safety precautions to observe during the mounting process. (10 marks)

(b) A power outage has been caused by a generator failure at a critical site. As a technician, explain FIVE potential reasons for this failure, and propose a single preventive measure for each cause to avoid future occurrences. (10 marks)

14.

(a) In industrial motor applications, the 'Direct on Line' (DOL) method is a common starting technique. With the aid of a labelled diagram, describe operation of the power circuit and control circuit of the 'Direct on Line' motor installation. (12 marks)

(b) Before commissioning an electrical installation, several tests must be carried out to verify its safety and functionality**.** Describe FOUR tests conducted on a complete electrical installation. (8 marks)

(a) Single-phase induction motors are commonly used in domestic and industrial applications due to their simplicity and reliability. With the aid of a labelled circuit diagram, explain the operation of a single-phase split-phase induction motor. (12 marks)

(b) DC motors are widely used in different applications because of their unique characteristics. Analyze FIVE advantages and THREE disadvantages of DC motors in comparison to other types o (8 marks)

16.

(a) During routine checks, an industrial technician observes that an electric motor is operating with reduced efficiency and frequent overheating. Explain FIVE possible solutions to restore efficiency and prevent future bre. (5 marks)

b) In industrial machine installations, cable lugging is one of the most common methods used to secure cable connections. Describe the correct steps for performing cable lugging during elece installation. (5 marks)

c) You have been awarded a contract to install a three phase posho mill within your shopping centre. Discuss the correct procedure for mounting the posho mill run by three phase motor. (10 marks)