

071606T4IMT

INDUSTRIAL MECHATRONICS TECHNOLOGY LEVEL 6

ENG/OS/IMT/CR/01/6

Design Electromechanical Systems

March/April 2026



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

WRITTEN ASSESSMENT

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATE

1. The paper consists of **TWO** sections: **A** and **B**.
2. Answer **ALL** questions in section **A** and **THREE** 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 this question paper.

This paper consists of THREE (3) printed pages.

**Candidate should check the guide to ascertain that all the pages are printed as indicated
and that no questions or answers are missing.**

SECTION A (40 MARKS)

Answer ALL questions in this section

1. Mathematical models are used to represent real systems during design and analysis. Identify FOUR mathematical modelling techniques. (4 marks)
2. The use of appropriate personal protective equipment (PPE) is important to ensure safety. State FOUR PPEs used when working with electromechanical systems. (4 marks)
3. Before developing a system, designers establish system requirements. List FOUR technical specifications that should be considered in the design process. (4 marks)
4. Safety should be considered at all stages of engineering design. Name FOUR aspects that should be addressed when designing for safety. (4 marks)
5. Need analysis is the first stage that forms the basis of the design process. State FOUR reasons for conducting need analysis during design process. (4 marks)
6. Simulation software is used to test system performance before physical implementation. Name FOUR simulation software. (4 marks)
7. Different stages of design have distinct purposes. State TWO Differences between conceptual design and functional specification. (4 marks)
8. Controllers regulate the operation of systems. State FOUR controller systems used in electromechanical systems. (4 marks)
9. Drawings play a crucial role in the design process. Identify FOUR importance of using technical drawing. (4 marks)
10. Accurate information is needed for effective system design. List FOUR sources of data collection in the design process. (4 marks)

SECTION A (60 MARKS)

Answer THREE questions in this section.

11.

- a. Patenting of projects is recommended in any design process due to its benefits. Describe FIVE importance of patenting. (10 marks)
- b. Simulation techniques are used to test and evaluate system performance before physical production. Explain FIVE types of simulation. (10 marks)

12.

- a. Technical reports are formal documents used to present engineering findings and designs. Describe FIVE elements of a technical report. (10 marks)
- b. Design optimization techniques are applied to improve system performance and reduce maintenance cost. Explain FIVE methods of performing design optimization. (10 marks)

13. Sensors provide feedback by detecting physical parameters. Proper sensor selection ensures system accuracy and reliability.

- a. Describe FIVE types of sensors. (10 marks)
- b. Explain FIVE factors to consider when selecting sensors. (10 marks)

14.

- a. Electromechanical systems combine various components to perform automated tasks. Explain FIVE components of electromechanical systems. (10 marks)
- b. Proper system design requires consideration of design factors to achieve safety and efficiency. Explain FIVE factors to consider in the design of systems. (10 marks)