

APPLY ELECTRICAL AND ELECTRONICS PRINCIPLES

UNIT CODE: 0713 441 09A

TVET CDACC UNIT CODE: ENG/OS/AUT/CC/05/5/MA

UNIT DESCRIPTION

This unit describes the competences required in order to apply electrical and electronics principles. It involves applying basic concepts of electrical quantities, cells and batteries, magnetism and electromagnetism, basic electrical machines and electronics principles.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range.</i>
1. Apply basic concepts of electrical quantities	1.1 <i>SI units</i> in Electrical are identified as per task requirement 1.2 <i>Quantities</i> of Charge, force, work and power are applied as per task requirement 1.3 Calculations involving Ohm's law are performed as per task requirement 1.4 Measuring instruments for electrical quantities are applied as per task requirement
2. Apply DC and AC circuits	2.1 Calculations of DC parallel and series circuits are performed as per task requirement 2.2 Calculations involving series resistor, inductor and capacitors in AC circuits are performed as per task requirement 2.3 Calculations involving parallel resistor, inductor and capacitors in AC circuits are performed as per task requirement
3. Apply the concept of cells and batteries	3.1 Various sources of electricity are used as per task requirement 3.2 Electrolysis is applied as per task requirement 3.3 E.M.F and internal resistance of cells is determined as per task requirement

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	3.4 Primary and secondary cells are applied as per task requirement 3.5 Cells and batteries are applied as per task requirement 3.6 Maintenance of batteries is carried out as per task requirement
4. Apply magnetism and electromagnetism	4.1 Magnetic and nonmagnetic materials are used as per task requirement 4.2 Magnetic field patterns are utilized as per task requirement 4.3 Force on current carrying conductor is applied as per task requirement 4.4 Magnetic circuit quantities are applied as per task requirement 4.5 Magnetism curve and hysteresis loop are applied as per task requirement 4.6 Electromagnetic induction principle is applied as per task requirement
5. Apply basic electrical machines	5.1 <i>Electrical machines</i> are applied as per task requirement 5.2 DC machines are applied as per task requirement 5.3 AC machines are applied as per task requirement
6. Apply electronics components	6.1 Capacitors are applied as per task requirement 6.2 Resistors are applied as per task requirement 6.3 Inductors are applied as per task requirement 6.4 Diodes are applied as per task requirement 6.5 Application and testing of electronics components is performed as per task requirement

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
	May include but not limited to:
1. SI unit includes but not limited to:	1.1 Power – Watts (W) 1.2 Current – Amperes (A) 1.3 Resistance – Ohms(Ω) 1.4 Voltage – Volts (V)
2. Quantities includes but not limited to:	2.1 Charge 2.2 Force 2.3 Work 2.4 Power
3. Electrical machines include but not limited to:	3.1 DC motors 3.2 Transformers 3.3 Generators DC

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Use of electrical instruments
- Power factor correction
- Logical thinking
- Problem solving
- Drawing graphs
- Using different measuring tools

Required knowledge

The individual needs to demonstrate knowledge of:

- Electrical power calculations
- Electrical formulas
- Power triangle
- SI units of various electrical parameters
- Types of electrical machines for various uses
- Types and purpose of measuring instruments
- Units of measurement and abbreviations

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1 Critical aspects of competency	Assessment requires evidence that the candidate: 1.1 Applied quantities of Charge, force, work and power as per task requirement 1.2 Performed calculations involving Ohm's law as per task requirement 1.3 Performed calculations of DC parallel and series circuits as per task requirement 1.4 Determined E.M.F and internal resistance of cells as per task requirement 1.5 Applied force on current carrying conductor as per task requirement 1.6 Applied electrical machines as per task requirement 1.7 Applied capacitors as per task requirement 1.8 Applied resistors as per task requirement 1.9 Applied inductors as per task requirement
2. Resource implications	The following resources should be provided: 2.1 Appropriately simulated environment where assessment can take place 2.2 Access to relevant work environment 2.3 Resources relevant to the proposed activities or tasks
3. Methods of assessment	Competency in this unit may be assessed through: 3.1 Portfolio of evidence 3.2 Practical test 3.3 Third party report 3.4 Written tests 3.5 Project work
4. Context of assessment	Competency may be assessed in the workplace or simulated workplace
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector and workplace job role is recommended.