

APPLY ELECTRICAL PRINCIPLES

UNIT CODE:ENG/OS/EI/CC/03/6

UNIT DESCRIPTION

This unit describes the competencies required by a technician in order to apply a wide range of Electrical principles in their work: Competencies include; use the concept of basic Electrical quantities, concepts of D.C and A.C circuits in electrical installation, use of basic electrical machine, use of power factor in electrical installation, use of earthing in Electrical installations, apply Electrostatics, magnetism and Electromagnetism and finally transient in electrical analysis

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA 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>
2. Use the concept of basic Electrical quantities	1.1 Basic <i>SI units</i> in Electrical are identified 1.2 <i>Quantities</i> of Charge, force, work and power are identified 1.3 Perform calculations involving Ohm's law i.e Current, Resistance and voltage 1.4 Calculations involving various electrical quantities are performed
3. Use the concepts of D.C and A.C circuits in electrical installation	2.1 Calculations involving parallel and series circuits are performed 2.2 Calculations involving DC and AC Network theorems are performed. E.g. Kirchoff's laws, Superposition, Thevinin's, Norton's
3. Use of basic electrical machine	3.1 Types of various single-phase electrical machines are identified 3.2 Calculations involving single phase and AC and DC Motors are performed 3.3 Calculations involving single AC and DC transformers are performed 3.4 Calculations involving single phase generators are performed
4. Use of power factor in electrical installation	4.1 Power triangle is identified i.e. Active, Apparent and reactive power 4.2 The use of power factor is performed 4.3 Calculations involving power factor correction is performed 4.4 Methods of power factor correction are applied
5. Use of earthing in Electrical installations	6.5 Earthing types are identified 6.6 Earthing points on Electrical installation are identified 6.7 Calculation involved in determining the earthing type is performed 6.8 Test on an earthing system is performed in line with the IEE regulations
6. Apply Electrostatics	6.1 Sources of Electrostatic fields are identified 6.2 Types of capacitors are identified 6.3 Concept of charge and electrostatic field is established

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	6.4 Dielectric field are determined 6.5 Calculations related to electrostatics are performed
7. Apply Magnetism and Electromagnetism	7.1 Sources of Magnetic field are determined 7.2 Concept of Electromagnetic induction is established 7.3 Electromagnetic Laws are identified 7.4 Losses in Electromagnetism identified 7.5 Leakage and flux fringing are determined 7.6 Rules of magnetic fields are identified
8. Apply transients in Electrical Circuit Analysis	8.1 Growth and decay in R-L-C circuits are determined 8.2 Calculations involving Growth and decay in R-L-C are performed

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	1.1 Power – Watts (W) 1.2 Current – Amperes (A) 1.3 Resistance – Ohms(Ω) 1.4 Voltage – Volts (V)
2. Quantities	2.1 Charge 2.2 Force 2.3 Work 2.4 Power

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:

- Apply basic Electrical formulas
- Use of basic Electrical instruments
- Perform various unit conversions of Electrical quantities
- Electrical earthing
- Lightning arrestors

- Power factor correction
- logical thinking
- problem solving
- applying statistics
- drawing graphs
- Using different measuring tools

Required knowledge

The individual needs to demonstrate knowledge of:

- Electrical power calculations
- Various laws in Electrical engineering
- Electrical formulas
- Power triangle
- SI units of various electrical parameters
- Earthing testing
- Lightening arrestor testing
- Selecting the correct type 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	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> 1.1 Applied the correct SI units of Electrical quantities 1.2 Stated, Calculate and relates the quantities in Ohm's law 1.3 Identified the components of an earthing system 1.4 Stated and apply various laws in Electrical system 1.5 Differentiated between AC and DC network 1.6 Applied correct formulas in the calculation of AC and DC machines 1.7 Used power triangle in calculating power factor 1.8 Applied various methods in power factor correction 1.9 Identified types of lightening arrestors and their applications
2. Resource Implications	<p>The following resources should be provided:</p> <ul style="list-style-type: none"> 2.1 Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2 Measuring equipment 2.3 Materials relevant to the proposed activity or tasks
3. Methods of Assessment	<p>Competency in this unit may be assessed through:</p> <ul style="list-style-type: none"> 3.1 Direct Observation 3.2 Demonstration with Oral Questioning 3.3 Written tests

Context of Assessment	Competency may be assessed individually in the actual workplace or through accredited institution
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

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