Australian Government

Department of Education, Employment and Workplace Relations

UEENEEF106A Solve problems in voice and data communications circuits

Release: 1

UEENEEF106A Solve problems in voice and data communications circuits

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor **1) Scope:**

1.1) Descriptor

This unit covers providing known solutions to predictable problems in single and multiple path circuits operated at extra-low voltage as they apply to various voice and data communications work functions. It encompasses working safely, problem solving procedures, including the use of basic voltage, current and resistance measuring devices, providing known solutions to predictable communication circuit problems.

Application of the Unit

Application of the Unit **2)**

This unit shall apply to persons entering work in electrotechnology and may be used in school based vocational programs.

Licensing/Regulatory Information

License to practice **3)**

The skills and knowledge described in this unit do not require a license to practice in the workplace. However they are subject to regulations directly related to occupational health and safe and contracts of training such as new apprenticeships.

Pre-Requisites

Prerequisite Unit(s) **4)**

Competencies **4.1)**

Granting competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed.

UEENEEE101A	Apply Occupational Health and Safety regulations, codes and practices in the workplace

Literacy and numeracy skills **4.2)**

Participants are best equipped to achieve competency in this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 'Literacy and Numeracy'

Reading	3	Writing	3	Numeracy	3

Employability Skills Information

Employability Skills **5)**

The required outcomes described in this unit of competency contain applicable facets of Employability Skills. The Employability Skills Summary of the qualification in which this unit of competency is packaged will assist in identifying Employability Skill requirements.

Elements and Performance Criteria Pre-Content

6) Elements describe the essential outcomes of a competency standard unit	Performance Criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the Evidence Guide.

Elements and Performance Criteria

ELEMENT		PERFORMANCE CRITERIA	
1	Prepare to work on extra-low voltage voice and data communications circuits	1.1	OHS procedures for a given work area are identified, obtained and understood.
		1.2	OHS risk control work preparation measures and procedures are followed.
		1.3	The nature of the circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.
		1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.
		1.5	Sources of materials that may be required for the work are established in accordance with established procedures.
		1.6	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.
2	Solve problems in extra-low voltage voice and data communications circuits	2.1	OHS risk control work measures and procedures are followed.
		2.2	The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.
		2.3	Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.
		2.4	Established routines are used to solve circuit problems using measured and calculated values

ELEMENT	PERFORMANCE CRITERIA	
		as they apply to single path, single source circuits.
	2.5	Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.
3 Complete work and document problem solving activities.	3.1	OHS work completion risk control measures and procedures are followed.
	3.2	Work site is cleaned and made safe in accordance with established procedures.
	3.3	Justification for solutions used to solve circuit problems is documented.
	3.4	Work completion is documented and appropriate person(s) notified in accordance with established routine procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

8) This describes the essential skills and knowledge and their level, required for this unit.

Evidence shall show that knowledge has been acquired of safe working practices and solving problems in extra-low voltage voice and data communications circuits.

All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies.

KS01-EF106A Electrotechnology communication principles

Evidence shall show an understanding of electrotechnology communication principles, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects:

T1. The basic electrical circuit

- basic circuit components
- function of basic circuit components
- connection of components
- measurement of circuit parameters
- open-circuit, closed-circuit and short-circuits.

T2. Circuit parameter relationships

- Ohms Law
- calculation of voltage, current and resistance
- power dissipated
- calculation of power.

T3. Measurement instruments (voltage, current & resistance)

- safe working procedures
- handling and storing instruments
- selecting and set up of instruments
- connecting instruments
- read analogue scales and digital readouts.

T4. Effects of electrical current

- physiological effect
- heating effect
- magnetic effect
- chemical effect
- typical uses

T5. EMF sources

- basic generator
- basic thermocouple

REQUIRED SKILLS AND KNOWLEDGE

- photovoltaic cells
- piezo electric
- primary and secondary cells.

T6. D.C. resistive circuits

- series circuits (set-up, measurement and calculations)
- parallel circuits (set-up, measurement and calculations)
- series-parallel circuits (set-up, measurement and calculations).

T7. Capacitance

- construction of capacitors
- operation of capacitors
- units
- charge of a capacitor
- RC series circuit.

T8. Magnetism and electromagnetic induction

- permanent magnets
- electromagnetism
- induced emf
- inductors
- principles of inductance
- unit of inductance
- electromagnetic radiation (EMR)
- cross talk.

T9. A.C. principles

- generation of sinusoidal voltage
- a.c. circuit parameters – frequency, period, amplitude, instantaneous value, maximum value, peak value, peak to peak value and rms value
- calculation of frequency and rms values
- effects of frequency on inductors
- effects of frequency on capacitors
- transformers construction and operating principles.

Evidence Guide

EVIDENCE GUIDE

9) This provides essential advice for assessment of the unit and must be read in conjunction with the performance criteria and the range statement of the unit and the Training Package Assessment Guidelines.

The Evidence Guide forms an integral part of this unit. It must be used in conjunction with all parts of the unit and performed in accordance with the Assessment Guidelines of this Training Package.

Overview of Assessment **9.1)**

Longitudinal competency development approaches to assessment, such as Profiling, require data to be reliably gathered in a form that can be consistently interpreted over time. This approach is best utilised in Apprenticeship programs and reduces assessment intervention. It is the industry-preferred model for apprenticeships. However, where summative (or final) assessment is used it is to include the application of the competency in the normal work environment or, at a minimum, the application of the competency in a realistically simulated work environment. It is recognised that, in some circumstances, assessment in part or full can occur outside the workplace. However, it must be in accordance with industry and regulatory policy.

Methods chosen for a particular assessment will be influenced by various factors. These include the extent of the assessment, the most effective locations for the assessment activities to take place, access to physical resources, additional safety measures that may be required and the critical nature of the competencies being assessed.

The critical safety nature of working with electricity, electrical equipment, gas or any other hazardous substance/material carries risk in deeming a person competent. Sources of evidence need to be ‘rich’ in nature to minimise error in judgment.

Activities associated with normal everyday work have a bearing on the decision as to how much and how detailed the data gathered will contribute to its ‘richness’. Some skills are more critical to safety and operational requirements while the same skills may be more or less frequently practised. These points are raised for the assessors to consider when choosing an assessment method and developing assessment instruments. Sample assessment instruments are included for Assessors in the Assessment Guidelines of this Training Package.

Critical aspects of evidence required to demonstrate competency in this unit **9.2)**

Before the critical aspects of evidence are considered all prerequisites shall be met.

Evidence for competence in this unit shall be considered holistically. Each element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines – UEE11'. Evidence shall also comprise:

- A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
  - Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
  - Apply sustainable energy principles and practices as specified in the performance criteria and range statement
  - Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
  - Demonstrate an appropriate level of skills enabling employment
  - Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures
- Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
  - Solve problems in solving problems in extra-low voltage data and voice communications circuits as described in 8) and including:

A Determining the operating parameters of an existing circuit.

B Determining the frequency response of existing circuits

C	Altering an existing circuit to comply with specified operating parameters.
D	Developing circuits to comply with a specified function and operating parameters.
E	Identifying earth faults.
F	Identifying loss of supply.
G	Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions incorporated in a holistic assessment with the above listed items.

Context of and specific resources for assessment **9.3)**

This unit should be assessed as it relates to normal work practice using procedures, information and resources typical of a workplace. This should include:

- OHS policy and work procedures and instructions.
- Suitable work environment, facilities, equipment and materials to undertake actual work as prescribed by this unit.

These should be used in the formal learning/assessment environment.

Note:

Where simulation is considered a suitable strategy for assessment, conditions must be authentic and as far as possible reproduce and replicate the workplace and be consistent with the approved industry simulation policy.

The resources used for assessment should reflect current industry practices in relation to solve problems in extra-low voltage voice and data communications circuits.

Method of assessment **9.4)**

This unit shall be assessed by methods given in Volume 1, Part 3 'Assessment Guidelines'.

Note:

Competent performance with inherent safe working practices is expected in the Industry to which this competency standard unit applies. This requires assessment in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.

Concurrent assessment and relationship with other units

9.5)

There are no concurrent assessment recommendations for this unit.

The critical aspects of occupational health and safety covered in unit UEENEEE101A and other discipline specific occupational health and safety units shall be incorporated in relation to this unit.

Range Statement

RANGE STATEMENT

10) This relates to the unit as a whole providing the range of contexts and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

This unit shall be demonstrated in relation to:

Single source single and multiple path communication circuits as they apply to problems related to installation, fault finding, maintenance or development work functions in any of the following disciplines:

- Voice and Data Communications
- Electronics
- Fire protection
- Renewable and sustainable energy systems, and
- Security technology
- In relation to at least three of the following types of communication circuit problems and on at least two occasions:
- Determining the operating parameters of an existing circuits
- Determining the frequency response of an existing circuits
- Identifying and locating open-circuits
- Identifying and locating short-circuits
- Identifying earth faults
- Identifying loss of supply

Generic terms used throughout this Vocational Standard shall be regarded as part of the Range Statement in which competency is demonstrated. The definition of these and other terms that apply are given in Volume 2, Part 2.1.

Unit Sector(s)

Not applicable.

Competency Field

Competency Field **11)**

Data and Voice Communications