

22697VIC

Certificate IV in Integrated Technologies

Version # 1

22 May 2025

This course has been accredited under Part 4.4 of the *Education and Training Reform Act 2006*.

Accredited for the period: 1 July 2025 to 30 June 2030

Version History:

Version number:	Details	Date Approved
Version # 1	Initial release approved to commence from 1 July 2025. This course supersedes and is <i>not equivalent to</i> 22519VIC – Certificate IV in Integrated Technologies	22 May 2025

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Section A – Copyright and course classification information

1. Copyright owner of the course	Copyright of this material is reserved to the Crown in the right of the State of Victoria on behalf of the Department of Jobs, Skills, Industry and Regions (DJSIR) Victoria © State of Victoria (DJSIR) 2025												
2. Address	Deputy CEO Victorian Skills Authority Department of Jobs, Skills, Industry and Regions (DJSIR) GPO Box 4509 Melbourne Vic 3001 Organisational contact: Manager, Training and Learning Products Unit Engagement Branch Victorian Skills Authority Telephone: 131 823 Email: course.enquiry@djsir.vic.gov.au Day-to-day contact: Curriculum Maintenance Manager (CMM) Engineering Industries Box Hill Institute Private Bag 2014 Box Hill Vic.3128 Telephone: (03) 9286 9231 Email: cmmei@boxhill.edu.au												
3. Type of submission	This submission is for the reaccreditation of: 22519VIC - Certificate IV in Integrated Technologies												
4. Copyright acknowledgement	<p>The following units of competence:</p> <table><tr><td>ICTCBL247</td><td>Install, maintain and modify customer premises communications cabling: ACMA Open Rule</td></tr><tr><td>ICTCBL301</td><td>Install, terminate and certify structured cabling installation</td></tr><tr><td>ICTCBL303</td><td>Install and terminate coaxial cable</td></tr><tr><td>ICTCBL322</td><td>Install, test and terminate optical fibre cable on customer premises</td></tr><tr><td>ICTCLD301</td><td>Evaluate characteristics of cloud computing solutions and services</td></tr><tr><td>ICTDBS413</td><td>Determine database requirements</td></tr></table>	ICTCBL247	Install, maintain and modify customer premises communications cabling: ACMA Open Rule	ICTCBL301	Install, terminate and certify structured cabling installation	ICTCBL303	Install and terminate coaxial cable	ICTCBL322	Install, test and terminate optical fibre cable on customer premises	ICTCLD301	Evaluate characteristics of cloud computing solutions and services	ICTDBS413	Determine database requirements
ICTCBL247	Install, maintain and modify customer premises communications cabling: ACMA Open Rule												
ICTCBL301	Install, terminate and certify structured cabling installation												
ICTCBL303	Install and terminate coaxial cable												
ICTCBL322	Install, test and terminate optical fibre cable on customer premises												
ICTCLD301	Evaluate characteristics of cloud computing solutions and services												
ICTDBS413	Determine database requirements												

ICTDRE301	Install digital reception equipment
ICTICT424	Address cyber security requirements
ICTNWK307	Provide network systems administration
ICTNWK309	Configure and administer network operating systems
ICTNWK425	Build small wireless local area networks
ICTNWK435	Create secure virtual private networks
ICTSAS310	Install, configure and secure a small office or home office network
ICTTEN202	Use hand and power tools
ICTTEN207	Install and test internet protocol devices in convergence networks
ICTTEN208	Use electrical skills when working with telecommunications networks
ICTTEN434	Install, configure and test internet protocol networks
ICTWHS204	Follow work health and safety and environmental policy and procedures

have been imported from the ICT- Information and Communications Technology Training Package administered by the Commonwealth of Australia

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The following units of competence:

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0046	Solve problems in single path circuits
UEECD0052	Use routine equipment/plant/technologies in an energy sector environment
UEECS0024	Integrate multiple computer operating systems on a client server local area network
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices
UEERL0003	Conduct in-service safety testing of electrical cord connected equipment and cord assemblies

have been imported from the UEE – Electrotechnology Training Package administered by the Commonwealth of Australia

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The following units of competence:

- CPPSEC2021 Install security equipment and systems
- CPPSEC2023 Install video surveillance systems and equipment

have been imported from the CPP – Property Services Training Package administered by the Commonwealth of Australia

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The following unit of competence:

- VU23486 Configure and program a basic robotic system

has been imported from 22632VIC Certificate II in Engineering Studies.

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- VU23119 Install, set up and test an embedded control system

has been imported from 22586VIC Certificate II in Integrated Technologies (Pre-vocational).

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- VU23214 Configure and secure networked end points

has been imported from 22603VIC Certificate IV in Cyber Security.

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The following units of competence:

- VU23144 Determine uses for artificial intelligence with robotic process automation tools
- VU23149 Investigate robotic systems
- VU23150 Design a basic robotic solution for a specific problem

- VU23155 Evaluate the impacts of the generations of wireless technologies
- VU23156 Explore the role of cloud computing in business
- VU23157 Support the implementation of a cloud computing technology
- VU23158 Explore the Internet of Things in industry (IoT)
- VU23159 Select, program and refine an IoT solution for use in a home or small business
- VU23160 Test and evaluate vulnerabilities and mitigate threats for IoT solutions

have been imported from 22588VIC Certificate III in Enabling Technologies.

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Request for other use should be addressed to:

Manager – Training and Learning Products Unit
 Victorian Skills Authority
 Department of Jobs, Skills, Industry and Regions (DJSIR)
 GPO Box 4509
 Melbourne Vic 3001
 Email: course.enquiry@djsir.vic.gov.au

Copies of this publication can be downloaded free of charge from the [Victorian government website](#).

6. Course accrediting body

Victorian Registration and Qualifications Authority



**7. AVETMISS
information**

ANZSCO code: 313199 - ICT Support Technicians nec
ASCED Code: 0313 - Electrical and Electronic Engineering and
Technology
National course code: 22697VIC

**8. Period of
accreditation**

1 July 2025 to 30 June 2030

Section B – Course information

1. Nomenclature	Standard 4.1 and 5.8 AQTF 2021 Standards for Accredited Courses
1.1 Name of the qualification	Certificate IV in Integrated Technologies
1.2 Nominal duration of the course	540 - 1040 hours
2. Vocational or educational outcomes	Standard 5.1 AQTF 2021 Standards for Accredited Courses
2.1 Outcome(s) of the course	<p>The Certificate IV in Integrated Technologies is designed to provide participants with the knowledge and skills to:</p> <ul style="list-style-type: none"> • install, set up, maintain and modify products and equipment which incorporate blended technologies. • safely use and maintain hand tools and handheld power tools and test equipment routinely applied in an electrotechnology environment • apply computer tools and networking in an integrated technology context • apply mathematical skills in an integrated technology context
2.2 Course description	<p>The Certificate IV in Integrated Technologies is designed to provide participants with the knowledge and skills to safely install, maintain and modify products and equipment which incorporate blended technologies in a range of electrotechnology contexts.</p>
3. Development of the course	Standards 4.1, 5.1, 5.2, 5.3 and 5.4 AQTF 2021 Standards for Accredited Courses
3.1 Industry, education, legislative, enterprise or community needs	<p>The term integrated technologies mean the bringing together of various technologies into new and innovative integrated applications. The term primarily relates to the transfer of information through electronic means.</p> <p>The integrated applications are changing the nature of work, the way people work and the skills they need. The impact of the application of integrated technologies is being increasingly felt within a range of industry areas such as transport, building and construction, engineering, electrical, electronic, information technology and telecommunications industries. The technology used by these industries range from traditional electronics and hardware platform to networking automation, fibre internet connectivity, Internet of Things (IoT), cloud computing and other integrated and converging technologies.</p> <p>Currently there isn't a suitable training package qualification to meet the needs for integrated technologies training. Therefore, the Victorian Skills Authority, Department of Jobs, Skills, Industry and Regions (DJSIR) has continued to fund the review of this course for reaccreditation.</p> <p>The Certificate IV in Integrated Technologies includes a cluster of Cisco Systems approved units available in the Computer Networking and Cyber Security stream. Successful completion of these units qualifies the</p>

learner to apply to be recognised as a Certified Cisco Networking Associate (CCNA) This certification will enhance the graduate's employment opportunities (Refer Item 4.3).

The primary target group for this course are school leavers who want to gain employment in a technical role in a range of industry areas. The qualification also provides a pathway for school leavers who have completed a prevocational VCE VET in Schools program such as the Certificate II in Integrated Technologies or Electrotechnology.

Enrolment data for the accreditation period of the current course provided by the Training and Learning Products Unit (TLPU) is as follows:

Funding type	2021	2022	2023	2024
Fee for Service (FFS)	35	42	20	25
Government funded	36	25	11	8
Totals =	71	67	33	33

(Enrolment data supplied by DJSIR, April 2024)

The above figures are from the two Victorian RTOs with the current course on their scope of registration. The Course Steering Committee noted a decline in government-funded enrolments over the past three years, highlighting the need to address this issue in the course review. A similar trend was observed in Fee-for-Service enrolments, though these remain significantly higher. Refer to Item 3.2 for actions planned to address the decline. It is anticipated that the new course, incorporating modern and updated units, will attract higher enrolment numbers.

There is also one RTO in Western Australia with the course on their scope of registration.

The review of the current course for reaccreditation has been expertly guided by a Course Steering Committee (CSC) consisting of the following persons:

Name	Organisation
Dominic Schipano (Chairperson)	National Executive Officer, Communications and Information Technology Training
Anna Henderson	Executive Officer, Business Skills Viability (BSV)
Emma Walker	Regional Manager, Cisco Network Academy
Michael Stewart	Trainer/Assessor, Northern College of the Arts and Technology
Paul Skelton	Consultant, Custom Electronic Design & Installation Association

Gabriele Giofre	Operational Manager, Australian Digital & Telecommunication Industry Association Inc
Omar Hammoud	MS Delivery Manager, Ericsson
Paul Vivian	Training Manager, Skills Recognition Australia
Kevork Krozian	Trainer/Assessor, Ringwood Training

This course:

- does not duplicate, by title or coverage, the outcomes of an endorsed training package qualification
- is not a subset of a single training package qualification that could be recognised through one or more statements of attainment or a skill set
- does not include units of competency additional to those in a training package qualification that could be recognised through statements of attainment in addition to the qualification
- does not comprise units that duplicate units of competency of a training package qualification.

3.2 Review for re-accreditation

Due to declining enrolment numbers and limited RTO delivery the Course Steering Committee undertook an extensive review of the current course content and made several changes to refresh and modernise the course content and structure.

All units with nil enrolments have been removed and in their place a number of newly imported and newly developed enterprise units covering new and emerging technologies have been added. To increase flexibility in unit selection the number of core units has been reduced but the overall number of units required for the qualification has been retained. The elective unit content has been aligned into five (5) streams which enables the qualification title to include a designated stream, for example, Certificate IV in Integrated Technologies (Smart Home Integration) if the selection of unit packaging rules for a selected designation is followed. The option to import units from other training packages or accredited courses has been retained within the packaging rules but the quantity has been reduced from four to three units. Due to the small number of suitable units covering Internet of Things, Cloud computing and Wireless Generation the decision was made to group the units for these three areas together with an overarching title of Converging Technologies stream.

The units initially developed for this course and retained, have been reviewed and redrafted into the current unit template. All imported training package and accredited course units have been checked to

ensure the current version of each is included and that the unit supports the course outcomes.

Due to the number of changes to the unit content and structure, this course 22697VIC Certificate IV in Integrated Technologies supersedes and is **not equivalent** to 22519VIC Certificate IV in Integrated Technologies.

22697VIC Certificate IV in Integrated Technologies	22519VIC Certificate IV in Integrated Technologies	Relationship
VU23853 Undertake an integrated technology project	VU22746 Undertake an integrated technology project	Equivalent
VU23883 Apply computer tools and networking in an integrated technology context	VU22747 Apply computer tools and networking in an integrated technology context	Equivalent
VU23884 Apply mathematics in an integrated technology context	VU22748 Apply mathematics in an integrated technology context	Equivalent
	VU22749 Install, test and commission transducers and sensors	Deleted
VU23885 Write programs for programmable logic controllers (PLCs)	VU22750 Write programs for programmable logic controllers (PLCs)	Equivalent
	VU22751 Set up and commission programmable logic controllers (PLCs)	Deleted
	VU22752 Develop, enter and verify programs for SCADA systems	Deleted
	VU22753 Install and maintain induction motors	Deleted
	VU22754 Perform precision measurements	Deleted
	VU22755 Identify and repair faults in AC motor control systems	Deleted

VU23886 Identify and repair faults in DC motor control systems	VU22756 Identify and repair faults in DC motor control systems	Equivalent
	VU22757 Apply basic scientific principles and techniques in mechanical engineering situations	Deleted
VU23887 Build and implement a basic network	VU22963 Build and implement a basic network	Equivalent
VU23888 Configure a small to medium network for an organisation	VU22964 Configure a small to medium network for an organisation	Equivalent
VU23889 Secure and monitor the performance of a small to medium network	VU22965 Secure and monitor the performance of a small to medium network	Equivalent
VU23890 Investigate design concepts of an accessible and secure network	VU22966 Investigate design concepts of a accessible and secure network	Equivalent
VU23893 Configure variable frequency drives		New unit
VU23891 Install and configure an audio-visual system		New unit
VU23892 Install and configure an integrated home control system		New unit
VU23119 Install, set up and test an embedded control system		Newly imported unit
VU23486 Configure and program a basic robotic system	VU22338 Configure and program a basic robotic system	Equivalent
VU23144 Determine uses for artificial intelligence with robotic process automation tools		Newly imported unit
VU23149 Investigate robotic systems		Newly imported unit

VU23150 Design a basic robotic solution for a specific problem	Newly imported unit
VU23155 Evaluate the impacts of the generations of wireless technologies	Newly imported unit
VU23156 Explore the role of cloud computing in business	Newly imported unit
VU23157 Support the implementation of a cloud computing technology	Newly imported unit
VU23158 Explore the Internet of Things in industry	Newly imported unit
VU23159 Select, program and refine an IoT solution for use in a home or small business	Newly imported unit
VU23160 Test and evaluate vulnerabilities and mitigate threats for IoT solutions	Newly imported unit
	VU22333 Perform intermediate engineering computations Deleted
	VU21270 Implement control processes using PLCs Deleted
	VU21988 Utilise basic network concepts and protocols required in cyber security Deleted
	VU21990 Recognise the need for cyber security in an organisation Deleted
VU23214 Configure and secure a networked personal computer	VU21993 Secure a networked personal computer Equivalent
	VU22257 Configure security devices for an organisation Deleted

	VU22563 Set up mechatronics engineering systems	Deleted
	VU22674 Explore applications and operation of the Internet of Things (IoT)	Deleted
	CPPSEC2021 Install security equipment and systems	Newly imported unit
	CPPSEC2023 Install video surveillance systems and equipment	Newly imported unit
	MEM30007A Select common engineering materials	Deleted
	MEM23064A Select and test mechatronic engineering materials	Deleted
	MEM30011A Set up basic pneumatic circuits	Deleted
	MEM30031A Operate computer-aided design (CAD) system to produce basic drawing elements	Deleted
	ICTCBL247 Install, maintain and modify customer premises communications cabling: ACMA Open Rule	Newly imported unit
	ICTCBL301 Install, terminate and certify structured cabling installation	Newly imported unit
	ICTCBL303 Install and terminate coaxial cable	Newly imported unit
	ICTCBL322 Install, test and terminate optical fibre cable on customer premises	Newly imported unit
	ICTCLD301 Evaluate characteristics of cloud	Newly imported unit

computing solutions and services

ICTDRE301 Install digital reception equipment

Newly imported unit

ICTDBS413 Determine database requirements

Newly imported unit

ICTICT424 Address cyber security requirements

Newly imported unit

ICTNWK435 Create secure virtual private networks

Newly imported unit

ICTTEN202 Use hand and power tools

Newly imported unit

ICTTEN207 Install and test internet protocol devices in convergence networks

Newly imported unit

ICTTEN208 Use electrical skills when working with telecommunications networks

Newly imported unit

ICTTEN434 Install, configure and test internet protocol networks

Newly imported units

ICTWHS204 Follow work health and safety and environmental policy and procedures

Newly imported unit

ICTNWK307 Provide network systems administration

ICTNWK301 Provide network systems administration

Equivalent

ICTNWK309 Configure and administer a network operating system

ICTNWK303 Configure and administer a network operating system

Equivalent

ICTNWK425 Build small wireless local area networks

ICTNWK405 Build a small wireless local area network

Equivalent

ICTSAS310 Install, configure and secure a

ICTSAS307 Install and configure and secure a

Equivalent

small office or home
office network

small office or home
office network

ICTICT103 Use,
communicate and search
securely on the internet

Deleted from
the course

ICTNWK408 Configure a
desktop environment

Deleted from
the course

ICTNWK410 Install
hardware to a network

Deleted from
the course

ICTSAS409 Manage
risks involving ICT
systems and technology

Deleted from
the course

ICTSAS410 Identify and
resolve client ICT
problems

Deleted from
the course

ICTSAS412 Action
change requests

Deleted from
the course

ICTSAS418 Monitor and
administer security of an
ICT system

Deleted from
the course

ICTSAS419 Support
system software

Deleted from
the course

ICTSAS420 Provide first-
level remote help desk
support

Deleted from
the course

ICTSAS421 Support
users and troubleshoot
desktop applications

Deleted from
the course

ICTSAS424 Support
different operating
systems

Deleted from
the course

ICTSAS425 Configure
and troubleshoot
operating system
software

Deleted from
the course

ICTSAS426 Locate and
troubleshoot ICT
equipment, system and
software faults

Deleted from
the course

UEECD0046 Solve
problems in single path
circuits

Newly
imported unit

UEEDV0012 Set up and configure the wireless capabilities of communications and data storage devices

Newly imported unit

UEERL0003 Conduct in-service safety testing of electrical cord connected equipment and cord assemblies

Newly imported unit

UEECD0007 Apply work health and safety regulations, codes and practices in the workplace

UEENEEE101A Apply work health and safety regulations, codes and practices in the workplace

Equivalent

UEECD0019 Fabricate, assemble and dismantle utilities industry components

UEENEEE102A Fabricate, assemble and dismantle utilities industry components

Equivalent

UEECD0052 Use routine equipment/plant/technologies in an energy sector environment

UEENEEE141A Use routine equipment/plant/technologies in an energy sector environment

Equivalent

UEECS0024 Integrate multiple computer operating systems on a client server local area network

UEENEEED124A Integrate multiple computer operating systems on a client server local area network

Equivalent

UEENEEED104A Use engineering applications software on personal computers

Deleted from the course

UEENEEED115A Administer computer networks

Deleted from the course

UEENEEE104A Solve problems in multiple path d. c. circuits

Deleted from the course

UEENEEE105A Fix and secure electrotechnology equipment

Deleted from the course

UEENEEE107A Use drawings, diagrams,

Deleted from the course

	schedules, standards, codes and specifications	
	UEENEEG006A Solve problems in single and three phase low voltage machines	Deleted from the course
	UEENEEG101A Solve problems in electromagnetic devices and related circuits	Deleted from the course
	UEENEEG102A Solve problems in low voltage a. c. circuit	Deleted from the course
	UEENEEG106A Terminate cables, cords and accessories for low voltage circuits	Deleted from the course

4. Course outcomes	Standards 5.5, 5.6 and 5.7 AQTF 2021 Standards for Accredited Courses
4.1 Qualification level	<p>The outcomes of the 22697VIC Certificate IV in Integrated Technologies are consistent with the Australian Qualifications Framework (AQF) for a Certificate IV level qualification.</p> <p>Graduates of this qualification will have the knowledge and skills to undertake a range of tasks using blended technologies in a range of applications.</p> <p>Knowledge</p> <p>Graduates will have broad factual, technical and theoretical knowledge in a specialised field of work. For example, the application of safe work practices and regulatory requirements in an electrotechnology environment</p> <p>Skills</p> <p>Graduates will have:</p> <ul style="list-style-type: none"> • cognitive skills to identify, analyse, compare and act on information from a range of sources. For example, analysing cabling diagrams, system schematics and appropriate lists for commissioning, testing, maintenance and fault-finding purposes • cognitive, technical and communication skills to apply and communicate technical solutions of a non-routine or contingency nature to a defined range of predictable and unpredictable problems. For example, methodically solving problems using fault finding procedures on a range of equipment and associated infrastructure, sometimes in unfamiliar contexts

- specialist technical skills to complete routine and non-routine tasks and functions. For example, in applying integrated technologies to a range of tasks and functions
- communication skills to guide activities and provide technical advice in work or learning. For example, providing technical advice to clients and colleagues on integrated technology solutions.

Application of knowledge and skills

Graduates will demonstrate the application of knowledge and skills to:

- undertake specialised tasks and functions, such as the detailed maintenance and repair of a range of integrated systems and supporting infrastructure
- take responsibility for own work outputs. For example, commissioning and testing of electrical, mechanical, medical systems, telecommunications or sustainable energy systems equipment and associated infrastructure with limited responsibility for organisation of others. For example, supervising a small work team and providing technical support.

Volume of Learning

Typically, the volume of learning for a Certificate IV qualification is between 0.5 to 2 years.

The Certificate IV in Integrated Technologies is designed to meet the requirements for an integrated technology practitioner and is equivalent to 1 full time year. It incorporates structured training as well as self-directed learning activities such as reading texts, research and gathering information, completing assignments and project work.

4.2 Foundation skills

The following table contains a summary of the Foundation skills for this qualification.

Foundation skills applicable to the outcomes of each unit are identified in the units.

Skill	Description
Reading Skills to:	<ul style="list-style-type: none"> • interpret and follow work instructions • interpret and following technical component installation or removal instructions
Writing skills to:	<ul style="list-style-type: none"> • prepare operating instruction for clients and own work team • complete work reports and documentation
Oral communication skills to:	<ul style="list-style-type: none"> • ask questions to clarify work instructions • communicate with others in the workplace and when working on-site

	<ul style="list-style-type: none"> • provide work instructions in a work team environment
Numeracy skills to:	<ul style="list-style-type: none"> • apply mathematical calculations to support problem solving • read and interpret test equipment results
Learning skills to:	<ul style="list-style-type: none"> • gain insights into the application of new wireless technologies into traditional hard-wired equipment
Problem-solving skills to:	<ul style="list-style-type: none"> • handle routine installations and maintenance with respect to integrated technologies • develop practical solutions by applying combined technologies
Initiative and enterprise skills to:	<ul style="list-style-type: none"> • adapt to new work situations • improve knowledge with respect to changing technologies • identify process improvement opportunities
Teamwork skills to:	<ul style="list-style-type: none"> • work cooperatively with other team members in the workplace • participate in group discussion of WHS/OHS procedures • organise and supervise small team activities that provide technical support • use a team approach to solve problems
Planning and organising skills to:	<ul style="list-style-type: none"> • collect and analyse information for an integrated electrotechnology installation • manage and monitor own and small group time and work priorities
Self-management skills to:	<ul style="list-style-type: none"> • work unsupervised in and out of the workplace • have confidence in own knowledge to meet goals • evaluate and monitor own performance • Take responsibility for work quality and completion timelines
Technology skills to:	<ul style="list-style-type: none"> • safely and correctly use a range of hand and handheld power tools commonly used in an electrotechnology workplace • perform the installation, setting up and maintenance tasks on integrated technology and components and equipment
Digital literacy skill to:	<ul style="list-style-type: none"> • apply computer tools and networking in an integrated technology context • use industry relevant software, to perform

	workplace tasks
4.3 Recognition given to the course (if applicable)	<p>Successful completion of the following four (4) units in the Computer Networking and Cyber Security Stream:</p> <p>VU23887 Build and implement a basic network</p> <p>VU23888 Configure a small to medium network for an organisation</p> <p>VU23889 Secure and monitor the performance of a small to medium network</p> <p>VU23890 Investigate design concepts of an accessible and secure network</p> <p>qualifies the learner to apply for recognition as a Certified Cisco Networking Associate (CCNA).</p>
4.4 Licensing/regulatory requirements (if applicable)	<p><i>Standard 5 AQTF Standards for Accredited Courses</i></p> <p>No licensing, legislative, regulatory or certification requirements apply to this course at the time of publication.</p>

5. Course rules	Standards 5.8 and 5.9 AQTF 2021 Standards for Accredited Courses
5.1 Course structure	<p>To achieve the qualification 22697VIC Certificate IV in Integrated Technologies the learner must successfully complete fifteen (15) units comprising of:</p> <ul style="list-style-type: none"> • six (6) core units <i>plus</i> • nine (9) elective units selected from one (1) stream or across streams. <p>To receive the Certificate IV in Integrated Technologies with a designated stream attached, a minimum of six (6) units must be selected from the designated stream.</p> <p><i>Designated Streams are:</i></p> <ul style="list-style-type: none"> - Electrotechnology - Computer Network and Cyber Security - Smart Home Integration - Robotics - Converging Technologies <p>A maximum of three (3) elective units can be selected from another training package or accredited course. Any selected must not jeopardise the integrity of the Certificate IV qualification.</p> <p>Where the full course is not completed, a VET Statement of Attainment will be issued for each unit successfully completed.</p>

Unit of competency code	Unit of competency title	Field of Education code (six-digit)	Pre-requisite	Nominal hours
Core units				
ICTWHS204	Follow work health and safety and environmental policy and procedures	061301	Nil	40
ICTTEN202	Use hand and power tools	030717	Nil	40
ICTTEN434	Install, configure and test internet protocol networks	020113	Nil	50
VU23853	Undertake an integrated technology project	031399	ICTTEN202	60

VU23883	Apply computer tools and networking in an integrated technology context	020199	Nil	50
VU23884	Apply mathematics in an integrated technology context	010101	Nil	50

Total nominal hours for core units =				290
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Elective Stream units

Electrotechnology Stream

UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	061301	Nil	20
UEECD0019	Fabricate, assemble and dismantle utilities industry components	031313	UEECD0007	40
UEECD0046	Solve problems in single path circuits	031313	UEECD0007	40
UEECD0052	Use routine equipment/plant/technologies in an energy sector environment	030717	UEECD0007	60
UEECS0024	Integrate multiple computer operating systems on a client server local area network	020113	Nil	80
UEERL0003	Conduct in-service safety testing of electrical cord connected equipment and cord assemblies	031313	UEECD0007	20
VU23885	Write programs for programmable logic controllers (PLCs)	030703	None	60
VU23886	Identify and repair faults in DC motor control systems	031301	None	60

Computer Networking and Cyber Security Stream

VU23887	Build and implement a basic network	020113	Nil	100
VU23888	Configure a small to medium network for an organisation	020113	Nil	90
VU23889	Secure and monitor the performance of a small to medium network	020113	Nil	100
VU23890	Investigate design concepts of an accessible and secure network	020113	Nil	90
VU23214	Configure and secure a networked	029901	Nil	60

	personal computer			
ICTDBS413	Determine database requirements	020303	Nil	80
ICTICT424	Address cyber security requirements	029901	Nil	80
ICTNWK307	Provide network systems administration	029999	Nil	60
ICTNWK309	Configure and administer network operating systems	029999	Nil	70
ICTNWK425	Build small wireless local area networks	020113	Nil	80

Smart Home Integration Stream

ICTTEN208	Use electrical skills when working with telecommunications networks	031309	Nil	40
ICTCBL247	Install, maintain and modify customer premises communications cabling: ACMA Open Rule	031309	ICTTEN208 ICTWHS204	60
ICTCBL301	Install, terminate and certify structured cabling installation	031309		50
ICTCBL303	Install and terminate coaxial cable	031309		20
ICTCBL322	Install, test and terminate optical fibre cable on customer premises	031309		40
ICTDRE301	Install digital reception equipment	031309		30
VU23891	Install and configure an audio-visual system	031317	ICTTEN202	60
VU23892	Install and configure an integrated home control system	031317	ICTTEN202	80
ICTSAS310	Install, configure and secure a small office or home office network	020113		50
ICTNWK435	Create secure virtual private networks	020113		20
CPPSEC2021	Install security equipment and systems	099905		40
CPPSEC2023	Install video surveillance systems and	099905		20

	equipment			
Robotics Stream				
VU23149	Investigate robotic systems	030799	Nil	20
VU23150	Design a basic robotic solution for a specific problem	030703	Nil	30
VU23144	Determine uses for artificial intelligence with robotic process automation tools	020119	Nil	30
VU23486	Configure and program a basic robotic system	030703	Nil	60
VU23119	Install, set up and test an embedded control system	031305	Nil	30
VU23893	Configure variable frequency drives	030717	Nil	40
Converging Technologies Stream				
VU23158	Explore the Internet of Things in industry	020113	Nil	30
VU23159	Select, program and refine an IoT solution for use in a home or Cloud computing	031317	Nil	50
VU23160	Test and evaluate vulnerabilities and mitigate threats for IoT solutions	029901	Nil	40
VU23156	Explore the role of cloud computing in business	020113	Nil	30
VU23157	Support the implementation of a cloud computing technology	020113	Nil	50
ICTCLD301	Evaluate characteristics of cloud computing solutions and services	020113	Nil	40
VU23155	Evaluate the impacts of the generations of wireless technologies	031307	Nil	30
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices	031309	Nil	40

ICTTEN207	Install and test internet protocol devices in convergence networks	031309	Nil	50
Indicative nominal hour range for elective units =				360 - 750
Total course nominal hour range =				650 - 1040

Standard 5.11 AQTF 2021 Standards for Accredited Courses

5.2 Entry requirements

There are *no entry requirements* for this course. However, learners are best equipped to achieve the vocational outcomes of this course if they have the following:

- language, literacy and numeracy skills that are equivalent to Level 3 of the Australian Core Skill Framework (ACSF). Full details, descriptors and tests of the ACSF can be found on website:
<https://www.education.gov.au/australian-core-skills-framework>.
- digital literacy and technology skills to self-manage generic software applications such as the ability to:
 - navigate within the system
 - save, retrieve and open files
- completed a prevocational course such as: Certificate II in Integrated Technologies, Certificate II in Electrotechnology.

Learners who have a lower level of language and literacy skills or digital literacy and technology skills to manage generic software applications, may require additional support to complete the course.

6. Assessment

Standard 5.12 and 5.14 AQTF 2021 Standards for Accredited Courses

6.1 Assessment strategy

All assessment, including Recognition of Prior Learning (RPL) must be compliant with the requirements of:

- Standard 1 of the Australian Quality Training Framework (AQTF): Essential Conditions and Standards for Initial/Continuing Registration and Guidelines 4.1 and 4.2 of the VRQA Guidelines for VET Providers
- or
- the Standards for Registered Training Organisations 2015 (SRTOs)
- or

- the relevant standards and guidelines for Registered Training Organisations in effect at the time of assessment

Assessment strategies must ensure that:

- all assessments are valid, reliable, flexible and fair
- learners are informed of the context and purpose of the assessment and the assessment process
- feedback is provided to learners about the outcomes of the assessment process and guidance given for future options
- time allowance to complete a task is reasonable and reflects the industry expectations of an operator

Assessment strategies should be designed to:

- cover a range of skills and knowledge required to demonstrate achievement of the course aim
- collect evidence on a number of occasions to suit a variety of contexts and situations
- be appropriate to the knowledge, skills, methods of delivery and needs and characteristics of learners
- assist assessors to interpret evidence consistently
- be equitable to all groups of learners

Suggested assessment methods for course units may include:

- oral and/or written questioning
- inspection of final process/product outcomes
- portfolio of documented evidence
- demonstration of required physical tasks

A holistic approach to assessment is encouraged. This may be achieved by combining the assessment of more than one unit where it better replicates working practice.

Assessment of the imported units must reflect the requirements of the Assessment Guidelines in the relevant training package and accredited course.

6.2 Assessor competencies

Assessment must be undertaken by a person or persons with competencies compliant with:

- Standard 1.4 of the Australian Quality Training Framework (AQTF): Essential Conditions and Standards for Initial/Continuing Registration and Guidelines 3 of the VRQA Guidelines for VET Providers

or

- the Standards for Registered Training Organisations 2015 (SRTOs),

or

- the relevant standards and guidelines for Registered Training Organisations in effect at the time of assessment

Assessors of the imported units must meet the requirements for assessors specified in the relevant training package or accredited course.

7. Delivery

Standards 5.12, 5.13 and 5.14 AQTF 2021 Standards for Accredited Courses

7.1 Delivery modes

This course is available for full or part-time study. Providers should be flexible in the way the training is delivered to ensure they meet the needs of the learner cohort.

The course can be delivered on the job or off the job. If the course is delivered off the job, it must be delivered in a training environment that reflects realistic workplace conditions.

Integrated technology applications draw on technical concepts across a range of industry sectors, therefore RTOs should consider achieving outcomes for students by utilising:

- project based strategies that allow learners to plan, organise and implement activities to achieve a defined outcome; and
- problem based strategies that focus on introducing concepts to learners by challenging them to solve a real-world integrated technologies problem
- other delivery methods may include:
 - classroom presentation from guest presenter from various technology-based enterprises
 - case study analysis.

Teaching and learning strategies must be selected to reflect the varying learning requirements, educational backgrounds and preferred learning styles of the individual students and the specific requirements of each unit. Some areas of content may be common to more than one unit and therefore integration may be appropriate.

It is recommended unit VU23853 - *Undertake an integrated technology project* and unit VU23883- *Apply computer tools and networking in an integrated technology context* are delivered and assessed concurrently

Delivery and contextualisation of imported units must be consistent with the assessment guidelines of the relevant training package or accredited course.

7.2 Resources

The resources that must be available for this course relate to normal work practice using procedures, information and resources typical of a workplace.

This must include access to:

- relevant WHS/OHS policy and workplace safety procedures and instructions
- an actual or simulated integrated technologies workplace
- relevant testing/diagnostic equipment, tools, materials and consumables
- computer hardware and relevant software including but not limited to Microsoft Office suite, Web search programs and computer aided drawing (CAD) software
- relevant plans, drawings and instructions to the level of operation

Training must be undertaken by a person or persons with competencies compliant with:

- Standard 1.4 of the Australian Quality Training Framework AQTF: Essential Conditions and Standards for Initial/Continuing Registration and Guidelines 3 of the VRQA Guidelines for VET Providers,

or

- the Standards for Registered Training Organisations 2015 (SRTOs),

or

- the relevant standards and guidelines for Registered Training Organisations in effect at the time of assessment.

Imported units must reflect the requirements of trainers specified in the relevant training package and accredited course.

8. Pathways and articulation	Standard 5.10 AQTF 2021 Standards for Accredited Courses
	<p>There are no formal arrangements for articulation to other VET or higher education qualifications.</p> <p>When arranging articulation providers should refer to the:</p> <p><u>AQF Second Edition 2013 Pathways Policy</u></p> <p>Participants must negotiate individual pathway arrangements directly with the training provider.</p> <p>Applicants who have already successfully completed any endorsed training package or accredited course unit/s of competency from previous study will receive direct credit transfer for the same unit/s in this course. Likewise, graduates of this course will also gain direct credit transfer for units successfully completed in any future course/s containing the same units.</p>
9. Ongoing monitoring and evaluation	Standard 5.15 AQTF 2021 Standards for Accredited Courses
	<p>The 22697VIC Certificate IV in Integrated technologies is monitored and maintained by the Curriculum Maintenance Manager (CMM) - Engineering Industries.</p> <p>A review will take place at midpoint during the accreditation period. The review will be informed through feedback and consultation with teaching staff and graduates of the course and will also consider any changes required to meet new and/or emerging technologies or developing needs in the industry areas served by this course.</p> <p>Any significant changes to the course resulting from course monitoring and evaluation procedures will be reported to the VRQA.</p>

Section C – Units of competency

Enterprise units of competency

VU23853	Undertake an integrated technology project
VU23883	Apply computer tools and networking in an integrated technology context
VU23884	Apply mathematics in an integrated technology context
VU23885	Write programs for programmable logic controllers (PLC)
VU23886	Identify and repair faults in DC motor control systems
VU23887	Build and implement a basic network
VU23888	Configure a small to medium network for an organisation
VU23889	Secure and monitor the performance of a small to medium network
VU23890	Investigate design concepts of an accessible and secure network
VU23893	Configure variable frequency drives
VU23891	Install and configure an audio-visual system
VU23892	Install and configure an integrated home control system

Imported units of competency from other Victorian accredited courses:

These units are not included in this course document. Refer Part A (Item 4) for details of the courses from which each unit is drawn. The course documents can be accessed from:

www.vic.gov.au/departments-accredited-vet-courses

VU23119	Install, set up and test an embedded control system
VU23144	Determine uses for artificial intelligence with robotic process automation tools
VU23149	Investigate robotic systems
VU23150	Design a basic robotic solution for a specific problem
VU23155	Evaluate the impacts of the generations of wireless technologies
VU23156	Explore the role of cloud computing in business
VU23157	Support the implementation of a cloud computing technology
VU23158	Explore the Internet of Things in industry
VU23159	Select, program and refine an IoT solution for use in a home or small business
VU23160	Test and evaluate vulnerabilities and mitigate threats for IoT solutions
VU23214	Configure and secure a networked personal computer
VU23486	Configure and program a basic robotic system

Imported units of competency from National Training Packages.

These units are not included in this course document and are available from: www.training.gov.au

CPPSEC2021	Install security equipment and systems
CPPSEC2023	Install video surveillance systems and equipment
ICTCBL247	Install, maintain and modify customer premises communications cabling: ACMA Open Rule
ICTCBL301	Install, terminate and certify structured cabling installation
ICTCBL303	Install and terminate coaxial cable
ICTCBL322	Install, test and terminate optical fibre cable on customer premises
ICTCLD301	Evaluate characteristics of cloud computing solutions and services
ICTDBS413	Determine database requirements
ICTDRE301	Install digital reception equipment
ICTICT424	Address cyber security requirements
ICTNWK307	Provide network systems administration
ICTNWK309	Configure and administer network operating systems
ICTNWK425	Build small wireless local area networks
ICTNWK435	Create secure virtual private networks
ICTSAS310	Install, configure and secure a small office or home office network
ICTTEN202	Use hand and power tools
ICTTEN207	Install and test internet protocol devices in convergence networks
ICTTEN208	Use electrical skills when working with telecommunications networks
ICTTEN434	Install, configure and test internet protocol networks
ICTWHS204	Follow work health and safety and environmental policy and procedures
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace
UEECD0019	Fabricate, assemble and dismantle utilities industry components
UEECD0046	Solve problems in single path circuits
UEECD0052	Use routine equipment/plant/technologies in an energy sector environment
UEECS0024	Integrate multiple computer operating systems on a client server local area network
UEEDV0012	Set up and configure the wireless capabilities of communications and data storage devices
UEERL0003	Conduct in-service safety testing of electrical cord connected equipment and cord assemblies

Unit code	VU23853
Unit title	Undertake an integrated technology project
Application	<p>This unit describes the performance outcomes, skills and knowledge required to carry out an integrated technology project by merging distinct technology domains to achieve an innovative and integrated technical outcome.</p> <p>It requires the ability to decide the technology options, plan, prepare and implement a project, in accordance with a project management plan. The use of appropriate mathematical techniques is required to determine system parameters.</p> <p>This unit of competency applies to a person working in an environment where merging technologies are utilised for innovative technical applications.</p> <p>No occupational licensing, legislative or certification requirements apply to this unit at the time of publication.</p>
Pre-requisite Unit(s)	ICTTEN202 Use hand and power tools
Competency Field	N/A
Unit Sector	N/A

Element		Performance Criteria	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Prepare for an integrated technology project	1.1	Integrated technology options and the scope of the desired project outcomes are considered and discussed with the appropriate personnel
		1.2	Project brief outlining the expected project outcomes is prepared and approved by appropriate personnel.
		1.3	Project stakeholders directly involved or other stakeholders who are affected by the project are consulted to ensure the work is coordinated and the impact of the planned work is minimised
		1.4	Relevant occupational health and safety (OHS) requirements and risk control measures are clarified
		1.5	An integrated technology project workplan is prepared and approved by the appropriate personnel

		1.6	Resources and equipment needed for the project are obtained in accordance with enterprise procedures and checked for correct specifications and operation
2	Instigate the integrated technology project	2.1	Plant or machine circuits are checked as being isolated where necessary in accordance with OHS requirements and procedures
		2.2	Project activities are undertaken in accordance with the project workplan and within specified timelines
		2.3	Appropriate mathematical processes are used to calculate and monitor the project variables
		2.4	Project progress is regularly reviewed against project workplan and discussed with appropriate personnel
		2.5	Decisions for addressing unexpected situations are made after discussion with the appropriate person, consideration of the job specifications, safety and compliance procedures.
		2.6	Network interactivity cycle is tested and evaluated to ensure connectivity, control and integration of different technologies
		2.7	Relevant occupational health and safety (OHS) requirements and risk control measures are implemented
3	Complete and document project outcomes	3.1	Key outputs of the integrated technology project are measured, calculated and/or charted to confirm compliance with the specifications
		3.2	Final project outcomes are reviewed against specifications and intended objectives.
		3.3	Equipment and tools used in the project are checked and stored in accordance with enterprise procedures.
		3.4	A clear and concise project report is prepared in accordance with enterprise procedures.

Range of Conditions

Integrated technology project may include but is not limited to:

- basic robotic prototype
- small renewable generation system
- automated ELV lighting system
- alarmed ELV warning system
- ELV security system
- basic IoT (connectivity) system e.g.
 - smart watering system

- personalised light switch system
- Project brief must include calculations, technical specifications and other relevant data is prepared and approved by the appropriate personnel

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria must be assessed.

Skill	Description
Reading skills to:	<ul style="list-style-type: none"> • use feedback to evaluate the success of the project
Oral communication skills to:	<ul style="list-style-type: none"> • present information in a clear and concise manner
Numeracy skills to:	<ul style="list-style-type: none"> • utilise a range of relevant mathematical techniques to calculate and chart project variables
Teamwork skills to:	<ul style="list-style-type: none"> • interact with others to determine work requirements
Planning and organising skills to:	<ul style="list-style-type: none"> • conduct basic project planning
Technology skills to:	<ul style="list-style-type: none"> • use a network to connect, control and integrate different technologies • use an interactive cycle of prototyping, testing and evaluation to assess the functional operation of the emerging technologies

Unit Mapping Information	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23853 - Undertake an integrated technology project	VU22746 Undertake an integrated technology project	equivalent

Assessment Requirements

Title	Assessment Requirements for VU23853 - Undertake an integrated technology project
Performance Evidence	<p>There must be evidence the learner has completed the tasks outlined in the elements, performance criteria and foundation skills of this unit and:</p> <ul style="list-style-type: none"> provide evidence of the ability to plan and carry out an integrated technology project by merging distinct technology fields to achieve an integrated technologies outcome. The project must include: <ul style="list-style-type: none"> a workplan with specified outcomes application of relevant mathematical processes integration of at least two (2) technologies documented assessment of the project to meet the specified outcomes application of relevant OHS regulations and risk control procedures.
Knowledge Evidence	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> relevant OHS regulations and risk control requirements technology integration options and connectivity requirements integrated technology project specifications requirements including defining the project and key outputs relevant mathematical techniques such as the use of geometry, trigonometry, algebra, graph and charts integrated technology project workplan requirements including timelines, resources, costs, milestones, contingencies.
Assessment Conditions	<p>Both practical skills and knowledge must be assessed. Simulated assessment environments must simulate the real-life working environment with access to:</p> <ul style="list-style-type: none"> relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials hand tools consumables personal protective equipment (PPE) project resources equipment <p>It is recommended this unit is assessed in combination with unit:</p> <ul style="list-style-type: none"> VU23883 – Apply computer tools and networking in an integrated technology context. <p>Refer Section B, Item 6.1 for suggested methods of assessment</p> <p>Assessor requirements:</p>

No specialist vocational competency requirements for assessors apply to this unit.

Unit code	VU23883
Unit title	Apply computer tools and networking in an integrated technology context
Application	<p>This unit describes the performance outcomes, skills and knowledge required to use relevant computer tools and networking operating systems to complete an integrated technology project.</p> <p>It requires the ability to determine computer and networking requirements, develop and set up a control system network of devices to meet project requirements.</p> <p>This unit of competency applies to a person working in an environment where merging technologies are utilised for innovative technical applications.</p> <p>No occupational licensing, legislative or certification requirements apply to this unit at the time of publication.</p>
Pre-requisite Unit(s)	Nil.
Competency Field	N/A
Unit Sector	N/A

Element		Performance Criteria	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Determine computer and network requirements for the integrated technology project	1.1	Nature and scope of the integrated control system and network is established from project briefs, specifications and/or discussions with appropriate personnel
		1.2	Occupational health and safety (OHS) requirements and risk control procedures required for the preparation of the work area are clarified and followed
		1.3	Computer tools are selected and, where required, procured to meet the integrated technology project needs, in accordance with enterprise procedures
		1.4	Network operating system versions and updates needed to configure and maintain the network are obtained in accordance with established procedures and checked against job specifications



		1.5	Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved at the workplace
		1.6	Computer tools are trialled to ensure their suitability for the integrated technology project
2	Set up and maintain control system networks	2.1	Control application network components are installed, and configured in accordance with manufacturer's specifications and enterprise procedures
		2.2	Devices, desktop environment, network protocols and services and system security are implemented in accordance with requirements.
		2.3	Network malfunctions are identified and rectified using control devices, storage, network protocols, connections and services and system security configuration processes.
		2.4	Network performance and reliability is monitored and optimised in accordance with established procedures
		2.5	Methods for dealing with unexpected situations are selected following discussion with appropriate personnel, review of job specifications, safety considerations and enterprise procedure
		2.6	Computer back-up arrangements are put in place to protect project outputs
3	Produce integrated technology project outputs	3.1	Computer output is checked to confirm compliance with the specifications and enterprise procedures
		3.2	Output style and format is confirmed as being consistent with specification
		3.3	Computer files and data are saved in accordance with enterprise procedures
		3.4	Appropriate personnel are notified of project completion, in accordance with enterprise procedures.

Range of Conditions

- computer tools may include but not limited to:
 - computer hardware
 - computer networks
 - internet access
 - database software
 - spreadsheet software
 - word processing software
 - simulation software
 - computer-aided design (CAD)
 - electrotechnology schematic capture and simulation
 - fluid power control schematic capture and simulation
 - process control modelling and simulation
 - diagnostics software
- integrated technologies may include but not limited to:
 - fluid power
 - computer network technology e.g. Internet of Things (IoT)
 - wireless technology e.g. Bluetooth, Wi Fi
 - robotics and embedded controller technology.
 - photonics technology
 - renewable energy generation
 - virtual/augmented reality technologies
 - computer aided design/drafting (CAD/D)

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria must be assessed.

Skill	Description
Reading skills to:	<ul style="list-style-type: none">• interpret work instructions and technology specifications
Writing skills to:	<ul style="list-style-type: none">• produce short test routines
Oral communication skills to:	<ul style="list-style-type: none">• seek advice and consult with other personnel in the workplace
Problem-solving skills to:	<ul style="list-style-type: none">• deal with unexpected situations during the trialing of computer tools
Planning and organising skills to:	<ul style="list-style-type: none">• systematically set up and integrate technology devices to perform a specified function
Digital literacy skills to:	<ul style="list-style-type: none">• use a network to connect, control and integrate different technologies• trial computer tools to ensure their suitability for the integrated technology project

Unit Mapping Information	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23883 - Apply computer tools and networking in an integrated technology context	VU22747 Apply computer tools and networking in an integrated technology context	Equivalent



Assessment Requirements

Title	Assessment Requirements for VU23883- Apply computer tools and networking in an integrated technology context
Performance Evidence	<p>There must be evidence the learner has completed the tasks outlined in the elements, performance criteria and foundation skills of this unit and provided evidence of the ability to perform the following on at least two (2) occasions:</p> <ul style="list-style-type: none"> • select and utilise a range of computer tools to achieve a required integrated technology project output • utilise appropriate computer data security and back-up processes • develop control system network models (layers) and protocols.
Knowledge Evidence	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> • relevant OHS regulations and requirements • project specifications including defining the project; project briefs; key outputs; computer tools required • functions and capabilities of various types of computer applications used in a technology-based workplace • project management plans including: timelines, resources, costs, monitoring, project teams, milestones, contingencies, budgets • control system networks interface • data link models or layers encompassing: <ul style="list-style-type: none"> ○ device types ○ bus arbitration ○ device initialisation ○ synchronous/asynchronous messaging ○ time management ○ specific functions of Link Active Scheduler (LAS) • bus monitor encompassing: <ul style="list-style-type: none"> ○ capturing ○ filtering • fieldbus message specification encompassing: <ul style="list-style-type: none"> ○ virtual field device ○ object dictionary ○ communicate objectives ○ communicate services • high speed ethernet encompassing: <ul style="list-style-type: none"> ○ protocols ○ messaging ○ sessions ○ time synchronisation ○ redundancy



- computer back-up techniques and data security processes

Assessment Conditions

This unit can be assessed either in the workplace or in a simulated workplace environment. Where the assessment is conducted in a simulated workplace the conditions must reflect a realistic workplace environment.

Resources include access to:

- OHS regulations and safe workplace procedures
- relevant computer hardware and software
- relevant integrated technologies
- tools and consumables.

It is recommended this unit is assessed in combination with unit:

- VU23853 – Undertake an integrated technology project.

Refer Section B, Item 6.1 for suggested methods of assessment

Assessor requirements:

No specialist vocational competency requirements for assessors apply to this unit.

Unit code	VU23884
Unit title	Apply mathematics in an integrated technology context
Application	<p>This unit describes the performance outcomes, skills and knowledge required to apply mathematical processes to solve problems and/or analyse data in various integrated technology scenarios.</p> <p>It requires the ability to utilise various mathematical procedures commonly applied in association with a range of technologies.</p> <p>This unit of competency applies to a person working in a technical role where mathematical processes are required to solve problems and verify data in various engineering and electrotechnology applications.</p> <p>No occupational licensing, legislative or certification requirements apply to this unit at the time of publication.</p>
Pre-requisite Unit(s)	Nil
Competency Field	N/A
Unit Sector	N/A

Element		Performance Criteria	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Determine the mathematics required for integrated technology tasks	1.1	Mathematical requirements of the integrated technology tasks are examined
		1.2	Relevant data for specific mathematical processing or calculation is collected
		1.3	Materials or devices needed to carry out the required calculations are obtained
2	Apply mathematics to specific integrated technology tasks	2.1	Relevance of data for the tasks is checked for accuracy
		2.2	Appropriate formulae or mathematical process is used to achieve the required information for each task
		2.3	Various parameters of the integrated technology task are calculated
		2.4	Ongoing checks of the accuracy of the calculations are undertaken in accordance with established procedures



3	Complete the mathematical activities	3.1	Mathematical calculations are checked against estimates or specifications
		3.2	Any errors or discrepancies in the calculations are detected and corrected in accordance established procedure
		3.3	Results of the calculations are conveyed to the appropriate personnel
		3.4	Appropriate records of the calculations are compiled and maintained in accordance with established procedure

Range of Conditions

N/A

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria must be assessed.

Skill	Description
Reading skills to:	<ul style="list-style-type: none"> check and validate calculations results
Oral communication skills to:	<ul style="list-style-type: none"> seek advice and consult with other personnel in the workplace
Problem-solving skills to:	<ul style="list-style-type: none"> deal with unexpected mathematical errors and discrepancies
Digital literacy skills to:	<ul style="list-style-type: none"> use tools/equipment/materials such as computer programs, calculators, reference charts

Unit Mapping Information	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23884 - Apply mathematics in an integrated technology context	VU22748 - Apply mathematics in an integrated technology context	Equivalent



Assessment Requirements

Title	Assessment Requirements for VU23884 - Apply mathematics in an integrated technology context
Performance Evidence	<p>There must be evidence that the learner has completed the tasks outlined in the elements, performance criteria and foundation skills of this unit and provided evidence on at least four (4) occasions to:</p> <ul style="list-style-type: none"> • identify the mathematics required for specific integrated technology work activities • utilise a variety of mathematical processes to achieve required information • check the accuracy of calculations against estimates and specifications for an integrated technology project
Knowledge Evidence	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> • basis of number systems • basis of measurement processes • addition, subtraction, multiplication and division processes • principles of geometry and trigonometry • principles of basic algebra and transformation of formulae • graphical and tabular approaches to data presentation and analysis • principles of non-deterministic data characterisation
Assessment Conditions	<p>Both practical skills and knowledge must be assessed. Simulated assessment environments must simulate the real-life working environment with access to all the relevant equipment and resources of that working environment which would include:</p> <ul style="list-style-type: none"> • mathematical calculator • engineering measurement tools e.g. micrometer <p>Refer Section B, Item 6.1 for suggested methods of assessment.</p> <p>Assessor requirements:</p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>

Unit code	VU23885
Unit title	Write programs for programmable logic controllers (PLCs)
Application	<p>This unit describes the performance outcomes, skills and knowledge required to write programs for programmable logic controllers (PLCs).</p> <p>It requires the ability to work safely, apply knowledge of control systems, program control functions and develop and test control programs using a range of programming language approaches developed for PLCs.</p> <p>This unit of competency applies to a person working in an engineering environment where programmable logic controllers are used for automating processes in manufacturing, process control, building services, laboratories etc.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>
Pre-requisite Unit(s)	Nil
Competency Field	N/A
Unit Sector	N/A.

Element		Performance Criteria	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Prepare to develop a PLC program.	1.1	Established occupational health and safety (OHS) requirements and risk control measures and procedures for the work area are followed
		1.2	Safety hazards, which have not previously been identified, are documented and risk control measures devised and implemented in consultation with appropriate personnel
		1.3	Control program and input/output interfacing requirements are determined from job specifications and consultation with appropriate personnel
		1.4	Equipment and software needed to carry out the work are obtained and checked for correct operation and safety
		1.5	Installation of programmable controller is checked for safety compliance and against job specification

2	Develop, write and test control program	2.1	Plant or machines circuits are checked as being isolated where necessary in accordance with OHS requirements and procedures
		2.2	Control solutions are established and documented based on the specified control mode and using appropriate methods for designing control systems
		2.3	The developed control system is converted to an appropriate form for the programmable controller using relevant software
		2.4	Program is entered into the programmable controller using a computer and appropriate software
		2.5	Entered instructions and settings are tested as meeting those specified in the control system scenario
		2.6	Appropriate methods and tools are used to test the control systems and operating faults and anomalies are identified and rectified
		2.7	Methods for dealing with unexpected situations are selected on the basis of safety considerations and specified work outcomes.
3	Finalise control program	3.1	Program is transferred from a programmable controller to an external medium for storage
		3.2	Control system specification and program are documented in accordance with enterprise procedures
		3.3	Work completion is reported and appropriate personnel notified in accordance with enterprise procedures

Range of Conditions

N/A

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria must be assessed.

Skill	Description
Reading skills to:	<ul style="list-style-type: none"> read and interpret project briefs to determine programs requirements for control applications follow relevant workplace OHS requirements and procedures

Writing skills to:	<ul style="list-style-type: none"> produce appropriate documentation for control programs
Oral communication skills to:	<ul style="list-style-type: none"> communicate technical requirements to others

Unit Mapping Information	Code and Title Current Version	Code and Title Previous Version	Comments
	VU23885 - Write programs for programmable logic controllers (PLCs)	VU22750 - Write programs for programmable logic controllers (PLCs)	Equivalent

Assessment Requirements

Title	Assessment Requirements for VU23885 - Write programs for programmable logic controllers (PLCs)
Performance Evidence	<p>There must be evidence the learner has completed the tasks outlined in the elements, performance criteria and foundation skills of this unit to:</p> <ul style="list-style-type: none"> interpret job specifications and write programs for PLCs on at least two (2) occasions using a range of programming features: <ul style="list-style-type: none"> input/output programming use of internal flags, counters and timers nested sub routines diagnostic indicators follow the established OHS requirements and risk control measures and procedures for the work area on each occasion.
Knowledge Evidence	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> PLC programming methods application and use of ladder diagram application and use of sequential function chart structure language programming tests for PLC control systems and operating faults PLC diagnostic indicator application of programming structures Input Output (I/O) programming relevant workplace OHS requirements and procedures
Assessment Conditions	<p>Both practical skills and knowledge must be assessed. Simulated assessment environments must simulate the real-life working environment with access to all the relevant equipment and resources of that working environment including:</p> <ul style="list-style-type: none"> relevant workplace procedures PLC, transducers and actuators and software hand tools and consumables personal protective equipment (PPE) <p>Refer Section B, Item 6.1 for suggested methods of assessment</p> <p>Assessor requirements:</p>

No specialist vocational competency requirements for assessors apply to this unit.

Unit code	VU23886
Unit title	Identify and repair faults in DC motor control systems
Application	<p>This unit describes the performance outcomes, skills and knowledge required to identify and repair faults in Direct Current (DC) motor control systems.</p> <p>It requires the ability to work safely, applying knowledge of DC motor control systems and operating parameters to logical fault-finding processes, carrying out fault repairs and functional testing and interpreting technical data.</p> <p>This unit of competency applies to a technician working in an engineering, manufacturing or processing environment where DC motor control systems are used to control processes and require ongoing maintenance and repair.</p> <p>If the work requires access to electrical plant and equipment that is fixed wired into relevant domestic, commercial and industrial electrical installations supplied at low voltage or above, the practice of the skills described in this unit are subject to the requirements of the Victorian Electricity Safety Act and Electricity Safety (Installation) Regulations.</p>
Pre-requisite Unit(s)	Nil
Competency Field	N/A
Unit Sector	N/A

Element		Performance Criteria	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Prepare to identify and repair faults.	1.1	Established Occupational Health and Safety (OHS) requirements and risk control procedures for the work area are identified and followed
		1.2	Details of faults are determined from reports and other documentation and from discussion with appropriate personnel
		1.3	Relevant personnel are consulted to ensure the work is co-ordinated effectively with others involved on the work area

		1.4	Equipment needed to identify faults and carry out repairs is obtained in accordance with enterprise procedures and checked for correct operation and safety.
2	Identify and repair faults.	2.1	Requirement to test and/or measure live is determined in strict accordance with OHS requirements and conducted within established safety procedures
		2.2	Plant or machine circuits are checked as being isolated in accordance with OHS requirements and enterprise procedures
		2.3	Logical fault-finding processes to diagnose DC motor control system faults are applied employing measurements and estimations of system operating parameters referenced to system operational requirements
		2.4	Suspected fault scenarios are tested to confirm system problems
		2.5	Faults in the control components of the system are repaired and the DC motor control system is restored to its operating condition
		2.6	If it is determined the cause of the fault/s is outside the control system then appropriately trained person/s are engaged to rectify the fault
		2.7	Methods for dealing with unexpected situations are applied on the basis of safety considerations, expected work outcomes and discussion with relevant personnel.
3	Restore control system and document work	3.1	Tests are conducted and data are interpreted to verify the control system is now operating within specified requirements
		3.2	Relevant personnel are notified the faults are repaired and the control system is restored
		3.3	Control system repairs are documented in accordance with enterprise procedures.

Range of Conditions

N/A

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria must be assessed.

Skill	Description
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Reading skills to:	<ul style="list-style-type: none"> read DC control system fault reports, technical specifications and related information
Numeracy skills to:	<ul style="list-style-type: none"> determine and estimate operating parameters of DC motor control systems make measurements on suspect components to determine failure
Technology literacy skills to:	<ul style="list-style-type: none"> use tools, equipment and testing devices to identify faults in DC motor control systems

Unit Mapping Information

Code and Title Current Version	Code and Title Previous Version	Comments
VU23886 - Identify and repair faults in DC motor control systems	VU22756 - Identify and repair faults in DC motor control systems	Equivalent

Assessment Requirements

Title	Assessment Requirements for VU23886 - Identify and repair faults in DC motor control systems
Performance Evidence	<p>There must be evidence the learner has completed the tasks outlined in the elements, performance criteria and foundation skills of this unit and provided evidence of the ability on at least two (2) occasions and each in a different situation or context to:</p> <ul style="list-style-type: none"> • apply relevant OHS requirements and safe work practices at all times when working with electrical control systems in an engineering, manufacturing or processing work environment • apply logical fault-finding processes and implement repairs to a DC motor control system • test and recommission DC motor control system to standard operating requirements.
Knowledge Evidence	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> • relevant OHS requirements and safe work practices in an engineering, manufacturing /processing environment • DC motor control system construction and operation • role of microcontrollers in DC motor control • logical fault-finding processes, symptoms and causes in DC motor control systems • DC motor drive components and fault identification • inspection and testing procedures of DC motor control systems
Assessment Conditions	<p>Both practical skills and knowledge must be assessed. Simulated assessment environments must simulate the real-life working environment with access to:</p> <ul style="list-style-type: none"> • relevant OHS workplace procedures • DC control systems • hand tools and consumables • personal protective equipment (PPE) <p>Refer Section B, Item 6.1 for suggested methods of assessment</p> <p>Assessor requirements</p> <p>No specialist vocational competency requirements for assessors apply to this unit.</p>

Unit code	VU23887
Unit title	Build and implement a basic network
Application	<p>This unit of competency describes the performance outcomes, knowledge and skills required to build and implement a basic network for a small enterprise and establish end-to-end connectivity.</p> <p>It requires the ability to investigate the structure, functions, protocols and components of a computer network in order to build and implement a basic network. It also includes the application of trouble shooting tools and techniques and data security fundamentals.</p> <p>The unit applies to a person working as an Information Technology (IT) practitioner and is required to build and maintain small networks using a range of client server applications and services.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication</p>
Pre-requisite Unit(s)	Nil
Competency Field	N/A
Unit Sector	N/A

Element		Performance Criteria	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Examine the function and role of components and devices that ensure connectivity of a computer network	1.1	Concepts of how data is accessed from a remote site computer network is examined
		1.2	Methods of connecting multiple computer end points to a network are examined
		1.3	Function and role of switches in a small computer network are explored
		1.4	Connecting computer end points to a switch is investigated
		1.5	Internet Protocol (IP) IPv4 addresses for the Network Interface Card (NIC) are examined and configured
		1.6	Function and structure of a switch Network Operating System (NOS) is examined
		1.7	Open Source Interconnection (OSI) and Transmission Control Protocol/Internet Protocol (TCP/IP) layered models of data communication are compared

2	Examine the function and operation of the physical and data link layers in a computer network	2.1	Physical Layer technologies and connection mechanisms for computer networks are examined
		2.2	Function and operation of the data link layer to support communication across a data network is investigated
		2.3	Data link layer media access control techniques are examined
		2.4	Operation of the media access mechanism and ethernet frames are examined
3	Demonstrate the function and operation of the network layer	3.1	Operation of network layer protocols to support data communication across a network is established
		3.2	Function and role of the Address Resolution Protocol (ARP) and Reverse Address Resolution Protocol (RARP) that enable communication on a network is demonstrated
		3.3	Features of a router to support end to end connectivity are determined
		3.4	Function and structure of a router Network Operating System (NOS) is explained and demonstrated
		3.5	Relevant commands of an NOS that facilitate connection to a Local Area Network (LAN) are validated
		3.6	Basic configurations for a router are implemented and tested for functionality
		3.7	Connecting computer end points to a router is demonstrated
		3.8	Methods used by network devices to router data traffic is explained
4	Implement IPv4 and IPv6 network addressing	4.1	Binary and hexadecimal number systems are compared
		4.2	Conversion between binary and hexadecimal number systems is performed
		4.3	Network addressing scheme utilising IPv4 is implemented
		4.4	Subnetting IPv4 network is implemented
		4.5	Subnetting IPv4 network utilising Variable Length Subnet Mask (VLSM) is implemented
		4.6	Network addressing scheme utilising IPv6 is implemented
		4.7	Subnetting IPv6 network is implemented
		4.8	Function and operation of Internet Control Message Protocol (ICMP) and ICMPv6 are explained
		4.9	Use of key ICMPv4 and ICMPv6 packets are determined
5	Examine the function and operation of	5.1	Function and operation of transport layer protocols and services that support data communication across a network are established

	transport and application layers in network communications	5.2	Operation of the Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) transport layer protocols are compared and the variations are identified
		5.3	Transport layer port numbers are identified
		5.4	Function and operation of application layer protocols that facilitate end to end data communication across a network are investigated
		5.5	Process for retrieving data from an external web site using the http application layer protocol is demonstrated
6	Construct a basic network for a small enterprise and verify end to end operation	6.1	Physical network devices and components on a network topological drawing are identified and sourced
		6.2	Network routers and switches are selected and configured to establish end to end connectivity
		6.3	Basic network topology is cabled
		6.4	Addressing scheme for the network is developed
		6.5	Relevant commands of the network operating system that facilitate connection to a LAN are selected and configured
		6.6	Base level troubleshooting skills and procedures are utilised to establish or re-establish network connectivity
		6.7	Network router and switch base level security functionality is configured
		6.8	Network resources are set up, configured and shared between network devices
		6.9	Completed configurations for the networking devices are copied to storage media
		6.10	Fundamentals of securing personal data are applied
		6.11	Fundamentals of data security for a small enterprise are implemented

Range of Conditions

N/A



Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria must be assessed.

Skill	Description
Reading skills to:	<ul style="list-style-type: none">• interpret network devices and component specifications• translate network topological drawing to determine required physical devices and connections
Oral communication skills to:	<ul style="list-style-type: none">• ask questions and seek advice on the suitability of network devices for a given application
Planning and organising skills to:	<ul style="list-style-type: none">• source devices and components to build a basic computer network
Technology skills to:	<ul style="list-style-type: none">• use base level troubleshooting skills and procedures to establish network connectivity• apply security fundamentals to secure personal and small network data

Unit Mapping Information

Code and Title Current Version	Code and Title Previous Version	Comments
VU23887 - Build and implement a basic network	VU22963 - Build and implement a basic network	Equivalent

Assessment Requirements

Title	Assessment Requirements for VU23887 - Build and implement a basic network
Performance Evidence	<p>There must be evidence the learner has completed the tasks outlined in the elements, performance criteria and foundation skills of this unit and provided evidence of the ability on at least one (1) occasion to:</p> <ul style="list-style-type: none"> select network devices and components and construct, configure and implement a basic network for a small enterprise utilising base level troubleshooting skills and procedures to confirm connectivity.
Knowledge Evidence	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> setting IP addresses on end points, switches and routers types of physical layer technologies Ethernet frame operation Internet Control Message Protocol, (ICMP) including key ICMPv4 and ICMPv6 packets Address Resolution Protocol (ARP) protocol Reverse Address Resolution Protocol (RARP) protocol routing protocols transport layer protocols: <ul style="list-style-type: none"> User Datagram Protocol (UDP) Transmission Control Protocol (TCP) Internet Protocol (IP) application layer protocols Network Operating System (NOS) commands Open Source Interconnection (OSI) layered communication model Transmission Control Protocol/Internet Protocol (TCP/IP) layered communication model binary and hexadecimal number systems Variable Length Subnet Mask (VLSM) network addressing schemes Internet Protocol IPv4 and IPv6 addressing base level troubleshooting procedures (Ping, Traceroute) securing concepts for personal data network security fundamentals
Assessment Conditions	<p>This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The candidate must have access to:</p> <ul style="list-style-type: none"> relevant tools, equipment, materials and documentation required. relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials. <p>Refer Section B, Item 6.1 for suggested methods of assessment</p>

Assessor requirements

No specialist vocational competency requirements for assessors apply to this unit.

Unit code	VU23888
Unit title	Configure a small to medium network for an organisation
Application	<p>This unit of competency describes the performance outcomes, knowledge and skills required to configure and implement a small to medium network comprising Virtual Local Area Network (VLAN), routers, switches and end points.</p> <p>It requires the ability to implement and configure Spanning Tree Protocol (STP), and Dynamic Host Routing Protocol (DHCP) network features. The unit also introduces Local Area Network (LAN) security concepts and practises for an organisation.</p> <p>The unit applies to an Information Technology (IT) practitioner required to analyse, configure and troubleshoot routers and switches in small to medium sized business network.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>
Pre-requisite Unit(s)	Nil
Competency Field	N/A
Unit Sector	N/A

Element		Performance Criteria	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Investigate and configure basic switch and router network settings	1.1	Manner by which frames are forwarded on a switched network is investigated
		1.2	Broadcast and collision domains are examined
		1.3	Layer 2 (L2) switch to meet network connection specifications is configured
		1.4	Network segmentation using VLANs is examined
		1.5	Manner by which a switch forwards frames in a multi switch VLAN environment is investigated
		1.6	Basic device security features for a network router and switch are investigated and configured
		1.7	Router commands to connect end points to network router are configured and verified
		1.8	Switch access and trunk ports are investigated and configured

		1.9	Dynamic Trunking Protocol (DTP) is investigated and configured
		1.10	Inter VLAN routing using router on a stick is implemented
		1.11	Inter VLAN routing using Layer 3 switches is implemented
		1.12	Standard troubleshooting techniques to solve common inter-VLAN configuration issues are applied
2	Investigate Layer 2 (L2) redundant network design concepts	2.1	Spanning Tree Protocol (STP) function and operation is examined
		2.2	Common problems in a redundant L2 switched networks are identified
		2.3	Differences between Rapid Spanning Tree Protocol (RSTP) and Pre-VLAN Spanning Tree (PVST+) protocol are examined
		2.4	Function and operation of Ether Channel is investigated
		2.5	Standard troubleshooting methods for an Ether Channel implementation are investigated and applied
3	Configure and implement protocols and tools to enable a reliable network	3.1	Dynamic Host Control Protocol (DHCPv4) for Internet Protocol (IPv4) client and server features are configured and implemented
		3.2	Function and operation of DHCPv6 for (IPv6) is examined and configured
		3.3	State full and stateless implementations of DHCPv6 are configured and tested
		3.4	Function and operation of First Hop Redundancy Protocols (FHRP) is investigated and implemented
4	Implement network security mitigating strategies for common Local Area Network (LAN) attacks	4.1	Requirements of end point security are determined
		4.2	Access control methods for end points in a LAN are implemented
		4.3	L2 security threats and vulnerabilities are examined
		4.4	Manner in which network security is compromised via LAN attacks is analysed
		4.5	Mitigating Media Access Control (MAC) to address table attacks using switch port security is implemented
		4.6	Mitigating Virtual Local Area Network (VLAN) attacks using Dynamic Trunking Protocol (DTP) and Native VLANs is implemented
		4.7	Mitigating DHCP network attacks using DHCP Snooping is implemented
		4.8	Mitigating Address Resolution Protocol (ARP) network attacks using Dynamic ARP Inspection (DAI) is implemented

		4.9	Mitigating Spanning Tree Protocol (STP) network attacks using Portfast and Bridge Protocol Data Unit (BPDU) Guard are implemented
5	Investigate and configure static and default routing	5.1	Router decision processes to forward data packets to a network are examined and explained
		5.2	Methods used by a router to detect remote networks are investigated and explained
		5.3	Router commands that facilitate communication between multiple directly connected networks are configured
		5.4	IPv4 and IPv6 static and default routes are configured and implemented
		5.5	Floating static route to provide a backup connection is configured
		5.6	IPv4 and IPv6 static and default host routes are configured
		5.7	Troubleshooting methods for static and default routes are applied

Range of Conditions

N/A

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria must be assessed.

Skill	Description
Reading skills to:	<ul style="list-style-type: none"> investigate a range of security software available to mitigate VLAN attacks
Oral communication skills to:	<ul style="list-style-type: none"> ask questions and seek advice on troubleshooting methodologies to ensure end to end connectivity for a small to medium network

Unit Mapping Information

Code and Title Current Version	Code and Title Previous Version	Comments
VU23888 - Configure a small to medium network for an organisation	VU22964 - Configure a small to medium network for an organisation	Equivalent

Assessment Requirements

Title	Assessment Requirements for VU23888 - Configure a small to medium network for an organisation
Performance Evidence	<p>There must be evidence the learner has completed the tasks outlined in the elements, performance criteria and foundation skills of this unit and provided evidence of the ability on at least one (1) occasion to:</p> <ul style="list-style-type: none"> • configure and implement basic switch and router network settings for a small to medium network and ensure end to end connectivity • configure and implement DHCPv4 and DHCPv6 server and client services for a network • configure and implement at least two (2) of the following features to mitigate LAN attacks: <ul style="list-style-type: none"> ○ switch port security for MAC Address table attacks ○ Dynamic Trunking Protocol (DTP) and Native VLANs for VLAN attacks ○ DHCP Snooping for DHCP network attacks ○ Address Resolution Protocol (ARP) and Dynamic ARP Inspection (DAI) for ARP network attacks ○ Portfast and BPDU Guard for Spanning Tree Protocol (STP) network attacks • configure static and default routing • apply troubleshooting commands and procedures.
Knowledge Evidence	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> • STP implementations RSTP and PVST+ • Ether Channel • methods of securing end points from security attacks • methods used to protect a small to medium network from Layer 2 security attacks • methods used to protect a small to medium network from MAC address security attacks • router forwarding decisions based on the contents of a routing table • segmenting a small to medium network using VLANs • switch operation and configuration • VLAN routing techniques, router on a stick and using Layer 3 switches • DHCP for IPv4 and IPv6 • router static, default and floating static routes • switch port security commands • mitigation strategies for VLAN, DHCP, ARP and STP attacks • Dynamic Trunking Protocol (DTP) and Native VLANs • First Hop Redundancy Protocols (FHRP) • access control methods used by end points to secure connection to a network

Assessment Conditions

This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The candidate will have access to:

- relevant tools, equipment, materials and documentation required.
- relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Refer Section B, Item 6.1 for suggested methods of assessment”

Assessor requirements

No specialist vocational competency requirements for assessors apply to this unit.

Unit code	VU23889
Unit title	Secure and monitor the performance of a small to medium network
Application	<p>This unit describes the performance outcomes, knowledge and skills required to secure and monitor the performance of a small to medium network.</p> <p>It requires the ability to implement routing protocols, Access Lists (ACL's) to block common security threats, implement Network Address Translation (NAT) on an edge router and selecting a WAN technology for an organisation. The unit also includes using tools to monitor the network for performance as well as the application of systematic troubleshooting tools and techniques to ensure correct network operation and performance.</p> <p>The unit applies to an Information Technology (IT) practitioner required to analyse, configure and troubleshoot routers and switches in small to medium sized business network.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>
Pre-requisite Unit(s)	N/A
Competency Field	N/A
Unit Sector	N/A

Element		Performance Criteria	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Investigate and configure a dynamic routing protocol to a small to medium network	1.1	Function and operation of the single area Open Shortest Path First (OSPF) version 2 (v2) dynamic routing protocol is investigated
		1.2	OSPFv2 for a point to point and broadcast multi-access networks are configured
		1.3	Election of specific routers to be the Designated Router (DR) and Backup Designated Router (BDR) is configured
		1.4	Propagating a default route into an OSPFv2 network is investigated and implemented
		1.5	OSPFv2 standard troubleshooting tools and techniques are applied to verify operation
2	Secure a network using	2.1	Use of ACL's to support the protection of a computer network is examined



	Access Control Lists (ACL's)	2.2	Differences between standard and extended ACL's are compared
		2.3	Structure and operation of Standard ACL's is examined
		2.4	Control measures to protect security risks utilising standard ACL's are implemented
		2.5	Standard ACL to secure Virtual Teletype (VTY) access is implemented
		2.6	Structure and operation of Extended ACL's is examined
		2.7	Control measures to protect security risks utilising extended ACL's are investigated and implemented
		2.8	Standard and Extended ACL's troubleshooting techniques are deployed
3	Implement and verify Network Address Translation (NAT)	3.1	Function and operation of Network Address Translation (NAT) is investigated
		3.2	Different types of NAT implementations are compared
		3.3	Static NAT on an edge router is implemented and verified for correct operation
		3.4	Dynamic NAT on an edge router is implemented and verified for correct operation
		3.5	Port Address Translation (PAT) on an edge router is implemented and verified for correct operation
		3.6	Troubleshooting methods for NAT are implemented
		3.7	NAT operation for IPv4 and IPv6 is implemented
4	Investigate Wide Area Network (WAN) options for an organisation	4.1	Different WAN technologies are identified
		4.2	Private and public WAN technologies are compared
		4.3	WAN Protocols for service implementation are investigated and selected
		4.4	Point to Point serial communication across a WAN is examined
		4.5	Remote broadband connection options for a small to medium enterprise are investigated
5	Optimise and monitor network performance	5.1	Differing requirements for end to end quality of Voice, Video and Data are investigated
		5.2	Queuing algorithms used by networking devices are investigated
		5.3	Different models of Quality of Service (QoS) are examined and compared
		5.4	Mapping network topologies utilising Cisco Discovery Protocol (CDP) and Link Layer Discovery Protocol (LLDP) is performed
		5.5	Network Time Protocol (NTP) is implemented

		5.6	Function and operation of the Simple Network Management Protocol (SNMP) is applied and monitored
		5.7	Function and operation of System Logging (SYSLOG) is investigated
		5.8	Method to maintain router and switch configuration files is implemented
		5.9	Internetworking Operating System (IOS) upgrade for a Router or Switch is performed and monitored
6	Investigate and apply troubleshooting techniques and tools	6.1	Network troubleshooting methodologies are investigated
		6.2	Network troubleshooting tools are investigated
		6.3	Troubleshooting tools and techniques are applied to verify operation

Range of Conditions

N/A

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria must be assessed.

Skill	Description
Reading skills to:	<ul style="list-style-type: none"> research security methodologies to meet networking requirements of an organisations
Oral communication skills to:	<ul style="list-style-type: none"> ask questions and seek advice on methods to maintain router and switch configuration files

Unit Mapping Information

Code and Title Current Version	Code and Title Previous Version	Comments
VU23889 - Secure and monitor the performance of a small to medium network	VU22965 - Secure and monitor the performance of a small to medium network	Equivalent

Assessment Requirements

Title	Assessment Requirements for VU23889 - Secure and monitor the performance of a small to medium network
Performance Evidence	<p>There must be evidence the learner has completed the tasks outlined in the elements, performance criteria and foundation skills of this unit and provided evidence of the ability on at least one (1) occasion to:</p> <ul style="list-style-type: none"> • implement a single area Open Shortest Path First OSPFv2 • configure, implement and verify standard and extended Access Control List ACL function and operation for common security threats • implement Network Address Translation NAT for Internet Protocol IPv4 • Select an appropriate Wide Area Network (WAN) technology to meet the requirements of an organisation • Monitor and optimize a network performance using testing and troubleshooting techniques.
Knowledge Evidence	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> • OSPF dynamic routing protocol • routing troubleshooting methodologies and tools • application of: <ul style="list-style-type: none"> ○ WAN technologies ○ QoS methods ○ Queuing algorithms ○ CDP ○ LLDP ○ NTP ○ IOS Commands ○ SNMP operation ○ SYSLOG files ○ Static and Dynamic NAT ○ PAT ○ Standard and extended ACL's • network troubleshooting tools and techniques
Assessment Conditions	<p>This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The candidate will have access to:</p> <ul style="list-style-type: none"> • relevant tools, equipment, materials and documentation required. • relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials. <p>Refer Section B, Item 6.1 for suggested methods of assessment</p> <p>Assessor requirements</p>

No specialist vocational competency requirements for assessors apply to this unit.

Unit code	VU23890
Unit title	Investigate design concepts of an accessible and secure network
Application	<p>This unit describes the performance outcomes, knowledge and skills to investigate design concepts of an accessible and secure network suitable for a small to medium size enterprise (SME).</p> <p>It requires the ability to investigate the features and operations of a Wireless Local Area Network (WLAN) and includes network security requirements, network design features, virtualisation concepts and network automation concepts. The unit also covers the use of systematic troubleshooting tools and techniques to ensure correct network operation and performance.</p> <p>The unit applies to an Information Technology (IT) practitioner required to oversee the operation of a small to medium sized business network. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>
Pre-requisite Unit(s)	N/A
Competency Field	N/A
Unit Sector	N/A

Element		Performance Criteria	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Investigate features for a WLAN network	1.1	WLAN technology standards are examined
		1.2	Function and operation of WLAN devices are investigated
		1.3	Tools used to control multiple Access Points (APs) are identified
		1.4	Operation of a wireless Access Point (AP) is configured and verified
		1.5	Methods of channel management in a WLAN system are investigated
		1.6	WLAN security threats and mitigation strategies are examined
		1.7	WLAN troubleshooting tools and techniques are examined and demonstrated

2	Research security options to minimise network compromises	2.1	Threat actors and threat actor tools used to exploit an organisation's network are identified
		2.2	Different types of current malware are examined
		2.3	Strategies and methods used by intruders to infiltrate an organisation's network are investigated
		2.4	Methods used to exploit Transmission Control Protocol (TCP), and User Datagram Protocol (UDP) are identified and compared
		2.5	Methods used to exploit Internet Protocol (IP) service vulnerabilities of an organisation are identified and compared
		2.6	Common cryptographic processes used to protect data from end to end are investigated and compared
		2.7	Best practices for protecting a network are determined
3	Examine the operation of secure remote access connections	3.1	Different types of Virtual Private Network (VPN) tools and techniques are identified
		3.2	The process by which the Internet Protocol Security (IPsec) framework is used to secure network traffic is examined
		3.3	Remote VPN connection utilising IPsec is examined
4	Investigate network design features for an SME	4.1	Differing requirements for end to end quality of Voice, Video and Data in a converged network are identified
		4.2	Function and operation of a switched based network is examined
		4.3	Function and role of a hierarchical network is examined
		4.4	Features of a scalable network are examined
		4.5	Features of switch hardware that support network requirements are investigated
		4.6	Routers to support small to medium organisation are identified
5	Investigate network virtualisation design concepts and tools	5.1	Features of cloud computing infrastructure for an organisation are examined
		5.2	Role and function of network virtualisation in an organisation is explained
		5.3	Use of virtualised devices and services for an organisation is demonstrated
		5.4	Software defined networking tools and techniques for an organisation are identified
		5.5	Role of virtualised networked controllers for an organisation is explained
6		6.1	Automation tools and techniques that support the development of network infrastructure are explored

Investigate network automation concepts tools and techniques	6.2	Current data formats used for network data exchange are investigated
	6.3	Function and operation of Common Application Programming Interfaces (API's) to enable network data communication are investigated and explained
	6.4	Function and operation of Representational State Transfer (REST) when used in network data communication are investigated and explained
	6.5	Common configuration management tools are identified
	6.6	Function and operation of Digital Network Architecture (DNA) when used to automate network design is explained

Range of Conditions

N/A

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria must be assessed.

Skill	Description
Reading skills to:	<ul style="list-style-type: none"> research security options used to minimise network compromises for a small to medium size organisations
Oral communication skills to:	<ul style="list-style-type: none"> ask questions and seek advice on features and operation of a Wireless Local Area Network (WLAN)

Unit Mapping Information

Code and Title Current Version	Code and Title Previous Version	Comments
VU23890 - Investigate design concepts of an accessible and secure network	VU22966 - Investigate design concepts of an accessible and secure network	Equivalent

Assessment Requirements

Title	Assessment Requirements for VU23890 - Investigate design concepts of an accessible and secure network
Performance Evidence	<p>There must be evidence the learner has completed the tasks outlined in the elements, performance criteria and foundation skills of this unit and provided evidence of the ability on at one (1) occasion to:</p> <ul style="list-style-type: none"> research and explain: <ul style="list-style-type: none"> features and operation of a WLAN network for an SME security options to minimise network compromises network design features for an SME to meet various requirements methods to minimise network attacks from IP, TCP, UDP and IP service vulnerabilities virtualised network infrastructure features and advantages of a switched based network for an organisation
Knowledge Evidence	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> WLAN design techniques and operation WLAN threats Security threat actors and tools malware types common network attack strategies IP vulnerabilities TCP & UDP vulnerabilities fundamentals of best practice for network security cryptographic basics configuration of secure remote users operation of a switched network for a SME design features of scalable networks network virtualisation tools and techniques software design networking tools function and operation of network controllers network automation overview standard data formats used for network data transfer function and operation of API's configuration management tools

- function and operation of REST

Assessment Conditions

This unit may be assessed on the job, off the job or a combination of both. Where assessment occurs off the job, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The candidate will have access to:

- relevant tools, equipment, materials and documentation required.
- relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Refer Section B, Item 6.1 for suggested methods of assessment

Assessor requirements

No specialist vocational competency requirements for assessors apply to this unit.

Unit code		VU23893	
Unit title		Configure variable frequency drives	
Application		<p>This unit describes the performance outcomes, skills and knowledge required to configure variable frequency drives (VFD).</p> <p>It requires the ability to work safely and apply knowledge of control systems and control functions to develop and test the configuration using a range of programming approaches developed for VFDs systems.</p> <p>The unit applies to a person working in an engineering environment where variable frequency drives are used for automating processes in manufacturing, process control, building services, laboratories etc.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>	
Pre-requisite Unit(s)		N/A.	
Element		Performance Criteria	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Prepare to develop control program	1.1	Established work health and safety/occupational health and safety (WHS/OHS) requirements and risk control measures and procedures for the work area are followed
		1.2	Safety hazards, which have not previously been identified, are documented and risk control measures devised and implemented in consultation with appropriate personnel
		1.3	Control program and input/output interfacing requirements are determined from job specifications and consultation with appropriate personnel
		1.4	Equipment and software needed to carry out the work are obtained and checked for correct operation and safety
2	Develop, write and test control program	2.1	Plant or machines circuits are checked as being isolated where necessary in accordance with WHS/OHS requirements and procedures
		2.2	Control solutions are established and documented based on the specified control mode and using acceptable methods for designing control systems
		2.3	Using appropriate software (if applicable) the developed control system is converted to an appropriate form for the variable frequency drive

		2.4	Parameters are entered into the variable frequency drive manually using pad panels or computers with appropriate software
		2.5	Entered instructions and settings are tested as meeting those specified in the control system scenario
		2.6	Appropriate methods and tools are used to test the control systems and operating faults and anomalies are identified and rectified
		2.7	Methods for dealing with unexpected situations are selected based on safety considerations and specified work outcomes
3	Finalise control program	3.1	Program is transferred from a variable frequency drive to an external medium for storage
		3.2	Control system specification and program are documented in accordance with enterprise procedures
		3.3	Work completion is reported and appropriate personnel notified in accordance with enterprise procedures

Range of Conditions

N/A

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria must be assessed.

Skill	Description
Oral communication skills to:	<ul style="list-style-type: none"> gather information and communicate with other in the work environment
Numeracy skills to:	<ul style="list-style-type: none"> read and interpret testing equipment to monitor a control system and determine operational faults
Learning skills to:	<ul style="list-style-type: none"> use a range of programming features to configure variable frequency drives
Teamwork skills to:	<ul style="list-style-type: none"> work with others in a technology environment to complete a specified task

Unit Mapping Information

New unit, no equivalent unit.



Assessment Requirements

Title	Assessment Requirements for: VU23893 - Configure variable frequency drives
Performance Evidence	<p>There must be evidence the learner has completed the tasks outlined in the elements and performance criteria of this unit and demonstrated the ability to:</p> <ul style="list-style-type: none"> interpret job specifications and configure, test and modify parameters for VFD on at least two (2) occasions using programming features including: <ul style="list-style-type: none"> input/output programming built-in features and micros configuring advanced parameters diagnostic indicators output relay to address operating fault.
Knowledge Evidence	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> alternating current (AC) motor types and characteristics, speed and torque choosing variable frequency drive (VFD) based on input power and motor type VFD programming methods online/offline VFD programming application of VFD VFD parameters VFD modes (prog, run, terminal) tests for VFD and operating faults VFD diagnostic indicator application of programming structures digital input output (I/O) programming. analog input output (I/O) programming fault relay programming relevant workplace WHS/OHS requirements and procedures
Assessment Conditions	<p>Both practical skills and knowledge must be assessed. Simulated assessment environments must simulate real-life working environment with access to:</p> <ul style="list-style-type: none"> relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials hand tools and equipment consumables personal protective equipment (PPE)

All assessment must be completed in accordance with work health and safety standards

Refer Section B, Item 6.1 for suggested methods of assessment

Assessor requirements:

No specialist vocational competency requirements for assessors apply to this unit.

Unit code		VU23891	
Unit title		Install and configure an audio-visual system	
Application		<p>This unit describes the performance outcomes, skills and knowledge required to install and configure a residential audio-visual system.</p> <p>It requires the ability to work safety, apply knowledge of amplification techniques, speaker technologies, wiring systems and cable types and applications and ensuring completed system meets the relevant standards and complies with installation and regulatory requirements.</p> <p>The unit applies to a person working in an audio-visual environment.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>	
Pre-requisite Unit(s)		ICTTEN202 Use hand and power tools	
Element		Performance Criteria	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Prepare to install audio-visual components and systems	1.1	Work health and safety (WHS)/Occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
		1.2	WHS/OHS risk control measures are followed in preparation for the work
		1.3	Nature and location of the work is obtained from relevant person/s to determine the scope of work
		1.4	Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
		1.5	Instructions for coordinating work with others is obtained from relevant person/s and applied
		1.6	Materials required for the work are determined in accordance with workplace procedures
		1.7	Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2	Install audio/video components and systems	2.1	Workplace risk control measures and procedures are applied
		2.2	Audio/video components are installed in accordance with relevant industry standards and job specifications with sufficient excess to affect terminations

		2.3	Accessories are installed straight and square in required locations within acceptable tolerances
		2.4	Cables and conductors are terminated at accessories in accordance with manufacturer specifications and regulatory requirements
		2.5	Unplanned events are reported to relevant person/s in accordance with workplace procedures
		2.6	Installation is conducted efficiently without waste of materials, damage to apparatus, circuits or the surrounding environment applying sustainable energy practices
3	Finalise installation work and report completion	3.1	WHS/OHS work completion and risk control measures and procedures are followed
		3.2	Terminated cables are tested to ensure continuity and insulation resistance comply with requirements.
		3.3	Completion of installation is reported to relevant person/s in accordance with workplace procedures
		3.4	Prepare instructions for a specific audience using clear language to convey operational details

Range of Conditions

N/A

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria must be assessed.

Skill	Description
Reading skills to:	<ul style="list-style-type: none"> read and interpret plans, specifications, computer program interface, and other documentation from a variety of sources, and consolidate information to determine requirements
Oral Communication skills to:	<ul style="list-style-type: none"> effectively participates in verbal exchanges using collaborative and inclusive techniques including active listening and questioning, and reading of verbal and non-verbal signals to convey and clarify information
Numeracy skills to:	<ul style="list-style-type: none"> read and interpret testing equipment
Problem-solving skills to:	<ul style="list-style-type: none"> identify hardware used in connecting equipment
Technology skills to:	<ul style="list-style-type: none"> select, safely use and maintain a range of hand tools and hand held power tools identify purposes and uses specific functions and key features of basic digital systems and tools
Digital skills to:	<ul style="list-style-type: none"> access information, search and enter data and code, present information and communicate with others, cognisant of data security and safety



	<ul style="list-style-type: none">• identify use of software specific to programming
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Unit Mapping Information	New unit, no equivalent unit.
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Assessment Requirements

Title	Assessment Requirements for: VU23891- Install and configure an audio-visual system
Performance Evidence	<p>There must be evidence learners have completed the tasks outlined in the elements, performance criteria and foundation skills of this unit and demonstrated the ability on at least two (2) occasions to install and configure a residential audio-visual system. In doing so they must confirm the ability to:</p> <ul style="list-style-type: none"> • apply relevant WHS/OHS requirements, including the use of risk control measures • read, interpret and follow manufacturer's installation drawing/s and supporting documentation • safely use hand and handheld power tools and testing devices • place and secure components and accessories according to manufacturer's requirements • set functional controls to customer's requirements • deal effectively with unplanned events • configure and test the installed equipment for correct operation.
Knowledge Evidence	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none"> • relevant manufacturer specifications for installations • relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes • relevant WHS/OHS legislated requirements • relevant workplace documentation • relevant workplace policies and procedures • video/audio components and system assembly and setting up in buildings and premises, including, but not limited to: <ul style="list-style-type: none"> ○ projector ○ TV monitor ○ digital TV tuner • electronic safe working practices • audio reproduction electronic components, including: <ul style="list-style-type: none"> ○ power and integrated amplifiers ○ preamplifiers ○ streaming music devices • audio reproduction and speaker fundamentals • audio/video control equipment • relevant standards, codes and regulations • sound reproduction fundamentals • video systems installation practices.

Assessment Conditions

Both practical skills and knowledge must be assessed. Simulated assessment environments must simulate real-life working environment with access to:

- relevant and appropriate materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- resources that reflect current industry practices in relation to installing and configuring an audio-visual system
- applicable documentation, including workplace procedures, equipment specifications, regulations, codes of practice and operation manuals.

Refer Section B, Item 6.1 for suggested methods of assessment

Assessor requirements:

No specialist vocational competency requirements for assessors apply to this unit.

Unit code		VU23892	
Unit title		Install and configure an integrated home control system	
Application		<p>This unit describes the performance outcomes, skills and knowledge required to install and configure an integrated home control system.</p> <p>It requires the ability to work safely and to standards, recognise various system components, connection methodologies, wiring systems, control system functions and applications and ensuring completed system meets the relevant standards and complies with requirements.</p> <p>The unit applies to a person working in an integrated home control environment under extra low voltage (ELV) conditions.</p> <p>No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.</p>	
Pre-requisite Unit(s)		ICTTEN202 Use hand and power tools	
Element		Performance Criteria	
Elements describe the essential outcomes of a unit of competency.		Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the assessment requirements.	
1	Prepare site to work	1.1	Work health and safety (WHS), Occupational health and safety (OHS) requirements and workplace procedures for relevant work area are identified, obtained and applied
		1.2	WHS/OHS risk control measures are followed in preparation for the work
		1.3	Nature and location of the work is obtained from relevant person/s to determine the scope of work
		1.4	Safety hazards which have not previously been identified are reported and advice on risk control measures is sought from the work supervisor
		1.5	Instructions for coordinating work with others is obtained from relevant person/s and applied
		1.6	Materials required for the work are determined in accordance with workplace procedures
		1.7	Tools, equipment and testing devices required for work are obtained and checked for correct operation and safety
2	Prepare to Install integrated system	2.1	The various components against the designated installation location are identified.
		2.2	The control bus networks and requirements from load calculations for devices on the system are identified

		2.3	A cable schedule highlighting all cable requirements is prepared
		2.4	Cable pathways to ensure compliance with relevant standards and manufacturer requirements are prepared
		2.5	Take-off plan for the number of devices and accessories required for the system, using manufacturer's title and ID for each is created
		2.6	Subsystems involved in the home automation system are identified
3	Install an integrated system	3.1	Workplace risk control measures and procedures are applied
		3.2	Integrated home control system is installed in accordance with relevant industry standards and job specification and with sufficient cable excess to affect terminations
		3.3	Accessories are installed straight and square in required locations within acceptable tolerances
		3.4	Cables and conductors are terminated at accessories in accordance with manufacturer specifications and regulatory requirements
		3.5	Unplanned events are reported to relevant person/s in accordance with workplace procedures
		3.6	Installation is conducted efficiently without waste of materials, damage to apparatus, circuits or the surrounding environment using sustainable energy practices
4	Configure integrated system devices	4.1	Required programming and diagnostic tools are downloaded to a compatible PC and checked for correct operation and safety
		4.2	Correct modes of programming to develop an integrated system according to manufacturer's programming software instructions is applied
		4.3	Manufacturer's instructions and recommendations when programming system devices to test requirements is followed
		4.4	Parameters for operation of loads to project requirements and within manufacturer's designated range is configured
		4.5	Programmed system database is saved and backed up according to manufacturer instructions
5	Load and test integrated system	5.1	Database of integrated system program is transferred to network
		5.2	All functions of the integrated system are tested for compliance with system requirements and manufacturer specifications

		5.3	Diagnostic tools are applied to locate system faults, defects and anomalies
		5.4	Any defects and anomalies are corrected to comply with project requirements and manufacturer specifications
		5.5	Copy of documentation of integrated system is provided to the customer at handover
6	Complete installation and tidy work area	6.1	Unused materials and waste is disposed of in accordance with workplace environmental requirements
		6.2	Hand tools and test equipment is checked and stored in accordance with workplace requirements
		6.3	Completion of installation is reported and documented in accordance with workplace procedure

Range of Conditions

Extra Low Voltage (ELV) means a nominal voltage not exceeding 50V a. c./120V d. c.

Low voltage means a nominal voltage exceeding 50V a. c /120V d. c. but not exceeding 1000V a. c./1500 V d. c..

Foundation Skills

Foundation skills essential to performance and not explicit in the performance criteria must be assessed.

Skill	Description
Reading skills to:	<ul style="list-style-type: none"> read and interpret plans, specifications, computer program interface, and other documentation from a variety of sources, and consolidates information to determine requirements
Writing skills to:	<ul style="list-style-type: none"> document work activities according to workplace procedure
Oral Communication skills to:	<ul style="list-style-type: none"> effectively participates in verbal exchanges using collaborative and inclusive techniques including active listening and questioning, and reading of verbal and non-verbal signals to convey and clarify information
Numeracy skills to:	<ul style="list-style-type: none"> read and interpret testing equipment
Problem-solving skills to:	<ul style="list-style-type: none"> identify hardware used in connecting equipment
Technology skills to:	<ul style="list-style-type: none"> select, safely use and maintain a range of handheld power tools identify purposes and uses specific functions and key features of basic digital systems and tools
Digital skills to:	<ul style="list-style-type: none"> access information, search and enter data and code, present information and communicate with others, cognisant of data security and safety identify use of software specific to programming

**Unit Mapping
Information**

New unit, no equivalent unit.

Assessment Requirements

Title	Assessment Requirements for: VU23892 - Install and configure an integrated home control system
Performance Evidence	<p>There must be evidence learners have completed the tasks outlined in the elements, performance criteria and foundation skills of this unit and demonstrated the ability on at least two (2) occasions to install and configure an integrated home control system. In doing so they must confirm the ability to:</p> <ul style="list-style-type: none">• comply with standards, regulations and WHS/OHS) procedures and practices when developing and installing an integrated home control system• determine the full scope of specifications for an integrated home control system• use calculations to correctly determine the number of networks, power over ethernet (POE) and current load requirements• install system devices appropriately in system scheme• apply and check appropriate modes of programming and diagnostic tools in the design• program devices and set load operating parameters with a basic program according to manufacturer specifications• use diagnostic tools to locate and correct system defects, faults and anomalies• document and backup system during appropriate stages of the project.
Knowledge Evidence	<p>The learner must be able to demonstrate essential knowledge required to effectively do the task outlined in elements and performance criteria of this unit, manage the task and manage contingencies in the context of the work role. This includes knowledge of:</p> <ul style="list-style-type: none">• relevant manufacturer specifications for installations• relevant safe work method statements (SWMS)/job safety assessments or risk mitigation processes• relevant WHS/OHS legislated requirements• relevant workplace documentation• relevant workplace policies and procedures• standards, regulations, WHS/OHS procedures and practices when developing an integrated system• scope of specifications for an integrated home control system• application of required calculations to correctly determine the number of network, POE and current load requirements• system devices in system scheme• modes of programming and diagnostic tools in the system design• programming devices and setting load operating parameters with a basic program according to manufacturer specifications• application of diagnostic tools to locate and correct system defects, faults and anomalies• purpose for documenting and backing up the system during appropriate stages of the project.

- various methods of control capabilities and selection
- various subsystems (Control Systems) in an integrated home control environment, including but not limited to:
 - air conditioning (HVAC)
 - audio visual systems
 - lighting control
 - security systems
 - CCTV systems
 - irrigation control
- identify the software used for system and device programming, monitoring and control
- system and device programming, encompassing:
 - addressing conventions for networks, devices, applications, output groups, types of control and outputs, which include 'on', 'off', a specific level, and over a specific time
 - PC programming tools and methods (programming includes configuring network database using addressing tools and objects, function objects, editing, altering and transferring the database to network)
- system fault-finding processes
- system components, encompassing:
 - support devices for control bus supply and control
 - support devices for programming, interconnection between networks and integration with third party systems
- types and capabilities of input and output devices

Assessment Conditions

Both practical skills and knowledge must be assessed. Simulated assessment environments must simulate real-life working environment with access to:

- relevant materials, tools, equipment and personal protective equipment (PPE) currently used in industry
- typical contemporary dwelling into which a control system will be delivered
- availability of all functional requirements of a modern home
- access to contemporary digital equipment
- access to either commercial automation systems (Control 4 or similar) or Apple HomeKit (Homebridge, System Hubs or similar)
- access to all current standards, codes and regulations.

Due to limitations in a training situation, connections must be in an Extra Low Voltage (ELV) environment, if completing practical work in a simulated assessment environment, voltages must not exceed ELV.

All assessment must be completed in accordance with work health and safety standards, policies and procedures.

Refer Section B, Item 6.1 for suggested methods of assessment

Assessor requirements:

No specialist vocational competency requirements for assessors apply to this unit.