UEE30820
Certificate III in Electrotechnology Electrician
Release 6

RPL /WORK EXPERIENCE RECORD

U Kyaw Naing (Dr Kyaw Naing)

BE(EP),MSc(EE),MSc(Sc Ed) Curtin, CIV TAE40116 , Graduate Diploma in Adult and Vocational Education(TAFE-NSW),EdD(STCTU),Dip VET (TAE50111),Dip Training Systems Design (TAE50211)

CIII Electrical Wiring (TAFE-NSW), Cert of Proficiency(Electrical Fitter)NSW VTT, Craft Cert (Electronic Computer Systems)NSWVTT,
Cert of Proficiency (Engineering), NSWVTT,UEE11 Statement (TAFE-NSW)
Dip Electronics (ICS-USA)
Marine Engineer Cadet Training Certificate (Mechanical)

MIEAust (907788),
Professional Engineer (NSW) 001338
Registered Professional Engineer of Queensland (07661)
NSW Electrician Licence-Qualified Supervisor Certificate (33631S)
(Former Teacher of Electrical Engineering & Electrotechnology-TAFE-NSW)

UK Qualifications

- Incorporated Engineer (Engineering Council-UK)(1995)
- Stage 1 Charter Engineer (Engineering Council-UK)(1998)
- AMIEE (1996)
- MIET (2018)
- AMIMarE (1996)

This work experience record prepared for the RTOs where I am teaching consists of

- Work Experience gained by the students in the workplace
- Some practical projects activities related to Workshop Practice,Electrical Principle, Electrical Machines, Electrical Installation, Safety Testing and Verifications for presenting the training provided to the students during their Certificate III in Electrotechnology-Electrician Training .
- They are just the sample and summarised form of practical experience record that needs to be accompanied with their full training evidence.
- All RTOs for which I am working can legally utilize this document .

Applicant Details:

1. Occupation you are seeking recognition in		
2 Personal details		
USI # (Unique Student Identifier)		
Surname		
Preferred title (Mr, Mrs, Ms, Miss)		
First name/s		
Any other name used		
Home address		
Postal address if different from above		
Telephone numbers	Home:	Work:
	Mobile:	Fax:
Date of birth	/ /	
Gender	MALE □ / FEMALE □	
Age		
Are you a permanent Resident of Australia	YES □ / NO □	
3 Current Employment		
Are you currently employed? If YES, in which occupation are you currently employed? Who is your current employer?	YES □ / NO □ …… ……	
4. Armed Forces details (If Applicable)		
Branch of Service		
Trade classification on discharge		

5. Further Training	
Have you undertaken any training courses related to the occupation applied for?	YES □ / NO □
If Yes	
What occupation were you trained in?	
Training completion date (month, year)	
Country where you trained	
Name of course and institution (if applicable)	
6. Is there any further information you wish to give in support of your application	
7. Professional Referees- relevant to trade	
Name Position Organisation Phone number Mobile number Email address	…… …… …… …… …… ……
Name Position Organisation Phone number Mobile number Email address	…… …… …… …… …… ……

CORE UNITS

Unit Code	Unit Title	Points	Questions (Verbal / Written)	Practical (Tasks/ Scenario)
HLTAID009	Provide cardiopulmonary resuscitation	10	To develop	To develop
UEECO0023	Participate in electrical work and competency development activities	60	✓	✓
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	20	✓	✓
UEECD0019	Fabricate, assemble and dismantle utilities industry components	40	✓	✓
UEECD0044	Solve problems in single path circuits	40	✓	✓
UEECD0046	Solve problems in multi path circuits	40	✓	✓
UEECD0020	Fix and secure electrotechnology equipment	20	✓	✓
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications	40	✓	✓
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work	20	✓	✓
UEEEL0024	Test and connect alternating current (a.c.) rotating machines*	50	✓	✓
UEEEL0025	Test and connect transformers*	30	✓	✓
UEEEL0008	Evaluate and modify low voltage heating equipment and controls*	20	✓	✓
UEEEL0009	Evaluate and modify low voltage lighting circuits, equipment and controls*	20	✓	✓
UEEEL0010	Evaluate and modify low voltage socket outlets circuits*	20	✓	✓
UEEEL0003	Arrange circuits, control and protection for electrical installations*	40	✓	✓
UEEEL0019	Solve problems in direct current (d.c.) machines*	30	✓	✓
UEEEL0021	Solve problems in magnetic and electromagnetic devices*	30	✓	✓
UEEEL0020	Solve problems in low voltage a.c. circuits*	80	✓	✓
UEEEL0012	Install low voltage wiring, appliances, switchgear and associated accessories*	40	✓	✓
UEEEL0047	Identify, shut down and restart systems with alternate supplies*	20	✓	✓
UEEEL0039	Design, install and verify compliance and functionality of general electrical installations*	40	✓	✓
UEEEL0023	Terminate cables, cords and accessories for low voltage circuits*	40	✓	✓
UEEEL0018	Select wiring systems and select cables for low voltage electrical installations*	60	✓	✓
UEEEL0014	Isolate, test and troubleshoot low voltage electrical circuits*	60	✓	✓
UEEEL0005	Develop and connect electrical control circuits*	80	✓	✓
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20	✓	✓
UETDRRF004	Perform rescue from a live LV panel*	20		
	Total Points in Core Units	**990**		

Group A Electives: Maximum 120 points

Unit Code	Unit Title	Points	Questions (Verbal / Written)	Practical (Tasks/ Scenario)
UEECS0033	Use engineering applications software on personal computers	40	✓	✓
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60	✓	✓
UEEAS0007	Assemble, mount and connect control gear and switchgear*	40	✓	✓
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80	✓	✓

NOTE: Additional elective units will be added in future revisions of this RPL Kit.

STEPS

1. Complete application

The candidate completes the application forms in **SECTION B**. It is important candidates provide as much information of their previous experience in the electrotechnology service industry as is available.

Documents that may be available include but are not limited to:

- any licences, e.g., unrestricted/ restricted licence
- brief CV/resume of work history
- indentures/trade papers
- certificates/results of assessment
- certificates/results of assessment – interstate/overseas
- certificates/results of assessment – universities
- results/statement of attendance/certificates – vendor training courses, in-house courses, workshops, seminars, symposiums
- results/statements of attendance/certificates – club courses e.g., first aid, surf lifesaving,
- tickets held e.g., forklift, crane, EWP,
- site competencies held record – Blue/White card, site safety induction
- industry awards
- photographs of your own industry work
- diaries/task sheets/job sheets/logbooks
- site training records
- membership of relevant professional associations
- hobbies/interests/special skills outside work
- references/letters from previous employers/supervisors
- any other documentation that may demonstrate industry experience

Candidates also need to provide contact details for one or two referees who can confirm their industry skills in context and over time.

To have skills formally recognised under the Australian Qualifications Framework, you must ensure the candidate's skills meet industry standards.

2. Interview about candidate's documentary information

Review the information provided by the candidate and arrange a time for both you and the candidate to discuss. Begin alignment of documentation and skills to the following qualification:

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The candidate will have the opportunity to discuss and identify previous experience with you. The available documents are step one in collecting information and you will need to determine which units of competency, if any, are fully covered at this stage. You use your own or your RTO's assessment recording forms to record this stage of the assessment.

There may be instances where the candidate has little, or no, documentary information of industry experience. This is **not** a barrier to gaining recognition. This will just require you to rely on the questioning, practical assessment and referee validation phases of the RPL process.

3. Questions for the Competency Conversation

The bank of questions in **SECTION C** is the next phase in collecting evidence for the RPL process. The questions are designed to enable you to have a "competency conversation" with the candidate to further gain evidence of their past experience. **REMEMBER**, the primary focus is on the candidate's experience.

Each question has "key points" to look for in responses. You may use the list of key points to formulate questions of your own if you wish or contextualise the question to the candidate's particular work situation. The Record of Conversation sheets indicate relevant content (evidence) that should be sought. Place a tick next to each key point as you hear this topic being discussed during the conversation. You should read the "industry requirements" of each competency before the candidate answers the questions posed. You may also target the assessment to those aspects that present the *greatest risk* in the industry. Questions are aligned with the relevant unit/s of competency in **SECTION G**.

It is not intended every question for all competencies is asked, only those competencies the initial interview about the candidate's documentary evidence has failed to **fully** address. The question bank covers most but not all units in the kit. Units without questions are covered in the practical assessment/scenario section.

4. Practical assessment tasks

It is important that you use both Steps 3 (Questioning) and 4 (Practical Assessment) in doing this assessment. The RPL process is a streamlined RPL process which **does not** rely solely on practical assessment but uses a combination of questioning and practical to provide evidence of candidate competence.

This is the third phase in collecting evidence. A practical skills test is then conducted by you at the candidate's workplace or another suitable venue. Appropriate permission must be sought before entering workplaces.

This is a further opportunity for candidate to demonstrate competence. It is expected the practical assessment will comprise **only those competencies** the candidate is still unable to demonstrate knowledge/experience in after documentary review and questioning have been applied. These assessments contain the practical skills and application of knowledge for the qualification. A number of holistic practical assessments are included in this kit (**SECTION D**) to assist you with tasks suitable for observation on the job.

You decide if the response to questions and practical assessment tasks fulfils the requirements of the standard and may choose to pursue the issue further for a determination to be made. The assessment is a conversation/observation, not an exam, and you are encouraged to assist candidates to focus responses on relevant issues.

Assessing through observation and questioning, particularly on the job, will speed up and streamline the RPL assessment process.

NOTE: Where candidate's documentation and responses to key questions contribute to the assessment decision, no judgement on an individual's competence should be made without having direct evidence that confirms knowledge and skills can be applied against the appropriate performance standards. The critical safety nature of working with electricity and electrical equipment carries risk in deeming a person competent. Sources of evidence need to be 'rich' in nature to minimise error in judgment and allow a confident decision by the assessor when making a judgement of "competence". Practical assessment will therefore be considered mandatory as

part of the RPL process and in particular will apply to those skills that are more critical to safety and operational requirements.

Recording sheets for candidate information, questioning and the practical assessments have been included in **SECTION D**. You may use other recording mechanisms provided these also keep a complete record of assessment *and justification of judgement*. Candidate responses, observations of skills demonstrated, and documents presented as evidence must be noted in enough detail so anyone external to the process (e.g., a fellow assessor, auditor, lawyer,) can read the record and retrace your judgement.

5. Gap training

RPL is an assessment process designed to show areas of competence and to identify and record if a candidate has gaps in skills and knowledge against a whole qualification.

Not all candidates will have skill/knowledge gaps, however it is vital to identify gaps so that training can be targeted to maintain relevance and maximise efficiencies in training that also support development of a safe & competent worker.

If a candidate has skills gaps, a pathway to complete training in the outstanding units can be negotiated to assist the client to gain the full qualification.

EVIDENCE REVIEW

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Recognition of prior learning outcomes (both Granted and Not Granted) are now funded nationally and as such will be included in National AVETMISS audits. NCVER have stipulated evidence recording requirements for RPL assessments as a minimum requirement for passing an AVETMISS audit. The following "Evidence Review" proforma has been approved by NCVER as covering AVETMISS audit requirements for RPL recorded outcomes. It also gives you an opportunity to track a student's assessment progress at a glance.

It is expected that this "Evidence Review" summary sheet (or similar) would be attached to each participant's evidence compiled during the RPL assessment process.

(Place a tick in the appropriate evidence collection method column for each unit of competency. Place a line through those units not examined as part of this RPL assessment.)

Unit Code	Unit Title	Questions	Practical	Documents	3rd Party Report	Other evidence
CORE UNITS						
HLTAID009	Provide cardiopulmonary resuscitation					
UEECO0023	Participate in electrical work and competency development activities					
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace					
UEECD0019	Fabricate, assemble and dismantle utilities industry components					
UEECD0044	Solve problems in single path circuits					
UEECD0046	Solve problems in multi path circuits					
UEECD0020	Fix and secure electrotechnology equipment					
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications					
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work					
UEEEL0024	Test and connect alternating current (a.c.) rotating machines*					
UEEEL0025	Test and connect transformers*					
UEEEL0008	Evaluate and modify low voltage heating equipment and controls*					
UEEEL0009	Evaluate and modify low voltage lighting circuits, equipment and controls*					
UEEEL0010	Evaluate and modify low voltage socket outlets circuits*					
UEEEL0003	Arrange circuits, control and protection for electrical installations*					
UEEEL0019	Solve problems in direct current (d.c.) machines*					
UEEEL0021	Solve problems in magnetic and electromagnetic devices*					
UEEEL0020	Solve problems in low voltage a.c. circuits*					
UEEEL0012	Install low voltage wiring, appliances, switchgear and associated accessories*					
UEEEL0047	Identify, shut down and restart systems with alternate supplies*					

Unit Code	Unit Title	Questions	Practical	Documents	3rd Party Report	Other evidence
UEEEL0039	Design, install and verify compliance and functionality of general electrical installations*					
UEEEL0023	Terminate cables, cords and accessories for low voltage circuits*					
UEEEL0018	Select wiring systems and select cables for low voltage electrical installations*					
UEEEL0014	Isolate, test and troubleshoot low voltage electrical circuits*					
UEEEL0005	Develop and connect electrical control circuits*					
UEERE0001	Apply environmentally and sustainable procedures in the energy sector					
UETDRRF004	Perform rescue from a live LV panel*					
Group A Electives You may complete units to a maximum weighting of 60						
UEECS0033	Use engineering applications software on personal computers					
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*					
UEEAS0007	Assemble, mount and connect control gear and switchgear*					
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*					

Assessor's Name: U Kyaw Naing

Assessor's Signature: _____

Date: _____

WHAT DOES IT MEAN TO BE RECOGNISED AS AN ELECTROTECHNOLOGY ELECTRICIAN

An **Electrotechnology Electrician** will have recognised skills and knowledge (competencies) to to select, install, set up, test, fault find, repair and maintain electrical systems and equipment in buildings and premises. It includes Electrical Regulatory Authority Council (ERAC), or their successor's, Essential Performance Capabilities for an 'Unrestricted Electrician's license' which permits to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

An Electrician will have the skills and knowledge to perform the following tasks and duties to the standard of performance expected in the workplace:

- ✓ Provide cardiopulmonary resuscitation
- ✓ Apply work health and safety regulations, codes and practices in the workplace
- ✓ Document and apply measures to control WHS risks associated with electrotechnology work*
- ✓ Fabricate, assemble and dismantle utilities industry components*
- ✓ Fix and secure electrotechnology equipment
- ✓ Solve problems in multiple path circuits
- ✓ Solve problems in single path circuits
- ✓ Use drawings, diagrams, schedules, standards, codes and specifications*
- ✓ Participate in electrical work and competency development activities
- ✓ Arrange circuits, control and protection for electrical installations*
- ✓ Develop and connect electrical control circuits*
- ✓ Evaluate and modify low voltage heating equipment and controls*
- ✓ Evaluate and modify low voltage lighting circuits, equipment and controls*
- ✓ Evaluate and modify low voltage socket outlets circuits*
- ✓ Install low voltage wiring, appliances, switchgear and associated accessories*
- ✓ Isolate, test and troubleshoot low voltage electrical circuits*
- ✓ Select wiring systems and select cables for low voltage electrical installations*
- ✓ Solve problems in direct current (d.c.) machines*
- ✓ Solve problems in low voltage a.c. circuits
- ✓ Solve problems in magnetic and electromagnetic devices*
- ✓ Terminate cables, cords and accessories for low voltage circuits*
- ✓ Test and connect alternating current (a.c.) rotating machines*
- ✓ Test and connect transformers
- ✓ Design, install and verify compliance and functionality of general electrical installations*

- ✓ Identify, shut down and restart systems with alternate supplies*
- ✓ Apply environmentally and sustainable procedures in the energy sector
- ✓ Perform rescue from a live LV panel* Perform rescue from a live LV panel* Develop, enter, and verify discrete control programs for programmable controllers
- ✓ Assemble, mount, and connect switchgear and control gear
- ✓ Source and purchase materials/parts for installation or service jobs

TIPS AND HINTS TO HELP YOU PREPARE FOR RECOGNITION

To have skills formally recognised in the national system, assessors must make sure you have the skills and knowledge to meet the industry standard. This means you must be involved in a careful and comprehensive process that covers the content of all unit/s or qualification/s you can be recognised for.

Assessment happens in a variety of ways. Being prepared can save you valuable time and hassle and make the recognition process stress-free for you.

Here are some tips and hints for you:

1. Be prepared to talk about your job roles and your work history. Bring a resume or jot down a few points about where you have worked, either paid or unpaid, and what you did there.

2. Bring your position description and any performance appraisals you have from any electrotechnology workplaces you have worked in.

3. Consider the possibilities for workplace contact. Are you in a workplace that is supporting your goals to get qualified? Would you feel comfortable to have the assessor contact your workplace or previous workplaces so your skills can be validated?

4. Think about who can confirm your skill level. Think about current or recent supervisors who have seen you work in the past 18 months and will be able to confirm your skills. The assessor will need to contact them. You may also have community contacts or even clients themselves who can vouch for your skills level.

5. Collect any certificates from in-house training or formal training you have done in the past.

6. You can speak with your training organisation about other ways you can show your skills in the electrotechnology industry. These could be letters from employers, records of your professional development sessions, employers or clients in related industries or government agencies, acknowledgements, workplace forms (as long as they don't show client details) or other relevant documents.

Step 1 – Provide Information of your skills and experience

Complete the attached forms and provide as much information of your previous experience in the electrotechnology industry as you can. This is your first opportunity (and not the last) to provide proof of your variety of experience in the industry. Here you can supply examples of your work history which could include:

- brief CV/resume or work history
- position descriptions of current or previous jobs
- certificates/results of assessment
- details of in-house courses, workshops, seminars, orientation, or induction sessions
- references/letters from previous employers/supervisors

Workplace documents

- any licences
- certificates/results of assessment
- indentures/trade papers
- certificates/results of assessment – interstate/overseas
- certificates/results of assessment – universities
- tickets held e.g., forklift, crane,
- photographs of work undertaken
- diaries/task sheets/job sheets/logbooks
- site training records
- site competencies held record
- membership of relevant professional associations
- hobbies/interests/special skills outside work
- references/letters from previous employers/supervisors
- industry awards

and any other documentation that may demonstrate industry experience.

Depending on the industry you have worked in, you may or may not have documentary evidence available. This should not deter you from seeking RPL as the Assessor will work with you during the RPL process.

You will also need to supply contact details of one or two work referees who can confirm your skills in the industry.

Step 2 – Conversation with Assessor

An assessor will review the information you have provided (usually with you) and begin to match up your skills to the units/subjects in the qualification. At this point, you will have the opportunity to discuss and identify your previous experience with the assessor who will understand your industry experience and conduct a competency conversation with you. You will be required to answer electrotechnology related questions to identify your current skills.

Step 3 – Practical demonstration of your skills

The assessor will conduct a practical skills test at your workplace (if appropriate) or at another suitable venue. This, again, is an opportunity to demonstrate your level of competence. This assessment will be focussed on skills that are required in the qualification. Your assessor will identify the skills that he/she will want you to demonstrate.

Further steps

After the assessment, your assessor will give you information about the skills that have been recognised and whether you have gained recognition against units of competency or have gained the full qualification. If you do have skill gaps, these may be addressed through flexible training.

APPLICATION – Self Assessment Questionnaire
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Candidate Name: _____ Date **Completed:** _____

Please identify your level of experience in each competency. Each unit title has a more complete description of what tasks a competent person can perform and can be found at back of this application form.

If you have performed the task many times and are confident that you can prove your competency to the industry standard, tick the "frequently" box.

If you only perform the tasks occasionally, or are unsure whether you can demonstrate your competency, tick the "sometimes" box.

If you never perform the task, or feel you cannot demonstrate competence, tick the "never" box.
PLEASE SEE THE DOCUMENTS IN THE LINK +HARD COPIES IN THE FOLDER

Unit Code	Unit Title	I have performed these tasks		
		Frequently	Sometimes	Never
CORE UNITS (review the unit descriptors at back of application before answering)				
HLTAID009	Provide cardiopulmonary resuscitation			
UEECO0023	Participate in electrical work and competency development activities			
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace			
UEECD0019	Fabricate, assemble and dismantle utilities industry components			
UEECD0044	Solve problems in single path circuits			
UEECD0046	Solve problems in multi path circuits			
UEECD0020	Fix and secure electrotechnology equipment			
UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications			
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work			
UEEEL0024	Test and connect alternating current (a.c.) rotating machines*			
UEEEL0025	Test and connect transformers*			
UEEEL0008	Evaluate and modify low voltage heating equipment and controls*			
UEEEL0009	Evaluate and modify low voltage lighting circuits, equipment and controls*			
UEEEL0010	Evaluate and modify low voltage socket outlets circuits*			
UEEEL0003	Arrange circuits, control and protection for electrical installations*			
UEEEL0019	Solve problems in direct current (d.c.) machines*			
UEEEL0021	Solve problems in magnetic and electromagnetic devices*			
UEEEL0020	Solve problems in low voltage a.c. circuits*			
UEEEL0012	Install low voltage wiring, appliances, switchgear and associated accessories*			
UEEEL0047	Identify, shut down and restart systems with alternate supplies*			
UEEEL0039	Design, install and verify compliance and functionality of general electrical installations*			

Unit Code	Unit Title	I have performed these tasks		
		Frequently	Sometimes	Never
UEEEL0023	Terminate cables, cords and accessories for low voltage circuits*			
UEEEL0018	Select wiring systems and select cables for low voltage electrical installations*			
UEEEL0014	Isolate, test and troubleshoot low voltage electrical circuits*			
UEEEL0005	Develop and connect electrical control circuits*			
UEERE0001	Apply environmentally and sustainable procedures in the energy sector			
UETDRRF004	Perform rescue from a live LV panel*			
Group A Electives				
UEECS0033	Use engineering applications software on personal computers			
UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*			
UEEAS0007	Assemble, mount and connect control gear and switchgear*			
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*			

Please answer questions below:
PLEASE SEE THE DOCUMENTS IN THE LINK +HARD COPIES IN THE FOLDER

1. Provide details about the types of electrical installations you have repaired, installed, tested and serviced.

2. Briefly describe one electrical installation job you have recently performed, mentioning how it was planned and carried out, and with what tools, components, fittings, and meters you used. What type of premises were you working in and what OHS procedures did you follow? (Attach extra page if required).

Candidate Signature: _____ **Date**:_____

APPLICANT EMPLOYMENT HISTORY FORM

PLEASE SEE THE DOCUMENTS IN THE LINK +HARD COPIES IN THE FOLDER

Name, Address and Phone number of Employers	Period of Employment (DD/MM/YYYY)		Position Held	Full Time Part-time Casual	Description of Major Duties
	From	To			
1.					
2.					
3.					

Attach additional sheet if required

If you are including documents in your application, please provide a brief description below *(see list in step 1 for types of documents which can be used in RPL process)*

Document Description (e.g. Statement of results/attendance, qualification, transcript of academic record, licence, resume, photos of own work, awards)	**Office Use Only –** Assessor to use this section to align documents to specific units of competency and identify key questions for competency conversation

Declaration

I declare that the information contained in this application is true and correct and that all documents are genuine.

Candidate Signature: _____ Date _____

REFEREE TESTIMONIAL 1

PLEASE SEE THE DOCUMENTS IN THE LINK +HARD COPIES IN THE FOLDER

(Date)
To whom it may concern,

RE: _____skills in/as _____
(insert candidate name) *(insert industry/job title)*

I certify that the above-named person has:

worked at _____ for a period of _____ years

regularly undertaken the following activities within the workplace since commencing employment with this organisation:

➔ *Initial those skills/ competencies (below) that the candidate has or can successfully perform in the workplace*

____Provide cardiopulmonary resuscitation

____Apply work health and safety regulations, codes and practices in the workplace

____Document and apply measures to control WHS risks associated with electrotechnology work*

____Fabricate, assemble and dismantle utilities industry components*

____Fix and secure electrotechnology equipment

____Solve problems in multiple path circuits

____Solve problems in single path circuits

____Use drawings, diagrams, schedules, standards, codes and specifications*

____Participate in electrical work and competency development activities

____Arrange circuits, control and protection for electrical installations*

____ Develop and connect electrical control circuits*

____Evaluate and modify low voltage heating equipment and controls*

____Evaluate and modify low voltage lighting circuits, equipment and controls*

____ Evaluate and modify low voltage socket outlets circuits*

____Install low voltage wiring, appliances, switchgear and associated accessories*

____Isolate, test and troubleshoot low voltage electrical circuits*

____Select wiring systems and select cables for low voltage electrical installations*

____Solve problems in direct current (d.c.) machines*

____Solve problems in low voltage a.c. circuits

____Solve problems in magnetic and electromagnetic devices*

____Terminate cables, cords and accessories for low voltage circuits*

____Test and connect alternating current (a.c.) rotating machines*

____Test and connect transformers

____Design, install and verify compliance and functionality of general electrical installations*

____Identify, shut down and restart systems with alternate supplies*

____Apply environmentally and sustainable procedures in the energy sector

____Perform rescue from a live LV panel* Perform rescue from a live LV panel* Develop, enter,

and verify discrete control programs for programmable controllers

____Assemble, mount, and connect switchgear and control gear

____Source and purchase materials/parts for installation or service jobs

If you would like any further information or would like to discuss any of the above, I can be contacted on _____

Yours sincerely,

Name:

Signature:

License number:

REFEREE TESTIMONIAL 2

PLEASE SEE THE DOCUMENTS IN THE LINK +HARD COPIES IN THE FOLDER

(Date)
To whom it may concern,

RE: _____skills in/as _____
(insert candidate name) *(insert industry/job title)*

I certify that the above-named person has:

worked at _____ for a period of _____ years

regularly undertaken the following activities within the workplace since commencing employment with this organisation:

➔ *Initial those skills/ competencies (below) that the candidate has or can successfully perform in the workplace*

____Provide cardiopulmonary resuscitation

____Apply work health and safety regulations, codes and practices in the workplace

____Document and apply measures to control WHS risks associated with electrotechnology work*

____Fabricate, assemble and dismantle utilities industry components*

____Fix and secure electrotechnology equipment

____Solve problems in multiple path circuits

____Solve problems in single path circuits

____Use drawings, diagrams, schedules, standards, codes and specifications*

____Participate in electrical work and competency development activities

____Arrange circuits, control and protection for electrical installations*

____ Develop and connect electrical control circuits*

____Evaluate and modify low voltage heating equipment and controls*

____Evaluate and modify low voltage lighting circuits, equipment and controls*

____ Evaluate and modify low voltage socket outlets circuits*

____Install low voltage wiring, appliances, switchgear and associated accessories*

____Isolate, test and troubleshoot low voltage electrical circuits*

____Select wiring systems and select cables for low voltage electrical installations*

____Solve problems in direct current (d.c.) machines*

____Solve problems in low voltage a.c. circuits

____Solve problems in magnetic and electromagnetic devices*

____Terminate cables, cords and accessories for low voltage circuits*

____Test and connect alternating current (a.c.) rotating machines*

____Test and connect transformers

____Design, install and verify compliance and functionality of general electrical installations*

____Identify, shut down and restart systems with alternate supplies*

____Apply environmentally and sustainable procedures in the energy sector

____Perform rescue from a live LV panel* Perform rescue from a live LV panel* Develop, enter, and verify discrete control programs for programmable controllers

____Assemble, mount, and connect switchgear and control gear

____Source and purchase materials/parts for installation or service jobs

If you would like any further information or would like to discuss any of the above, I can be contacted on _____

Yours sincerely,

Name:

Signature:

License number:

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Core Units

PLEASE SEE THE DOCUMENTS IN THE LINK +HARD COPIES IN THE FOLDER

Unit Code	Unit Title	Scope/Descriptor
HLTAID009	Provide cardiopulmonary resuscitation	This unit describes the skills and knowledge required to perform cardiopulmonary resuscitation (CPR) in line with the Australian Resuscitation Council (ARC) guidelines. This unit applies to all persons who may be required to provide CPR, in a range of situations, including community and workplace settings.
UEECO0023	Participate in electrical work and competency development activities	This unit involves the skills and knowledge required to participate in electrical work and related activities that contribute to the ongoing development of competency.
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	This unit involves the skills and knowledge required to apply work health and safety (WHS)/occupational health and safety (OHS) regulations and codes of practices in the electrotechnology workplace. It includes applying safe working practices, following workplace procedures for hazard identification and risk control. It also includes electrotechnology worker responsibilities and application for health and safety, risk management and adherence to safety practices as part of electrotechnology work functions when preparing to enter a work area
UEECD0019	Fabricate, assemble and dismantle utilities industry components	This unit involves the skills and knowledge required to fabricate, assemble and dismantle utilities industry components using fitting and metal fabrication techniques. It includes the safe use of hand tools, fixed and portable power tools; cutting, shaping, joining and fixing; using metallic and non-metallic materials; dismantling and assembling equipment; mechanical measurement and marking out; and, reading drawings/diagrams.
UEECD0044	Solve problems in single path circuits	This unit involves the skills and knowledge required to solve problems in multiple path circuits. It includes working safely; applying problem-solving procedures, including the use of voltage, current and resistance measuring devices; and providing solutions derived from measurements and calculations to predictable problems in multiple path circuits.
UEECD0046	Solve problems in multi path circuits	This unit involves the skills and knowledge required to solve problems in single path circuits. It includes working safely; applying problem-solving procedures, including the use of basic voltage, current and resistance measuring devices; and providing known solutions to predictable circuit problems.
UEECD0020	Fix and secure electrotechnology equipment	This unit involves the skills and knowledge required to fix, secure and mount electrotechnology equipment to hollow walls, solid walls and metal fixings. It includes the safe use of hand and portable tools/ power tools and the selection and safe application of fixing devices and supporting accessories/equipment.

UEECD0051	Use drawings, diagrams, schedules, standards, codes and specifications	This unit involves the skills and knowledge required to use drawings, diagrams, cable schedules, industry standards, codes of practice and specifications as they apply to various electrotechnology work functions. It includes interpreting schematic, wiring and mechanical diagrams, equipment and cable/connection schedules and manuals; and the use and format of compliance standards, codes and job specifications used in the electrotechnology industry. It also includes the use of site and architectural drawings/plans to show the location of services, apparatus, plant and machinery.
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work	This unit involves the skills and knowledge required to identify, document and apply work health and safety (WHS)/occupational health and safety (OHS) hazard and risk control measures associated with electrotechnology work. It includes identifying workplace hazards, assigning levels of risk, developing control measures to eliminate and/or mitigate risks, reviewing risk control measures and maintaining documentation of hazards, risk control measures and their application in accordance with compliance procedures. This unit addresses information, processes and techniques for the application of WHS/OHS, specific to working in the electrotechnology sector and is essential for workers without managerial or supervisory responsibilities.
UEEEL0024	Test and connect alternating current (a.c.) rotating machines*	This unit involves the skills and knowledge required to test and connect alternating current (a.c.) rotating machines. It includes safe working practices, ascertaining correct operation of a.c. machines and solving problems as they apply to servicing, fault finding, installation and compliance work functions The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) a.c. or 120 V direct current (d.c.).
UEEEL0025	Test and connect transformers*	This unit involves the skills and knowledge required to solve problems in transformers. It includes safe working practices, ascertaining correct operation of transformers and solving problems as they apply to servicing, fault finding, installation and compliance work functions. The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).
UEEEL0008	Evaluate and modify low voltage heating equipment and controls*	This unit involves the skills and knowledge required to evaluate and modify low voltage (LV) heating equipment and controls. It includes working safely, identifying faults in heating equipment, repairing heating equipment, ensuring all work complies with relevant Australian Standards and legislation, and completing work and documenting activities.
UEEEL0009	Evaluate and modify low voltage lighting circuits, equipment and controls*	This unit involves the skills and knowledge required to evaluate and modify low voltage (LV) lighting circuits, equipment and controls. It includes working safely, identifying faults in luminaires and associated control equipment, repairing/replacing luminaire and control equipment components, ensuring all work complies with relevant Australian Standards and legislation, and completing work and documenting activities
UEEEL0010	Evaluate and modify low voltage socket outlets circuits*	This unit involves the skills and knowledge required to evaluate and modify low voltage (LV) socket outlets circuits. It includes working safely, identifying and repairing/replacing faulty socket outlets, ensuring all work complies with relevant Australian Standards and legislation, and completing work and documenting activities.

UEEEL0003	Arrange circuits, control and protection for electrical installations*	This unit involves the skills and knowledge required to select, arrange and terminate circuits, control and protection devices and systems for electrical installations operating at low voltage (LV). It includes protection of persons and property, correct functioning, ensuring compatibility with the supply, arranging installation into circuits, selecting and arranging switchgear/control gear and protective devices to meet compliance requirements, and documenting arrangement decisions.
UEEEL0019	Solve problems in direct current (d.c.) machines*	This unit involves the skills and knowledge required to determine correct operation of direct current (d.c.) machines and provide solutions as they apply to electrical installations and equipment. It includes working safely, the use of testing and measuring devices, and providing solutions derived from measurements and calculations to predictable problems in d.c. machines
UEEEL0021	Solve problems in magnetic and electromagnetic devices*	This unit involves the skills and knowledge required to determine correct operation of electromagnetic devices and related circuits and provide solutions as they apply to electrical installations and equipment. It includes working safely; applying power circuit problem-solving processes, including the use of testing and measuring devices; and providing solutions derived from measurements and calculations to predictable problems in electromagnetic devices and related circuits.
UEEEL0020	Solve problems in low voltage a.c. circuits*	This unit involves the skills and knowledge required to ascertain correct operation of single and three phase alternating current (a.c.) circuits and solving circuit problems as they apply to servicing, fault finding, installation and compliance work functions. It includes safe working practices, multi-phase circuit arrangements, issues related to fault protection, power factor and multiple earthed neutral (MEN) systems and solutions to circuit problems derived from calculated and measured parameters.
UEEEL0012	Install low voltage wiring, appliances, switchgear and associated accessories*	This unit includes the installation of wiring enclosures, cable support systems, cables, protection devices, switchgear, control gear, switchboards, and accessories designed to operate at voltages up to 1,000 volt (V) alternating current (a.c.) or 1,500 V direct current (d.c.). It covers working safely and to installation standards, routing cables to specified locations, terminating cables and connecting wiring at accessories, matching appliances and accessories with that specified, making required circuit connections and completing the necessary installation documentation.
UEEEL0047	Identify, shut down and restart systems with alternate supplies*	This unit involves the skills and knowledge required to identify, shut down and restart systems with alternate supplies. It includes identifying the system configuration, working safely with electricity generation systems and inverters, identifying hazards and controlling the associated risks, isolation and testing for de-energisation, reinstating the system after isolation, and completing relevant documentation
UEEEL0039	Design, install and verify compliance and functionality of general electrical installations*	This unit involves the skills and knowledge required to design, install, inspect and test to verify an electrical installation is safe and complies with regulatory requirements. It includes working safely; designing, installing, commissioning and fault finding of electrical installations; visual inspections and mandatory testing; following workplace procedures; and completing mandatory reporting requirements. The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.).

UEEEL0023	Terminate cables, cords and accessories for low voltage circuits*	This unit involves the skills and knowledge required to terminate cables, cords and their conductors at accessories and current-using devices, designed to operate at voltages up to 1,000 volts (V) alternating current (a.c.) or 1,500 V direct current (d.c.). It includes working safely to industry standards, wiring systems, cable types and applications; selecting appropriate termination accessories; preparing and terminating cables and cords; terminating cables/cord conductors; and ensuring completed termination complies with industry standard requirements
UEEEL0018	Select wiring systems and select cables for low voltage electrical installations*	This unit involves the skills and knowledge required to select wiring systems and cables for electrical installations operating at voltages up to 1,000 volt (V) alternating current (a.c.) or 1,500 V direct current (d.c.). It includes application of wiring systems and cable types, selecting wiring system compatible with the installation conditions, selecting cables that comply with required current-carrying capacity and voltage drop and earth fault-loop impedance limitations, coordinating between protective devices and conductors, and documenting selection decisions.
UEEEL0014	Isolate, test and troubleshoot low voltage electrical circuits*	This unit involves the skills and knowledge required to isolate, test and troubleshoot electrical circuits operating at voltages up to 1,000 volts (V) alternating current (a.c.) or 1,500 V direct current (d.c.). It includes working safely, isolating electrical circuits, evaluating low voltage (LV) electrical circuits, applying systematic fault-finding procedures, conducting repairs and completing the necessary documentation.
UEEEL0005	Develop and connect electrical control circuits*	This unit involves the skills and knowledge required to develop, connect and functionally test electrical power and control circuits that perform specific control functions. It includes working safely, developing schematic diagrams and converting them to wiring diagrams, selecting and connecting contactors and control devices to perform a specific function. It also includes testing electrical control circuits and completing circuit development activities documentation.
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	This unit involves the skills and knowledge required to apply environmentally sustainable procedures in the energy sector. It includes identifying and applying sustainable methods of work practice that minimise energy and material usage and to apply energy reduction strategies in the energy sector workplace.
UETDRRF004	Perform rescue from a live LV panel*	This unit covers the performance of rescue procedures from live low voltage (LV) apparatus, not including overhead lines and underground cables in the workplace. It specifies the mandatory requirements of rescue from a live LV panel and how they apply in the context of transmission, distribution or rail work functions. It encompasses responsibilities for health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work
Group A Electives		
UEECS0033	Use engineering applications software on personal computers	This unit involves the skills and knowledge required to use computer application software relevant to engineering support work functions. It includes using computer engineering application software, menus and tools, entering and retrieving information, transferring and printing files and shutting down computer applications. This unit applies to personnel using computer application software relevant to a workplace. Typically, this will apply to individuals working under supervision

UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	This unit involves the skills and knowledge required to develop, enter and verify programs for programmable logic controller (PLC) (also known as programmable controller) for a system requiring discrete control functions. It includes working safely, using control systems and control system development methods, using ladder diagrams/statement list/function block diagram instruction sets, following written instructions, and documenting program development and testing activities
UEEAS0007	Assemble, mount and connect control gear and switchgear*	This unit involves the skills and knowledge required to assemble, mount and connect control gear and switchgear, including the interconnections within a switchboard enclosure intended to operate at voltages up to 1,000 volts (V) alternating current (a.c.) or 1,500 V direct current (d.c.). It includes working safely; following standards, specifications and component manufacturer requirements; matching equipment with that specified; terminating cables; connecting wiring and completing necessary documentation
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	This unit involves the skills and knowledge required to install and maintain telecommunications cabling in buildings and premises. It includes working to relevant regulations, legislation, codes of practice and industry standards and to Australian Communications and Media Authority's (ACMA) Telecommunications Cabling Provider Rules; installing multiple telecommunication lines for multiple access to telecommunication services; terminating at telecommunication outlets, termination modules and distributors; testing for compliance and completing cabling documentation. This unit applies to customer cabling terminated on distributors and to the installation, maintenance and modification of indoor, external, underground cabling and customer cabling and may be used to connect devices for a range of applications, including telecommunications phones, data (video and multimedia) and security (alarms and fire protection).

Return

Competency Record

This section assists the assessor in documenting the competency conversation.

Do NOT give this section to the candidate.

Once you have assessed the candidate's documentary information and determined which competencies you still require more information/evidence on, you use the question bank and Record of Conversation sheets in this section to document evidence of past experience. It is not intended that every question for all competencies be discussed during the conversation, only those competencies the initial documentary review has failed to fully address.

Each question has "key points" to look for in responses. You may use the list of key points to formulate questions of your own if you wish or contextualise or rephrase the suggested question to the candidate's particular work situation. The questions are not intended to be a formal 'script' for the assessor to follow, but to provide guidance in exploring the range of the candidate's skills, knowledge, and experience in performing a particular task or function.

The Record of Conversation sheets indicate relevant content that should be sought. Place a tick next to each key point as you hear this topic being discussed during the conversation. In doing so, you are making a statement of fact about what you hear the candidate say during the competency conversation. Use the Comments section to provide further detail about the context of the discussion or briefly outline any examples discussed by the candidate. You may also use the Comments section to make a brief analysis of the responses or summary judgements about the quality of the candidate's responses in relation to the requirements of the competency standard.

Remember, the notes you take about this conversation are important evidence and should be retained in the candidate's assessment record.

QUESTION BANK
UEE30811 Certificate III in Electrotechnology Electrician

Note to Assessors: Refer to "Record of Conversation" sheets
(Performance criteria, industry context, critical aspects of evidence, essential knowledge, and skills)

Unit of Competency	Questions
UEECD0007 Apply work health and safety regulations, codes and practices in the workplace **Core**	1. **(Prepare to enter an electrotechnology workplace)** Discuss what safety processes you have followed before entering a work area and what procedures you have used to ensure a safe work area, including how tools and equipment are checked for safety and correct functionality? 2. **(Apply safe electrotechnology working practices)** What are typical hazards you have come across in your work and what risk management control measures did you initiate? 3. **(Follow electrotechnology workplace procedures for hazard identification and risk control)** How would you deal with an accident or fire that has occurred in your work area?
UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work (Identify and document hazards and risks associated with electrotechnology work) (Assign levels of risk and develop and document control measures) (Monitor, review and document risk control measures) **Core**	4. Explain where you have used documentation in recording hazards, their risk classification and control measures used?
Generic Questions Plan and prepare	5. Before you commence a new job or task, how have you established the scope of work to be undertaken, tools and equipment requirements and obtained appropriate resources? How do you monitor variations to the job?
Generic Questions Communication	6. What procedures do you follow for non-routine events and job variations that occur on the work site? 7. Provide an example of a recent electrotechnology job you have performed and the steps you followed when completing service reports, and another workplace documentation? What information do you provide in that documentation and how is that communicated to the appropriate persons when completing a job?
Generic Questions Sustainable Work Practices	8. Explain how you have actively employed sustainable energy principles during and completing a job and when leaving the work site at the end of the day?

Unit of Competency	Questions
UEECD0019 Fabricate, assemble and dismantle utilities industry components **Core**	9. Provide an example and explain the process you have followed when dismantling and assembly of components. 10. Provide an example and explain the process you have followed when fabricating components.
UEEEL0024 Test and connect alternating current (a.c.) rotating machines * UEEEL0025 Test and connect transformers*. **Core**	11. (a) Provide examples of the types of single/ three phase machines you have worked on and what problem-solving procedures you have followed? 11 (b) Provide examples of the types of transformers you have worked on and what problem-solving procedures you have followed
UEECD0020 Fix and secure electrotechnology Equipment **Core**	12. Give examples of the types of fixing devices and fitting/accessories and tools that you have used to install electrotechnology equipment. Provide an example of equipment that you have fixed and secured, outlining the steps you have undertaken.
UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications **Core**	13. Provide details of the types of drawings and manuals you have used in the workplace and give examples of how they were used.
UEECD0044 Solve problems in single path circuits UEECD0046 Solve problems in multi path circuits **Core**	14. (a) Provide examples of how you have solved problems in series d.c. circuits and what d.c. principles have you applied? 14 (b) Provide examples of how you have solved problems in parallel d.c. circuits and what d.c. principles have you applied?
UEEEL0020 Solve problems in low voltage a.c. circuits* **Core**	15. Demonstrate an understanding of correct operation of single and three-phase a.c. circuits and solving circuit problems as they apply to servicing, fault finding, installation and compliance work functions, encompassing safe work practices, multiphase circuit arrangements, issues related to protection, power factor and MEN systems and solutions to circuit problems derived from calculated and measured parameters.

Unit of Competency	Questions
UEEEL0019 Solve problems in direct current (d.c.) machines* UEEEL0021 Solve problems in magnetic and electromagnetic devices* **Core**	16. (a) Explain how you have determined correct operation of electromagnetic circuits and the processes you follow when providing solutions derived from measurements and calculations. 16 (b) Explain how you have determined correct operation of dc motor and dc generator and the processes you follow when providing solutions derived from measurements and calculations
UEEEL0008 Evaluate and modify low voltage heating equipment and controls* UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls* UEEEL0010 Evaluate and modify low voltage socket outlets circuits* **Core**	17. Explain how you have solved problems in single and three phase low voltage circuits and the processes you follow when providing solutions derived from measured and calculated values? 17(a) Explain how you have solved problems in low voltage heating equipment and controls* 17(b) Explain how you have solved problems in low voltage lighting circuits, equipment and controls 17(c) Explain how you have solved problems in low voltage socket outlets circuits*
UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories* **Core**	18. What are the types of wiring enclosures, cable support systems, cables and accessories you have installed? What are the processes you follow when installing and terminating cables and connecting wiring at accessories?
	19. What are the types of low voltage electrical apparatus and associated equipment you have installed and what processes have you followed when installing and connecting apparatus?
UEEEL0039 Design, install and verify compliance and functionality of general electrical installations* **Core**	20. What have been the types of electrical installations that you have inspected and tested to verify whether is safe and complies with all requirements? Describe the process you undertake in verifying electrical installations for safety and regulatory compliance.

Unit of Competency	Questions
UEEEL0018 Select wiring systems and select cables for low voltage electrical installations* **Core**	21. What have been the types of electrical equipment that you have selected and arranged for general electrical installations? Describe the process you undertake in selecting and arranging equipment for electrical installations?
UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits* **Core**	22. What have been the types of faults you have found and repaired in low voltage electrical apparatus and circuits? Describe the process you undertake when applying fault finding techniques for repair of low voltage electrical apparatus and circuits.
UEEEL0005 Develop and connect electrical control circuits* **Core**	23. What have been the types of control circuits that you have developed and connected? Describe the process you undertake in developing and connecting a control circuit including functional tests you have performed.
UEEIC0013 Develop, enter and verify discrete control programs for programmable controllers* **Group A Elective** **(Demonstration Observation)**	24.a) Discuss your actions in carrying out your obligations and responsibilities prior to commencing work. As well as work preparation include your obligations and responsibilities under current OH&S legislation. You should include in your response actions taken in regard to: b) You are required to determine from specifications a control system scenario. Provide examples of control functions. Describe the steps you would take to develop this control system. Included in your description should be comments relating to: c) Derived timers' counters, jump instructions, latching relays and simple step sequence. d) Discuss the testing methods and tools as monitor mode as an aid for fault finding and inbuilt software/ hardware and use of error codes. e) Examples of storage mediums IC storage, disks, servers.
UEEAS0007 Assemble, mount and connect control gear and switchgear* **Group A Elective**	25. What have been the types of switchgear and control gear you have installed and connected for control panels and switchboards? Explain the processes you follow in selecting, installing, and connecting switchgear and control gear.
UEECS0033 Use engineering applications software on personal computers **Group A Elective**	26. What have been the types of computer applications you have used in your work environment and outline the steps you take in using computer applications including how information is used, files stored and forwarded?
UEECS0033 Use engineering applications software on personal computers **Core**	27. What types of computer applications you have used in your work environment, and outline the steps you take in using computer applications including how information is used, files stored and forwarded?

Unit of Competency	Questions
UEERE0001 Apply environmentally and sustainable procedures in the energy sector **Core**	28. Provide examples of the sustainable work practices that you have used in the workplace.
UEECO0023 Participate in electrical work and competency development activities **Core**	29. How have you monitored your competency development and ensured your progression of knowledge and skills was maintained? **Note:** *This unit of competency is designed for an apprentice/learner in employment-based programs covered by an approved contract of training. To RPL in this unit the assessor must therefore establish that candidate has been actively participating in own competency development to the level of performance required by this unit. Where gap training is required to gain qualification, assessor can use this opportunity to collect additional relevant evidence from candidate for support of this unit.*
UEEEL0003 Arrange circuits, control and protection for electrical installations* Core	30. What type of control and protection devices have you installed in the workplace? And how have you verified compliance?
UEEEL0023 Terminate cables, cords and accessories for low voltage circuits	31. List the type of cables you have terminated using safe work practices.
HLTAID009 Provide cardiopulmonary resuscitation **Core**	32. Demonstrate cardiopulmonary resuscitation.
UETDRRF004 Perform rescue from a live LV panel* **Core**	33. Demonstrate how to rescue a workmate from a live LV panel
UEEEL0047 Identify, shut down and restart systems with alternate supplies** **Core**	34. When the main power supply is broken down, provide the work procedure to identify, shut down and restart the system with alternate supply

NOTE – Those shaded by Yellow colour are new questions which were not included in previous RPL Kit.

Results / Comments Descriptions	
AT	Australian Transcripts
OT	Overseas Transcripts
PE	Photo Evidence
VR	Video Recording
AR	Audio Recording
SD (Resume,	Supporting Documents
IK	Industry Knowledge
SK	Skills knowledge

RECORD OF CONVERSATION

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

Core

CANDIDATE'S NAME: _____ ASSESSOR'S **NAME:** _____ **DATE:** ____/____/____

Question 1: Discuss what OH&S procedures you have followed before entering a work area and what procedures you have used to ensure a safe work area, including how tools and equipment are checked for safety and correct functionality.

Question 2: What are typical *hazards* you have come across in your work and what risk management control measures did you initiate?

Question 3: What are the procedures for dealing with an accident or emergency in your workplace?

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 1	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2018 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data		
Demonstrates understanding and applies OHS procedures in workplace and legal responsibilities for personal safety of self and for others: • employer and employee responsibilities for rights, obligations for personal safety for self and others • functions of safety committees, inspectors, and representatives.			
Monitors condition of equipment, tools, and meters to regulatory requirements.			
Identifies and obtains instructions in hazards and risk control measures for specific work functions including work area access permits.			
Understands requirements for live work, use of PPE and safety observer.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Understands the necessity of work permits and exclusion zones, clearances (hazardous areas, proximity to live LV/HV cable).	Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Low Voltage Rescue First Aid and CPR Elevated Work Platforms Permit		
Understands purpose of isolation and can apply correct procedure for electrical & mechanical isolation including use of danger and warning tags.			
Question 2			
Uses workplace safety checklist.			
Identifies and reports workplace hazards and potential hazards (electrical and non-electrical) and consults with others in implementing and monitoring control measures.			
Recognises sources of pollution and control measures.			
Works safely with tools: • understands the effects of electric shock • purpose of circuit and personal protection devices: o fuses o circuit breakers o RCD.			
Understands and follows correct isolation according to workplace procedures.			
Follows workplace procedures and work instructions for controlling risk.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Uses and maintains correct PPE: • gloves • safety glasses • long sleeves, .			
Question 3			
Ensures hazard and risk control measures are implemented and reported.			
Can complete OHS records of incident and report to regulatory requirements and established procedures.			
Understands emergency procedures for the rescue of an electric shock victim (LVR).			
Has required knowledge to carry out basic first aid procedures and CPR.			
Understands dangers of refrigerant gas inhalation: • rescue procedures • CPR procedures.			
Follows workplace procedures in dealing with accidents and incidents.			
Understands and follows workplace instructions and training to established procedures.			

RECORD OF CONVERSATION

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work. Core

CANDIDATE'S NAME:_____ **ASSESSOR'S NAME:**_____**DATE:** ____/____/____

Question 4: Explain where you have used documentation in recording hazards, their risk classification and control measures used.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 4	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2018 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation JSEA (job safety and environmental analysis SOP, Work permits, Safety		
Identifies and documents hazards using appropriate processes while consulting with others: • electrical conditions, voltage levels • radiation and energy levels • toxic substances, airborne particles • pressure discharge, explosive atmosphere • worksite and specific location • general work-site conditions • moving parts • tools and equipment • worker's competence and/or capacity and/or personal effects.			
Makes changes to documentation for unforseen hazards.			

KEY POINTS The candidate's response should evidence the following	INDUSTRY REQUIREMENTS These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	COMMENTS Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Identifies risk classification to established procedures: • high (potential to kill) • medium (potential to cause injury) • low (potential to cause minor injury).	checklists, incident reports) Low Voltage Rescue CPR Elevated Work Platforms Permit		
Develops control measures to eliminate risk according to classification: • uses different approaches to work or redesign • uses different equipment or machinery • fixes defective equipment • PPE.			
Seeks agreement on control measures and documents and gives access to others.			
Monitors and reviews control measures and modifies in consultation with others.			
Files documentation according to established procedures.			
Understands principles and legal responsibilities and regulatory requirements in managing hazards and assessing risks in the workplace.			

RECORD OF CONVERSATION

Generic Components – Plan and Prepare

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME:** _____ **DATE:** ____/____/____

Question 5: Before you commence a new job or task, how have you established the scope of work to be undertaken, tools and equipment requirements and obtained appropriate resources?

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 5	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2018 Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation Workplace policies and procedures		
Obtains documentation and work requirements from supervisor and establishes work to be undertaken.			
Ensures work is coordinated effectively with others.			
Obtains materials, specifications, and drawings according to established routines and procedures.			
Obtains tools and equipment including measuring and testing devices and checks for correct operation and safety.			
Confirms job requirements with supervisor before commencing work.			

RECORD OF CONVERSATION

Generic Components – Communication

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME:** _____**DATE:** ____/____/____

Question 6: What procedures do you follow for non-routine events and job variations that occur on the work site?

Question 7 Provide an example of a recent electrotechnology job you have performed and the steps you followed when completing service reports, and other workplace documentation?

What information do you provide in that documentation and how is that communicated to the appropriate persons when completing a job?

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 6	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2018 Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation Workplace policies and procedures		
Follows procedures for referring non-routine events to immediate supervisor for directions.			
Communicates to others to ensure awareness of site changes and effective work co-ordination.			
Question 7			
Informs supervisor and other appropriate persons on job completion.			
Completes status/ service reports and test certificates to established workplace procedures.			
Documents details of repairs and works completed.			
Notes any defects.			

RECORD OF CONVERSATION

Generic Components – Sustainable Work Practices

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME:**_____ **DATE:** ____/____/____

Question 8: Explain how you have actively employed sustainable energy principles during and completing a job, and when leaving the work site at the end of the day?

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 8	Workplace Health and Safety Act: 1995		
Understands and uses sustainable energy work practices.	Electrical Safety Act & Regulations		
Work site made safe.	Electrical Code of Practice		
Actively reduces waste.	Environmental and building regulations		
Checks tools and equipment for faults and report them to supervisor.	Manufacturer's instructions for materials and equipment		
Cleans, maintains, stores and secures equipment.	Correct use of MSDS data		
Clears the work area of all waste.	Workplace documentation		
Material wastage disposed to manufacturers and industry requirements.	Workplace policies and procedures		

RECORD OF CONVERSATION

UEECD0019 Fabricate, assemble and dismantle utilities industry components. Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME:**_____DATE: ____/____/____

Question 9: Provide an example and explain the process you have followed when dismantling and assembly of components.

Question 10: Provide an example and explain the process you have followed when fabricating components.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 9	Electrical Safety Act & Regulations Electrical Code of Practice Manufacturer's instructions for materials and equipment Correct use of MSDS data Engineering references/ specifications, plans, drawings Workplace documentation Workplace policies and procedures		
Uses manufacturer guides.			
Selects and uses appropriate tools and techniques (hand and power).			
Marks or tags components to ensure correct assembly.			
Replaces or repairs components to manufacturer specifications.			
Stores parts to protect against loss or damage.			
Works with minimising waste of materials.			
Assembles to manufacturer's user guides and established procedures and techniques: • including techniques for close fitting parts.			
Performs routine quality checks.			

KEY POINTS The candidate's response should evidence the following	INDUSTRY REQUIREMENTS These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	COMMENTS Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 10			
Follows drawings and instructions accurately.			
Selects and uses appropriate tools and techniques (hand and power): • cutting • shaping • drilling • threading and tapping.			
Sharpens drills correctly to manufacturers' specifications.			
Calculates and measures accurately for component dimensions from information given in job drawings and instructions.			
Fabricates components efficiently minimising waste of materials and damage to environment and services.			
Performs routine quality checks.			

RECORD OF CONVERSATION

UEEEL0024 Test and connect alternating current (a.c.) rotating machines*Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

13. **Question 11a:** Provide examples of the types of single/ three phase machines you have worked on and what problem-solving procedures you have followed?

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 11a:	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation Workplace policies and procedures		
Indicates has worked on problems related to installation, fault finding, maintenance or development work functions.			
Understands requirements for testing and measuring live to be in accordance with Electrical Safety legislation.			
Determines the operating parameters of an existing machine including: • Alternating current rotating machines.			
Three phase motor construction and operating principles.			
Understands the type of single-phase machines e.g. capacitor start and run, PSC principles of operation, operating characteristics and applications. Motor reversal and motor protection. For example:			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Performs basic insulation resistance, continuity, and winding identification tests. Demonstrates understanding of electrical principles including: • Using the right-hand grip rule for conductors and solenoids and Flemings right and left-hand rule. • Relationship between torque, speed and power and interpretation of speed / torque curves of induction motors. • Types of motor of motor overload protection • Selecting suitable protection devices for a given motor and starter combination. • Effects of repetitive starting and or reversing of motors. • Principles of operation of a synchronous and asynchronous motor/ generator (induction generator). • Effects on generated voltage of variations of load/ excitation. • Ratings of single and three phase portable/ standby alternators, and applications.			

RECORD OF CONVERSATION

UEEEL0025 Test and connect transformers*Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

14. **Question 11b:** Provide examples of the types of single/ three phase machines you have worked on and what problem-solving procedures you have followed?

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 11b:	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation Workplace policies and procedures		
Indicates has worked on problems related to installation, fault finding, maintenance or development work functions.			
Understands requirements for testing and measuring live to be in accordance with Electrical Safety legislation.			
Determines the operating parameters of an existing machine including: • Transformer construction, operation, efficiency • Transformer types, parallel operation • .			
Performs basic insulation resistance, continuity, and winding identification tests. Determination of transformer losses and efficiency using test results. Demonstrates understanding of electrical principles including:			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
• Principles of mutual induction of a transformer. • Determine the value secondary current and voltage given one winding electrical detail and turns ratio. • Identification of voltage and current components of a phaser diagram for a transformer on no-load • Determine the voltage regulation of a transformer form voltage and percentage impedance values • Using the right-hand grip rule for conductors and solenoids and Flemings right and left-hand rule.			

RECORD OF CONVERSATION

UEECD0020 Fix and secure electrotechnology equipment Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 12: Give examples of the types of fixing devices and fitting/accessories and tools that you have used to install electrotechnology equipment.

Provide an example of equipment that you have fixed and secured, outlining the steps you have undertaken.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 12:	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation Workplace policies and procedures		
Identifies and accesses material using workplace procedures.			
Uses and installs a variety of fixing devices appropriate to weight and position: floor, wall or ceiling <5Kg, <20Kg, <50Kg: • hollow wall • concrete • steel • brick. Understands and complies with technical standards and job specifications.			

Uses and selects a variety of appropriate tools:
• hand (cutting, shaping, threading, and tapping)
• power (drills, saws .)
  ○ portable
  ○ fixed.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Fixes and secures to: • industry time frames • minimise wastage and disposes according to workplace practice • prevent damage to surrounding environment • Sustainable Energy principles and practices.			
Shows knowledge and understanding of environment and building regulation including the protocols for working in and around protected environments and heritage sites.			

RECORD OF CONVERSATION

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications. Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 13: Provide details of the types of drawings and manuals you have used in the workplace and give examples of how they were used.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 13:	AS/NZS3000:2018		
Correctly obtains information from a variety of drawings, diagrams, schedules and manuals: • drawing layouts • conventions and symbols • dimensions • location of equipment • schematics and wiring diagrams • cable schedules • termination schedule • site and architectural drawings and plans: ○ services, apparatus plant and machinery.	AS/NZS drawing standards Electrical Code of Practice Workplace documentation Workplace policies and procedures Manufacturer's instructions for materials and equipment Engineering references/ specifications, plans, drawings		
Uses freehand drawing conventions used to convey information.			
Correctly adjusts drawings to reflect variations according to established procedures and forwards to appropriate persons.			

RECORD OF CONVERSATION

UEECD0044 Solve problems in single path circuits. Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 14: Provide examples of how you have solved problems in series/parallel d.c. circuits and what d.c. principles have you applied?

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 14:	Electrical Safety Act Electrical Safety Regulations Code of Practice – Electrical work Standard Operating Procedures (SOP) Job Safety and Environmental Analysis (JSEA) Workplace documentation, policies, and procedures		
Meets regulatory requirements to undertake electrical work (electrical licence, electrical work permit, apprenticeship or performs electrical work under a "prescribed place of work" as defined by the Electrical Safety Act section18 d).			
Determines nature of circuit problems and scope of work and materials from documentation, supervisor or customer and coordinates work with others.			
Determines need to test or measure live and follows risk control measures as determined by regulatory requirements.			
Tests all equipment for correct operation and isolates circuits according to established procedures.			
Uses established methods to determine operating parameters and solves d.c. circuit problems from measured and calculated values: resistance, voltage, current and power dissipated.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Understands hazards associated with using meters and uses correct meters and probes.			
Understands hazards associated with charged capacitors and follows established procedures in testing.			
Modifies and develops circuits within limits of operating parameters and according to function requirements.			
Circuit problems solved without damage to equipment and uses sustainable energy practices.			
Deals with unplanned events using essential knowledge and skills of d.c. electrical principles as applied to series d.c. circuits.			

RECORD OF CONVERSATION

UEECD0046 Solve problems in multi path circuits. Core

Question 14: Provide examples of how you have solved problems in series/parallel d.c. circuits and what d.c. principles have you applied?

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 14:	Electrical Safety Act Electrical Safety Regulations Code of Practice – Electrical work Standard Operating Procedures (SOP) Job Safety and Environmental Analysis (JSEA) Workplace documentation, policies, and procedures		
Meets regulatory requirements to undertake electrical work (electrical licence, electrical work permit, apprenticeship or performs electrical work under a "prescribed place of work" as defined by the Electrical Safety Act section18 d).			
Determines nature of circuit problems and scope of work and materials from documentation, supervisor or customer and coordinates work with others.			
Determines need to test or measure live and follows risk control measures as determined by regulatory requirements.			
Tests all equipment for correct operation and isolates circuits according to established procedures.			
Uses established methods to determine operating parameters and solves d.c. circuit problems from measured and calculated values: resistance, voltage, current and power dissipated.			
Understands hazards associated with using meters and uses correct meters and probes.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Understands hazards associated with charged capacitors and follows established procedures in testing.			
Modifies and develops circuits within limits of operating parameters and according to function requirements.			
Circuit problems solved without damage to equipment and uses sustainable energy practices.			
Deals with unplanned events using essential knowledge and skills of d.c. electrical principles as applied to parallel d.c. circuits and series/parallel dc circuits			

RECORD OF CONVERSATION

UEEEL0023 Terminate cables, cords and accessories for low voltage circuits*Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 15 What are the types of extra-low voltage wiring/cabling systems you have installed and explain the processes you have followed in installing and terminating ELV systems.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 15:	AS/NZS Wiring Rules 3000:2018 Electrical Safety Act Electrical Safety Regulations Code of Practice – Electrical work Standard Operating Procedures (SOP) Job Safety and Environmental Analysis (JSEA) Workplace documentation, policies, and procedures		
Meets regulatory requirements to undertake electrical work (electrical licence, electrical work permit, apprenticeship or performs electrical work under a "prescribed place of work" as defined by the Electrical Safety Act section18 d).			
Uses ***at least one*** of the following wiring/cabling systems: • enclosed thermoplastic insulated (TPI) or sheathed cables • unenclosed thermoplastic sheathed (TPS) cable.			
Uses ***at least three*** of following wiring/cabling systems • single cable, flexible cable, flexible cord, shielded cable, armoured cable, ribbon cable, • other similar and like cable.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Installs and terminates ELV powered devices in: • security • controls • integrated systems • audio/video systems.			
Follows OHS and risk control procedures.			
Determines nature and scope of work, sources materials and coordinates work with others.			
Determines need to test or measure live and follows risk control measures as determined by regulatory requirements and safe working practices.			
Uses and selects appropriate tools, cables, and accessories.			
Tests all equipment for correct operation and safety and isolates circuits according to established procedures.			
Follows appropriate cable routes and installs cable and accessories to comply with standards, job specifications and established work practices.			
Terminates cables and accessories to manufacture's specifications and regulatory requirements.			
Installs cables and terminates without waste or damage to equipment and uses sustainable energy practices.			
Cleans work site, makes safe and notifies appropriate persons regarding completion of work using established procedures.			

RECORD OF CONVERSATION

UEEEL0021 Solve problems in magnetic and electromagnetic devices*Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 16a: Explain how you have determined correct operation of electromagnetic circuits and the processes you follow when providing solutions derived from measurements and calculations.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 16a			
Regularly uses voltage, current and resistance measuring devices in determining correct operation and solving problems in electromagnetic circuits.	AS/NZS Wiring Rules 3000:2018 Electrical Safety Act Electrical Safety Regulations Code of Practice – Electrical work Standard Operating Procedures (SOP) Job Safety and Environmental Analysis (JSEA) Workplace documentation, policies and procedures		
Determines nature and scope of work, sources materials and coordinates work with others.			
Determines need to test or measure live and follows risk control measures as determined by regulatory requirements and safe working practices.			
Uses and selects appropriate tools, cables and accessories.			
Tests all equipment for correct operation and safety and isolates circuits according to established procedures.			
Uses established methods to solve circuit problems from measure and calculated values.			
Develops and alters existing electromagnetic circuit to comply with specified operating parameters.			
Applies control measures to electrical devices and machines operating at low voltage.			
Cleans work site, makes safe and notifies appropriate persons regarding completion of work using established procedures.			

RECORD OF CONVERSATION

UEEEL0008 Evaluate and modify low voltage heating equipment and controls*. Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 16b: Explain how you have determined correct operation of direct current machines and the processes you follow when providing solutions derived from measurements and calculations.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 16b			
Regularly uses voltage, current and resistance measuring devices in determining correct operation and solving problems in direct machines.	AS/NZS Wiring Rules 3000:2018 Electrical Safety Act Electrical Safety Regulations Code of Practice – Electrical work Standard Operating Procedures (SOP) Job Safety and Environmental Analysis (JSEA) Workplace documentation, policies and procedures		
Determines nature and scope of work, sources materials and coordinates work with others.			
Determines need to test or measure live and follows risk control measures as determined by regulatory requirements and safe working practices.			
Uses and selects appropriate tools, cables and accessories.			
Tests all equipment for correct operation and safety and isolates circuits according to established procedures.			
Uses established methods to solve circuit problems from measure and calculated values.			
Develops and alters existing direct current machines to comply with specified operating parameters.			
Applies control measures to electrical devices and machines operating at low voltage.			
Cleans work site, makes safe and notifies appropriate persons regarding completion of work using established procedures.			

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 17a: Explain how you have solved problems in low voltage heating equipment and the processes you follow when providing solutions derived from measured and calculated values.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 17a			
Determines operating parameters of low voltage heating equipment	AS/NZS Wiring Rules 3000:2018 Electrical Safety Act Electrical Safety Regulations Code of Practice – Electrical work Standard Operating Procedures (SOP) Job Safety and Environmental Analysis (JSEA) Workplace documentation, policies, and procedures		
Determines nature and scope of work, sources materials and coordinates work with others.			
Determines need to test or measure live and follows risk control measures as determined by regulatory requirements and safe working practices.			
Uses and selects appropriate tools, cables, and accessories.			
Tests all equipment for correct operation and safety and isolates circuits according to established procedures.			
Uses established methods to solve circuit problems from measure and calculated values as they apply to low voltage heating equipment			
Determines conditions causing an existing low voltage heating equipment			
Develops and alters existing circuits to comply with specified operating parameters.			
Deals with unexpected situations safely by drawing on essential knowledge and skills to provide appropriate solutions.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Cleans work site, makes safe and notifies appropriate persons regarding completion of work using established procedures.			
Demonstrates understanding of: • alternating current power principles • occupational health and safety principles • electrical safe working practices.			

RECORD OF CONVERSATION

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls*. Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 17b: Explain how you have solved problems in low voltage lighting circuits, equipment and controls.and the processes you follow when providing solutions derived from measured and calculated values.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 17b			
Determines operating parameters of low voltage lighting circuits, equipment and controls.	AS/NZS Wiring Rules 3000:2018 Electrical Safety Act Electrical Safety Regulations Code of Practice – Electrical work Standard Operating Procedures (SOP) Job Safety and Environmental Analysis (JSEA) Workplace documentation, policies, and procedures		
Determines nature and scope of work, sources materials and coordinates work with others.			
Determines need to test or measure live and follows risk control measures as determined by regulatory requirements and safe working practices.			
Uses and selects appropriate tools, cables, and accessories.			
Tests all equipment for correct operation and safety and isolates circuits according to established procedures.			
Uses established methods to solve circuit problems from measure and calculated values as they apply to low voltage heating equipment			
Determines conditions causing an existing low voltage lighting circuits, equipment and controls.			
Develops and alters existing circuits to comply with specified operating parameters.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Deals with unexpected situations safely by drawing on essential knowledge and skills to provide appropriate solutions.			
Cleans work site, makes safe and notifies appropriate persons regarding completion of work using established procedures.			
Demonstrates understanding of: • alternating current power principles • occupational health and safety principles • electrical safe working practices.			

RECORD OF CONVERSATION

UEEEL0010 Evaluate and modify low voltage socket outlets circuits. Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 17c: Explain how you have solved problems in low voltage socket outlets circuits and the processes you follow when providing solutions derived from measured and calculated values.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 17c			
Determines operating parameters in low voltage socket outlets circuits	AS/NZS Wiring Rules 3000:2018 Electrical Safety Act Electrical Safety Regulations Code of Practice – Electrical work Standard Operating Procedures (SOP) Job Safety and Environmental Analysis (JSEA) Workplace documentation, policies, and procedures		
Determines nature and scope of work, sources materials and coordinates work with others.			
Determines need to test or measure live and follows risk control measures as determined by regulatory requirements and safe working practices.			
Uses and selects appropriate tools, cables, and accessories.			
Tests all equipment for correct operation and safety and isolates circuits according to established procedures.			
Uses established methods to solve circuit problems from measure and calculated values as they apply to low voltage socket outlets circuits			
Determines conditions causing an existing circuit to be unsafe: electric shock hazard from indirect contract with conductive parts, insufficiently low impedance of a fault current path and inadequate fault protection.			
Develops and alters existing circuits to comply with specified operating parameters.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Deals with unexpected situations safely by drawing on essential knowledge and skills to provide appropriate solutions.			
Cleans work site, makes safe and notifies appropriate persons regarding completion of work using established procedures.			
Demonstrates understanding of: • alternating current power principles • occupational health and safety principles • electrical safe working practices.			

RECORD OF CONVERSATION

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories.

Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 18: What are the types of wiring enclosures, cable support systems, cables, and accessories you have installed?

What are the processes you follow when installing and terminating cables and connecting wiring at accessories?

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 18	Workplace Health and Safety		

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Demonstrates use of ***at least three*** different wiring systems and applies regulatory requirements: • TPI cable in conduit or trunking • TPS circular or flat cable unenclosed • TPS circular cable unenclosed • SWA cable unenclosed • fire performance cables (e.g. MIMS, Radox). Has installed ***at least four*** of the following types of circuits and applies regulatory requirements: • control devices • fixed appliances/accessories • lighting and socket outlets • single/three phase motors and their controls • transformers and their controls • switchboards and/or distribution boards • protection and/or metering devices • d.c. machines and their controls.	Act: 1995 Queensland Electricity Safety Act Queensland Electricity Safety Regulations Electrical Code of Practice AS/NZS 3000:2018 Workplace documentation (component faults report, test results, parts/components dispatch, stores record) Service manuals Manufacturer's instructions for materials and equipment		
Uses range of cable support and mechanical protection devices and applies regulatory requirements: • clips, saddles, hangers, ties • metallic and non-metallic conduit • cable ducts, trunking, cable trays/ladder.			
Follows OHS and risk control procedures.			
Determines nature and scope of work, sources materials and coordinates work with others.			
Reads and interpreting drawings related to cable layouts, cable schedules and apparatus locations.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Determines need to test or measure live and follows risk control measures as determined by regulatory requirements and safe working practices.			
Uses and selects appropriate tools, cables, and accessories.			
Tests all equipment for correct operation and safety and isolates circuits according to established procedures.			
Follows appropriate cable routes and installs cable and accessories to comply with standards, job specifications and established work practices.			
Accessories are installed straight and square in the required locations and within acceptable tolerances.			
Maintains fire integrity and terminates cables and accessories to manufacture's specs and regulatory requirements without waste or damage to equipment and uses sustainable energy practices.			
Tests and verifies installation to regulatory requirements.			
Cleans work site, makes safe, documents work and notifies appropriate persons regarding completion of work using established procedures.			
Deals with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions.			
Demonstrates understanding and applies knowledge and skills in: • power cable and conductor terminations • technical standards, regulations, and codes • electrical installation wiring, accessories, and equipment requirements.			

RECORD OF CONVERSATION

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories .

Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 19: What are the types of low voltage electrical apparatus and associated equipment you have installed and what processes have you followed when installing and connecting apparatus?

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 19			
Demonstrates appropriate experiences and skills in installing and connecting apparatus including ***at least four*** different electrical apparatus from list below: • motor staters and associated control devices • switchgear and control gear • protective devices; Control devices • fixed appliances/accessories • lighting and their controls and socket outlets • single and three phase motors and their controls • transformers and their controls; Metering devices • a c./d c. machines and their controls.	AS/NZS Wiring Rules 3000:2018 Electrical Safety Act Electrical Safety Regulations Code of Practice – Electrical work Standard Operating Procedures (SOP) Job Safety and Environmental Analysis (JSEA) Workplace documentation, policies and procedures Manufacturer's specifications and drawings		
Follows OHS and risk control procedures and determines nature and scope of work, sources materials and coordinates work with others.			
Reads and interpreting drawings related to cable layouts, cable schedules and apparatus locations.			
Determines need to test or measure live and follows risk control measures according to regulatory requirements and safe working practices.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Uses and selects appropriate tools, cables and accessories and tests all equipment for correct operation and safety and isolates circuits according to established procedures.			
Installs and terminates apparatus and associated equipment to comply with standards, job specifications and established work practices (including maintaining fire integrity and placing and securing apparatus accurately).			
Installs apparatus without waste or damage to equipment and uses sustainable energy practices.			
Cleans work site, makes safe, documents work and notifies appropriate persons regarding completion of work using established procedures.			
Deals with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions.			
Demonstrates understanding and applies knowledge and skills in: • alternating current rotating machines • single and three phase transformers • luminaries and lighting systems • power cable and conductor terminations (assessed in G003B) • technical standards, regulations, and codes (assessed in G003B) • electrical installation wiring, accessories, and equipment requirements (assessed in G003B).			

RECORD OF CONVERSATION

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations Core

☐ *Please tick this box to indicate if all prerequisites have been met. Prerequisites:* ***UEENEE****/ E001B; E002B; E003B; E004B; E005B; E007B; E008B; E033B; G001B; G002B; G003B; G004B; G007B; G008B; G009B; and elective units as required, from Schedule 3 to a Strand Unit value of 6*

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 20: What have been the types of electrical installations that you have inspected and tested to verify whether is safe and complies with all requirements? Describe the process you undertake in verifying electrical installations for safety and regulatory compliance.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 20	Electrical work permit (Electrical Safety Office) OTSR certificate (VETASSESS) ARTC certificate (Trades Recognition Australia) Electrical apprenticeship AS/NZS Wiring Rules 3000:2018 AS/NZS 3017 Electrical installations—Verification guidelines AS/NZS 3008 Electrical installations— Selection of cables		

Demonstrates appropriate experiences and skills in verifying compliance and functionality of:
• main switchboards containing circuits for:
  ○ lighting
  ○ socket outlets
  ○ fixed appliances.
• distribution boards.
• circuits supplying a three-phase load.			

Follows OHS and risk control procedures and determines nature and scope of work, sources materials and coordinates work with others.			
Determines need to test or measure live and follows risk control measures according to regulatory requirements and safe working practices.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Uses and selects appropriate tools, equipment and measuring devices are checked for correct operation and safety and isolates circuits according to established procedures.	AS/NZS 4836 Safe Working on LV Electrical Installations Electrical Safety Act Electrical Safety Regulations Code of Practice – Electrical work Standard Operating Procedures (SOP) Job Safety and Environmental Analysis (JSEA) Workplace documentation, policies and procedures Manufacturer's specifications and drawings Work permits and isolation orders		
Checks wiring for suitability to environment and checks if suitably protected from damage or overheating.			
Confirms cable conductor sizes meet current-carrying capacity requirements and voltage drop and fault-loop impedance limits.			
Validates protection methods and devices as meeting co-ordination requirements for overload and short-circuit protection.			
Validates switchgear and control gear as being appropriately rated and meeting functional requirement.			
Inspects electrical equipment for compliance with safety requirements.			
Checks earthing system components are correctly located and conductors correctly sized.			
Checks that marking on switchboards are clear and accurate and comply with requirements.			
Conducts mandatory tests for verification of: • earthing conductor resistance is sufficiently low • insulation resistance is sufficiently high • all polarities are correct • circuit connections are correct • fault-loop impedance is sufficiently low • residual current devices operate as intended.			
Identifies non-compliance defects are identified and reported in accordance with established procedures.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Makes recommendations for rectifying defects in accordance with established procedures.			
Completes mandatory documentation in accordance with established procedures.			

RECORD OF CONVERSATION

UEEEL0018 Select wiring systems and select cables for low voltage electrical installations*

Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 21: What have been the types of electrical equipment that you have selected and arranged for general electrical installations?

Describe the process you undertake in selecting and arranging equipment for electrical installations.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 21	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS 3000:2018 Workplace documentation (component faults report, test results, parts/components dispatch, stores record) Service manuals Manufacturer's parts catalogue		

Demonstrates appropriate experiences and skills in selecting and arranging equipment comprising:
• main switchboards containing circuits for:
  ○ lighting
  ○ socket outlets
  ○ fixed appliances
• distribution boards and
• circuits supplying three-phase loads.			

Determines extent and nature of the electrical installation and follows safety and regulatory requirements.			
Arranges circuits to ensure safe and functional operation of the installation and to comply with technical standards and job specifications and requirements.			
Arranges circuits to ensure safe and functional operation of the installation and to comply with technical standards and job specifications and requirements.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Selects wiring for: • suitability of environment • current-carrying capacity, voltage-drop and fault-loop impedance • Selects protection methods and devices to meet co-ordination requirements for overload and short-circuit protection.			
Selects switchgear and control gear to meet current, voltage and IP ratings and functional requirements.			
Selects earthing system components to meet requirements of the MEN system and obtains evidence that electrical equipment complies with safety requirements.			
Documents reasons for selections and arrangements made, including calculations and specifications for selected items in accordance with established procedures and forwards to appropriate person/s.			

RECORD OF CONVERSATION

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 22: What have been the types of faults you have found and repaired in low voltage electrical apparatus and circuits?

Describe the process you undertake when applying fault finding techniques for repair of low voltage electrical apparatus and circuits.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 22			
Demonstrates appropriate range of experiences and skills in finding and repairing faults and their cause (***at least five***): • open circuit; short-circuit; incorrect connections; insulation failure; unsafe condition; apparatus /component failure; related mechanical failure. Finds and rectifies faults in a range of apparatus (at least ***four***): • control devices, fixed appliances, lighting; single and three phase motors, socket outlets; transformers, switchboards and/or distribution boards, protection and/or metering devices, a.c./d.c. machines and their controls. Finds and rectifies faults in a range of circuits that supply (***at least three***): • fixed appliances; lighting; single and three phase motors; socket outlets; machines and transformers; electronic or computer-based equipment.	Electrical work permit (Electrical Safety Office) OTSR certificate (VETASSESS) ARTC certificate (Trades Recognition Australia) Electrical apprenticeship AS/NZS Wiring Rules 3000:2018 AS/NZS 3017 Electrical installations—Verification guidelines AS/NZS 3008 Electrical installations— Selection of cables AS/NZS 4836 Safe Working on LV Electrical Installations		

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Determines likely extent of the fault and work from fault/breakdown reports and/or discussion with appropriate person/s and follows safety and regulatory requirements.	Electrical Safety Act Electrical Safety Regulations Code of Practice – Electrical work Standard Operating Procedures (SOP) Job Safety and Environmental Analysis (JSEA) Workplace documentation, policies, and procedures Manufacturer's specifications and drawings Work permits and isolation orders		
Determines need to test or measure live and follows risk control measures for hazards caused by fault.			
Uses appropriate tools and resources while applying methodical fault-finding techniques and draws on knowledge of a.c. circuits and apparatus using measured and calculated values of circuit/apparatus parameters.			
Conducts tests or measurements in strict accordance with OHS and electrical safe working requirements.			
Locates and finds faults efficiently and sources replacement parts and rectifies faults effectively.			
Tests apparatus without waste or damage to equipment and uses sustainable energy practices.			
Cleans work site, makes safe, documents work and notifies appropriate persons regarding completion of work using established procedures.			
Deals with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions.			

RECORD OF CONVERSATION

UEEEL0005 Develop and connect electrical control circuits Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 23: What have been the types of control circuits that you have developed and connected?

Describe the process you undertake in developing and connecting a control circuit including functional tests you have performed.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 23	Electrical work permit (Electrical Safety Office) OTSR certificate (VETASSESS) ARTC certificate (Trades Recognition Australia) Electrical apprenticeship AS/NZS Wiring Rules 3000:2018 AS/NZS 3017 Electrical installations—Verification guidelines AS/NZS 3008 Electrical installations— Selection of cables AS/NZS 4836 Safe Working on LV Electrical Installations Electrical Safety Act		
Demonstrates satisfactory range of experiences in developing and connecting control circuits (***at least four*** from list below): • multiple light switching circuit • master control circuit • single stop-start circuit • multiple stop-start circuit • time controlled circuit • machine interlocked circuit • motor jogging circuit • machine safety circuit.			
Follows all OHS requirements and determines control scenarios and develops schematic arrangement of control circuits in accordance with established procedures.			
Determines need to test or measure live and follows risk control measures according to regulatory requirements and safe working practices.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Uses and selects appropriate tools, cables and accessories and tests all equipment for correct operation and safety and isolates circuits according to established procedures.	Electrical Safety Regulations Code of Practice – Electrical work Standard Operating Procedures (SOP) Job Safety and Environmental Analysis (JSEA) Workplace documentation, policies, and procedures Manufacturer's specifications and drawings Work permits and isolation orders		
Connects control circuit components to comply with the agreed control scenario and tests circuit operation for agreed functionality and in strict accordance with OHS requirements and established safety procedures.			
Identifies and corrects non-compliant control functions and deals with unexpected situations safely and with the approval of an authorised person.			
Tests and connects control circuits efficiently without waste or damage to equipment and uses sustainable energy practices.			
Cleans work site, makes safe, documents work using standard drawing conventions and notifies appropriate persons regarding completion of work using established procedures.			

RECORD OF CONVERSATION

UEEIC0013 Develop, enter and verify discrete control programs for programmable controllers*. Group A Elective

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 24

a) Discuss your actions in carrying out your obligations and responsibilities prior to commencing work. As well as work preparation include your obligations and responsibilities under current OH&S legislation.

b) You are required to determine a control system scenario from job specifications of the process/ plant machine/ to be controlled through consultation with appropriate person(s)

c) Describe the preparation to develop and verify the program.

d) Describe how you would develop control system and enter and test program.

e) Discuss the requirements to verify, document and report programming activities.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 24			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
A) • Knows and applies OH&S procedures. • Understands risk analyses process and applies 'order of risk reduction', i.e., elimination of risk a priority. • Confirms machines are isolated where necessary. • Control solutions are developed and documented. • Developed control system is converted to an appropriate form such as flow state and ladder diagram. • Program is entered into the programmable control using a personal computer and appropriate soft ware • Appropriate methods and tools are used to test control systems and operating faults and anomalies are identified and rectified. • Methods of dealing with unexpected situations are selected on the basis of safety and specified work outcomes.	OH&S Legislation Codes of Practice - Electrical Work – Electrical Safety Act 2002 Manufacturer's specifications – Equipment Licensing		
B) • OHS work completion risk control measures and procedures are followed. • Program is transferred from a programmable controller to an external medium for storage. • Control system specification documented • Work completion is reported, and appropriate personnel notified in accordance with established procedures.			
C) • Understands the requirements for correctly setting up a PLC • Understands the control methodology behind plc integration into the workplace			

RECORD OF CONVERSATION

UEEEL0020 Solve problems in low voltage a.c. circuits. Core

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 25: See Below

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 25	Electrical Safety Act 2002 Electrical Safety Regulation 2002 Electrical Safety Act 2002 (ESA) Code of Practice – Electrical Work Workplace Health and Safety Act 1995 Workplace Health and Safety Regulation 2008 Workplace Health and Safety Act Codes of Practice as applicable AS/NZS3000:2007 Sustainable Energy		
• Demonstrate an understanding of Alternating quantities for example RMS values and frequency of sinusoidal waveforms			
• Demonstrates an understanding phasor diagram including 'in phase' 'out of phase' 'phase angle' 'lead' and 'lag'			
• Application of ohms law to determine voltage, current or reactance. Show understanding of RC and RL in a series AC circuit encompassing impedance and impedance triangle and RLC series circuits.			

KEY POINTS The candidate's response should evidence the following	INDUSTRY REQUIREMENTS These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	COMMENTS Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
• Show understanding of parallel AC circuits encompassing the determination of branch currents that contain RL, RC in two branches, the total circuit impedance, the total current by phasors and phase angle.	principles and practices Effective communication Workplace documentation		
• Show understanding of power in an AC circuit encompassing the difference between true power, apparent power, reactive power. List their units of measurement and define the term 'power factor' and phase angle.			
• Explain how power factor can be improved.			
• What are harmonics?			
• What problems arise from the effects of harmonics?			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
• Demonstrate an understanding of the relationship of voltages in a multiphase system and explain the term 'phase sequence' or 'phase rotation'			
• What do we mean by the term 'fault loop impedance?			
• Show understanding of a three-phase star connected system encompassing phase relationship between line and phase voltages and line and phase currents. • Show understanding of a three-phase delta connected system encompassing phase relationship between line and phase voltages and line and phase currents. • What is the purpose for measuring power, energy, power factor and maximum demand of a.c. power systems and loads?			

RECORD OF CONVERSATION

UEEAS0007 Assemble, mount and connect control gear and switchgear. Group A Elective

CANDIDATE'S NAME:_____ ASSESSOR'S **NAME** _____ **DATE:** ____/____/____

Question 26: What have been the types of switchgear and control gear you have installed and connected for control panels and switchboards? Explain the processes you follow in selecting, installing, and connecting switchgear and control gear.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 26	Electrical work permit (Electrical Safety Office) OTSR certificate (VETASSESS) ARTC certificate (Trades Recognition Australia) Electrical apprenticeship AS/NZS Wiring Rules 3000:2018 AS/NZS 3017 Electrical installations—Verification guidelines AS/NZS 3008 Electrical installations— Selection of cables AS/NZS 4836 Safe Working on LV Electrical Installations Electrical Safety Act AS/NZS Switchboard		
Meets regulatory requirements to undertake electrical work (electrical licence, electrical work permit, apprenticeship or performs electrical work under a "prescribed place of work" as defined by the Electrical Safety Act section18 d)			
Demonstrates satisfactory range of experiences in installing and connecting switchgear and control gear (in ***at least two*** different control panels) and includes all equipment and apparatus from list below: • busbars • bus ties • isolators • current transformers • voltage transformers • core balance protective devices • HRC Fuses • meters and measuring equipment • air circuit breakers and/or oil circuit breakers.			
Follows OHS and risk control procedures and determines nature and scope of work from wiring diagrams, sources materials and coordinates work with others			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Determines need to test or measure live and follows risk control measures according to regulatory requirements and safe working practices.	standards Electrical Safety Regulations Code of Practice – Electrical work Standard Operating Procedures (SOP) Job Safety and Environmental Analysis (JSEA) Workplace documentation, policies and procedures Manufacturer's specifications and drawings Work permits and isolation orders		
Uses and selects appropriate tools, cables and accessories and tests all equipment for correct operation and safety and isolates circuits according to established procedures.			
Follows assembly instructions and correctly fits and connects switchgear/control gear without damage and follows quality procedures, standards/codes and job specifications.			
Tests completed switchboard against work instructions and industry standards and in strict accordance with OHS risk control measures.			
Follows procedures for non-routine events and carries out work without waste or damage to equipment and uses sustainable energy practices.			
Cleans work site, makes safe, documents work and notifies appropriate persons regarding completion of work using established procedures.			

RECORD OF CONVERSATION

UEECS0033 Use engineering applications software on personal computers*.

Group A Elective

CANDIDATE'S NAME:_____ **ASSESSOR'S NAME:**_____ **DATE:** ____/____/____

Question 27: What types of computer applications you have used in your work environment, and outline the steps you take in using computer applications including how information is used, files stored and forwarded?

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 27			
Examples provided indicate that ***at least three*** of the applications listed are routinely used: • word processing • spread sheet • drawings • business management • apparatus set-up • email.	Work safety practices Standard operating procedures Vendor computer application instruction manual		
Processes routinely followed include: • switching computer on to established procedures • applying user preferences and uses help directory • adds, alters or deletes information in accordance with user instructions • produces and prints engineering related reports • stores/files engineering related reports • forwards engineering related reports using email • names, saves and print files/documents • shuts down computer correctly • uses essential knowledge and skills to deal with anomalies and unplanned events.			

RECORD OF CONVERSATION

UETDRRF004 Perform rescue from a live LV panel Core

CANDIDATE'S NAME:_____ ASSESSOR'S NAME _____ **DATE:** ____/____/____

Question 33: Demonstrate how to rescue a workmate from a live LV panel

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 33	Electrical Safety Act		
(a) How will you prepare to perform rescue procedures from live LV?	Electrical Safety Regulations		
(b) Demonstrate how to carry out rescue from live LV panel	Code of Practice – Electrical work		
(c) Provide your plan regarding the processes for reporting accidents and/or incidents to authorised personnel in accordance with established procedures	Standard Operating Procedures (SOP) Job Safety and Environmental Analysis (JSEA) Workplace documentation, policies, and procedures ESI Safety Practice and Relevant High Voltage Safety Standards of Energy Supply Authorities ESI Training Materials http://www.iqytechnicalcollege.com/Form71ESILesson.htm		
• Instruction in hazards and risk control measures for specific work functions and work areas are			

KEY POINTS The candidate's response should evidence the following	INDUSTRY REQUIREMENTS These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	COMMENTS Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
identified and obtained • Electricity isolation point is identified and labelled, where appropriate • Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to established procedures • Workplace procedures and work instructions for controlling risk are followed • Workplace procedures for accessing and isolating the LV panel and removing the victim, where necessary, from contact with live apparatus are followed • Workplace procedures for applying cardiopulmonary resuscitation (CPR), if required at the site, and gaining access to treatment by a medical professional, if necessary, are followed • The worksite is secured and entry controlled until appropriate authorities inspect and release the site • Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures			

RECORD OF CONVERSATION

UEERE0001 Apply environmentally and sustainable procedures in the energy sector. Core

CANDIDATE'S NAME:_____ **ASSESSOR'S NAME:**_____ **DATE:** ____/____/____

Question 29: Provide examples of the sustainable work practices that you have used in the workplace.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 29	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2018 Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation Workplace policies and procedures		
Implements techniques which reduces energy usage directly or indirectly. Minimises waste of material or damage to surrounding environment. Involves others to communicate suggestions for improvements to workplace practices to minimise energy and materials wastage. Dealing with unplanned events.			
Evidence of understanding of sustainable work practices include: • effects of neglecting sustainable work practice • greenhouse effect - causes, consequences. • international and national greenhouse imperatives • role of regulators and similar bodies • economic benefits of sustainable initiatives. Techniques for reducing carbon produced energy and hence greenhouse gases: • domestic, commercial and industrial strategies • trade related technologies and methods • energy efficient retrofits (overview) • renewable energy technologies (overview). • Energy efficiency			

KEY POINTS The candidate's response should evidence the following	INDUSTRY REQUIREMENTS These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	COMMENTS Record other key points and examples from conversation. Identify whether a practical assessment is warranted.

RECORD OF CONVERSATION

UEECO0023 Participate in electrical work and competency development activities. Core

CANDIDATE'S NAME: _____ **ASSESSOR'S NAME:** _____ **DATE:** _____

Question 30: How have you monitored your competency development and ensured your progression of knowledge and skills was maintained?

***Note**: This unit of competency is designed for an apprentice/learner in employment-based programs covered by an approved contract of training. To RPL in this unit the assessor must therefore establish that the candidate has been actively participating in own competency development to the level of performance required by this unit. Where gap training is required (from other Appliance Servicing units) to gain qualification, assessor can use this opportunity to collect additional relevant evidence from candidate for support of this unit.*

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 30	Workplace Health and Safety Act: 1995 Queensland Electricity Act Queensland Electricity Safety Regulations Electrical Code of Practice AS/NZS 3000:2018 Workplace documentation (service report, test results, parts/components dispatch, stores record Service manuals Manufacturer's instructions for materials and equipment		
Identified and confirmed training practices, requirements, administration costs and support service policies and procedures provided by training organisation.			
Identified and confirmed the context, requirements, and responsibilities of a competency development plan.			
Has clarified how particular work is carried out and the procedures involved.			
Identified and confirmed the critical industry, enterprise and regulatory policies, procedures, and context applicable to work activities.			
Has requested assistance to overcome difficulties when developing competency.			
Progressed successfully against periodic or staged evaluative performance events.			
Reported periodically the competency development activities in accordance with requirements.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Met obligations by periodically reviewing progress of competency development and modified through consultation with appropriate persons.			
Competency development reports validated by an appropriate person.			
Pursued strategies for developing opportunities in gaining range of workplace experiences and exposure.			
Dealt with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions.			
Demonstrates understanding of: • responsibilities under a competency development plan • exposure requirements to scope of workplace activities and equipment • methods of monitoring and reporting competency development activities • workplace evidence reporting and review • workplace evidence validation • periodic evaluation of competency development progress • enterprise work activities policies and procedures.			

RECORD OF CONVERSATION

UEEEL0003 Arrange circuits, control and protection for electrical installations Core

CANDIDATE'S NAME: _____ **ASSESSOR'S NAME:** _____ **DATE:** _____

Question 31:

KEY POINTS The candidate's response should evidence the following	INDUSTRY REQUIREMENTS These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	COMMENTS Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 31	Codes of Practice Safety NSW Work Cover AS/NZS3000:2018 AS/NZS 3018 Electrical Safety Act Electrical Safety Regulations Code of Practice – Electrical work Standard Operating Procedures (SOP) Job Safety and Environmental Analysis (JSEA) Workplace documentation, policies, and procedures		
Safe work practices			
Protection against overload and earth fault protection			
Factors that determine the number and type of circuits in the installation.			
Devices for protection against direct and indirect contact.			
Earthing arrangements for example MEN systems, protective earth and functional earthing			
Devices for Automatic disconnection.			
Causes of under voltage and effects on the system.			
Switching arrangements for example local isolation and emergency situations.			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
CT metering and application.	ESI Safety Practice and Relevant High Voltage Safety Standards of Energy Supply Authorities		
Requirements of single and three phase metering			
Circuit arrangements, compliance requirements (includes location, access, identification and marking, arc fault protection and construction suitability			
Control arrangement for complete installations with or without with or without safety services and an alternate supply. Switch types current, voltage and IP rating			

RECORD OF CONVERSATION

HLTAI009 Provide cardiopulmonary Resuscitation Core

CANDIDATE'S NAME: _____ **ASSESSOR'S NAME:** _____ **DATE:** _____

Question 32: Demonstrate cardiopulmonary resuscitation to workmate who suffers the serious injury.

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 32	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2018 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Low Voltage Rescue First Aid and CPR Elevated Work Platforms Permit		
Respond to an emergency situation			
Recognise and assess an emergency situation.			
Ensure safety for self, bystanders and casualty.			
Assess the casualty and recognise the need for cardiopulmonary resuscitation (CPR).			
Seek assistance from emergency services			
Perform CPR procedures			
Perform CPR in accordance with the ARC guidelines			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Display respectful behaviour towards casualty			
Operate an automated external defibrillator (AED) according to manufacturers' instructions			
Communicate details of the incident.			
Accurately convey incident details to emergency services.			
Report details of incident in line with appropriate workplace or site procedures.			
Maintain privacy and confidentiality of information in line with statutory or organisational policies.			
Review the incident.			

RECORD OF CONVERSATION

UEEEL0047 Identify, shut down and restart systems with alternate supplies. Core

CANDIDATE'S NAME: _____ **ASSESSOR'S NAME:** _____ **DATE:** _____

Question 34: When the main power is outage, how will you identify, shut down and restart the system with alternate supplies.

KEY POINTS The candidate's response should evidence the following	INDUSTRY REQUIREMENTS These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	COMMENTS Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
Question 34	Codes of Practice Manufacturer's Instructions AS/NZS 3000 NSW Electrical Service Rules ESI Safety Practice and Relevant High Voltage Safety Standards of Energy Supply Authorities ESI References http://www.iqytechnicalcollege.com/Form71ESILesson.htm		
(a) How will you prepare to work on systems with alternate supplies?			
(b) How do you identify and isolate alternate supplies?			
(c) Provide the sample of your complete work and document records			

KEY POINTS The candidate's response should evidence the following	INDUSTRY REQUIREMENTS These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	COMMENTS Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
• Nature of the installation is obtained from appropriate written documentation, electrical drawings and/or relevant person/s to determine the scope of work			
• WHS/OHS workplace procedures are obtained, interpreted and applied			
• Hazards are identified, risks are assessed, and control measures are implemented			
• Tools, equipment and circuit testing devices are obtained and checked for correct operation and safety in accordance with workplace procedures			
• Work supervisor is consulted to ensure work is coordinated effectively with others			
• Labelling indicating generation system/s connected on site is located, interpreted and checked against electrical diagram			
• Switchboard, circuits and known supply are identified			
• Site procedures for isolation and shutdown are obtained and interpreted			
• Circuit to be isolated is identified and tested			

KEY POINTS The candidate's response should evidence the following	**INDUSTRY REQUIREMENTS** These must be evidenced in the candidate's response	Indicate if response addresses KP and IR	**COMMENTS** Record other key points and examples from conversation. Identify whether a practical assessment is warranted.
• Shutdown procedures are completed in accordance with industry standards and workplace procedures			
• Isolation of energy sources is completed and proved in accordance with workplace procedures, industry standards and regulatory requirements			
• Systems are inspected and tested for compliance with industry and regulatory standards			
• Battery storage system integrity is checked in accordance with industry standards and regulatory requirements			
• System is re-instated after isolation			
• WHS/OHS work completion risk control measures and procedures are followed			
• Worksite is cleaned and made safe in accordance with workplace procedures			
• Work completion is documented, electrical drawings are updated, and relevant personnel are notified in accordance with workplace procedures and regulatory requirements			

32	**Task 33** **Practical** Practical demonstration of <u>1.Respond to an emergency situation</u> 1.1. Recognise and assess an emergency situation. 1.2. Ensure safety for self, bystanders and casualty. 1.3. Assess the casualty and recognise the need for cardiopulmonary resuscitation (CPR). 1.4. Seek assistance from emergency services <u>2. Perform CPR procedures.</u> 2.1. Perform CPR in accordance with the ARC guidelines. 2.2. Display respectful behaviour towards casualty. 2.3. Operate an automated external defibrillator (AED) according to manufacturers' instructions. <u>3. Communicate details of the incident.</u> 3.1. Accurately convey incident details to emergency services. 3.2. Report details of incident in line with appropriate workplace or site procedures. 3.3. Maintain privacy and confidentiality of information in line with statutory or organisational policies <u>4.Review the incident.</u> 4.1. Recognise the possible psychological impacts on self and other rescuers and seek help when required. 4.2. Contribute to a review of the first aid response as required.	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit

UEEEL0047 Identify, shut down and restart systems with alternate supplies** **Core**	34.When the main power supply is broken down, provide the work procedure to identify, shut down and restart the system with alternate supply

SECTION D

Return

Written Assessments / Exams/Electrical Practice

Topic Skills Practice Cover Sheet

Unit Name:	UEEAS0007 Assemble, mount and connect control gear and switchgear
Topic Title:	Switchgear and Controlgear Selection

Skill Practice Number:	5.2
Skill Practice Name:	Select Switchgear and Controlgear

Student Name:	

Student ID:	
College/Campus:	
Group:	

Results	
Planning:	
Carryout:	
Completion:	
Overall Results:	
Comments:	

Topic Skills Practice 5.2

UEEAS0007 Assemble, mount and connect control gear and switchgear

Topic 5. Switchgear and Controlgear Selection

Skills Practice 5.2: Select Switchgear and Controlgear

Task:

To develop a single line diagram for the protection of a three phase motor scenario, including selection and settings for all protection equipment.

Objectives:

At the completion of this skills practice, you should be able to:

- Determine the voltage and current ratings of relays and contactors for a specified application.
- Develop a single line diagram of a supply circuit for a three-phase 400 V 7.5 kW squirrel cage induction motor with star-delta starter.
- Determine fault current limit and isolator ratings, as well as utilisation categories of contactors and overload settings.
- Determine the overload currents of protective relays and fuse ratings to protect the system.

Topic Skills Practice 5.2

1. Planning the Skills Practice

1.1	1.2 Suggested	1.3 Miscellaneous
• Pen/pencil	• Switchgear and controlgear manufacturer catalogues	• N/A • N/A

1.4 Risk Assessment

Risk assessment procedure:

- Identify any hazards that may exist with this skills practice below
- List the supervision level you will be working under - Direct (D), General (G) or Broad (B)
- List the risk classification – High Risk (H), Medium Risk (M) or Low Risk (L)
- List the control measures required for each identified hazard that you need to implement.

Hazard/s Identified	Supervision Level (D, G or B)	Risk Classification (H, M or L)	Control Measure/s
Exposed terminal	D	H	Test before touch
Wrong voltage damaging equipment	D	H	Test the voltage and check the equipment name plate before energizing.

Feedback

Have your teacher/trainer check your risk assessment

Teacher/Trainer Initials and Date	✓

2. Carrying Out the Skills Practice

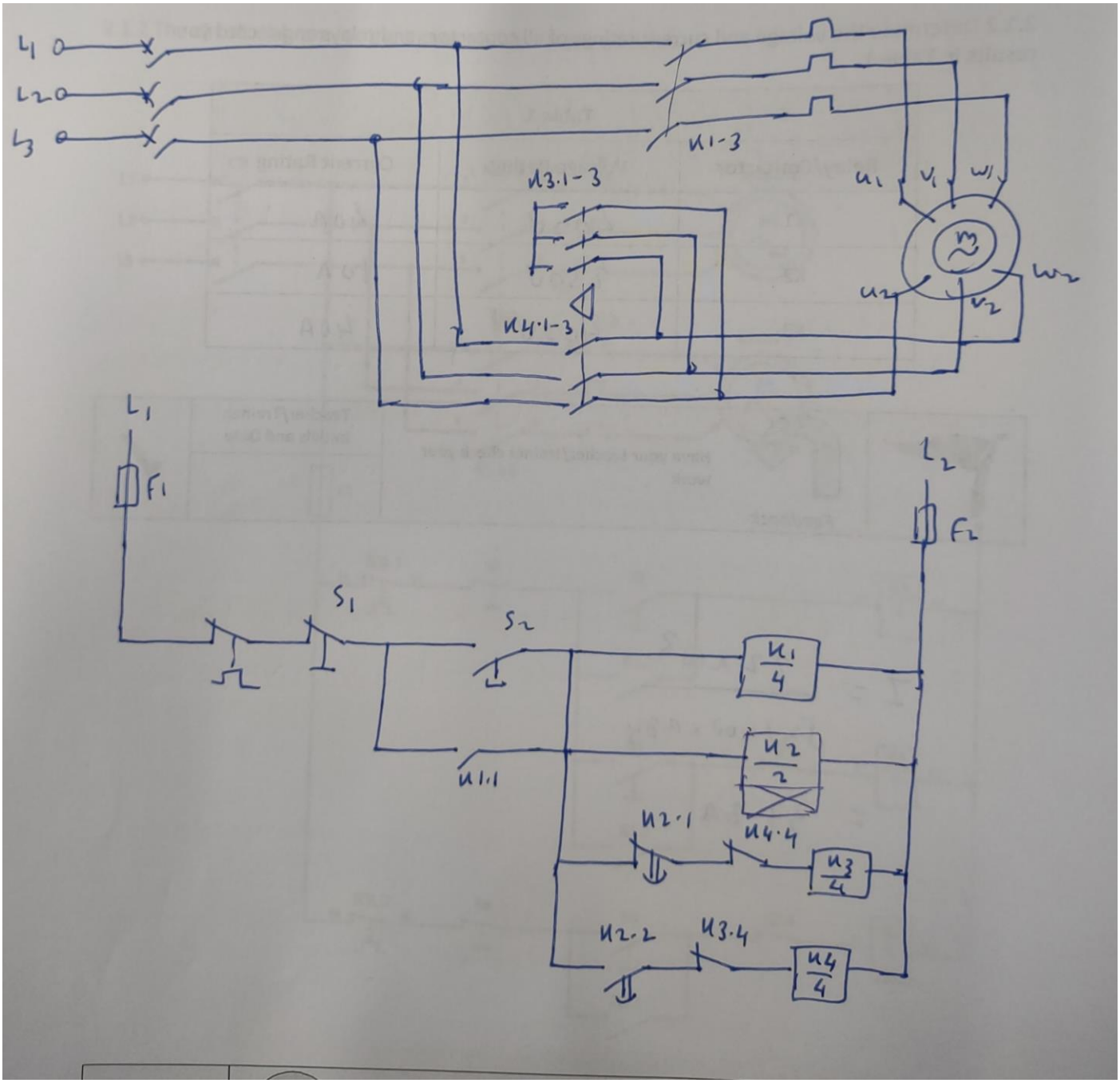
2.1 Select Switchgear and Controlgear

2.1.1 Determine the voltage and current ratings of relays and contactors for the operational specification and circuit diagram below.

Operational
The control panel is designed to control the operation of two squirrel cage inductionmotors. operational specification is: tor 1 and Motor 2 are controlled by independent stop-start DOL starters h motor is rated at 22 kW, 400 V, 50 Hz, cos ϕ = 0.84, 1470 rpm tor 1 cannot run if Motor 2 is running tor 2 cannot run if Motor 1 is running tor 1 incorporates jogging control

Topic Skills Practice 5.2

2.1.2 The circuit diagram for the motor circuit is pictured below:

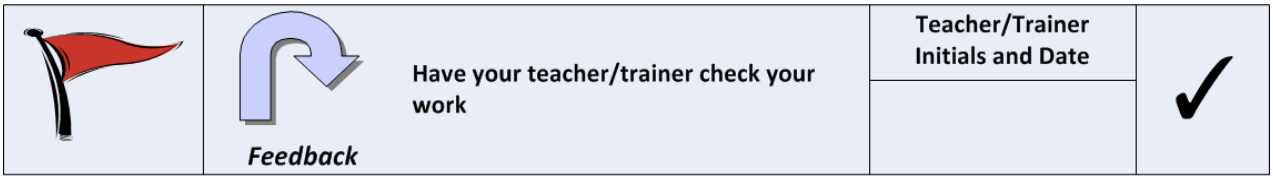


Topic Skills Practice 5.2

2.1.2 Determine the voltage and current ratings of all contactors and relays and record your results in Table 1.

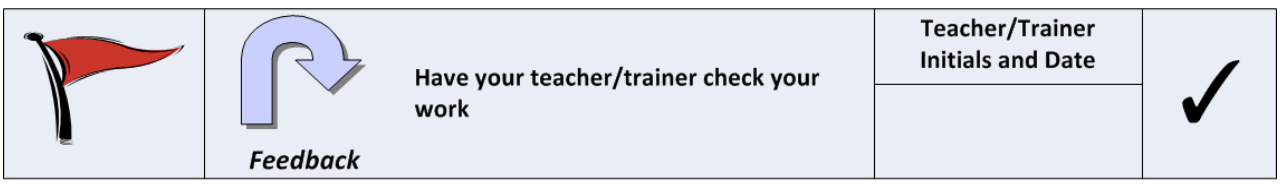
Table 1		
Relay/Contactor	**Voltage Rating**	**Current Rating**
K1	400 V	40 A
K2	250 V	10 A
K3	400 V	40A

$$I = \frac{22 \times 10^3}{1.7321 \times 400 \times 0.84} = 37.8 \text{ A}$$



2.2 Select Protection Device Settings

2.2.1 Develop a single line diagram of a supply circuit for a three phase 400 V 7.5 kW star-deltastarter motor circuit. Draw your diagram in the space provided below:



Topic Skills Practice 5.2

2.2.2 Determine all fault current limit and isolator ratings, as well as utilisation categories of contactors and determine the overload settings for the supply circuit and document your resultsin Table 2.

Note: the motor circuit originates from switchboard with a prospective fault capacity of 15 kA

Table 2			
Protection Device	**kA rating**	**Utilisation Category**	**Overload Setting**
Fault current limiter	15 KA	Main pole, PTC Device	
Isolator	15 KA	Main pole , Type D CB	12.5 times Nominal current
Contactors	15 KA	Main pole CA 7.9	32 A
Thermal overload	15 KA	Main pole Automativ set mode	110%

Feedback

Have your teacher/trainer check your work

Teacher/Trainer Initials and Date

✓

2.2.3 Determine the overload current setting of the protective relays and document your resultsin Table 3.

Table 3	
Protection Device	**Overload Current**
Overload relays	12.5 times Nominal current 20x12.5 =250A

2.2.4 Determine the fuse ratings to protect the system and document your results in Table 4.

Table 4	
Protection Device	**Rating**
Fuse	30A

Feedback

Have your teacher/trainer check your work

Teacher/Trainer Initials and Date

✓

Topic Skills Practice 5.2

3. Completing the Skills Practice

3.1 Skills Practice Review Questions

3.1.1 Clean your work area and then complete the following review questions.

1. List six (6) common ratings used for the selection of switchgear and controlgear.

1/ Maximum voltage rating (KV) 2/ Short time withstand current (KA)

3/ Short circuit current rating (KA) 4/ Continuous current rating

5/ Insulation level dielectric strength 6/Temperature rating

2. What does the utilisation category of switchgear indicate?

Characteristic operating conditions for switchgear such as contactors, circuit breakers , circuit breaker fuse unit, contactor relay.

3. Why do fuses have an inverse-time characteristic?

Due to excessive current, the greater the current, the smaller is the time taken by the fuse to blow out.

4. What is the function/purpose of a fault current limiter?

To limit the prospective fault current at any downstream equipment.

	 *Feedback* Have your teacher/trainer check your answers	Teacher/Trainer Initials and Date	✓

Topic Skills Practice Cover Sheet

Unit Name:	UEEEL0005 Develop and connect electrical control circuits
Topic Title:	Three phase induction motor braking

Skill Practice Number:	10.3
Skill Practice Name:	Connect a three phase motor circuit with dynamic braking

Learner Name:	
Learner ID:	
College/Campus:	
Group:	

Results	
Planning:	
Carryout:	
Completion:	
Overall Results:	
Comments:	

Topic Skills Practice 10.3

UEEEL0005 Develop and connect electrical control circuits

KE-UEEEL0005 Knowledge Evidence

Topic: 10. Three phase induction motor braking

Skills Practice 10.3: Connect a three phase motor circuit with dynamic braking

Task:
To connect and operate a three phase induction motor control circuit incorporating dynamic braking.

Objectives:
At the completion of this skills practice, you should be able to:

- Connect a three phase motor control circuit with dynamic braking.
- Operate the motor using a control circuit, including operating of dynamic braking.
- Record your observations of the circuit characteristics.

1. Planning the Skills Practice

1.1 Equipment:	1.2 Suggested Materials:	1.3 Miscellaneous Items:
• Three phase induction motor • Dynamic braking unit • Inertia load • Tong tester • Stopwatch	• 2 x contactors • Thermal overload • Off-delay relay • STOP-START station	• Three phase supply • Suitable cabling • Circuit breaker • Calculator • AS/NZS 3000

1.4 Risk Assessment

Risk assessment procedure:

- ✓ Identify any hazards that may exist with this skills practice below
- ✓ List the supervision level you will be working under - Direct (D), General (G) or Broad (B)
- ✓ List the risk classification – High Risk (H), Medium Risk (M) or Low Risk (L)
- ✓ List the control measures required for each identified hazard that you need to implement.

Hazard/s Identified	Supervision Level (D, G or B)	Risk Classification (H, M or L)	Control Measure/s
Exposed Terminal	D	H	Enclose Terminal
Motor body earth fault	D	H	Measure body voltage
Falling of motor on foot	D	H	Use safety shoe

2. Carrying Out the Skills Practice

Procedures:

Topic Skills Practice 10.3

2.1 Three phase induction motor name-plate details

2.1.1 Examine the name-plate of the motor and record the details in the following table:

Name-Plate Details	
Rating	**Details**
Line Voltage:	3
Output Power:	44 watt
Power Factor:	0.67
Frequency:	50
Rated Full-Load Current:	1.6A
Rated Speed:	1365 rpm
Connection:	λ/Δ
Insulation Class:	F

2.1.2 In the space provided, determine the full-load torque of the motor, using the nameplate details and the following equation:

$$P_{OUT} = \frac{2\pi NT}{60}$$

Where:

P_{OUT} = output power in watts (W)

N = rated speed in revolutions per minute (rpm)

T = full-load torque in newton-metres (Nm)

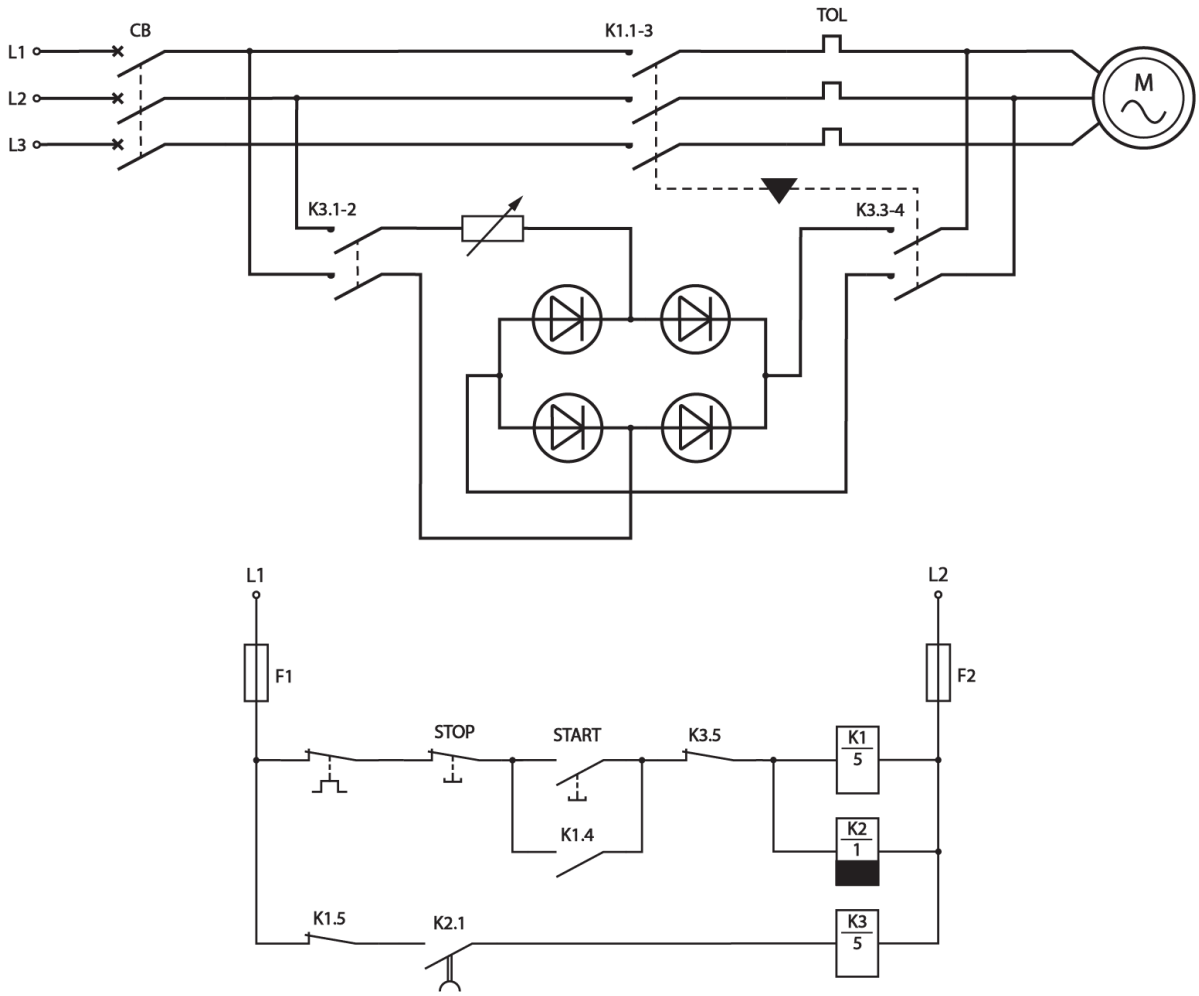
Full-Load Torque Calculation	
Working: $T = \frac{P_{out} \times 60}{2\pi N} = \frac{44 \times 60}{2 \times 3.1416 \times 1365} = 0.3\ N-m$	
Full-Load Torque:	$0.3\ N-m$

	 *Feedback*	Have your teacher/trainer check your work	**Teacher/Trainer Initials and Date** ✓

Topic Skills Practice 10.3

2.2 Connect a dynamic braking circuit

2.2.1 Connect the dynamic braking power and control circuits as shown below:



2.2.2 Couple the rotor shaft with the inertia load, prepare to measure the motor line current by clamping the tong tester around the motor supply cable L1, and set the dynamic braking unit to the minimum current setting.

Don't energize your circuit until your teacher/trainer has verified your connections

Topic Skills Practice 10.3

	Feedback: Have your teacher/trainer check your work	Teacher/Trainer Initials and Date	✓

2.3 Dynamic braking characteristics

2.3.1 After obtaining permission from your teacher/trainer, energise the motor using the START button, measure and record the starting current in the characteristics table on this page, and allow the motor to reach its rated speed.

2.3.2 Prepare to stop the motor by having a stopwatch ready and the tong tester clamped around the motor supply cable L1. Stop the motor using the STOP button, measure and record the braking current and braking time in the characteristics table below:

Dynamic Braking Characteristics			
Dynamic Braking	**Starting Current (A)**	**Braking Time (s)**	**Braking Current (A)**
Minimum current setting	0.37	3 Sec	1.75
Maximum current setting	1.36	5 Sec	2.14

2.3.3 Adjust the setting of the dynamic braking unit to the maximum current setting, and then repeat the characteristic tests by starting and stopping the motor, recording your measured values in the table above.

	Feedback: Have your teacher/trainer check your work	Teacher/Trainer Initials and Date	✓

2.3.7 Disconnect the circuit from the supply, disassemble circuit components and return equipment to their correct storage areas.

3. Completing the Skills Practice

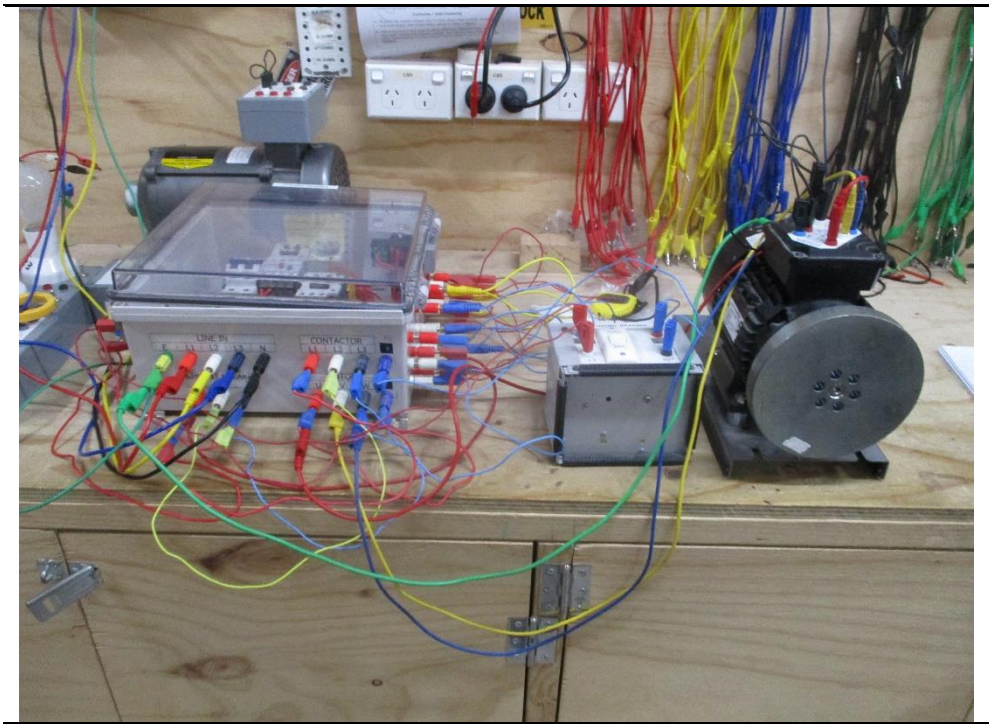
Return all tools and equipment to their correct places and clean the work area.

Topic Skills Practice 10.3

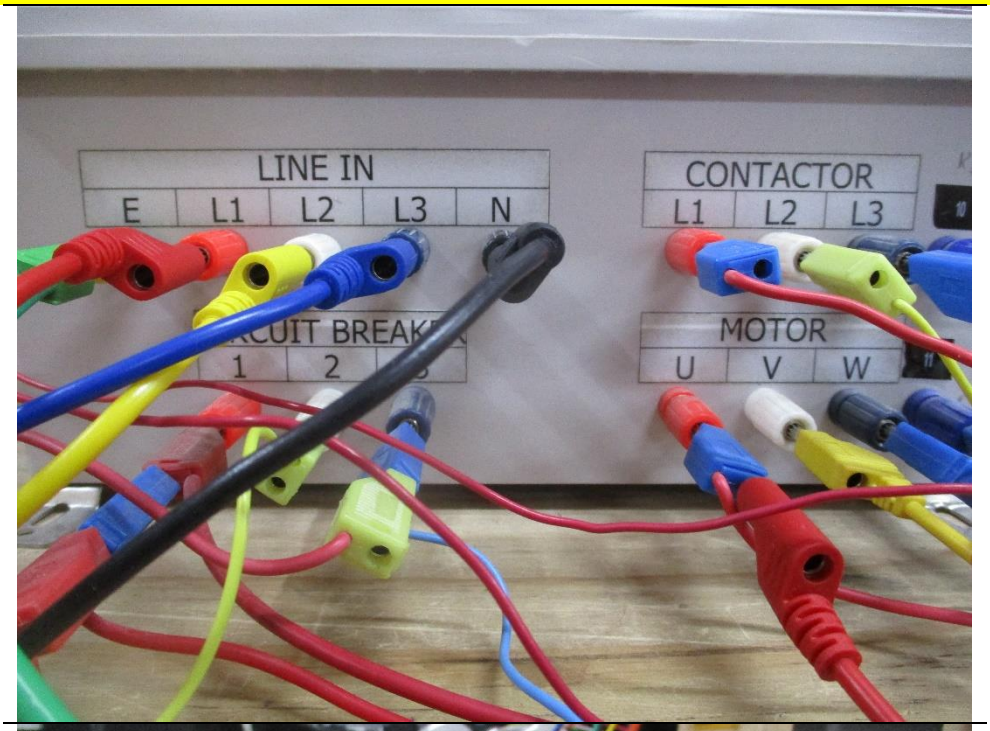
Answer the following questions using your results and observations from the skills practice.

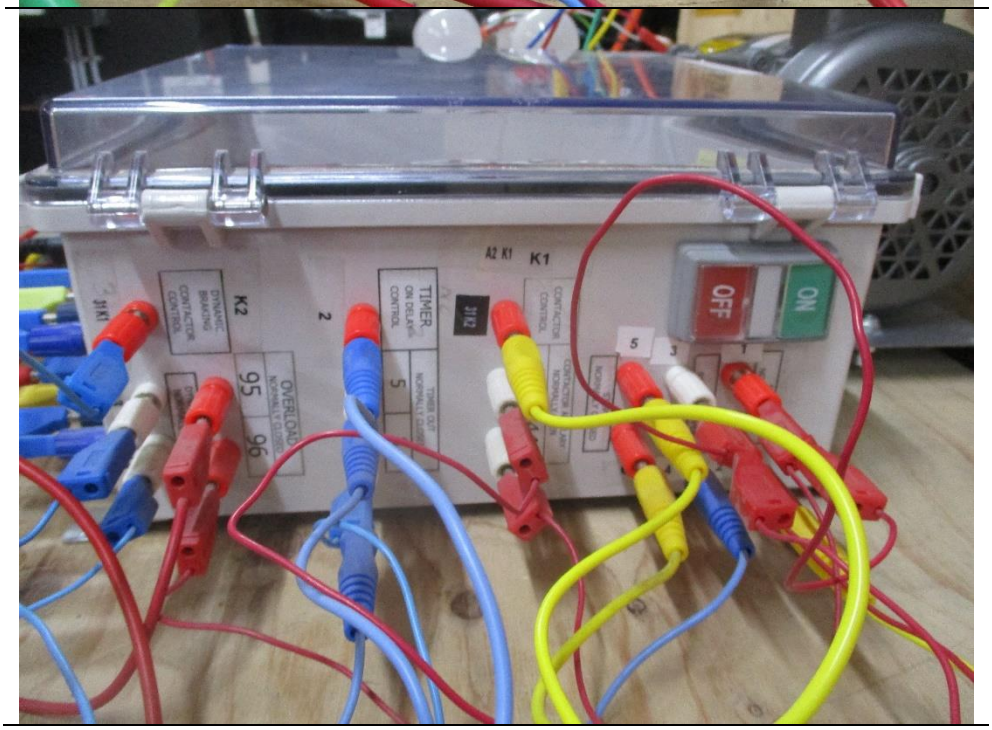
1. Explain the effects of increasing the d.c. current on braking time in dynamic braking.

Dynamic braking is achieved by disconnecting the ac supply and connecting a dc supply across the stator winding. The dc supply sets up a stationary magnetic field in the stator, slowing the motor causing it to stop immediately.

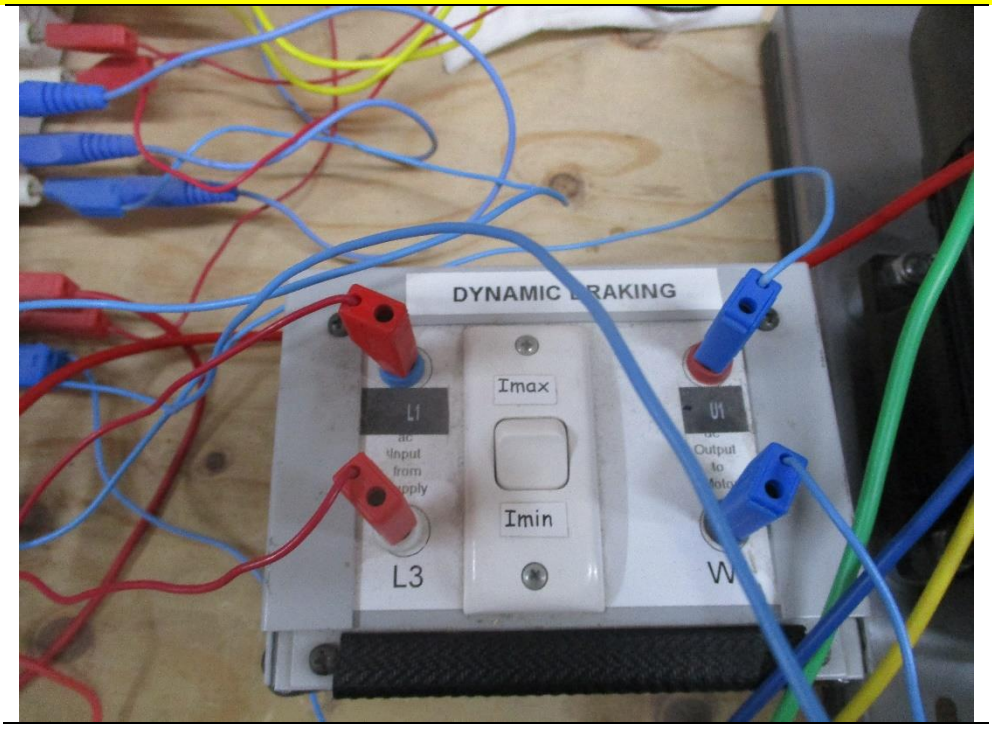


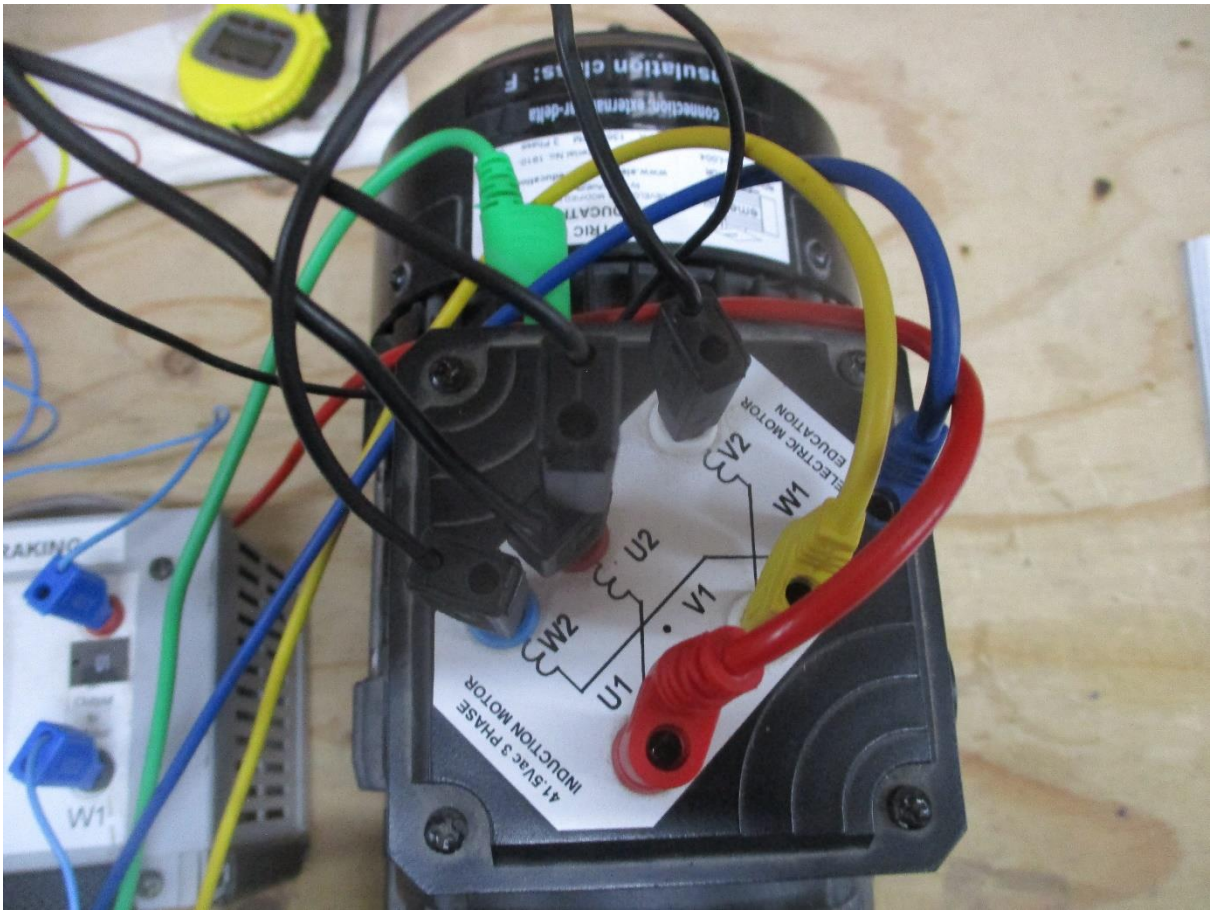
Topic Skills Practice 10.3

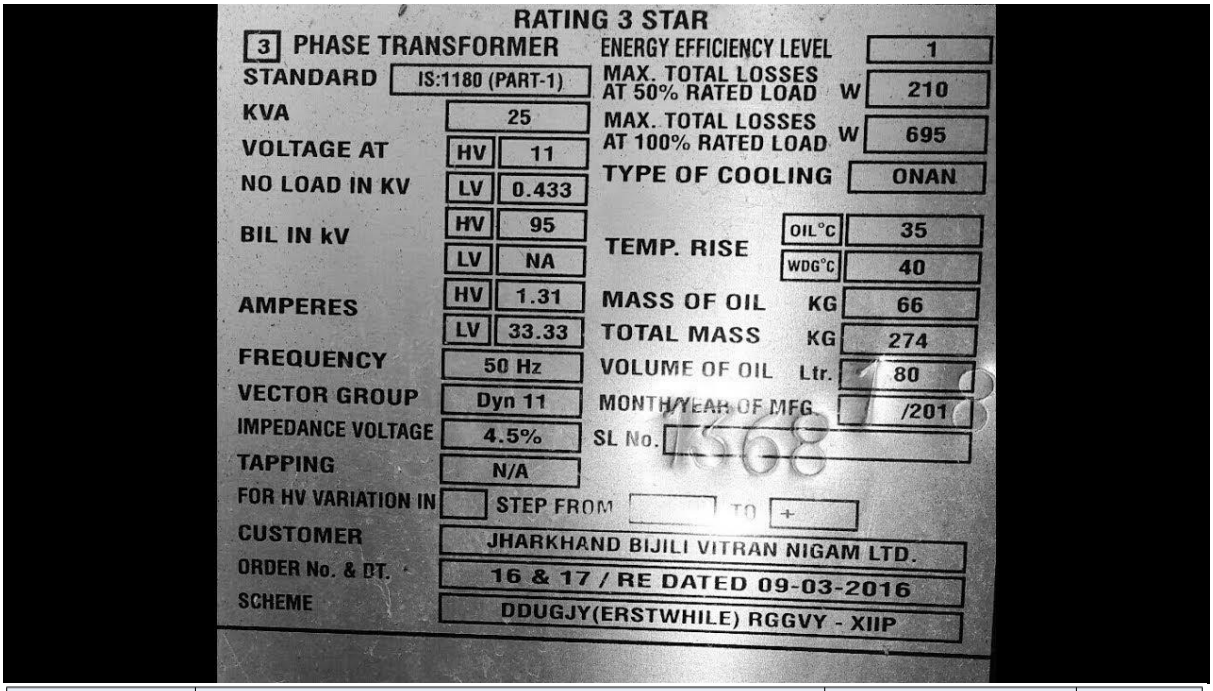




Topic Skills Practice 10.3







	Have your teacher/trainer check your work *Feedback*	Teacher/Trainer Initials and Date	✓

	Have your teacher/trainer check your work *Feedback*	Teacher/Trainer Initials and Date	✓

Topic Skills Practice Cover Sheet

Unit Name:	UEEEL0021 Solve problems in magnetic and electromagnetic devices
Topic Title:	Magnetism

Skill Practice Number:	1.3
Skill Practice Name:	Magnetic fields of permanent magnets and screening

Student Name:	

Topic Skills Practice Cover Sheet

Student ID:	
College/Campus:	
Group:	

Results	
Planning:	
Carryout:	
Completion:	
Overall Results:	
Comments:	

Topic Skills Practice 1.3

UEEEL0021 Solve problems in magnetic and electromagnetic devices
Topic 1. Magnetism
Skills Practice 1.3: Magnetic fields of permanent magnets and screening

Task:
To observe and skh the magnetic field patterns when bar magnets are positioned near each other in different configurations. Also to examine the effect of placing different types of metal within the area of the magnetic fields created by bar magnets.

Objectives:
At the completion of this skills practice, you should be able to:

- Skh the pattern of the magnetic field that surrounds permanent magnets.
- Demonstrate the effect on a magnetic field produced by a single magnet by a piece of demagnetised magnetic material placed in the field.

Topic Skills Practice 1.3

- Demonstrate how regions can be isolated from the influence of adjacent magnets by surrounding the region with a low reluctance path.
- Demonstrate the effect of the flux distribution of magnetic fields by the insertion of magnetic and non-magnetic substances.
- Demonstrate the screening, or shielding, of areas in magnetic fields by appropriately placed low reluctance materials.

1. Planning the Skills Practice

1.1 Equipment

- Bar magnets (3)
- Horseshoe magnet
- Magnetic compass

1.2 Suggested Materials

- Piece of mild steel of similar dimensions as the magnets.
- Piece of brass of similar dimensions to the magnets.
- Mild steel ring
- Brass ring
- Several sheets of cardboard or heavy paper.
- A quantity of iron filings.

1.3 Miscellaneous Items

Note: suggested specification for brass and steel rings:

- same height as the magnets
- outside diameter approximately 30 mm
- inside diameter approximately 5 mm

1.4 Risk Assessment

Risk assessment procedure:

- Identify any hazards that may exist with this skills practice below
- List the supervision level you will be working under - Direct (D), General (G) or Broad (B)
- List the risk classification – High Risk (H), Medium Risk (M) or Low Risk (L)
- List the control measures required for each identified hazard that you need to implement.

Hazard/s Identified	Supervision Level (D, G or B)	Risk Classification (H, M or L)	Control Measure/s
Entry of iron fillings in to cage	G	M	Wash the hand after handling of iron filling
Inhale the iron fillings	B	M	Not to use them too close to nose

Topic Skills Practice 1.3

Feedback

Have your teacher/trainer check your risk assessment

Teacher/Trainer Initials and Date

2. Carrying Out the Skills Practice

2.1 Permanent Magnet Field Patterns

2.1.1 Cover each arrangement of the magnets shown in Figures 1.1 to 1.6 with a piece of cardboard/paper (or clear perspex sheet). Sprinkle the iron filings evenly and lightly over the cardboard/paper and gently tap the cardboard/paper until the filings form a pattern.

2.1.2 For each arrangement, neatly skh the respective patterns that represent the magnetic field as illustrated by the iron filings. Also indicate the direction of the magnetic lines of force on each diagram (use the standard convention).

Topic Skills Practice 1.3

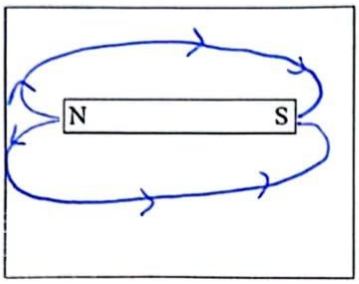


Figure 1.1

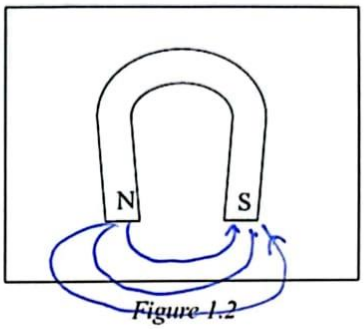


Figure 1.2

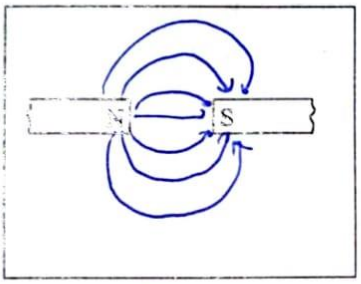


Figure 1.3

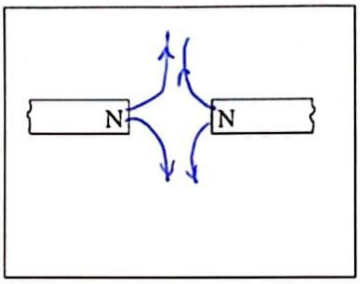


Figure 1.4

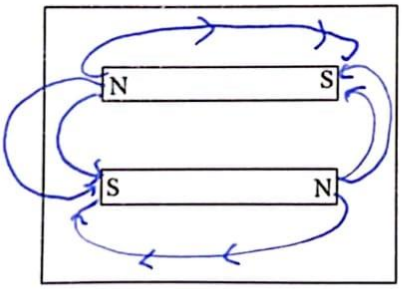


Figure 1.5

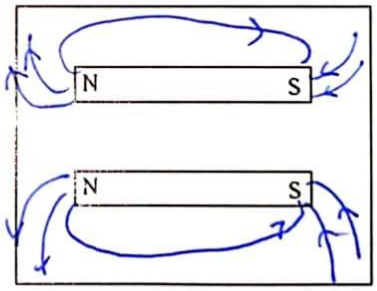
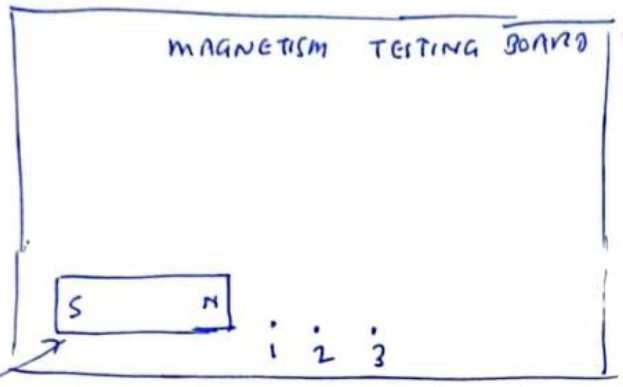


Figure 1.6

	 *Feedback* Have your teacher/trainer check your work	Teacher/Trainer Initials and Date	✓

PRACTICAL (1)



POSITION TO PLACE THE MAGNET

(1) Place the nail at position 3

Observation - Attract, Not attract

(2) Place the nail at position 2

observation - Attract, Not attract

(3) Place the nail at position 3

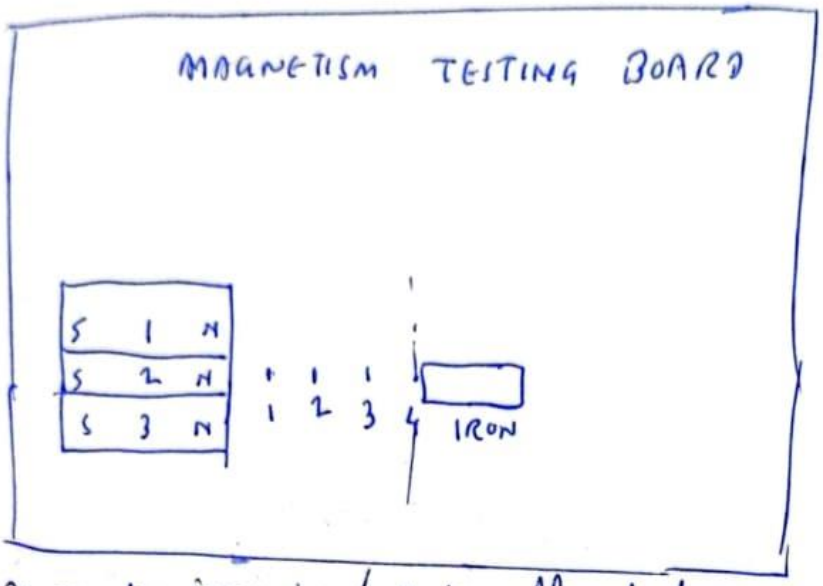
Observation - Attract, Not attract

Remark: The closer to the magnetic, the magnetic force is (a) stronger (b) weaker

Place the another magnet North pole and Repeat step 1 → 3

Place the another magnet South pole and Repeat step 1 → 3

PRACTICAL (2)



Place the iron bar/nail at the allocated position

Put magnet 1, observation - Attract / Not attract

Put magnet 1+2, observation - Attract / Not attract

Put magnet 1+2+3, observation - Attract / Not attract

Remark

The more the magnet bars, the magnetic force is (a) stronger (b) weaker.

- Sketch the magnetic flux diagrams

- The above two practicals can be substituted for magnetic flux observation practicals depending on availability of equipment.

2.2 Magnets Configurations

2.2.1 Arrange the two magnets in Figure 1.7, placing a piece of cardboard/paper (or clear perspex sheet) on top of the arrangement. Sprinkle the iron filings evenly and lightly over the cardboard/paper and gently tap the cardboard/paper until the filings form a pattern.

2.2.2 Neatly skh the respective patterns that represent the magnetic field as illustrated by the iron filings on the diagram (1.7). Also indicate the direction of the magnetic lines of force on each diagram (use the standard convention).

2.2.3 Repeat steps 1 and 2 for the three magnet configuration in Figure 1.8 and 1.9 and the magnet and brass bar and steel bar shown in Figure 1.10.

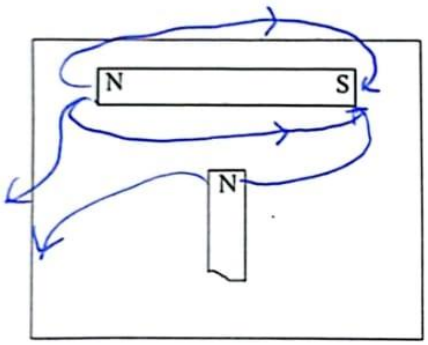


Figure 1.7

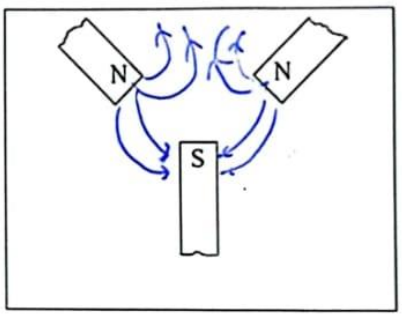


Figure 1.8

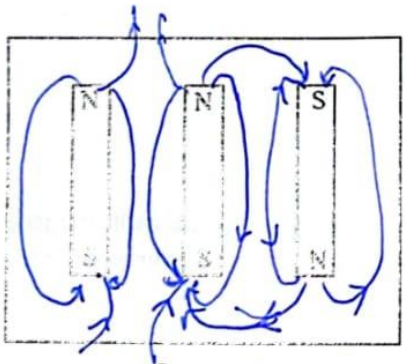


Figure 1.9

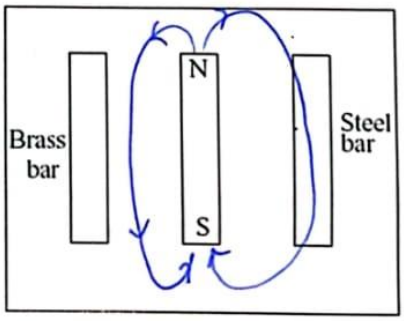


Figure 1.10

	Feedback Have your teacher/trainer check your work	Teacher/Trainer Initials and Date	✓

2.3 Magnetic Screening

2.3.1 Arrange the two magnets and the mild steel ring as shown in Figure 1.11, placing a piece of cardboard/paper (or clear perspex sheet) on top of the arrangement. Sprinkle the iron filings evenly and lightly over the cardboard/paper and gently tap the cardboard/paper until the filings form a pattern.

2.3.2 Neatly skh the respective patterns that represent the magnetic field as illustrated by the iron filings on the diagram (1.11). Also indicate the direction of the magnetic lines of force on each diagram (use the standard convention).

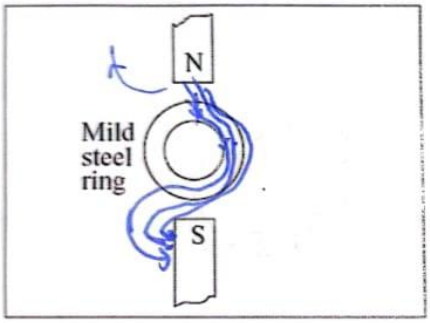


Figure 1.11

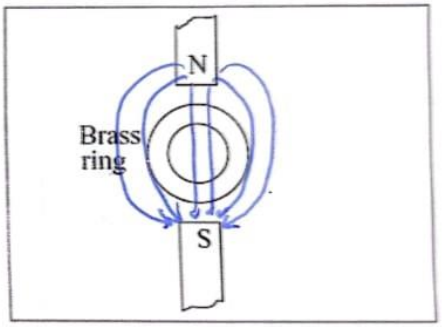


Figure 1.12

2.3.3 Arrange the two magnets and the brass ring as shown in Figure 1.12, placing a piece of cardboard/paper (or clear perspex sheet) on top of the arrangement. Sprinkle the iron filings evenly and lightly over the cardboard/paper and gently tap the cardboard/paper until the filings form a pattern.

2.3.4 Neatly skh the respective patterns that represent the magnetic field as illustrated by the iron filings on the diagram (1.12). Also indicate the direction of the magnetic lines of force on each diagram (use the standard convention).

	Have your teacher/trainer check your work ***Feedback***	**Teacher/Trainer Initials and Date**	✓

3. Completing the Skills Practice

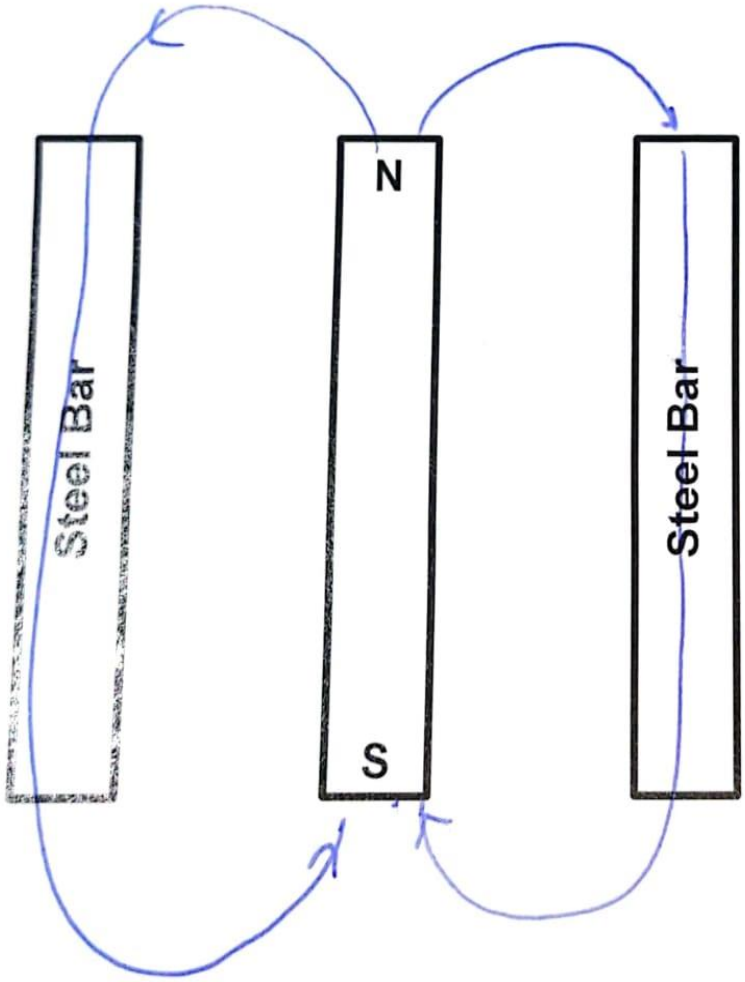
3.1 Skills Practice Review Questions

3.1.1 Return all tools and equipment to their correct places and clean the work area. Answer the following questions using your results and observations from the skills practice.

1. Explain why the iron filings formed different patterns for each of the combinations of Figure 1.1 to 1.10.

Due to repulsion and attraction behavior of magnetic Poles, the flux Lines were formed.
and the diagrams will be in different Patterns.

2. Draw the filed pattern of Figure 1.10 when the brass bar was replaced with another steel bar.



3. Explain why the field patterns of Figure 1.11 and 1.12 are different when the rings are the same dimensions and the magnets are in the same locations.

Brass ring is not magnetic material. It cannot be impacted by magnetic field. The magnetic fluxes passing around it will not be effected. But mild steel ring is magnetic material and it can be charged with magnetic field. The induced magnetism in it will interact with original magnetic fluxes.

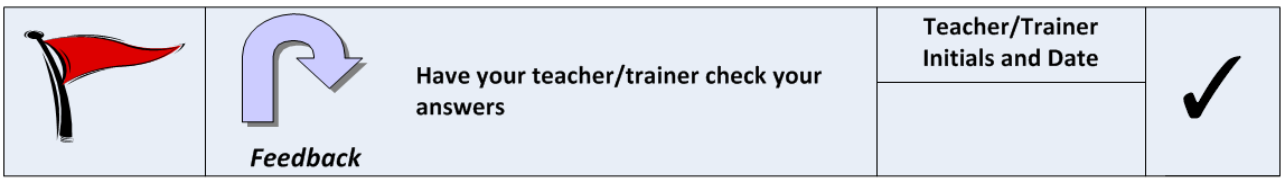
4. State in your own words what is meant by the term “screening” or “shielding”.

Magnetic Screening | Shielding is a phenomenon of protection of a region against any external magnetic effects. for example, when a soft iron ring is placed in a magnetic field, most of the lines are found to pass through the ring and no lines pass through the space inside the

ring.

5. List some practical applications of magnetic shielding.

Electric and hybrid Automobiles. Energy meters medical devices, safety devices.
To protect an equipment from magnetic field.



Topic Skills Practice Cover Sheet

Unit Name:	UEEEL0047 Identify, shut down and restart systems with alternate supplies
Topic Title:	Photovoltaic (PV) Systems

Skill Practice Number:	3.2
Skill Practice Name:	Apply PV System Standards

Student Name:	
Student ID:	
College/Campus:	
Group:	

Results

Topic Skills Practice Cover Sheet

Planning:	
Carryout:	
Completion:	
Overall Results:	
Comments:	

Topic Skills Practice 3.2

UEEEL0047 Identify, shut down and restart systems with alternate supplies
Topic 3. Photovoltaic (PV) Systems
Skills Practice 3.2: Apply PV System Standards

Task:
Your task is to identify PV system arrangements, and apply AS/NZS 5033 requirements for low voltage PV systems.

Objectives:
At the completion of this skills practice, you should be able to:

- Navigate the Wiring Rules and AS/NZS 5033.
- Identify compliant arrangements for the connection of a PV system as an alternative supply.
- Identify Wiring Rules and AS/NZS 5033 requirements for PV systems.

Topic Skills Practice Cover Sheet

Unit Name:	UEERE0001 Apply environmentally and sustainable procedures in the energy sector

Topic Skills Practice 3.2

Topic Title:	Reduction of Carbon-Based Energy Sources

Skill Practice Number:	2.1
Skill Practice Name:	Energy Audit

Student Name	
Student №	
College/Campus	Electrical Trades College — Revesby

Results	
Planning:	
Carryout:	
Completion:	
Overall Results:	
Comments:	

Topic Skills Practice 3.2

Topic Skills Practice 2.1

UEERE0001 Apply environmentally and sustainable procedures in the energy sector

Topic 2. Reduction of Carbon-Based Energy Sources

Skills Practice 2.1: Energy Audit

Task:

To carry out an audit on the energy usage at a given workplace, and to identify methods to reduce reliance on carbon-based energy.

*This audit may be carried out on the learner's actual workplace or on the RTO premises.

Topic Skills Practice 3.2

Objectives:

At the completion of this skills practice, you should be able to:

- identify sources and applications of energy.
- identify opportunities for reducing reliance on carbon-based energy.
- document and report suggestions for improvement.

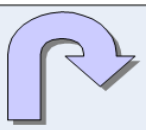
1. Planning the Skills Practice		
1.1 Equipment	**1.2 Suggested Materials**	**1.3 Miscellaneous Items**
• workplace installation / scenario (e.g., rto)	• calculator	• ppe • pens / pencils
1.4 Risk Assessment		

Topic Skills Practice 3.2

Risk assessment procedure:

- identify any hazards that may exist with this skills practice below
- list the supervision level you will be working under - Direct (D), General (G) or Broad (B)
- list the risk classification – High Risk (H), Medium Risk (M) or Low Risk (L)
- list the control measures required for each identified hazard that you need to implement.

hazard/s identified	supervision level (D, G or B)	risk classification (H, M or L)	control measure/s
Energized terminal in workshop	G	M	Follow teacher's instruction
Switch boards under construction in workshop	G	M	Do not touch any equipment in workshop. without teacher's instruction.



Feedback

Have your teacher/trainer check your risk assessment

Teacher/Trainer Initials and Date

2. Carrying Out the Skills Practice

Topic Skills Practice 3.2

2.1 Sustainable Practices Audit

2.1.1 Your teacher/trainer will provide you with information on the workplace to conduct the audit on. Carry out the audit using the following checklist.

№	Questions	Yes	No	N/A	Comments
1	Does the workplace have a policy or plan committing to a reduction in carbon-based energy usage?	☑	□	□	
2	Has the workplace had an energy audit conducted for water, electricity or gas?	☑	□	□	
3	Does the workplace have any strategies in place to reduce their '*peak demand*'?	☑	□	□	
4	Has the workplace been retrofitted with energy efficient appliances?	☑	□	□	Energy efficient monitors are found
5	Is the workplace utilizing energy from any renewable sources?	☑	□	□	Sum energy is effectively used far lighting by using sun light glasses.
6	Are people in the workplace aware of the energy consumption of tools and equipment they use?	☑	□	□	
7	Do people in the workplace turn off, not just log off, all computers, terminals, speakers and other office equipment at the end of every day?	☑	□	□	
8	Does the workplace have LED exit signs installed?	☑	□	□	
9	Does the workplace use motions sensors to activate light fixtures in storage rooms, bathrooms, and other rooms that are vacant for long periods of time?	☑	□	□	
10	Does the workplace turn off lights when not in use and use natural light when possible?	☑	□	□	

1. Planning the Skills Practice

1.1 Research Generator Requirements

1.1.1 Research the requirements of AS/NZS 5033:2021 and the Wiring Rules as they apply to the selection, arrangement and installation of PV systems as an alternative supply within an installation.

The following reference material will include some useful information:

- Energy Space content pages 3.1 and 3.2
- Pethebridge, K. and Neeson, I., Electrical Wiring Practice, McGraw-Hill
- Hampson, J., Hanssen, S., Electrotechnology Practice, Pearson Education

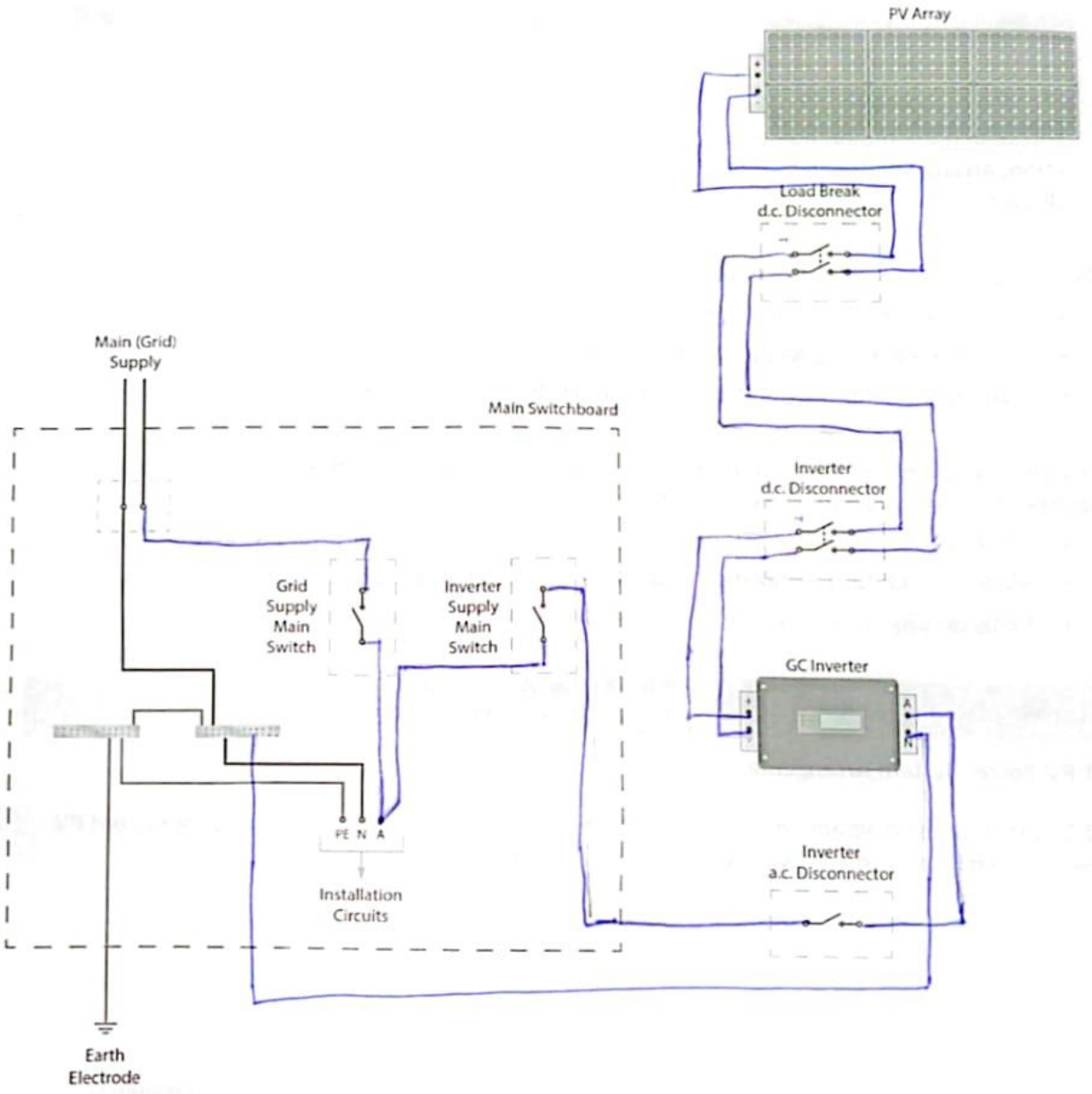
1.1.2 Once you feel you have sufficient knowledge of the subject matter, obtain the following materials to assist you with carrying out this skills practice:

- AS/NZS 3000:2018 Wiring Rules
- AS/NZS 5033:2021 Installation and safety requirements for photovoltaic (PV) arrays
- Pens/pencils

2. Carrying Out the Skills Practice

2.1 PV Power System Arrangements

2.2.1 Complete the diagram below to show the necessary connections for the grid connected PV power system in accordance with AS/NZS 5033:2021 and the Wiring Rules:



	Feedback **Have your teacher/trainer check your work**	**Teacher/Trainer Initials and Date**	✓

3. Completing the Skills Practice

3.1 Skills Practice Review Questions

3.1.1 Finalise your work and then use AS/NZS 5033:2021 and/or the Wiring Rules to answer the following questions.

6. What are the requirements for protection of cables running between the array and inverter of a grid-connected PV system?

   Provide relevant AS/NZS 5033:2021 clause(s) to support your answer.

AS 5033 / 2.4.5 PV Array cables of the systems connected to batteries shall be protected
with fault current protection devices.

7. What are the requirements for identification of PV system cabling?

   Provide relevant AS/NZS 5033:2021 clause(s) to support your answer.

AS 5033 / 3.5 where PV Array cabling could be confused with other wiring systems, appropriate identification shall be provided at regular intervals.
{ Typically identification should not be more than 3m apart.)

8. What is the minimum IP rating for grid-connected PV system components installed outdoors?

   Provide relevant AS/NZS 5033:2021 clause(s) to support your answer.

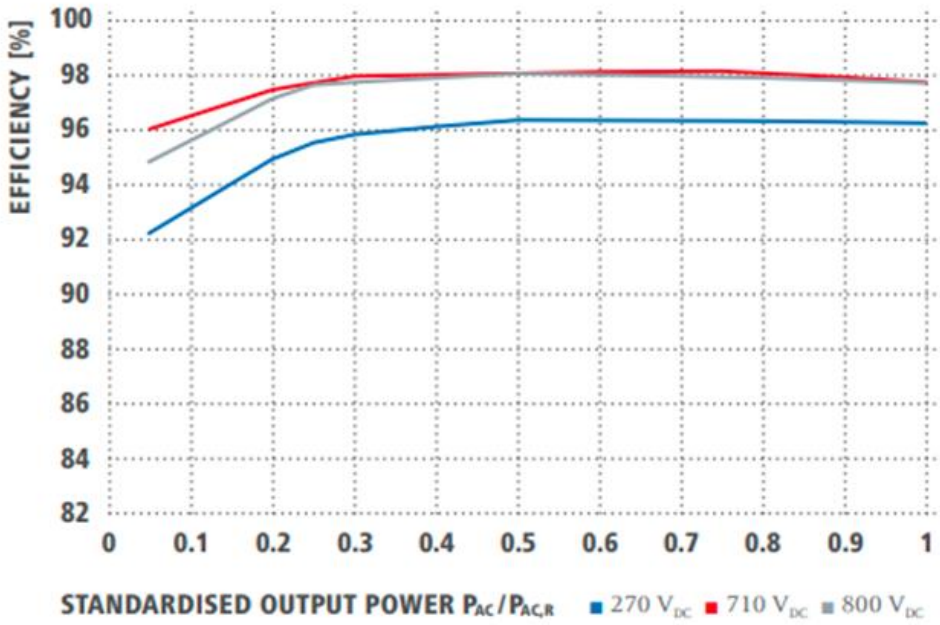
4.2.1 PV Array and PV sub array junction box exposed to the environment shall be at least
IP54 compliant in accordance with AS 60529 and shall be UV resistant.

9. What is the maximum array voltage for a domestic grid-connected PV system?

   Provide relevant AS/NZS 5033:2021 clause(s) to support your answer.

AS 5033 / 1.4.2.8 The PV array voltage shall be considered to be equal to Voc array
3.2 Voc array shall not be exceed the maximum allowed operating voltage of the PV modules
(as specified by manufacturer)

https://youtu.be/i5GsQpFkotU?si=TJbZXZCjtpqZvZaQ



Inverter Operating Characteristics

Load	DC Input Voltage	DC Input Current	AC Output Voltage	AC Output Current	Efficiency
No Load	22	4	28	0	0
1	22	4	27	3	92%
2	22	4	23.8	3.5	95%
3	22	4	22.8	3.7	96%

Check out "ScanTheSun"

https://play.google.com/store/apps/details?id=com.scanthesun

solar irradiance app - Google Search

SOLAR RADIATION METER (ORJA)

https://www.google.com/search?q=solar+irradiance+app&oq=&gs_lcrp=EgZjaHJvbWUqCQgAECMYJxjqAjIJCAAQIxgnGOoCMgkIARAjGCcY6gIyCQgCECMYJxjqAjIJCAMQIxgnGOoCMgkIBBAjGCcY6gIyCQgFECMYJxjqAjIJCAYQIxgnGOoCMgkIBxAjGCcY6gIyCQgIECMYJxjqAjIJCAkQIxgnGOoCMgkIChAjGCcY6gIyCQgLECMYJxjqAjIJCAwQIxgnGOoCMgkIDRAjGCcY6gIyCQgOECMYJxjqAjIRCA8QABgDGEIYjwEYtAIY6gIyDwgQEC4YAxiPARi0AhjqAjIRCBEQABgDGEIYjwEYtAIY6gIyDwgSEC4YAxiPARi0AhjqAjIPCBMQLhgDGI8BGLQCGOoC0gEGLTFqMGo3qAIUsAIB&client=ms-android-vf-au-revc&sourceid=chrome-mobile&ie=UTF-8

Solar Panel Tilt Angle Calculator

https://footprinthero.com/solar-panel-tilt-angle-calculator

NOTES

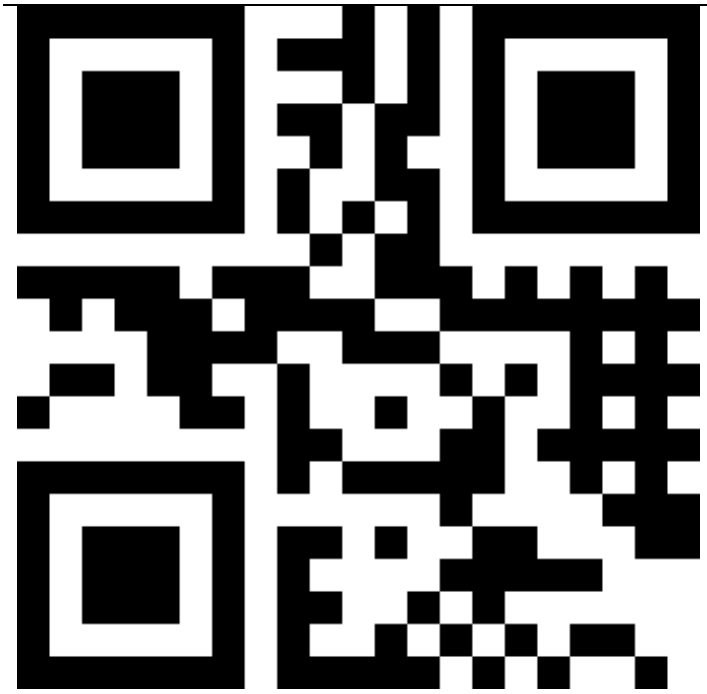
UERE0022

Metrology

http://www.bom.gov.au

Latitude

www.latlong.net



Topic Skills Practice Cover Sheet

Unit Name:	UEEEL0019 Solve problems in direct current (d.c.) machines
Topic Title:	Rotating machine construction, testing and maintenance

Skill Practice Number:	1.2
Skill Practice Name:	Testing a d.c. compound motor

Student Name:	
Student ID:	
College/Campus:	
Group:	

Results	
Planning:	
Carryout:	
Completion:	
Overall Results:	
Comments:	

KE-UEEEL0019Knowledge Evidence

Topic 1: Rotating machine construction, testing and

maintenanceSkills Practice 1.2: Testing a d.c. compound motor

Task:

To identify the various components of a d.c. compound machine and to carryout basic testing of a d.c.compound motor.

Objectives:

At the completion of this skills practice, you should be able to:

- Record the nameplate details of a d.c. compound motor
- Identify and skh the major components of a d.c. compound motor
- identify leads on a d.c. compound motor windings
- Test a d.c. compound motor for suitability for connection to the supply
- Determine if the motor is safe to connect to the supply.

1. Planning the Skills Practice

1.1 Equipment:	**1.2 Suggested Materials:**	**1.3 Miscellaneous Items:**
• d.c. power supply • d.c compound motor • multimeter • LCR meter • test lamps • basic hand tools	•	•

2.2 Risk Assessment

Risk assessment procedure:

2.2.1 Identify any hazards that may exist with this skills practice below

2.2.2 List the supervision level you will be working under - Direct (D), General (G) or Broad (B)

2.2.3 List the risk classification – High Risk (H), Medium Risk (M) or Low Risk (L)

2.2.4 List the control measures required for each identified hazard that you need to implement.

Hazard/s Identified	**Supervision Level (D, G or B)**	**Risk Classification (H, M or L)**	**Control Measure/s**
Hazard/s Identified	**Supervision Level (D, G or B)**	**Risk Classification (H, M or L)**	**Control Measure/s**
Dc motor must be taken out from supply	D	H	Measure to switch off & motor to be taken out
Inappropriate use of hand tools & hard injuries.	G	M	Appropriate tools, spanner plier to be provided.
Fall down of machine component on foot	G	M	Appropriate safety shoe to be worn

Untidy work bench can cause misuse of equipment	B	L	Work bench cleaniness tidy and housekeeping

Topic Skills Practice Cover Sheet

2. Carrying Out the Skills Practice

Procedures:

Part A – Motor nameplate details

3 Ensure the d.c. motor is disconnected from the supply.

4 Record the Nameplate details of the d.c. compound motor below:

Nameplate details			
The standard to which the machine is constructed			
Manufacturer's name	EMG	Manufacturer's reference number	71-0-B100
Output power	0.057 kw	Class of rating (continuous or short time)	Continuous
Voltage rating	ARM 24V Field 24V	Current	ARM 7 Amp Field 1.7 Amp
Speed at rated output	1600 RPM	Class of insulation	F
Type of machine	DC motor	Type of enclosure	TEFC

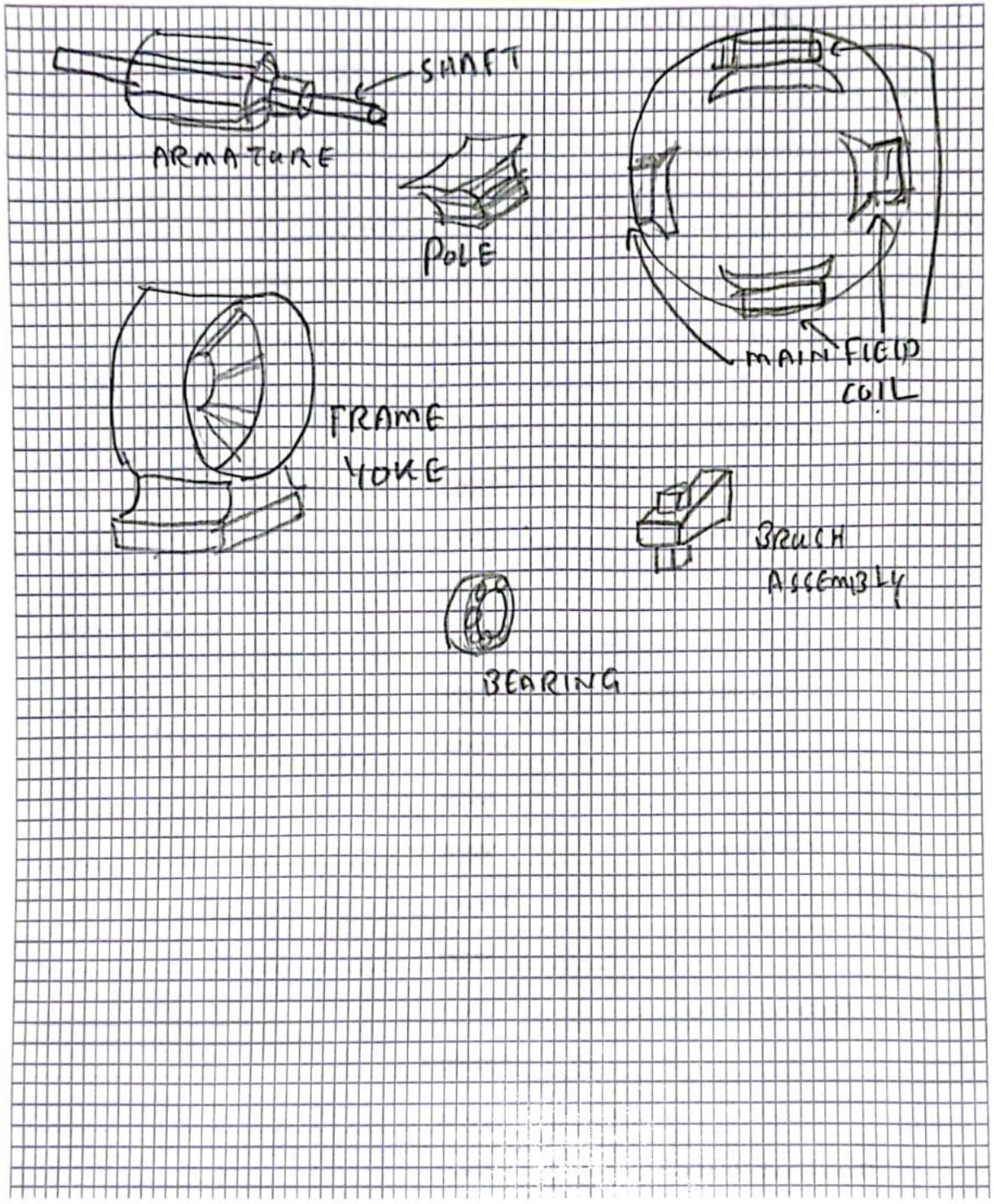
	Have your teacher/trainer check your answers are correct *Feedback*	Teacher/Trainer Initials and Date	√

Part B – Motor component identification

- Skh a diagram of the d.c. compound motor, identifying and labeling each major components:
  - armature - core and commutator,
  - pole core,
  - field coils,
  - frame/ yoke,
  - brush gear,
  - bearings,
  - shaft

- Identify the six leads of the compound motor by correctly marking each lead:
  - armature winding ($A_1 – A_2$)
  - series field and ($Se_1 – Se_2$)
  - shunt field ($Sh_1 – Sh_2$)

Topic Skills Practice Cover Sheet



	Have your teacher/trainer check your answers are correct ***Feedback***	**Teacher/Trainer Initials and Date**	√

Topic Skills Practice Cover Sheet

Part C – Electrical testing of motor winding

- With the motor disconnected, use an ohmmeter to measure the resistance of the series field, shuntfield and armature circuit. Record these values in Table 1.1.
- With the motor disconnected, use a LCR meter to measure the inductance of the series field, shuntfield and armature winding. Record these values in Table 1.1
- Test the motor for shorted coils and document your findings in Table 1.1.
- Test the motor for earth faults and document your findings in Table 1.1.
- Test the motor for open circuit field windings and document your findings in Table 1.1.

Table 1.1

Components	Windings	Measurements
Windings Resistance	**Series**	S_1-S_2 0.6 Ω S_1-S_3 0.9 Ω S_4-S_5 0.6 Ω S_4-S_6 0.9 Ω
	Shunt	15 Ω {f_1-f_4}
	Armature	0.8 Ω
0.9 HWindings Inductance	**Series**	S_1-S_3 4.4 mH S_5-S_6 0.9 mH S_1-S_2 0.91 S_2-S_3 0.925 S_4-S_5 0.899 mH S_4-S_6 4.31 mH
	Shunt	3.22 mH
	Armature	0
Shorted Windings	**Series**	0
	Shunt	0
	Armature	∞
Earthed Windings	**Series**	∞
	Shunt	∞
	Armature	∞
Open Circ		
	Armature	∞

	Have your teacher/trainer check your electrical measurements are correct *Feedback*	Teacher/Trainer Initials and Date	√

Topic Skills Practice Cover Sheet

3. Completing the Skills Practice

Return all tools and equipment to their correct places and clean the work area.
Answer the following questions using your results and observations from the skills practice.

1. Is the motor suitable for connecting to the supply?

The motor is suitable to connect the supply but it needs to make sure that the Voltage regulator must be set at Zero not at maximum to avoid the over voltage being applied to the motor.

2. If the motor is not suitable for connecting to the supply, why not

Suitable

3. What repairs are necessary to make the motor safe?

Motor shaft must not be jammed, motor commutators must be regularly cleaned to avoid sparking. Terminals must be clearly marked because series field winding with low resistance must not be connected in parallel to supply. If can burn the winding. Shunt field winding connection must be secured because any loosen connection will not produce the excitation magnetism.

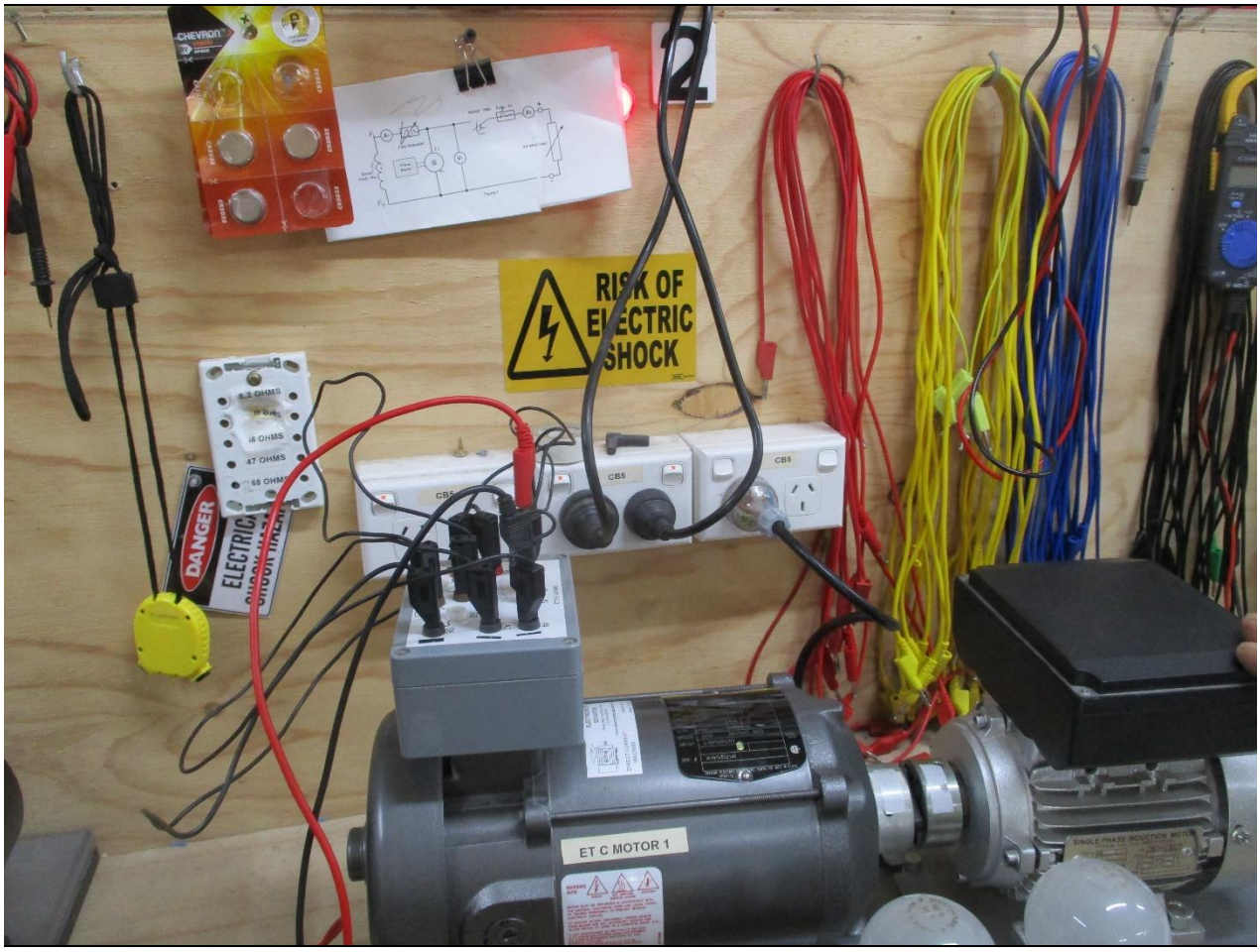
4. Explain the difference between the resistance values for the shunt and series fields.

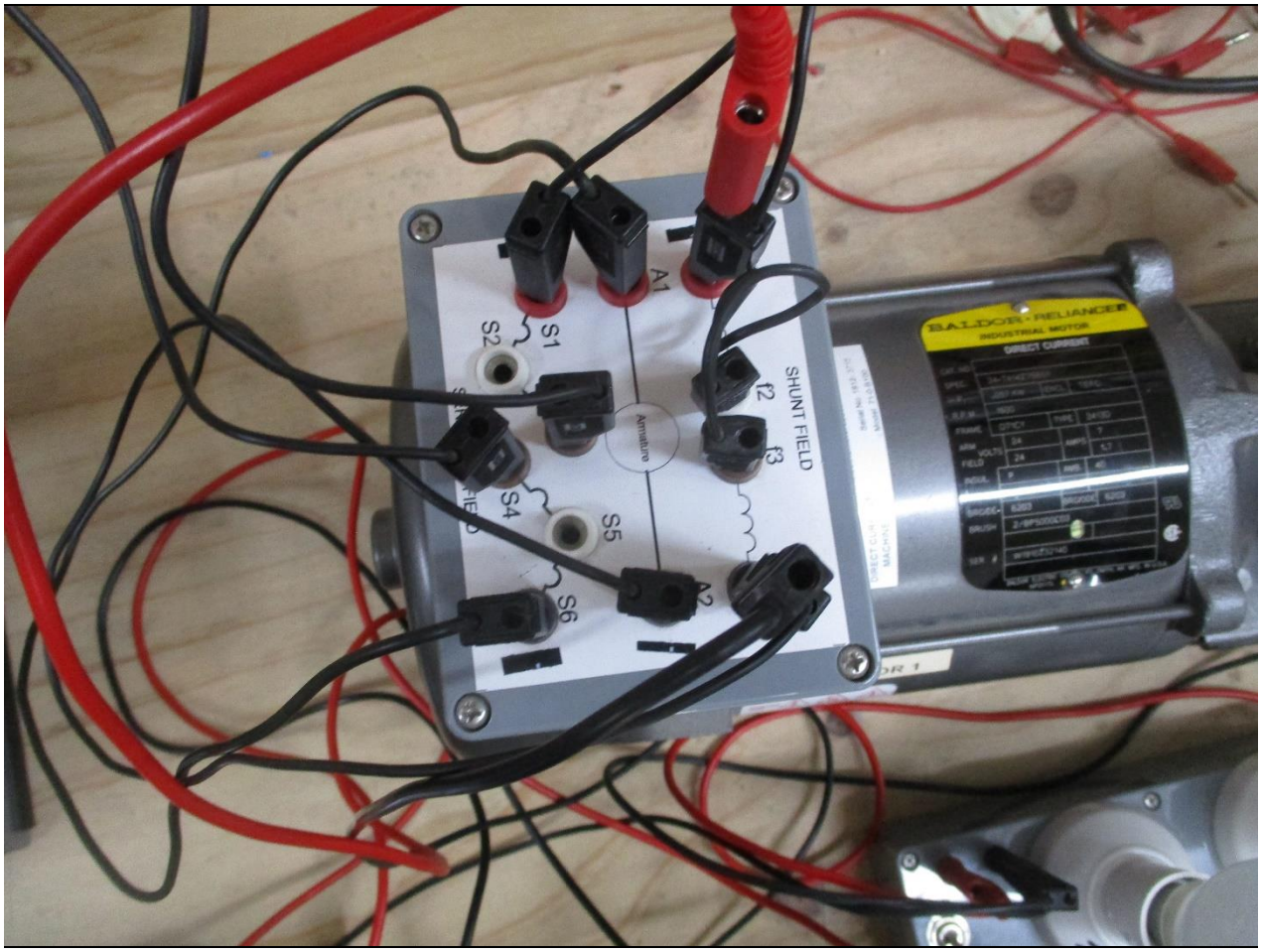
Series field resistance is much less than shunt field. In this motor it is 0.6 to 0.9Ω But shunt field has 15Ω resistance. The function of shunt field is to produce the appropriate magnetizing flux for operation but the function of series field is to provide supplementary magnetization to improve motor operation.

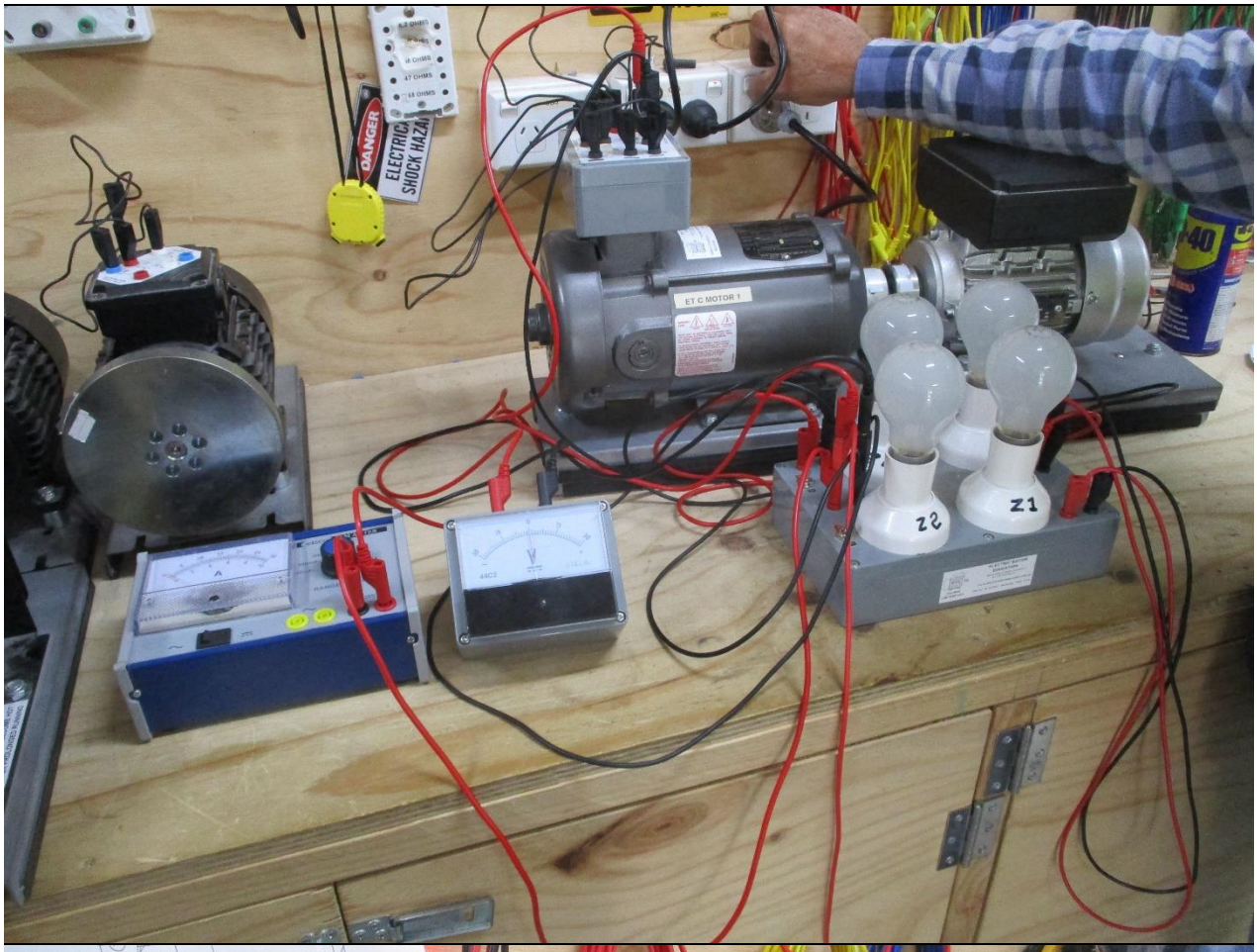
5. Explain the difference between the inductance values for the shunt and series fields.

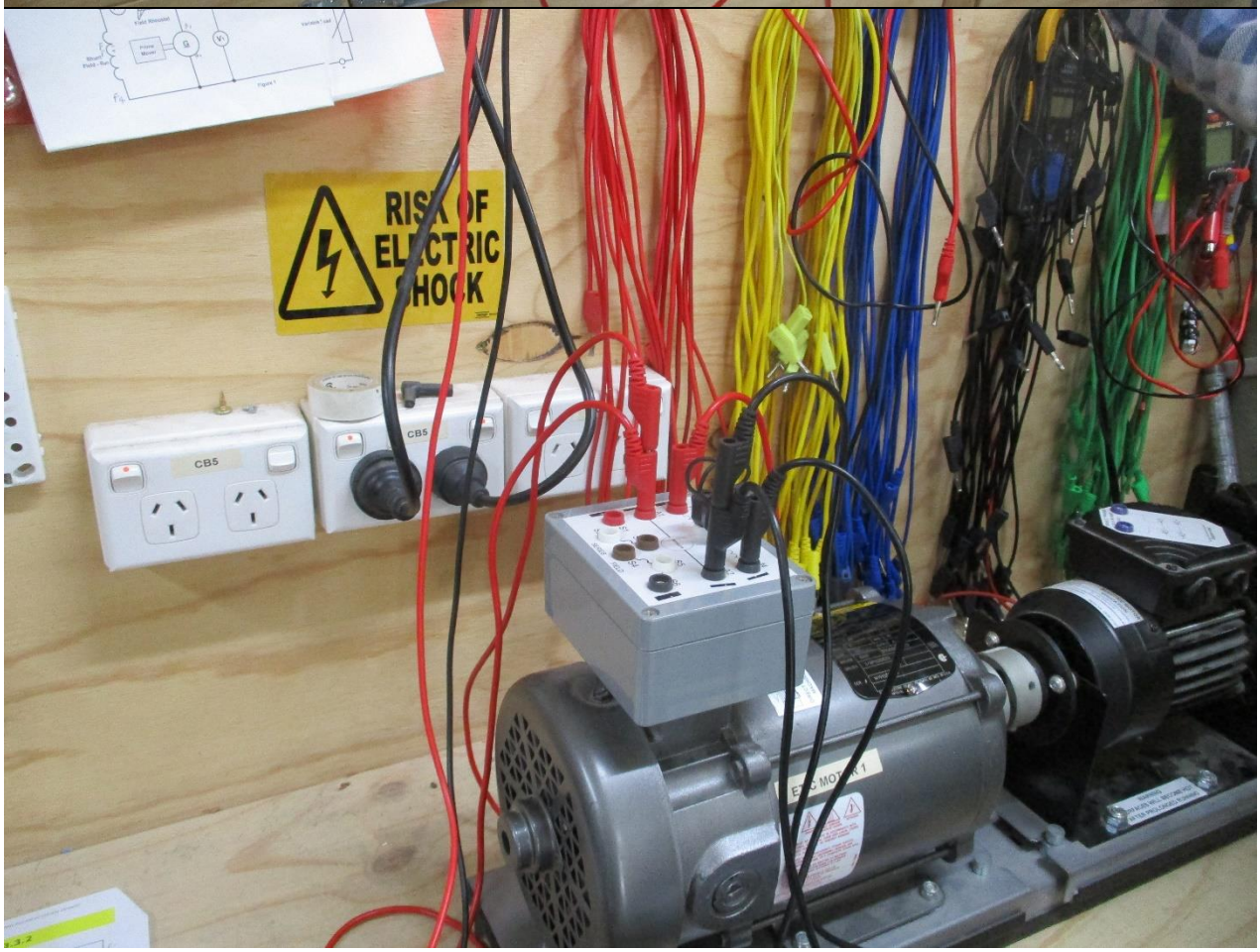
Shunt field $f_1 - f_4$ value is 0.498H but series field inductance is 0.9mH. Shunt field as more number of turns causing more inductance.

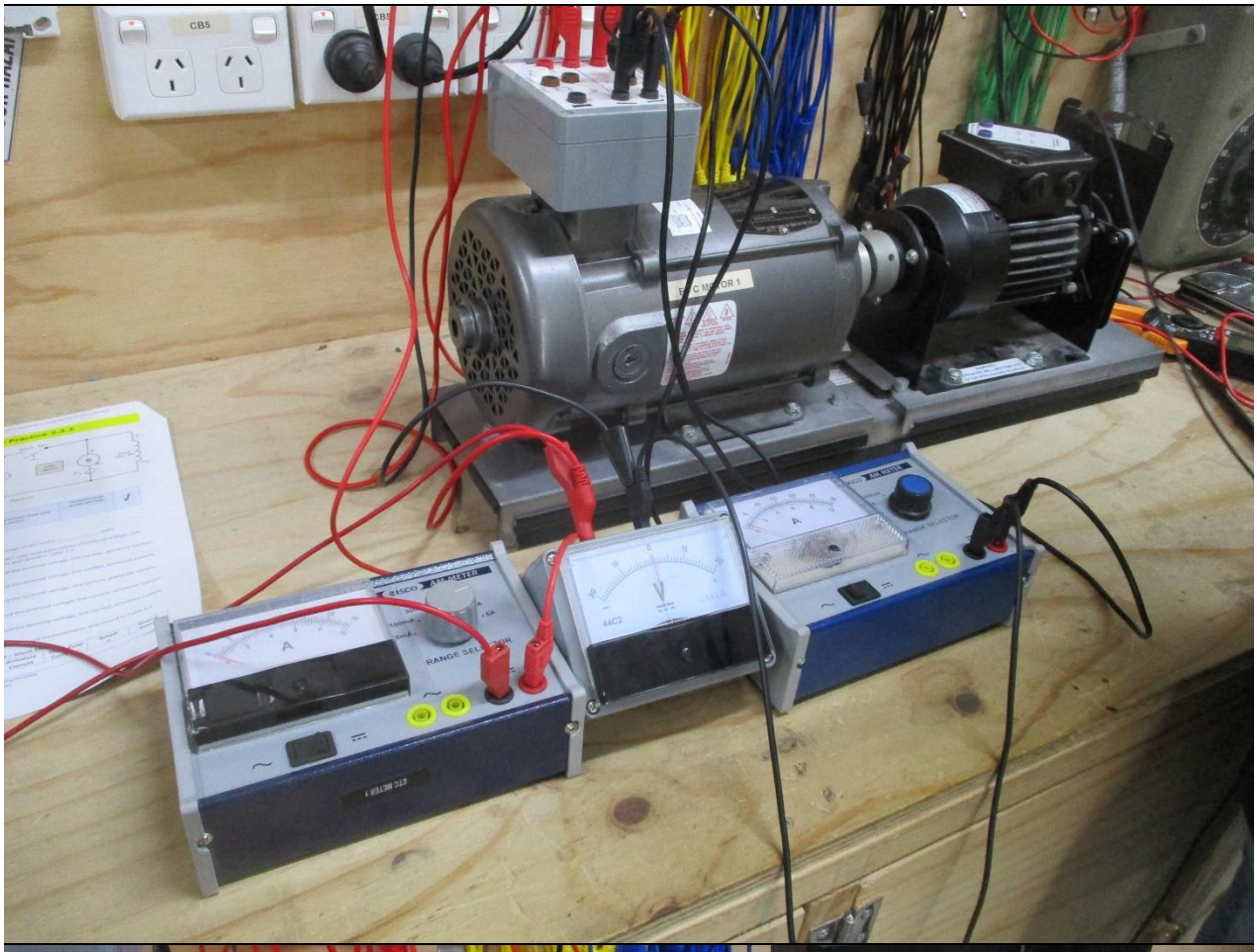
Topic Skills Practice Cover Sheet

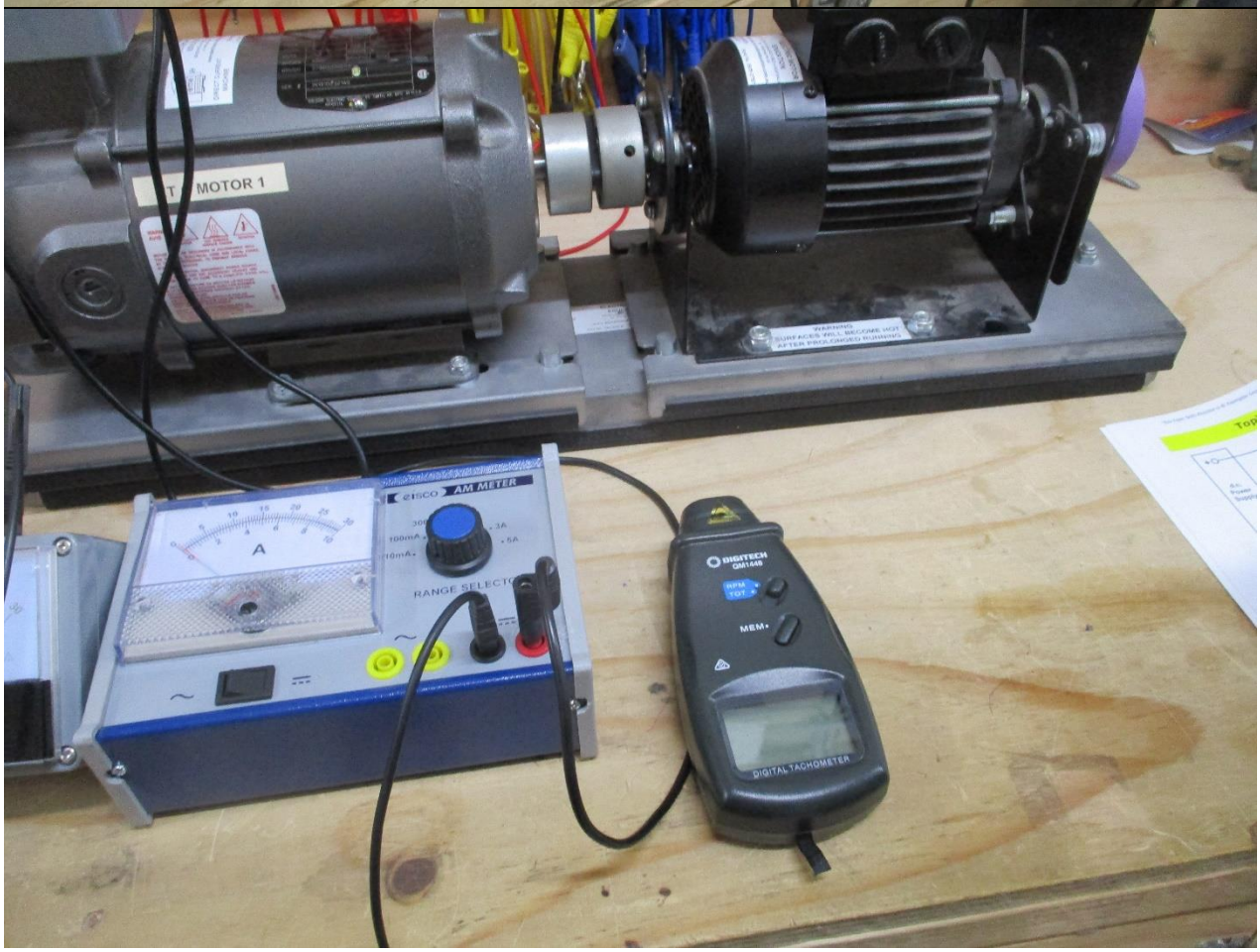


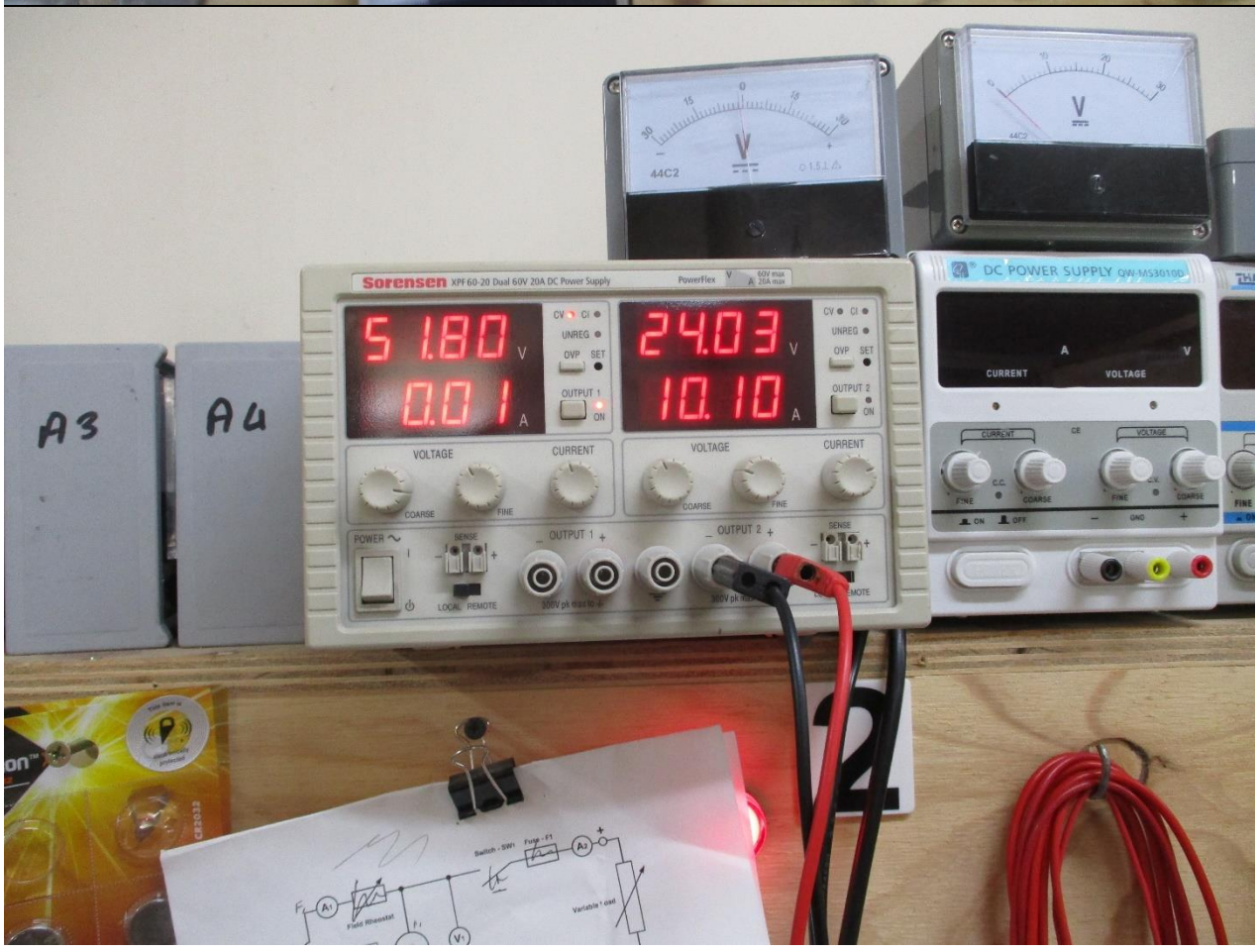

A1
S1
S2
SHUNT FIELD
f2
f3
Armature
S4
S5
S6
A2
BALDOR · RELIANCE
INDUSTRIAL MOTOR
DIRECT CURRENT

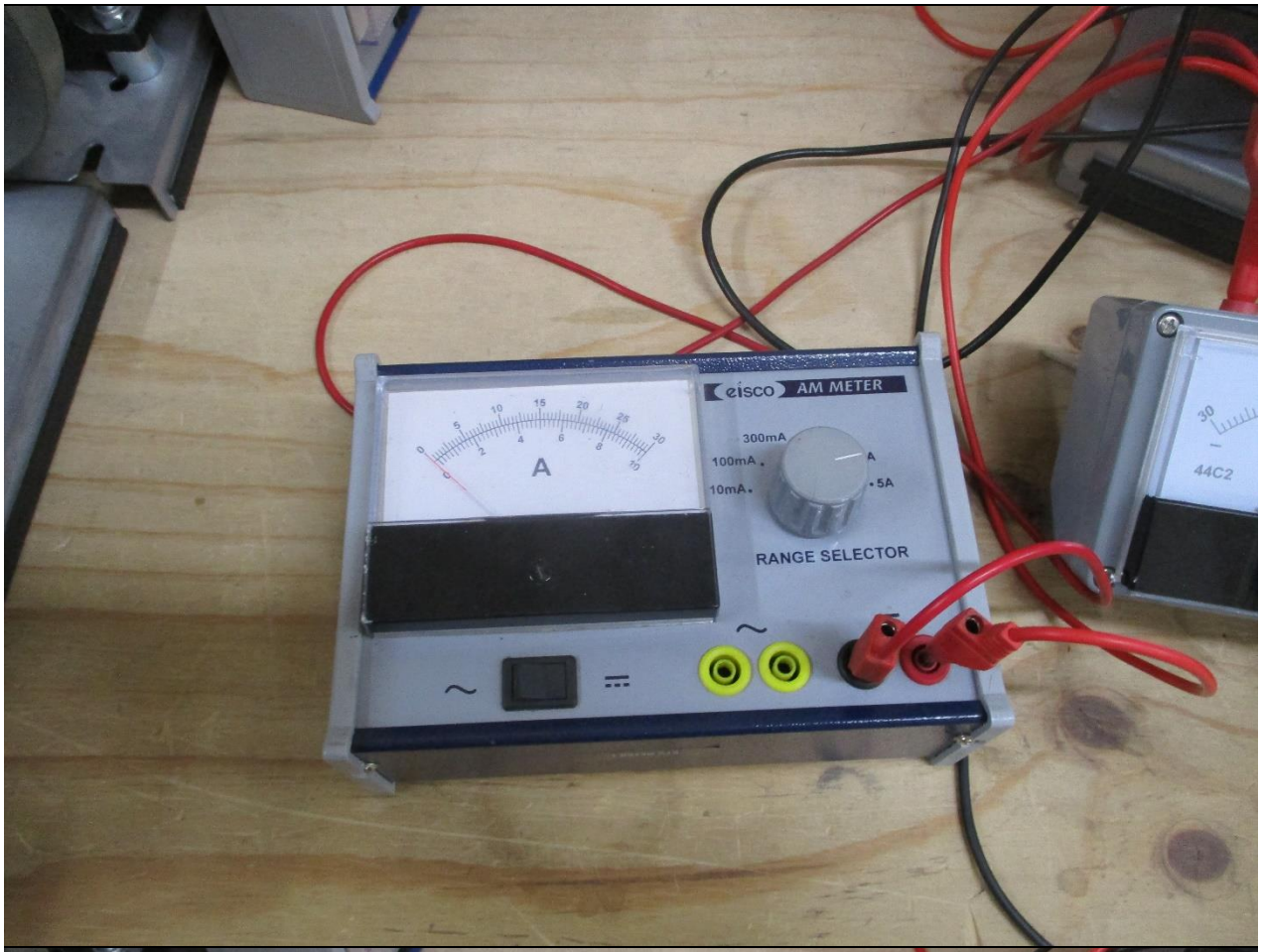

DANGER
ELECTRIC SHOCK HAZA
ET C MOTOR 1
Z2
Z1

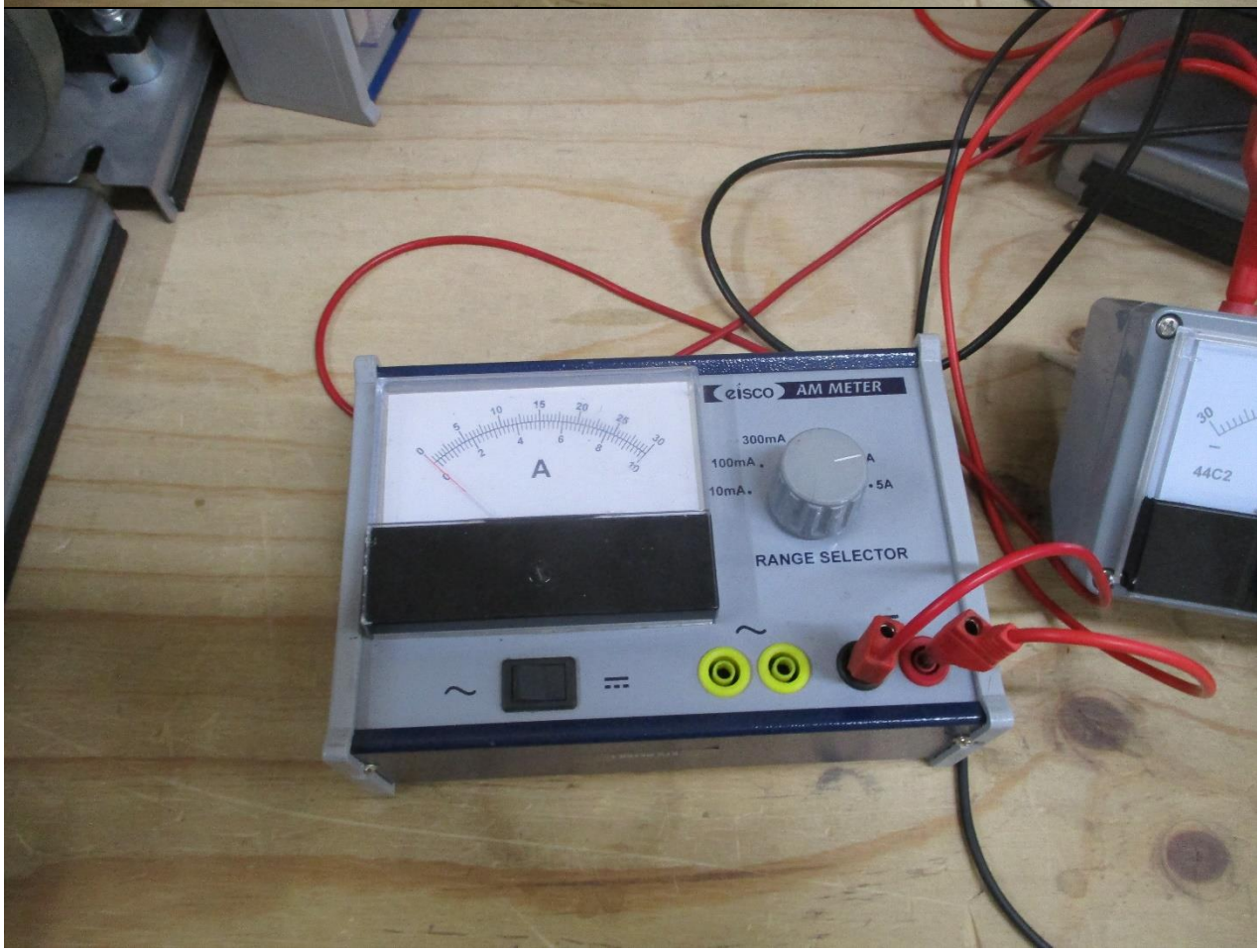

RISK OF
ELECTRIC
SHOCK
CB5
CB5

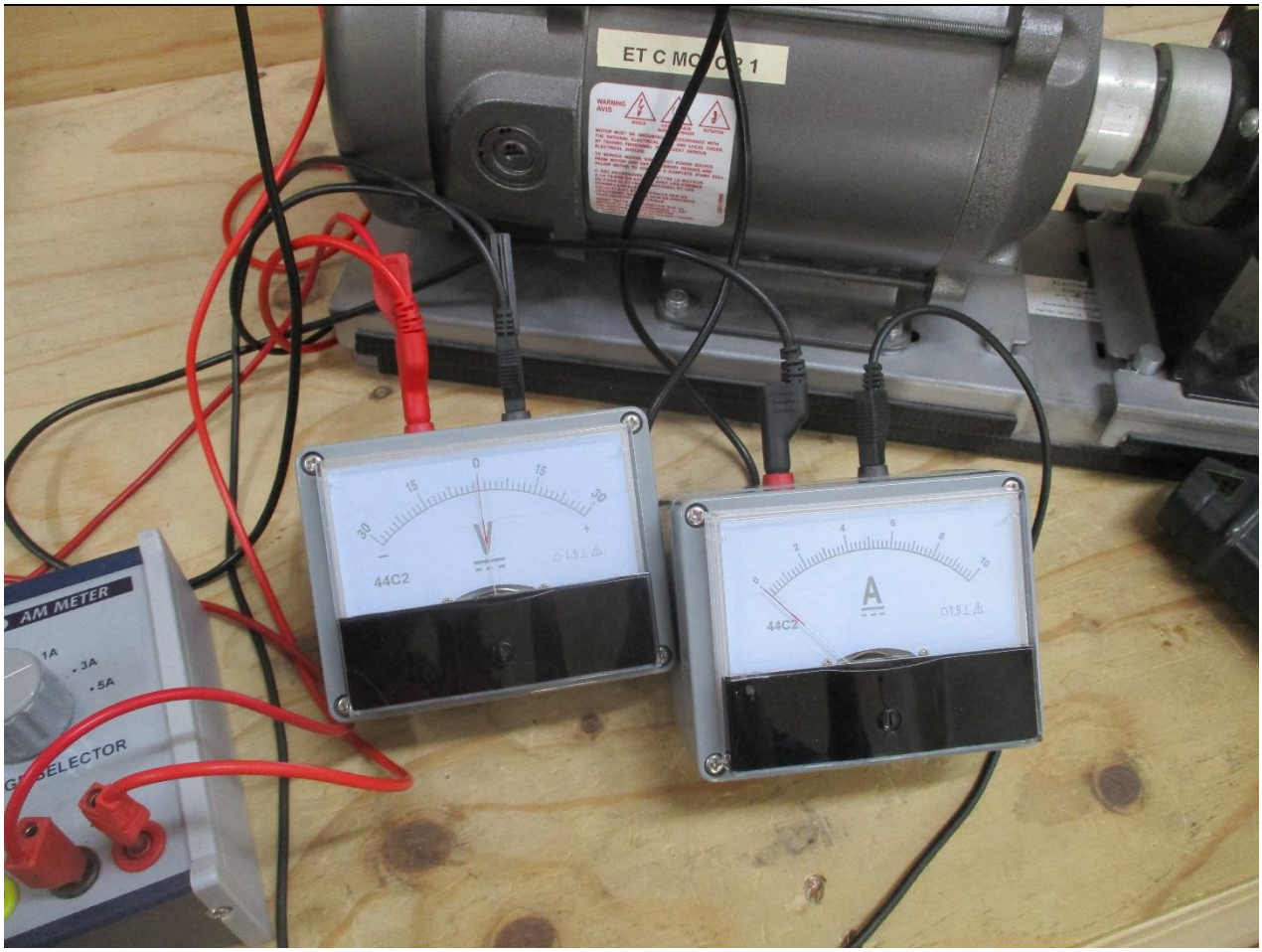

CB5
AM METER
RANGE SELECTOR


MOTOR 1
AM METER
RANGE SELECTOR
DIGITECH
QM1448
MEM
DIGITAL TACHOMETER


A3
A4
Sorensen XPF60-20 Dual 60V 20A DC Power Supply
5 1.80 V
0.0 1 A
24.03 V
10.10 A
VOLTAGE
CURRENT
DC POWER SUPPLY
CURRENT
VOLTAGE


eisco AM METER
A
300mA
100mA
10mA
A
5A
RANGE SELECTOR
44C2


eisco AM METER
A
300mA
100mA
10mA
A
5A
RANGE SELECTOR
44C2



Have your teacher/trainer check your		Teacher/Trainer Initials and Date	√

SECTION E

Return

Practical Tasks and Observation Recording Sheets

You use this section to assist you in determining a candidate's competency in those areas where they have not yet successfully demonstrated their skills, knowledge and prior experience. Therefore, candidates are not required to complete all tasks. You select tasks after considering available evidence collected through previous phases and according to context and needs of each candidate.

UEECD0016

1. Unit Assessment Plan Overview

Competency Standard Unit (CSU)	**UEECD0016 – Document and apply measures to control WHS risks associated with electrotechnology work**	
CSU Descriptor	This unit involves the skills and knowledge required to identify, document and apply work health and safety (WHS)/occupational health and safety (OHS) hazard and risk control measures associated with electrotechnology work. It includes identifying workplace hazards, assigning levels of risk, developing control measures to eliminate and/or mitigate risks, reviewing risk control measures and maintaining documentation of hazards, risk control measures and their application in accordance with compliance procedures. This unit addresses information, processes and techniques for the application of WHS/OHS, specific to working in the electrotechnology sector and is essential for workers without managerial or supervisory responsibilities. Typically, this unit will relate to the type of job being undertaken, electrical conditions, energy levels, radiation levels, toxic substances, airborne particles, pressure discharge, explosive atmosphere, worksite location, general worksite conditions, specific work location, moving parts, tools and equipment, workers competence and/or capacity and/or personal effects. No licensing, legislative or certification requirements apply to this unit at the time of publication	
Purpose of Assessor Guide	The purpose of the Unit Assessment Plan (UAP) is to provide the specification and mapping for the evidence gathering tools required to satisfy the Assessment Requirements of this Competency Standard Unit (CSU).	
Sequence	• Before undertaking the evidence gathering events in this UAP, a learner is to have met the requirements of: • UEECD0007 Apply work health and safety regulations, codes and practices in the workplace	
Unit aspects addressed in this UAP	**Code**	**Specification Title**
	PC-UEECD0016	Performance Citeria
	KE-UEECD0016	Knowledge Evidence

	PE-UEECD0016	Performance Evidence	
Number of Evidence Sources	3	UEECD0016-UKT	Unit Knowledge Test
		UEECD0016-UST	Unit Skills Test
		UEECD0016-WPE	Work Performance Experience

2.Assessment

2.1. Assessment Conditions and Context

Using the Evidence Gathering Tools/Activities provided and the detailed mapping within this document will assist RTOs in determining if sufficient evidence has been gathered to ensure full coverage of the unit.
Identified gaps in knowledge, skills or work performance evidence may be addressed through a variety of means including, but not limited to, written tests, onlinequizzes, practical tests, and/or technical interviews and work performance.

Evidence Gathering Tools/Activities	Conditions	Reporting Requirement
Unit Knowledge Test (UEECD0016-UKT)	Knowledge Test undertaken from nationally developed question knowledge test bank.	**Graded Result**
Unit Skills Test (UEECD0016-UST)	Unit Skills Test activity covering identification of hazards, assessing risks, selecting risk control measures, and reviewing and documenting risk management processes at Facility.	Satisfactory/ Not Satisfactory Recorded on customized marking forms. Then result logged into Energy Space records.
Work Performance (UEECD0016-WPE)	Recording of activities undertaken in a simulated or real workplace environment to meet the requirements and scope of this competency standard unit	Satisfactory/ Not Satisfactory E- Profiling work cards logged into system. Unit report generated

Evidence Gathering Tools Specifications:

2.2. Unit Knowledge Test

Event Type	**Unit Knowledge Test**
Types of Items	Learner is required to complete a knowledge test (43 questions) based on multiple choice (41% of marks), matching (37% of marks), and diagram type (22% of marks).
Coverage	Knowledge Evidence (KE-UEECD0016), some aspects of the Performance Evidence (PE-UEECD0016), and Essential Performance Capabilities (EPC) 31, 42, 43 and 44.
Staging	After Unit Learning Plan (ULP) Knowledge and Skills Topics 1 to 7 have been completed.
Duration	1 hour
Assessment Conditions	Supervised (invigilated) classroom environment (off the job). Relevant Australian Standards and Codes of Practice can be used. This is to be conducted at the facility in a classroom environment (off the job). It must be supervised. The student will log in to Energy Space. The student will be set up to do the computer-generated test from national E-Oz Energy Skills Australia online test bank.
Resources required	Computer and log in for Energy Space Computer generated test from national E-Oz Energy Skills Australia online test bank.
Application	The Unit Knowledge Test aligns directly to the knowledge that underpins the safe and correct application of skills. It should be noted that the evidence gathered by Knowledge Tests is limited in its capacity to indicate whether a person can actually plan, carry out or complete a skills-based task, with some exceptions, for example: • Evidence of problem solving skills can be gathered by UKTs in some contexts. • Performance criteria (PCs) relating to the selection of tools, materials and equipment are heavily reliant on certain knowledge dot points that are addressed in UKTs. The evidence collected by a Unit Knowledge Test is not as directly aligned to what constitutes competency as other forms of evidence (such as that gathered by a Skills Test). It is recommended that Knowledge Test evidence is interpreted primarily as an indicator of: • The reliability of other evidence. • The likelihood that a learner will be capable of applying related skills safely and autonomously in different contexts. • The likelihood that the learner will be capable of dealing with nonstandard

	situations.

Unit Skills Test

Event Type	**Unit Skills Test**
Staging	After ULP Knowledge and Skills Topics 1 to 7 have been completed.
Types of Items	Skills Test covering the following tasks: • Undertake a workshop safety check and update risk register • Undertake a job safety/hazard analysis as a small group • Review risk management to ensure control measures remain valid
Coverage	Performance Criteria (PC-UEECD0016), Performance Evidence (PEUEECD0016), Range of Conditions (RC-UEECD0016), some aspects of the Knowledge Evidence (KE-UEECD0016), and Essential Performance Capabilities (EPC) 31, 42, 43 and 44
Duration	1 hour
Assessment Conditions	This is to be conducted at the facility. It must be supervised.
Resources required	customized Unit Skills Tests facility and task supporting documents and attachments. UST recording forms Results are recorded on forms then transferred to the Energy Space LMS student records.

2.3. Work Performance

Event Type	On the job workplace activities carried out as part of the candidates daily work placement / workplace activities, or a combination of simulation and questioning.
Types of Items	Identifying and documenting hazards and risks, assessing risk levels, applying and monitoring risk control measures, following safe work methods, and participating in consultative processes.
Coverage	Performance Criteria (PC-UEECD0016), Range of Conditions (RCUEECD0016), and some aspects of Performance Evidence (PE-UEECD0016).
Staging	Evidence collected via profiling on a regular basis, or through a combination of questioning, technical interviews, simulations or similar activities, e.g. through the appropriate application of formative evidence gathering tools such as Topic Skill Practice (TSP) activities.
Duration	n Duration will reflect the learner's record of workplace activities undertaken to meet the requirements and scope of this competency standard unit.
Conditions	Supervised electrical work environment
Resources	Typical domestic/non-domestic, commercial and/or industrial electrotechnology work sites, work permits, SWMS, JSA/JHA, PPE, LOTO equipment, .
Application	The Exemplar Profiling evidence gathering tool is designed to: • Facilitate progressive monitoring of a learner's competency development in the workplace. • Assist an RTO assessor, in conjunction with other forms of evidence, to make a judgement of a learner's competency. The evidence gathered is directly aligned to planning, carrying out and completing tasks in an actual workplace, and unlike other tools, highlights the learner's competency development over time. The following indicators are embedded within the tool, and can be assessed using the various reporting functions: • Autonomy (level of support received) • Participation (plan, carry out and complete) • Technical ability (range of activities and equipment)

UEECD0016
Assessor Instructions
For the set-up of Skills Test Assessments at Workshop PRIOR to assessment

Instructions to Assessor one (1) week prior to actual test day:

1. Assessors are to gather students in classroom to handout 'UEECD0016 Assessment overview' which outlines the assessments on a part by part basis and gives detailed and clear instructions to students before undertaking any assessments.
2. Assessor can answer questions regarding **'Units Skills Test'** for student clarification.

Instructions to Assessor on actual test day

3. Assessors will be conducting Part A and completion questions consecutively.
   'Planning' and 'Carrying out the task' will be conducted in workshop and 'Completing the Unit Skills Test' will be conducted in the classroom.
   Students are allowed 1 hour to complete

Part A–Assessors are to prepare training facility for Part A 60 min prior to commencing student assessment:

- Assessors will be implementing hazards for this skills test:
  - **Exposed wiring**
  - **Off cut conduits on the floor**
  - **Water on floor**
  - **Chemicals incorrectly stored**
- Assessors to complete ' **Inspection Test plan' for Assessment**

Note: The planning phase for unit skills test is done prior to any students 'Carrying out the task'. Ensure all 'Equipment, Suggested Materials and Miscellaneous items' from the Unit Skills Test Task Sheet are ready in the workshop for students to use.

- Gather students that are being assessed in Classroom prior to commencement of unit skills test.
- Assessors to hand out **Unit Skills Test Task Sheets which includes instructions to students**.
- Assessor to engage students in a Q/A session regarding **'Unit Skills Test'** for student clarification purposes.
- Check/Verify ALL notes that students will have prior to student commencing assessment.
- Collect all mobile phones/tablets from students and place into locker room
- Assessor 1 is to take first group of4 x students conducting assessment in classroom and workshop.
- ***Note: Only 4 x students will be allowed to enter the workshop at any given time under supervision.***
- ***Assessor 2 is to take second group of 4 x students*** conducting assessment in classroom and workshop. ***Note: Only 4 x students will be allowed to enter the workshop at any given time under supervision.***

Unit Skills Test Task Sheet

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

Learner Name:	**<Leaner Name>**	**ID:**	**<Student ID>**
College/ Campus:	**Revesby**	**Group/ Class:**	**1 or 2**
Learner Signature:	**<Learner Signature>**	**Date:**	**<Date>**

Final Result of UEECD0016 UST			
The learner has demonstrated a satisfactory performance of identified steps listed.		Yes	No
Assessor Name:	**<Assessor Name>**		
Assessor Signature:	**<Assessor Signature>**	**Date:**	**<Date>**

Comments:
<Assessors Comments>

Instruction:

There are two main tasks to this skills test. In the first part, you are required to undertake a workshop safety check and document the hazards and risks in a risk register. In the second part, you are required to work in a small group to undertake a job safety/hazard analysis (JSA/JHA) for a particular work task to be undertaken in a particular work area.

- Time Allowed (to be specified by assessor):
- Orange shaded checkpoints are for assessor use only. Entering information in these areas may invalidate your assessment.
- Mobile phones and smart devices must be turned off and not accessed.
- Wait for the assessor to mark your work when requested.
- You will be allowed two (2) attempts at each check point to demonstrate the task described.
- If you are unsure about what you need to do, you should ask your assessor for guidance.
- Whilst carrying out skills activities you must follow all standard workplace procedures (i.e. Anti-discrimination, health and safety .) and ensure efficient / sustainable use of materials.

1. Planning the Unit Skills Test

Your assessor will provide the details of the equipment required for this Unit Skills Test.

1.1 Equipment:	**1.2 Suggested Materials:**	**1.3 Miscellaneous Items:**
• Workshop and/or electrical installation facility.	• Various items set up to simulate hazards in the workplace.	• PPE. • Pens/pencils.

Assessor Guidelines:

1. Planning the Unit Skills Test

Instructions and safety requirements should be clearly explained to the learner at the beginning of the assessment event, including the permitted time – to be indicated on the Unit Skills Test Task Sheet (USTS) cover page.
Recommended time allowed – 1 hour.
Note that the JSA/JHA section of this skills test (Checkpoint 3) should be completed in a group of three to four learners. Each learner should complete their own documentation.
It should be explained to the learner that the orange checkpoint areas on the Unit Skills Test Task Sheet are for assessor use only, and that entering information in these areas may invalidate the assessment event.
In the pre-work briefing the assessor must inform the learners of the following:

- **Details of the workshop area for which they will undertake the safety check (at Checkpoint 2).**
- **Details of the work task and work area for which they will undertake the JSA/JHA (at Checkpoint 3).**
- **Groups in which the JSA/JHA will be undertaken.**
- **Any simulated features of work areas to be considered as part of the safety check or JSA/JHA, e.g. presence of high voltage equipment.**

The job selected for the JSA/JHA (Checkpoint 3) should be an electrotechnology work task of medium complexity that is practical and realistically typical of the specified work area. Some examples could include:

- **Installing a set of submains for a new distribution board.**
- **Adding a socket outlets circuit to an installation.**
- **Replacing an existing switchboard or plant.**
- **Installing wiring and equipment to supply a new plant.**
- **Disconnecting, repairing and reconnecting faulty equipment.**

Recommended time allowed – 1 hour

1.4 Pre-Work Briefing

Your assessor will direct you to bench 4 of the workshop for which you will complete the safety check and the job safety/hazard analysis (JSA/JHA) – Attachment B.

Basic Description of Job: You are required to add a socket outlet circuit to an installation. Please allocate the tasks in order of operation:

Task Step	Order of Operation (1-4)
Terminate socket outlet and protection device at switchboard	4
Fix and secure wiring to timber beams	3
Set up tools and equipment in front of bench 4	2
Unload materials from the van	1

Item	Description of Item	Naming
1	Learner listens attentively to pre-work briefing, seeking clarification as needed, and notes down key points in the space provided.	Pre-Work Briefing

1. Planning the Unit Skills Test

Full marks will be awarded only after assessor affirms that the above checklist has been met.

	Checkpoint 1 - Planning the Work	Satisfactory Yes/No	
Item	**Description of Item**	**1st**	**2nd**
1	Pre-Work Briefing		
	Assessor Initial:		

2. Carrying Out the Unit Skills Test

Assessor Guidelines:

Assessor is to implement the following hazards in front of bench 4 of workshop:

- **Exposed wiring**
- **Off cut conduits on the floor**
- **Water on floor**
- **Chemicals incorrectly stored**

2.1 Workshop Safety Check

Your task in this section is to walk through the workshop area and identify as many hazards as you can:

- Document each hazard in the risk register (Attachment A).
- Identify and document each risk and its risk level (using the risk matrix provided).
- Select and document control measures to reduce the level of risk posed by each hazard.
- Reassess and document the level of risk that will exist with the selected control measures implemented.

Likelihood / Severity	Likely	Possible	Unlikely
Death or permanent disability	1	1	2
Serious injury or chronic illness	1	2	3
Minor injury requiring first aid	2	3	4

1 = Extreme risk
2 = High risk
3 = Medium risk
4 = Low risk

2. Carrying Out the Unit Skills Test

The assessor must assess your work at this point. **(Checkpoint 2)**

Item	Description of Item	Naming
1	Learner identifies and documents the hazards in the workshop.	Identify Hazards
2	Learner identifies the risks posed by each hazard and accurately assesses the initial risk level.	Assess Initial Risk Level
3	Learner selects appropriate control measures to reduce each risk.	Select Control Measures
4	Learner correctly identifies where each control measure fits within the Hierarchy of Control.	Hierarchy of Control
5	Learner accurately re-assesses the level of risk posed after control measures are implemented.	Re-assess Risk Level

Full marks will be awarded only after assessor affirms that the above checklist has been met.

Checkpoint 2 – Workshop Safety Check		Satisfactory Yes/No	
Item	**Description of Item**	**1st**	**2nd**
1	Identify Hazards		
2	Assess Initial Risk Level		
3	Select Control Measures		
4	Hierarchy of Control		
5	Re-assess Risk Level		
	Assessor Initial:		

2.2 Job Safety/Hazard Analysis

In this part of the test, learners must work in small groups to complete the JSA/JHA.

Each learner should document the work of the group in the JSA/JHA template (provided as Attachment B to the USTS), or another suitable RTO-specific document provided by the assessor.

You are now required to undertake a job safety / hazard analysis for the work task specified by your assessor.

You will need to complete the JSA/JHA in consultation with two or three of your peers. Each person participating must complete their own copy of the JSA/JHA template (Attachment B) to record the work of the group:

- Break down the task into the required steps.
- Identify the hazards that will be present at each step.

2. Carrying Out the Unit Skills Test

- Identify the risks and risk level posed by each hazard.
- Identify control measures to reduce risk levels.
- Reassess the level of risk that will exist with the selected control measures implemented.

The assessor must assess your work at this point. **(Checkpoint 3)**

Item	Description of Item	Naming
1	Learner breaks the job down into suitable steps.	Identify Job Steps
2	Learner identifies and documents the hazards that will be present during each step.	Identify Hazards
3	Learner identifies the risks posed by each hazard and accurately assesses the initial risk level.	Assess Initial Risk Level
4	Learner selects appropriate control measures to reduce each risk.	Select Control Measures
5	Learner accurately re-assesses the level of risk posed after control measures are implemented.	Re-assess Risk Level
6	Learner actively consults and participates in the group to identify hazards and develop a safe system of work for the specified job.	Work as a Group

Full marks will be awarded only after assessor affirms that the above checklist has been met.

Checkpoint 3 – Job Safety/Hazard Analysis		Satisfactory Yes/No	
Item	**Description of Item**	**1st**	**2nd**
1	Identify Job Steps		
2	Identify Hazards		
3	Assess Initial Risk Level		
4	Select Control Measures		
5	Re-assess Risk Level		
6	Work as a Group		
	Assessor Initial:		

3. Completing the Unit Skills Test

Finalise your risk register and JSA/JHA documentation and file/submit your work as directed by your assessor. Then answer the following questions.

Completion Questions

10. Consider that you are required to undertake routine maintenance work on a pole mounted distribution transformer. The power pole supports both low voltage (230/400 V) and high voltage (11 kV) distribution lines, and is located beside a busy four lane road (two lanes in each direction).

    From the information provided, describe at least five (5) practical control measures that would be needed to reduce the risks posed by the work.

    (5 MARKS)

- **Consultation with electricity networks to arrange for safe isolation and earthing of HV and LV lines.**

Safe isolation, HV switching and earthing procedures of the electricity supplier must be consulted and referred.

- **Observe safe approach distances from HV lines.**

Safe approach distance depending on the level of voltage needs to be aware of.

- **Work permit/authorisation system.**

Work permit and relevant authorization needs to be obtained

- **Safety observer.**

For working in confined space, safety observer must be allocated.

- **Registered first aider on site.**

Registered first aider/ first aids gears must be onsite

- **Traffic control.**

Traffic controllers must be assigned for the work that can be on the traffic areas.

- **PPE – anchored safety harness, safety glasses, hard hat, safety boots, hi-visibility vests.**
- **Standard safe work procedures**

Standard safe working procedures of the workplace must be followed.

Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.

11. Now consider that it starts to rain whilst you are half-way through the work described above in Question 1.

    Identify any additional hazards, risks and required adjustments to the risk management that may be required. **(3 MARKS)**

- **Hazards – water, reduced visibility.**
- **Risks – increased risk of electric shock, increased risk of slips/falls.**
- **Adjustments – work ceased until rain clears**.

It will be dangerous to continue the electrical work due to electrical current flows in the rain
For working at height, there is a high risk of slip and falls

3. Completing the Unit Skills Test

It needs to stop the work and wait until rain stops and cleared.

Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.

12. Consider that you are required to fabricate and install trapeze supports for a suspended cable tray on a construction site. The supports are to be fabricated using various hand tools and a drop saw to cut struts and rods to length. A mobile scaffold is to be used to install the supports. Various other trades are also working in the area.

    From the information provided, describe at least five (5) practical control measures that would be needed to reduce the risks posed by the work.

    (5 MARKS)

- **General – standard safe work procedures**

Standard general workplace safety procedures must be followed.

- **Drop saw – use RCD box and lead stands, ensure safety guards positioned correctly, secure work using vice/clamps, hot works permit, safety glasses, ear plugs/muffs, hard hat, safety boots, gloves, clean up off cuts.**

When cutting the metal to make the supports for construction site trays, safety goggles must be worn to protect eye. Safety gears such as ear plugs,safety helmets, safety boots, gloves must be worn.The metallic pieces must be secured with vice, clamps . Safe working procedures for using hand tools and power tools must be observed. Safety procedures for scaffold and ladder must be followed.

- **Working at heights – scaffolding erected by licensed personnel, anchored safety harness, toe boards, ensure casters are locked when scaffold in use.**

Working at heights competency certificate must be obtained , licensed scaffolders must be employed.Safety gears including safety harness, safety vest, toe boards must be used.When scaffold is in use, casters are to be locked.

- **Drilling – use RCD box, safety glasses, ear plugs/muffs, dust mask, hard hat, safety boots**

To do drilling, RCD box must be used. Safety boots, safety helmets, ear plugs/muffs, dust mask, safety glasses must be worn

Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.

13. Now consider that during the course of carrying out the work described in Question 3, the safety guard that was covering the drop saw blade has become damaged, has fallen off, and is not able to be repaired.

    Identify any additional hazards, risks and required adjustments to the risk management that may be required. **(3 MARKS)**

3. Completing the Unit Skills Test

- **Hazards – uncovered drop saw blade, increased sparks, increased risk of projectiles.**
- **Risks – increased risk of cuts/lacerations, burns and projectiles.**

The broken saw blade in speed can hit a person causing cuts even death

- **Adjustments – drop saw tagged with 'out of service' tag and returned to workshop for servicing. Obtain replacement drop saw that is in a serviceable condition prior to continuing work.**

If the cover can not be fitted, the machine must not be used. It needs to be hang with tag "out of service". Replace and refit the cover before start of the work.

Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.

14. The space below is to allow for an additional question to be provided at the time of your assessment ***if deemed necessary by your assessor***.

If your assessor does not wish to provide an additional question you may leave the spaces below blank.

Q **You arrive at a customer's premises to replace a faulty circuit breaker that intermittently trips. The customer tells you that you cannot turn off the supply to the switchboard at the time because essential machinery needs to keep operating. What should you do? (1 MARK)**

A **Re-schedule a time with the customer to replace the circuit breaker when the switchboard supply can be isolated.**
Find the alternative supply to keep the essential machinery to keep running. If it is not possible, the time needs to be rescheduled.
Only change the circuit breaker while the switchboard is not isolated if the risks to health and safety would be greater if supply is isolated.
Change the circuit breaker after switchboard is isolated. Replacing the circuit breaker on live circuit can only be done if the risks to health and safety would be greater if supply is isolated. In this safe work procedure related to working on Live supply must be followed.

Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.

15. The assessor must assess your work at this point. **(Checkpoint 4)**

Item	Description of Item	Naming
1	Learner finalises and files/submits risk register	Documentation

3. Completing the Unit Skills Test

	and JSA/JHA documentation in accordance with assessor instruction.	
2	**All work planned, carried out and completed in accordance with relevant workplace policies and procedures (i.e. anti-discrimination, health and safety .).**	**Procedures Followed**

Full marks will be awarded only after assessor affirms that the above checklist has been met.

 **Checkpoint 4 – Completing the Work**		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Documentation		
2	Procedures Followed		
3	Completion Question 1		
4	Completion Question 2		
5	Completion Question 3		
6	Completion Question 4		
7	Completion Question 5 (Optional)		
	Assessor Initial:		

Attachment A – Risk Register

Hazard	Risks	Risk Level	Control Measures	Hierarchy of control	New Risk Level
Exposed Wiring	**Electrocution**	**1**	**Isolation Procedures**	□ Elimination □ Engineering □ Substitution □ Administration □ Isolation □ PPE	**2**
Off cut conduits on the floor	**Trips and falls**	**2-3**	**Stack in appropriate location**	□ Elimination □ Engineering □ Substitution □ Administration □ Isolation □ PPE	**4**
Water on the floor	**Trips and falls**	**2-3**	**Mop the floor**	□ Elimination □ Engineering □ Substitution □ Administration □ Isolation □ PPE	**4**
Chemicals incorrectly stored	**Poison**	**1-3**	**Store in approved/appr oriate cabinet**	□ Elimination □ Engineering □ Substitution □ Administration □ Isolation □ PPE	**4**
				□ Elimination □ Engineering □ Substitution □ Administration □ Isolation □ PPE	
				□ Elimination □ Engineering □ Substitution □ Administration □ Isolation □ PPE	
				□ Elimination □ Engineering □ Substitution □ Administration □ Isolation □ PPE	
				□ Elimination □ Engineering □ Substitution □ Administration □ Isolation □ PPE	

Attachment B – JSA/JHA

B1 Work Site & Job Task Information

Job Task: **Adding a socket outlet circuit to an installation**	JSA Conducted By: **<Student Name>**
Type of Work Site: **Workshop**	
Work Site Location: Facilty	
Date: **<Date>**	

Required Qualifications/Work Permits: **Electrical License**

Applicable Legislation & Regulations: **WHS Act, Safework NSW**

Applicable Standards & Codes of Practice: **AS/NZS 3000:2018**

B2 Types of Hazards at the Worksite

(☑ tick each applicable box)

□ high voltage	□ work at heights	□ foreign bodies	□ explosive gases
□ **low voltage**	□ hot works	□ asbestos	□ toxic gases
□ extra-low voltage	□ confined spaces	□ dust	□ explosive chemicals
□ high currents	□ UV radiation	□ noise	□ corrosive chemicals
□ working 'live'	□ mobile plant	□ **manual handling**	□ toxic chemicals
□ **housekeeping**	□ **power tools**	□ mechanical handling	□ flora / fauna

□ other:

B3 Risk Matrix

Severity \ Likelihood	Likely	Possible	Unlikely
Death or permanent disability	1	1	2
Serious injury or chronic illness	1	2	3
Minor injury requiring first aid	2	3	4

1 = Extreme risk
2 = High risk
3 = Medium risk
4 = Low risk

B4 Job Steps, Hazards, Risks & Control Measures

Attachment B – JSA/JHA

Job Steps	Hazards	Risks	Risk Level	Control Measures	New Risk Level
1. Unload materials from the van	Heavy objects	Injury	1-3	Correct manual handling techniques	4
2. Set up tools and equipment at bench 4	Sharp objects	Cuts and Abrasions	1-3	Wear PPE - Gloves	4
3. Fix and secure wiring to timber beams	Sharp objects	Cuts & Abrasions	2-3	Wear PPE - Gloves	4
4. Terminate socket outlet and protection device at	Electricity	Electrocution	1	Isolation Procedures	2

Electrical Trades College

Assessor Guide

UEEEL0012

1. Unit Assessment Plan Overview	
Competency Standard Unit (CSU)	**UEEEL0012 Install Low voltage wiring, appliances, switchgear and associated accessories**
CSU Descriptor	This unit includes the installation of wiring enclosures, cable support systems, cables, protection devices, switchgear, control gear, switchboards, and accessories designed to operate at voltages up to 1,000 volt (V) alternating current (a.c.) or 1,500 V direct current (d.c.). It covers working safely and to installation standards, routing cables to specified locations, terminating cables and connecting wiring at accessories, matching appliances and accessories with that specified, making required circuit connections

<table>
<tr><td></td><td colspan="2">and completing the necessary installation documentation.
The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.
Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required.
Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.</td></tr>
<tr><td>Purpose of Assessor Guide</td><td colspan="2">The purpose of the Assessor Guide is to provide the specification for the evidence gathering tools to meet the competency standard unit for the CIII in Electrotechnology Electrician qualification.</td></tr>
<tr><td>Sequence</td><td colspan="2">Before undertaking the evidence gathering events in this UAP, a learner is to have met the requirements of:
• UEECD0007 Apply work health and safety regulations, codes and practices in the workplace
• UEECD0019 Fabricate, assemble and dismantle utilities industry components
• UEECD0020 Fix and secure electrotechnology equipment
• UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications
• UEEEL0003 Arrange circuits, control and protection for electrical installations
• UEEEL0020 Solve problems in low voltage a.c. circuits
• UEEEL0023 Terminate cables, cords and accessories for low voltage circuits
• UEEEL0018 Select wiring systems and select cables for low voltage electrical installations
• UEEEL0005 Develop and connect electrical control circuits
• UEEEL0019 Solve problems in direct current (d.c.) machines UEEEL0012-UAP-R1.1 ©Exemplar Learning July 2022 Page 4 of 31 • UEEEL0021 Solve problems in magnetic and electromagnetic devices
• UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits
• UEEEL0008 Evaluate and modify low voltage heating equipment and controls
• UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls
• UEEEL0010 Evaluate and modify low voltage socket outlets circuits
• UEEEL0024 Test and connect alternating current (a.c.) rotating machines
• UEEEL0025 Test and connect transformers and
• UEECD0043 Solve problems in direct current circuits or
• UEECD0044 Solve problems in multiple path circuits
• UEECD0046 Solve problems in single path circuits</td></tr>
<tr><td rowspan="3">Unit aspects addressed in this UAP</td><td>Code</td><td>Specification Title</td></tr>
<tr><td>PC – UEEEL0012</td><td>Performance Criteria</td></tr>
<tr><td>RC – UEEEL0012</td><td>Range of Conditions</td></tr>
</table>

	KE – UEEEL0012	Knowledge Evidence	
	PE – UEEEL0012	Performance Evidence	
Number of Evidence Sources	3	UEEEL0012-UKT	Unit Knowledge Test
		UEEEL0012-UST	Unit Skills Test
		UEEEL0012-WPE	Work Performance Experience
	Note: This unit mandates collection of workplace evidence, as stated in the unit Assessment Conditions: **"In addition, evidence of Performance Evidence items of this unit marked with a hash (#) must be gathered in authentic workplace operational conditions (not simulated) before final determination of competence in this unit can be made."**		

2.Assessment

2.1. Assessment Conditions andContext

Using the Evidence Gathering Tools/Activities provided and the detailed mapping within this document will assist RTOs in determining if sufficient evidence has been gathered to ensure full coverage of the unit.
Identified gaps in knowledge, skills or work performance evidence may be addressed through a variety of means including, but not limited to, written tests, onlinequizzes, practical tests, and/or technical interviews and work performance.

Evidence Gathering Tools/Activities	Conditions	Reporting Requirement
Unit Knowledge Test (UEEEL0012-UKT)	Knowledge Test undertaken from nationally developed question knowledge test bank.	**Graded Result**
Unit Skills Test (UEEEL0012-UST)	Unit Skills Test covers the selection, installation, inspection, testing and documentation of low voltage wiring, accessories, switchgear and appliancesin the Revesby Facility	Satisfactory/ Not Satisfactory Recorded on customized marking forms. Then result logged into Energy Space records.

Work Performance (UEEEL0012-WPE)	Recording of workplace activities undertaken to meet the requirements and scope of this competency standard unit	Satisfactory/ Not Satisfactory E- Profiling work cards logged into system. Unit report generated

Evidence Gathering ToolsSpecifications:

2.2. Unit KnowledgeTest

Event Type	**Unit Knowledge Test**
Types of Items	Learner is required to complete a knowledge test (68 questions) based on multiple choice (44% of marks), matching (30% of marks) and diagram type (26% of marks).
Coverage	Knowledge Evidence (KE-UEEEL0012). Essential Performance Capabilities (EPC) 20, 23, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35, 36, 37, 38, 39 and 40.
Staging	After Unit Learning Plan (ULP) Knowledge and Skills Topics 1 to 10 have been completed.
Duration	2 hours.
Assessment Conditions	This is to be conducted at the facility in a classroom environment (off the job). It must be supervised. The student will log in to Energy Space. The student will be set up to do the computer-generated test from national E-Oz Energy Skills Australia online test bank.
Resources required	Computer and log in for Energy Space Computer generated test from national E-Oz Energy Skills Australia online test bank.
Application	The Unit Knowledge Test aligns directly to the knowledge that underpins the safe and correct application of skills. It should be noted that the evidence gathered by Knowledge Tests is limited in its capacity to indicate whether a person can actually plan, carry out or complete a skills-based task, with some exceptions, for example: • Evidence of problem solving skills can be gathered by UKTs in some contexts. • Performance criteria (PCs) relating to the selection of tools, materials and equipment are heavily reliant on certain knowledge dot points that are addressed in UKTs. The evidence collected by a Unit Knowledge Test is not as directly aligned to what constitutes competency as other forms of evidence (such as that gathered by a Skills Test). It is recommended that Knowledge Test evidence is interpreted primarily as an indicator of: • The reliability of other evidence. • The likelihood that a learner will be capable of applying related skills safely and autonomously in different contexts. • The likelihood that the learner will be capable of dealing with nonstandard situations.

Unit SkillsTest

Event Type	**Unit Skills Test**
Types of Items	Skills Test covering the following tasks: • Installing and terminating LV wiring systems • Installing and terminating LV appliances/equipment • Verify compliance of LV wiring and appliances/equipment
Coverage	Performance Criteria (PC-UEEEL0012), Performance Evidence (PEUEEEL0012), and some aspects of the Range of Conditions (RC-UEEEL0012) and Knowledge Evidence (KE-UEEEL0012). Essential Performance Capabilities (EPC) 20, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35, 36, 37, 38, 39 and 40.
Staging	After ULP Knowledge and Skills Topics 1 to 9 have been completed.
Duration	3 hours.
Assessment Conditions	This is to be conducted at the facility. It must be supervised.
Resources required	Unit Skills Test Task Sheet (USTS), Unit Skills Test Assessor Guide (USAG), electrical wiring workshop or similar, and test equipment (e.g. digital multimeter and IR tester), selection of LV cables (TPI, flat and circular TPS, flexible cable, selection of wiring supports (cable tray, conduit, catenary wire and supports, pendant socket-outlet, 5-pin socket-outlet, downlight (LED recommended) and ancillary equipment, smoke detector, test equipment (digital multimeter and IR tester), fittings and fixings for cable tray and conduit, snake, cable ties, cable glands, battery drill, distribution board, selection of circuit breakers and RCDs, selection of isolators and switches, hand tools, PPE, and AS/NZS 3000 (current edition). customized Unit Skills Tests facility and task supporting documents and attachments. UST recording forms Results are recorded on forms then transferred to the Energy Space LMS student records.
Associated Documents	Unit Skills Test Task Sheet (USTS) – provides learner instructions relating to the test conditions and activities, and provides a convenient means of documenting the learner's performance and associated observations. Unit Skills Test Assessor Guide (USAG) – indicates the intent and structure of the test, and provides recommendations and guidelines to the assessor in relation to administering the test, and the key elements of performance to be demonstrated.

2.3. Work Performance

Event Type	On the job workplace activities carried out as part of the candidates daily work activities.

Types of Items	Installation of LV wiring support/protection – aerial, cable tray/ladder, catenary support, ducts/trunking, metallic conduit, non-metallic conduit, unenclosed support, construction wiring, earthing systems, underground systems, reinstating fire barriers. Installation and termination of LV cables – aluminium conductors/cables, armoured cables, fire rated cables, flexible cords/cables, thermoplastic insulated cables, thermoplastic sheathed flat and circular cables. Installation of LV electrical equipment – alternate supply equipment, lighting, smoke alarms, heating equipment, socket outlets, motors, generators, transformers, switchboards and switchgear. Testing of LV circuits and equipment – isolation, visual inspection, resistance/continuity, insulation, polarity and correct connections.
Coverage	Performance Criteria (PC-UEEEL0012), Range of Conditions (RC-UEEEL0012) and Performance Evidence (PE-UEEEL0012). Essential Performance Capabilities (EPC) 20, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35, 36, 37, 38, 39 and 40.
Staging	Evidence collected via profiling.
Duration	Duration will reflect the learner's record of workplace activities undertaken to meet the requirements and scope of this competency standard unit.
Conditions	Supervised electrical work environment
Resources	Typical domestic/non-domestic, commercial and/or industrial electrical installations, relevant tools and test equipment, relevant workplace safety and operational documentation and specifications.
Application	The Exemplar Profiling evidence gathering tool is designed to: • Facilitate progressive monitoring of a learner's competency development in the workplace. • Assist an RTO assessor, in conjunction with other forms of evidence, to make a judgement of a learner's competency. The evidence gathered is directly aligned to planning, carrying out and completing tasks in an actual workplace, and unlike other tools, highlights the learner's competency development over time. The following indicators are embedded within the tool, and can be assessed using the various reporting functions: • Autonomy (level of support received) • Participation (plan, carry out and complete) • Technical ability (range of activities and equipment)

UEEEL0012
Assessor Instructions
For the set-up of Skills Test Assessments at Workshop PRIOR to assessment

Instructions to Assessors one (1) week prior to actual test day:

1. Assessors are to gather students in classroom to handout 'UEEEL0012 Assessment overview' which outlines the assessments on a part by part basis and gives detailed and clear instructions to students before undertaking any assessments.
2. Assessor can answer questions regarding **'Units Skills Test'** for student clarification.

Instructions to Assessors on actual test day

3. Assessors will be conducting all parts and completion questions consecutively.
   'Planning' and 'Carrying out the task' will be conducted in workshop and 'Completing the Unit Skills Test' will be conducted in the classroom.
   Students are allowed 3 hours.

Part A–Assessors are to prepare training facility for Part A 60 min prior to commencing student assessment:

- Assessors will be implementing hazards for this skills test:
    - Exposed live wiring
    - Sharp tools in booth 6
    - Tools on the floor in booth 6
- Assessors to complete ' **Inspection Test plan' for Assessment**

  Note: The planning phase for unit skills test is done prior to any students 'Carrying out the task'. Ensure all 'Equipment, Suggested Materials and Miscellaneous items' from the Unit Skills Test Task Sheet are ready in the workshop for students to use.
- Gather students that are being assessed in Classroom prior to commencement of unit skills test.
- Assessors to hand out **Unit Skills Test Task Sheets which includes instructions to students**.
- Assessor to engage students in a Q/A session regarding **'Unit Skills Test'** for student clarification purposes.
- Check/Verify ALL notes that students will have prior to student commencing assessment.
- Collect all mobile phones/tablets from students and place into locker room
- Assessor 1 is to take first group of4 x students conducting assessment in classroom and workshop. ***Note: Only 4 x students will be allowed to enter the workshop at any given time under supervision.***
- ***Assessor 2 is to take second group of 4 x students*** conducting assessment in classroom and workshop. ***Note: Only 4 x students will be allowed to enter the***

workshop at any given time under supervision.

Unit Skills Test Task Sheet

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

Learner Name:	**<Learner Name>**	**ID:**	**<Learner ID>**
College/ Campus:	**Revesby**	**Group/ Class:**	**1 or 2**
Learner Signature:	**<Learner Signature>**	**Date:**	**<Date>**

Final Result of UEEEL0012 UST		
The learner has demonstrated a satisfactory performance of identified steps listed.	Yes	No

Assessor Name:	**<Assessor Name>**		
Assessor Signature:	**<Assessors Signature>**	**Date:**	**<Date>**

Comments:
<Assessors Comments>

Instruction:

Unit Skills Test Task Sheet

You are required to install consumer mains, submains, final subcircuits and associated appliances and accessories for the supply of a water heater, lighting, smoke alarm and socket outlets. You are also required to select and arrange all switchboard equipment and earthing, and verify that the installation work complies with the Wiring Rules.

- Time Allowed: 3 hours
- Orange shaded checkpoints are for assessor use only. Entering information in these areas may invalidate your assessment.
- Mobile phones and smart devices must be turned off and not accessed.
- Wait for the assessor to mark your work when requested.
- You will be allowed two (2) attempts at each check point to demonstrate the task described.
- If you are unsure about what you need to do, you should ask your assessor for guidance.
- Whilst carrying out skills activities you must follow all standard workplace procedures (i.e. anti-discrimination, health and safety, unplanned events .) and ensure efficient / sustainable use of materials.

1. Planning the Unit Skills Test

Your assessor will provide the details of the equipment required for this Unit Skills Test.

1.1 Equipment:

- Wiring booth
- Distribution board
- Selection of circuit breakers and RCDs
- Selection of isolators and switches
- Pendant socket-outlet
- 5-pin socket-outlet
- Downlight and ancillary equipment
- Smoke detector
- Digital multimeter
- IR tester
- Battery drill

1.2 Suggested Materials:

- Selection of LV cables, including:
  - TPI
  - Flat TPS
  - Circular TPS
  - Flexible cable
- Selection of wiring supports, including:
  - Cable tray
  - Conduit
  - Catenary wire and supports
- Fittings and fixings for cable tray and conduit
- Snake
- Cable ties
- Cable glands

1.3 Miscellaneous Items:

- Hand tools
- PPE
- AS/NZS 3000 (current edition)

Assessors Guidelines:
Instructions and safety requirements should be clearly explained to the learner at the beginning of the assessment event, including the permitted time.

Recommended time allowed – 3 hours.

The assessor should provide a broad selection of cables, protection devices, supports, accessories, tools and other materials required for the task. The learner should select and arrange all installation elements independently. Unplanned events/conditions can be deemed as any situation for which the learner is unsure of how to proceed. In this event, the learner must seek clarification from the assessor, who should provide guidance, as should be considered reasonable in the workplace.

1.4 Job Specifications

1.4.1 Your task is to install a complete installation consisting of:

- Consumer mains
- Main switchboard (MSB)
- Distribution Switchboard (DB)
- Water heater circuit
- Pendant socket outlet circuit

1. Planning the Unit Skills Test

- Lighting circuit
- Three phase socket outlet circuit
- All earthing, bonding and circuit protection

1.4.2 *Attachment A – Specifications and Documentation* provides details on the required installation arrangements and provides templates to document the work. Review the specifications and consult your assessor to identify and confirm all job requirements.

1.5 Risk Assessment (12 MARKS)

Risk assessment procedure:

- Identify 3 hazards that may exist with this skills practice below
- List the supervision level you will be working under – Direct (D), General (G) or Broad (B)
- List the risk classification – High (H), Medium (M) or Low (L) risk
- List the control measures required for each identified hazard.

Hazard/s Identified	Supervision Level (D, G or B)	Risk Classification (H, M or L)	Control Measure/s
Electricity	**D**	**H**	**Isolation**
Noise	**D**	**L-H**	**PPE – Ear protection**
Sharp Objects	**D**	**L-H**	**PPE – Gloves**
Bad house keeping	**D**	**L-H**	**Clean up work area**

The assessor must assess your work at this point. **(Checkpoint 1)**

Checkpoint 1 – Planning the Work		
Item	**Description of Item**	**Naming**
1	**Learner receives and understands job instructions, seeking clarification as required.**	**Job Instructions**
2	**Learner selects suitable materials and equipment for the specified application and correctly checks and documents the associated components and specifications.**	**Materials and Equipment**

1. Planning the Unit Skills Test

3	**Learner completes risk assessment in consultation with assessor, including:** • **Identification of hazards.** • **Assessment of risks.** **Selection of controls.**	**Risk Assessment**

Full marks will be awarded only after assessor affirms that the above checklist has been met.

 **Checkpoint 1 – Planning the Work**		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Job Instructions		
2	Materials and Equipment		
3	Risk Assessment		
	Assessor Initial:		

2. Carrying Out the Unit Skills Test

2.1 Install Wiring and Equipment (13 MARKS)

16. Install all switchboards, appliances, wiring systems, accessories and switchgear in accordance with the job specifications.

    Ensure that:

    - Safe and sustainable work practices are followed at all times.
    - All equipment selections and installation work complies with the Wiring Rules.
    - All sources of supply, circuits and equipment are isolated.
    - Have your assessor check your work before terminating.

17. The assessor must assess your work at this point. **(Checkpoint 2)**

Checkpoint 2 – Install Wiring and Equipment		
Item	**Description of Item**	**Naming**
1	**Learner correctly installs the distribution switchboard straight and square, and in the correct location.**	**Install Distribution Switchboard**
2	**Learner correctly installs the water heater, isolator and associated supports straight and square, and in the correct locations.**	**Install Water Heater**
3	**Learner correctly installs luminaire, transformer, control switch and associated supports straight and square, and in the correct locations.**	**Install Lighting Equipment**
4	**Learner correctly installs smoke alarm and associated supports straight and square, and in the correct locations.**	**Install Smoke Alarm**
5	**Learner correctly installs required three phase socket outlet mount straight and square, and in the correct location.**	**Install Three Phase Socket Outlet**
6	**Learner correctly installs the required circuit protection equipment in the main switchboard and distribution switchboard.**	**Install Protection Devices**
7	**Learner correctly installs consumer mains cables and associated supports/enclosures and accessories straight and square, using correct cable route (consumer mains).**	**Install Consumer Mains**
8	**Learner correctly installs enclosed TPI wiring and associated accessories straight and square, using correct cable route (water heater circuit).**	**Water Heater Circuit Wiring**
9	**Learner correctly installs unenclosed TPS cable and associated accessories straight and square, using correct cable route (lighting circuit).**	**Lighting Circuit Wiring**
10	**Learner correctly installs catenary wiring system and accessories straight and square, using**	**Pendant Socket Outlet Circuit Wiring**

2. Carrying Out the Unit Skills Test

	correct cable route (pendant socket outlet circuit).	
11	**Learner correctly installs submain wiring system and all associated accessories, as directed by assessor, straight and square, using correct cable route (submain circuit).**	**Install Submains**
12	**Learner correctly installs circular TPS cables on cable tray and associated accessories straight and square, using correct cable route (three phase socket outlet circuit).**	**Three Phase Socket Outlet Circuit Wiring**
13	**Learner undertakes all installation work in accordance with standards, job requirements and approved safe working practices.**	**Installation Practices and Requirements**

Full marks will be awarded only after assessor affirms that the above checklist has been met.

 **Checkpoint 2 – Install Wiring and Equipment**		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Install Distribution Switchboard		
2	Install Water Heater		
3	Install Lighting Equipment		
4	Install Smoke Alarm		
5	Install Three Phase Socket Outlet		
6	Install Protection Devices		
7	Install Consumer Mains		
8	Water Heater Circuit Wiring		
9	Lighting Circuit Wiring		
10	Pendant Socket Outlet Circuit Wiring		
11	Install Submains		
12	Three Phase Socket Outlet Circuit Wiring		
13	Installation Practices and Requirements		
	Assessor Initial:		

2.2 Terminate Wiring and Equipment (8 MARKS)

Terminate all wiring at circuit appliances, accessories and switchgear in accordance with the job specifications.

2. Carrying Out the Unit Skills Test

Ensure that:

- Safe and sustainable work practices are followed at all times.
- All equipment selections and installation work complies with the Wiring Rules.
- Terminations are made to ensure continuity across the connection.
- Measures are taken to prevent stress on terminations.

The assessor must assess your work at this point. **(Checkpoint 3)**

Checkpoint 3 – Terminate Wiring and Equipment		
Item	**Description of Item**	**Naming**
1	Learner correctly and safely terminates consumer mains at the main switchboard.	Terminate Consumer Mains
2	Learner correctly and safely terminates TPI wiring at control device, water heater and associated protection device(s) and main switchboard links/bars.	Terminate Water Heater Circuit
3	Learner correctly and safely terminates flat TPS wiring at functional control switch, luminaire/transformer, smoke alarm and associated protection device(s) and main switchboard links/bars.	Terminate Lighting Circuit
4	Learner correctly and safely terminates flexible cable at pendant socket outlet, and associated protection device(s) and main switchboard links/bars.	Terminate Pendant Socket Outlet Circuit
5	Learner correctly terminates submain wiring system at protection device(s) and switchboard links/bars at the main switchboard and distribution switchboard.	Terminate Submains
6	Learner correctly and safely terminates circular TPS wiring at three phase socket outlet and associated protection device(s) and distribution switchboard links/bars.	Terminate Three Phase Socket Outlet Circuit
7	Learner correctly terminates all required MEN earthing and interconnecting conductors at the main switchboard and distribution switchboard, including provisions for connection of supply metering.	Terminate Earthing and Switchboards
8	Learner performs all termination work in accordance with standards, job requirements and approved safe working practices.	Termination Practices and Requirements

Full marks will be awarded only after assessor affirms that the above checklist has been met.

 **Checkpoint 3 – Terminate and Test Wiring**		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**

2. Carrying Out the Unit Skills Test

1	Terminate Consumer Mains		
2	Terminate Water Heater Circuit		
3	Terminate Lighting Circuit		
4	Terminate Pendant Socket Outlet Circuit		
5	Terminate Submains		
6	Terminate Three Phase Socket Outlet Circuit		
7	Terminate Earthing and Switchboards		
8	Termination Practices and Requirements		
	Assessor Initial:		

Assessors Guidelines:
The learner is required to inspect and test all circuits to verify compliance with Wiring Rules requirements, including:

- **Resistance/continuity of main earth, equipotential bonds and protective earthing.**
- **Insulation resistance of wiring (taking care not to damage to electronic components).**
- **Correct polarity and circuit connections.**
- **The smoke alarm must not be switched by the functional controls.**
- **Fire barriers must be maintained.**
- **Protection devices must be correctly selected and arranged.**
- **Interconnecting switchboard wiring must be correctly sized and connected.**

Pendant socket outlet must be suitably supported without stress on terminations.

2.3 Inspect and Test the Installation (9 MARKS)

Inspect the installation work to verify compliance with the Wiring Rules. Document the outcomes of the inspection in the table provided below:

Visual Inspection Checklist				
Item		**Yes**	**No**	**Comments/Details**
1	Wiring supports/enclosures are firmly secured in place.	✓	□	

2. Carrying Out the Unit Skills Test

2	Fire-rating of all fire barriers has been maintained/reinstated.	✓	□	
3	Cables are suitably supported to prevent undue sagging.	✓	□	
4	Cables are protected against damage at enclosure entry points.	✓	□	
5	Enclosures and cables correctly terminated at enclosures.	✓	□	
6	Adequate cable length provided to prevent strain on terminations.	✓	□	
7	Exposed/extraneous conductive parts are equipotentially bonded.	✓	□	
8	Smoke alarm is unswitched.	✓	□	
9	Switchboard equipment, including circuit neutrals, are correctly marked/identified.	✓	□	

18. Test the installation to verify the earth resistance complies with the Wiring Rules. Document test results and outcomes in the following table:

(9 MARKS)

Earth Resistance					
Meter:	**Multimeter / Ohm Meter**	**Range:**	**OHMS**		
Item/Circuit		**Test Results**		**AS/NZS 3000 Compliance**	
Main Earth		**0-0.9 OHMS**		**□ Yes**	□ No

2. Carrying Out the Unit Skills Test

Equipotential Bonding	**0-0.9 OHMS**	□ **Yes**	□ No
Submains	**0-0.9 OHMS**	□ **Yes**	□ No
Water heating	**0-0.9 OHMS**	□ **Yes**	□ No
Lighting	**0-0.9 OHMS**	□ **Yes**	□ No
Pendant S/O	**0-0.9 OHMS**	□ **Yes**	□ No
Three phase S/O	**0-0.9 OHMS**	□ **Yes**	□ No

19. Test the installation to verify the insulation resistance complies with the Wiring Rules. Document test results and outcomes in the following table:

(14 MARKS)

Insulation Resistance				
Meter:	**IR Tester**	**Range:**	**500v d.c**	
Item/Circuit	**Test Results**		**AS/NZS 3000 Compliance**	
Consumer mains	**INFINITY**		□ **Yes**	□ No
Submains	**INFINITY**		□ **Yes**	□ No
Water heating	**INFINITY**		□ **Yes**	□ No
Lighting	**INFINITY**		□ **Yes**	□ No
Pendant S/O	**INFINITY**		□ **Yes**	□ No
Three phase S/O	**INFINITY**		□ **Yes**	□ No

20. Test the installation to verify correct circuit connections. Document test results and outcomes in the following table:

(14 MARKS)

Correct Circuit Connections				
Meter:	**MULTIMETER**	**Range:**	**OHMS**	
Item/Circuit	**Test Results**		**AS/NZS 3000 Compliance**	
Consumer mains	**PASS**		□ **Yes**	□ No

2. Carrying Out the Unit Skills Test

Submains	**PASS**	□ **Yes**	□ No
Water heating	**PASS**	□ **Yes**	□ No
Lighting	**PASS**	□ **Yes**	□ No
Pendant S/O	**PASS**	□ **Yes**	□ No
Three phase S/O	**PASS**	□ **Yes**	□ No

21. The assessor must assess your work at this point. **(Checkpoint 4)**

Checkpoint 4 – Inspect and Test the Installation		
Item	**Description of Item**	**Naming**
1	**Learner inspects the installation work as per the checklist provided, documents outcomes in the tables provided, and rectifies any defects if present.**	**Visual Inspection**
2	**Learner correctly and safely tests the installation to verify compliance of the earth resistance/continuity, documents outcomes in the tables provided, and rectifies any defects if present.**	**Earth Resistance**
3	**Learner correctly and safely tests the installation to verify compliance of the insulation resistance, documents outcomes in the tables provided, and rectifies any defects if present.**	**Insulation Resistance**
4	**Learner correctly and safely tests the installation to verify correct polarity and circuit connections, documents outcomes in the tables provided, and rectifies any defects if present.**	**Circuit Connections**

Full marks will be awarded only after assessor affirms that the above checklist has been met.

 **Checkpoint 4 – Inspect and Test Wiring and Equipment**		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Visual Inspection		
2	Earth Resistance		
3	Insulation Resistance		
4	Circuit Connections		
	Assessor Initial:		

3. Completing the Unit Skills Test

3. Completing the Unit Skills Test

Finalise/update all documentation in Attachment A to represent the 'as-installed' condition of your electrical installation.

Return all tools and equipment to their correct places and clean the work area, then answer the following completion questions.

Completion Questions

List at least two (2) precautions that should be taken when handling or testing electronic components of electrical equipment. **(2 MARKS)**

Examples of acceptable answers include:

- **Safe isolation and safe discharge of capacitors.**
- **Don't apply IR test voltages across electronic components (may need to disconnect from circuit).**

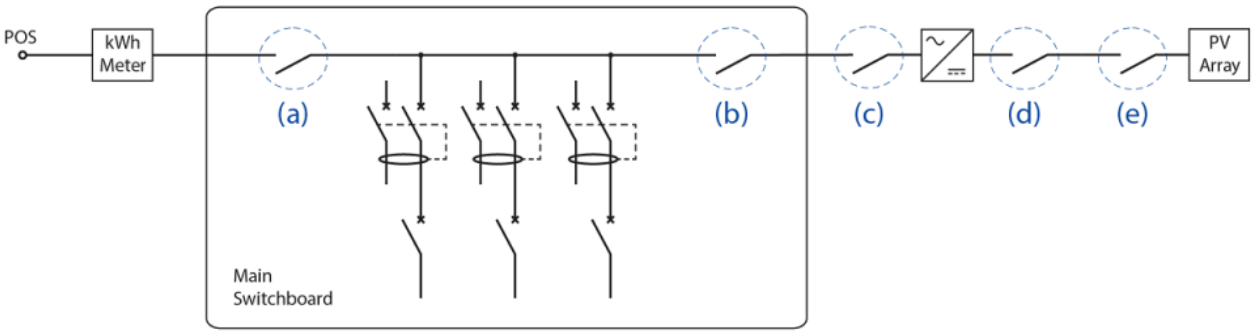
Handle circuit boards with care, don't touch components, hold at edges

Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.

Do not test IC Boards with IR Tester because 250-500V DC can damage them

Carefully mark the terminals and connections before disconnecting them

Identify each of the key installation components in the multiple supply system pictured, by indicating the corresponding letter next to each component. **(5 MARKS)**



Supply System Components	Corresponding Letter
PV array disconnector:	e
Solar supply main switch:	b
Grid supply main switch:	a

3. Completing the Unit Skills Test

Inverter d.c. disconnector:	**d**
Inverter a.c. disconnector:	**c**

22. The space below is to allow for an additional question to be provided at the time of your assessment ***if deemed necessary by your assessor***.

If your assessor does not wish to provide an additional question you may leave the spaces below blank.

Q **While preparing to test an installation you find an equipotential bond on the riser bracket. Describe what you would do prior to continuing the testing process. (1 MARK)**

A Disconnect the equipotential bond on the riser bracket and attach a note in the switchboard so you remember to reconnect it.

Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.

What is testing procedure for ELCB?

Test the ELCB or RCCB by pressing the 'Test' button. The ELCB or RCCB switch will flip down and cut off all power supply in home. If the ELCB or RCCB switch does not flip down, it is faulty.

23. The assessor must assess your work at this point. **(Checkpoint 5)**

Checkpoint 5 – Completing the Work		
Item	**Description of Item**	**Naming**
1	**Learner completes 'as-installed' documentation including equipment layout diagram and circuit schedule using the templates provided.**	**As-Installed Documentation**
2	**Learner adequately cleans up the work area and returns all materials and equipment to their correct places as directed.**	**Clean Up & Store Equipment**
3	**All work planned, carried out and completed in accordance with relevant workplace policies and procedures (i.e. anti-discrimination, health and safety, dealing with unplanned events .).**	**Follow Procedures**

Full marks will be awarded only after assessor affirms that the above checklist has been met.

3. Completing the Unit Skills Test

 **Checkpoint 5 – Completing the Work**		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	As-Installed Documentation		
2	Clean Up & Store Equipment		
3	Follow Procedures		
4	Question 1		
5	Question 2		
6	Question 3 (Optional)		
	Assessor Initial:		

Attachment A – Specifications and Documentation

Part 1 – Mains and Submains

The following mains and submains are to be installed:

- Consumer mains to be connected between the point of supply (POS) and the main switchboard (MSB).
- Submains to be connected between the MSB and a distribution switchboard (DB).

Document the wiring systems to be used for the consumer mains and submains in the following table (as specified by your assessor). In addition specify the cable size, and type and nominal current rating of associated protection device(s): **(6 MARKS)**

Circuit	Wiring System	Size	Protection Device
Consumer Main	PVC Conduit	40mm	63A MCB
Submain	PVC Conduit	32mm	50A MCB

Full marks will be awarded only after assessor affirms the above answers

Part 2 – Final Subcircuits – MSB

Wiring, appliances and accessories to be installed for the following circuits supplied from the MSB:

- Water heater circuit consisting of a water heater and associated isolation device.
- Socket outlets circuit consisting of at least one (1) single phase pendant socket outlet.
- Lighting circuit consisting of at least one (1) downlight, switched by a single light switch, and at least one (1) unswitched smoke alarm.

Document the specifications for the equipment and associated wiring using the following tables:

Water Heater Circuit (4 MARKS)	
Water Heater Type:	250 Litre HWS
Voltage/Current Ratings:	230V
Wiring System:	TPI cables enclosed in PVC conduit
Conductor Size:	2.5MM
Circuit Protection:	20A RCBO

Full marks will be awarded only after assessor affirms the above answers

Pendant Socket Outlet Circuit (3 MARKS)	
Voltage/Current Ratings:	230 V
Wiring System:	Flexible cable on a cable tray then supported on a catenary system

Conductor Size:	**2.5mm**
Circuit Protection:	**20A RCBO**

Full marks will be awarded only after assessor affirms the above answers

Lighting Circuit (5 MARKS)	
Downlight Type:	**12V**
Ancillary Equipment:	**N/A**
Voltage/Current Ratings:	**230V**
Smoke Alarm Type:	**Photoelectric**
Wiring System:	Flat TPS cable clipped to surface
Conductor Size:	**1.5mm**
Circuit Protection:	**16A RCBO**

Full marks will be awarded only after assessor affirms the above answers

Part 3 – Final Subcircuits – DB

Wiring and accessories to be installed for the following circuits supplied from the DB:

- Socket outlets circuit consisting of a three phase 5-pin socket outlet.

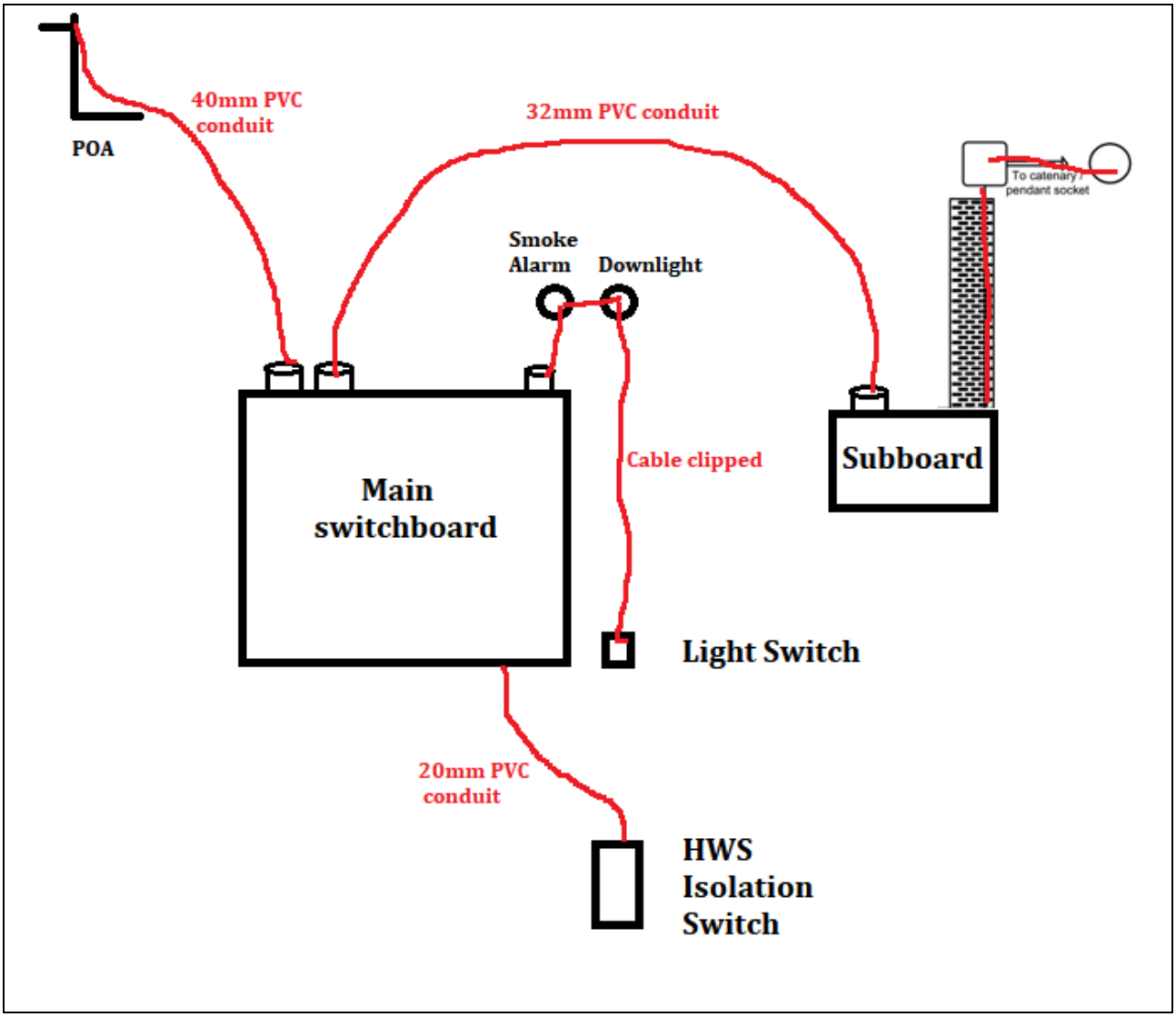
Document the specifications for the equipment and associated wiring using the following tables:

Three Phase 5-Pin Socket Outlet Circuit (3 MARKS)	
Voltage/Current Ratings:	**415V**
Wiring System:	Circular TPS cable tied to cable tray
Conductor Size:	**2.5mm**
Circuit Protection:	**20A RCBO**

Full marks will be awarded only after assessor affirms the above answers

Part 4 – Equipment Locations

Your assessor will specify the locations for each item of equipment to be installed. In the space provided below, draw a basic skh to represent the installation layout: **(5 MARKS)**



Full marks will be awarded only after assessor affirms the student has the above drawing.

Assessor Guide

UEEEL0014

1. Unit Assessment Plan Overview

Competency Standard Unit (CSU)	**UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits**
CSU Descriptor	This unit involves the skills and knowledge required to isolate, test and troubleshoot electrical circuits operating at voltages up to 1,000 volts (V) alternating current (a.c.) or 1,500 V direct current (d.c.). It includes working safely, isolating electrical circuits, evaluating low voltage (LV) electrical circuits, applying systematic fault-finding procedures, conducting repairs and completing the necessary documentation. The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical circuits and equipment which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c. Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required. Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.
Purpose of Assessor Guide	The purpose of the Assessor Guide is to provide the specification for the evidence gathering tools to meet the competency standard unit for the CIII in Electrotechnology Electrician qualification.
Sequence	Before undertaking the evidence gathering events in this UAP, a learner is to have met the requirements of: • UEECD0007 Apply work health and safety regulations, codes and practices in the workplace • UEECD0019 Fabricate, assemble and dismantle utilities industry components • UEECD0020 Fix and secure electrotechnology equipment • UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications

<table>
<tr><td></td><td colspan="3">• UEEEL0003 Arrange circuits, control and protection for electrical installations
• UEEEL0020 Solve problems in low voltage a.c. circuits
• UEEEL0023 Terminate cables, cords and accessories for low voltage circuits
• UEEEL0019 Solve problems in direct current (d.c.) machines
• UEEEL0021 Solve problems in magnetic and electromagnetic devices
• UEEEL0024 Test and connect alternating current (a.c.) rotating machines
• UEEEL0025 Test and connect transformers
• UEEEL0047 Identify, shut down and restart systems with alternate supplies and
• UEECD0043 Solve problems in direct current circuits or
• UEECD0044 Solve problems in multiple path circuits
• UEECD0046 Solve problems in single path circuits</td></tr>
<tr><td rowspan="5">Unit aspects addressed in this UAP</td><td>Code</td><td colspan="2">Specification Title</td></tr>
<tr><td>PC – UEEEL0014</td><td colspan="2">Performance Criteria</td></tr>
<tr><td>RC – UEEEL0014</td><td colspan="2">Range of Conditions</td></tr>
<tr><td>KE – UEEEL0014</td><td colspan="2">Knowledge Evidence</td></tr>
<tr><td>PE – UEEEL0014</td><td colspan="2">Performance Evidence</td></tr>
<tr><td rowspan="4">Number of Evidence Sources</td><td rowspan="3">3</td><td>UEEEL0014-UKT</td><td>Unit Knowledge Test</td></tr>
<tr><td>UEEEL0014-UST</td><td>Unit Skills Test</td></tr>
<tr><td>UEEEL0014-WPE</td><td>Work Performance Experience</td></tr>
<tr><td colspan="3">Note: This unit mandates collection of workplace evidence, as stated in the unit Assessment Conditions:

“In addition, evidence of Performance Evidence items of this unit marked with a hash (#) must be gathered in authentic workplace operational conditions (not simulated) before final determination of competence in this unit can be made.”</td></tr>
</table>

2.Assessment

2.1. Assessment Conditions andContext

Using the Evidence Gathering Tools/Activities provided and the detailed mapping within this document will assist RTOs in determining if sufficient evidence has been gathered to ensure full coverage of the unit. Identified gaps in knowledge, skills or work performance evidence may be addressed through a variety of means including, but not limited to, written tests, onlinequizzes, practical tests, and/or technical interviews and work performance.

Evidence Gathering Tools/Activities	Conditions	Reporting Requirement
Unit Knowledge Test (UEEEL0014-UKT)	Knowledge Test undertaken from nationally developed question knowledge test bank.	**Graded Result**
Unit Skills Test (UEEEL0014-UST)	Unit Skills Test covers safe isolation of circuits, visual inspection, mandatory testing, and fault finding and repair of LV electrical equipment, including alternative supplies in the Revesby Facility	Satisfactory/ Not Satisfactory Recorded on customized marking forms. Then result logged into Energy Space records.
Work Performance (UEEEL0014-WPE)	Recording of workplace activities undertaken to meet the requirements and scope of this competency standard unit	Satisfactory/ Not Satisfactory E- Profiling work cards logged into system. Unit report generated

Evidence Gathering Tools Specifications:

2.2. Unit Knowledge Test

Event Type	Unit Knowledge Test
Types of Items	Learner is required to complete a knowledge test (43 questions) based on multiple choice (44% of marks), matching (39% of marks) and diagram type (17% of marks).
Coverage	Knowledge Evidence (KE-UEEEL0014). Essential Performance Capabilities (EPC) 30, 31, 50, 54 and 55.
Staging	After Unit Learning Plan (ULP) Knowledge and Skills Topics 1 to 7 have been completed.
Duration	2 hours.
Assessment Conditions	This is to be conducted at the facility in a classroom environment (off the job). It must be supervised. The student will log in to Energy Space. The student will be set up to do the computer-generated test from national E-Oz Energy Skills Australia online test bank.
Resources required	Computer and log in for Energy Space Computer generated test from national E-Oz Energy Skills Australia online test bank.
Application	The Unit Knowledge Test aligns directly to the knowledge that underpins the safe and correct application of skills. It should be noted that the evidence gathered by Knowledge Tests is limited in its capacity to indicate whether a person can actually plan, carry out or complete a skills-based task, with some exceptions, for example: • Evidence of problem solving skills can be gathered by UKTs in some contexts. • Performance criteria (PCs) relating to the selection of tools, materials and equipment are heavily reliant on certain knowledge dot points that are addressed in UKTs. The evidence collected by a Unit Knowledge Test is not as directly aligned to what constitutes competency as other forms of evidence (such as that gathered by a Skills Test). It is recommended that Knowledge Test evidence is interpreted primarily as an indicator of: • The reliability of other evidence. • The likelihood that a learner will be capable of applying related skills safely and autonomously in different contexts. • The likelihood that the learner will be capable of dealing with nonstandard situations.

Unit Skills Test

Event Type	**Unit Skills Test**
Types of Items	Skills Test covering the following tasks: • Task A – Safe Isolation Procedures • Task B – Visual Inspection • Task C – Mandatory Testing and Fault Finding
Coverage	Performance Criteria (PC-UEEEL0014), Performance Evidence (PEUEEEL0014), and some aspects of the Range of Conditions (RC-UEEEL0014) and Knowledge Evidence (KE-UEEEL0014). Essential Performance Capabilities (EPC) 30, 31, 50, 54 and 55.
Staging and duration	Total duration of 4 hours, with the following suggested arrangement: • Task A – 1 hour – May be attempted after completion of ULP Knowledge and Skills Topics 1 and 2 • Task B – 45 minutes – May be attempted after completion of ULP Knowledge and Skills Topics 1 to 3 • Task C – 2 hour and 15 minutes – May be attempted after completion of ULP Knowledge and Skills Topics 1 to 7
Assessment Conditions	This is to be conducted at the facility. It must be supervised.
Resources required	Unit Skills Test Task Sheet (USTS), Unit Skills Test Assessor Guide (USAG), current versions of AS/NZS 3000, AS/NZS 3017 and AS/NZS 4836, PPE and the following task specific equipment: • Task A – Three phase motor circuit, multimeter, IR tester, isolation and lockout equipment • Task B – Existing installation with visual defects for identification (recommended 5 defects per session/learner) • Task C – Existing installation, including an alternative supply (basic UPS recommended) with switchable/programmable faults for identification (recommended 5 faults per session/learner), multimeter, IR tester, isolation and lockout equipment customized Unit Skills Tests facility and task supporting documents and attachments. UST recording forms Results are recorded on forms then transferred to the Energy Space LMS student records.
Associated Documents	Unit Skills Test Task Sheet (USTS) – provides learner instructions relating to the test conditions and activities, and provides a convenient means of documenting the learner's performance and associated observations. Unit Skills Test Assessor Guide (USAG) – indicates the intent and structure of the test, and provides recommendations and guidelines to the assessor in relation to administering the test, and the key elements of performance to be demonstrated.

2.3. Work Performance

Event Type	On the job workplace activities carried out as part of the candidates daily work activities (not simulated).
Types of Items	Maintaining LV circuits and equipment – switchboards, rotating machines, heating equipment, lighting, socket outlets, single and three phase circuits. Fault finding

	and repairing LV circuits and equipment – short circuits, insulation failure, incorrect connections, component/mechanical failure, unsafe conditions, high impedance neutral, dismantling/assembling equipment, repairing/replacing components. Testing of LV circuits and equipment – visual inspection, earth resistance/continuity, insulation resistance, polarity, phase rotation, correct connections, earth fault loop impedance, RCD operation, load test, voltage.
Coverage	Performance Criteria (PC-UEEEL0014), Range of Conditions (RC-UEEEL0014) and Performance Evidence (PE-UEEEL0014). Essential Performance Capabilities (EPC) 30, 31, 50, 54 and 55
Staging	Evidence collected via profiling.
Duration	Duration will reflect the learner's record of workplace activities undertaken to meet the requirements and scope of this competency standard unit.
Conditions	Supervised electrical work environment
Resources	Typical domestic/non-domestic, commercial and/or industrial electrical installations, relevant tools and test equipment, relevant workplace safety and operational documentation and specifications.
Application	The Exemplar Profiling evidence gathering tool is designed to: • Facilitate progressive monitoring of a learner's competency development in the workplace. • Assist an RTO assessor, in conjunction with other forms of evidence, to make a judgement of a learner's competency. The evidence gathered is directly aligned to planning, carrying out and completing tasks in an actual workplace, and unlike other tools, highlights the learner's competency development over time. The following indicators are embedded within the tool, and can be assessed using the various reporting functions: • Autonomy (level of support received) • Participation (plan, carry out and complete) • Technical ability (range of activities and equipment)

Assessor Guide

UEEEL0018

[redacted]

Competency Standard Unit (CSU)	**UEEEL0018 – Select wiring systems and select cables for low voltage electrical installations**	
CSU Descriptor	This unit involves the skills and knowledge required to select wiring systems and cables for electrical installations operating at voltages up to 1,000 volt (V) alternating current (a.c.) or 1,500 V direct current (d.c.). It includes application of wiring systems and cable types, selecting wiring system compatible with the installation conditions, selecting cables that comply with required current-carrying capacity and voltage drop and earth fault-loop impedance limitations, coordinating between protective devices and conductors, and documenting selection decisions. The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.. Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required. Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.	
Purpose of Assessor Guide	The purpose of the Unit Assessment Plan (UAP) is to provide the specification and mapping for the evidence gathering tools required to satisfy the Assessment Requirements of this Competency Standard Unit (CSU).	
Sequence	Before undertaking the evidence gathering events in this UAP, a learner is to have met the requirements of: • UEECD0007 Apply work health and safety regulations, codes and practices in the workplace • UEECD0019 Fabricate, assemble and dismantle utilities industry components • UEECD0020 Fix and secure electrotechnology equipment • UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications • UEEEL0003 Arrange circuits, control and protection for electrical installations • UEEEL0020 Solve problems in low voltage a.c. circuits • UEEEL0023 Terminate cables, cords and accessories for low voltage circuits • UEEEL0019 Solve problems in direct current (d.c.) machines • UEEEL0021 Solve problems in magnetic and electromagnetic devices • UEEEL0008 Evaluate and modify low voltage heating equipment and controls • UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls • UEEEL0010 Evaluate and modify low voltage socket outlets circuits • UEEEL0024 Test and connect alternating current (a.c.) rotating machines • UEEEL0025 Test and connect transformers and • UEECD0043 Solve problems in direct current circuits or • UEECD0044 Solve problems in multiple path circuits • UEECD0046 Solve problems in single path circuits	
Unit aspects addressed in this UAP	**Code**	**Specification Title**
	PC-UEEEL0018	Performance Citeria

	KE-UEEEL0018	Knowledge Evidence	
	PE-UEEEL0018 RC-UEEEL0018	Performance Evidence Range of Conditions	
Number of Evidence Sources	3	UEEEL0018-UKT	Unit Knowledge Test
		UEEEL0018-UST	Unit Skills Test
		UEEEL0018-WPE	Work Performance Experience

Note: This unit mandates collection of workplace evidence, as stated in theunit Assessment Conditions:

"In addition, evidence of Performance Evidence items of this unit marked witha hash (#) must be gathered in authentic workplace operational conditions (not simulated) before final determination of competence in this unit can be made."

2.1. Assessment Conditions and Context

Using the Evidence Gathering Tools/Activities provided and the detailed mapping within this document will assist RTOs in determining if sufficient evidence has beengathered to ensure full coverage of the unit.

Identified gaps in knowledge, skills or work performance evidence may be addressedthrough a variety of means including, but not limited to, written tests, online quizzes,practical tests, and/or technical interviews and work performance.

Evidence Gathering Tools/Activities	**Conditions**	**Reporting Requirement**
Unit Knowledge Test (UEEEL0018-UKT)	Knowledge Test undertaken from nationally developed question knowledge test bank.	**Graded Result**
Unit Skills Test (UEEEL0018-UST)	Unit Skills Test covers the selection of wiring systems and cables that complywith required current-carrying capacityand voltage drop and earth fault-loop impedance limitations for LV electrical installations..	Satisfactory/ Not Satisfactory Recorded on customized marking forms. Then result logged into Energy Space records.
Work Performance (UEEEL0018-WPE)	Recording of activities undertaken in a simulated or real workplace environmentto meet the requirements and scope of this competency standard unit	Satisfactory/ Not Satisfactory E- Profiling work cards logged into system. Unit report generated

Evidence Gathering Tools Specifications:

2.2. Unit Knowledge Test

Event Type	**Unit Knowledge Test**
Types of Items	Learner is required to complete a knowledge test (38 questions) based on multiple choice (50% of marks), matching (24% of marks), diagram type (13% of marks) and calculations (13% of marks).
Coverage	Knowledge Evidence (KE-UEEEL0018). Essential Performance Capabilities (EPC) 10, 20, 21, 22, 23, 24.
Staging	After Unit Learning Plan (ULP) Knowledge and Skills Topics 1 to 10 have been completed.
Duration	2 hours
Assessment Conditions	Supervised (invigilated) classroom environment (off the job). Relevant Australian Standards and Codes of Practice can be used. This is to be conducted at the facility in a classroom environment (off the job). It must be supervised. The student will log in to Energy Space. The student will be set up to do the computer-generated test from national E-Oz Energy Skills Australia online test bank.
Resources required	Computer and log in for Energy Space Computer generated test from national E-Oz Energy Skills Australia online test bank.
Application	The Unit Knowledge Test aligns directly to the knowledge that underpins the safe and correct application of skills. It should be noted that the evidence gathered by Knowledge Tests is limited in its capacity to indicate whether a person can actually plan, carry out or complete a skills-based task, with some exceptions, for example: • Evidence of problem solving skills can be gathered by UKTs in some contexts. • Performance criteria (PCs) relating to the selection of tools, materials and equipment are heavily reliant on certain knowledge dot points that are addressed in UKTs. The evidence collected by a Unit Knowledge Test is not as directly aligned to what constitutes competency as other forms of evidence (such as that gathered by a Skills Test). It is recommended that Knowledge Test evidence is interpreted primarily as an indicator of: • The reliability of other evidence. • The likelihood that a learner will be capable of applying related skills safely and autonomously in different contexts.

	• The likelihood that the learner will be capable of dealing with nonstandard situations.

Unit Skills Test

Event Type	**Unit Skills Test**
Staging	After ULP Knowledge and Skills Topics 1 to 10 have been completed.
Types of Items	Skills Test covering the following tasks: • Selecting consumermains cables • Selecting submains cables • Selecting final subcircuits cables and protection • Applying local service andinstallation rules (SIRs)
Coverage	Performance Criteria (PC-UEEEL0018), Performance Evidence (PEUEEEL0018), and some aspects of the Range of Conditions (RC-UEEEL0018) and Knowledge Evidence (KE-UEEEL0018). Essential Performance Capabilities (EPC) 10, 20, 21, 22, 23, 24.
Duration	4 hours
Assessment Conditions	This is to be conducted at the facility. It must be supervised. classroom. Relevant Australian Standards, Non-programmable calculators and basic drawing instruments may be used.
Resources required	customized Unit Skills Tests facility and task supporting documents and attachments.UST recording forms Results are recorded on forms then transferred to the Energy Space LMS student records. Unit Skills Test Assessor Guide (USAG),

	calculators, AS/NZS 3000 Wiring Rules – current edition, AS/NZS 3008.1.1 Electrical Installations – Selection of Cables.
Application	The Unit Skills Test gathers direct evidence of a learner's ability to plan, carry out and complete the required tasks in a simulated/controlled environment. It also indirectly gathers evidence that a learner has or does not have the knowledge underpinning safe and correct application of these skills.

2.3. Work

Performance

Event Type	On the job workplace activities carried out as part of the candidates daily work activities (not simulated).
Types of Items	Selecting LV wiring and equipment, including cables, supports and enclosures, protection devices, control and isolation devices, earthing equipment, alternate supply equipment Arranging LV wiring and equipment, including determining maximum demand, division of circuits, coordination of wiring and circuit protection devices Installing, maintaining and repairing LV appliances and accessories
Coverage	Performance Criteria (PC-UEEEL0018), Range of Conditions (RC-UEEEL0018) and Performance Evidence (PE-UEEEL0018).
Staging	Evidence collected from the workplace via profiling on a regular basis.
Duration	n Duration will reflect the learner's record of workplace activities undertaken to meet the requirements and scope of this competency standard unit.
Conditions	Supervised electrical work environment
Resources	Typical domestic/non-domestic, commercial and/or industrial electrical installations, relevant workplace safety and operational documentation.
Application	The Exemplar Profiling evidence gathering tool is designed to: • Facilitate progressive monitoring of a learner's competency development in the workplace. • Assist an RTO assessor, in conjunction with other forms of evidence, to make a judgement of a learner's competency. The evidence gathered is directly aligned to planning, carrying out and completing tasks in an actual workplace, and unlike other tools, highlights the learner's competency development over time. The following indicators are embedded within the tool, and can be assessed using the various reporting functions: • Autonomy (level of support received) Participation (plan, carry out and complete)

	• Technical ability (range of activities and equipment)

UEEEL0018

Assessor Instructions For the set-up of SkillsTest Assessments at Workshop

PRIOR to assessment

Instructions to Assessor one (1) week prior to actual test day:

1. Assessors are to gather students in classroom to handout 'UEEEL0018 Assessment overview' whichoutlines the assessments on a part by part basis and gives detailed and clear instructions to students before undertaking any assessments.
2. Assessor can answer questions regarding **'Units Skills Test'** for student clarification.

Instructions to Assessor on actual test day

3. Assessors will be conducting Part A and completion questions consecutively.
   'Planning' and 'Carrying out the task' will be conducted in workshop and 'Completing the UnitSkills Test' will be conducted in the classroom.
   Students are allowed 1 hour to complete

   ALL PARTS –Assessors are to prepare training facility for Part A 60 min prior to commencing student assessment:

   - Assessors will be implementing hazards for this skills test:
     - **Bags on the floor**
     - **Also students need to address body fatigue due to ergonomics**
   - Assessors to complete ' **Inspection Test plan' for Assessment**
     Note: The planning phase for unit skills test is done prior to any students 'Carrying out the task'. Ensure all 'Equipment, Suggested Materials and Miscellaneous items'from the Unit Skills Test Task Sheet are ready in the classroom for students to use.
   - Gather students that are being assessed in Classroom prior to commencement ofunit skills test.
   - Assessors to hand out **Unit Skills Test Task Sheets which includes instructions tostudents**.
   - Assessor to engage students in a Q/A session regarding **'Unit Skills Test'** for studentclarification purposes.
   - Check/Verify ALL notes that students will have prior to student commencingassessment.
   - Collect all mobile phones/tablets from students and place into locker room
   - Assessor 1 is to take first group of4 x students conducting assessment in classroom
   - ***Note: Only 4 x students will be allowed to enter the classroom at any given timeunder supervision.***

Handouts	Checklist
AS/NZS 3000: Wiring Rules	1 copy per 4 students – resource library
AS/NZS 3008.1.1	1 copy per 4 students – resource library
Local Service and installation Rules	1 copy per 4 students – resource library
UEEEL0018 Unit Skills Test Task Sheet	1 per student - printed

Unit Skills Test Task Sheet

UEEEL0018 Select wiring systems and select cables for lowvoltage electrical installations

Learner Name:	**<STUDENT NAME>**	**ID:**	**<STUDENT ID>**
College/ Campus:	Revesby	**Group/ Class:**	**1 or 2**
Learner Signature:	**<STUDENT SIGNATURE>**	**Date:**	**<DATE>**

Final Result of UEEEL0018 UST		
The learner has demonstrated a satisfactory performance ofidentified steps listed.	Yes	No

Assessor Name:			
Assessor Signature:		**Date:**	

Comments: **THIS UNIT SKILLS TEST WILL BE CONDUCTED IN THE CLASS ROOM**

Instruction:

This test is broken into four parts – Parts A to D. In Parts A, B and C, you will apply Australian Standards to select consumer mains, submains and final subcircuit cablesfor a given multiple domestic electrical installation. In Part D you will apply your local Service and Installation Rules to determine particular requirements in your jurisdiction.

- Time Allowed (to be specified by assessor):
- Orange shaded checkpoints are for assessor use only. Entering information inthese areas may invalidate your assessment.
- Mobile phones and smart devices must be turned off and not accessed.
- Wait for the assessor to mark your work when requested.
- You will be allowed two (2) attempts at each check point to demonstrate thetask described.
- If you are unsure about what you need to do, you should ask your assessorfor guidance.

Whilst carrying out skills activities you must follow all standard workplace procedures (i.e. anti-discrimination, health and safety, unplanned events .) andensure efficient / sustainable use of materials.

Unit Skills Test Task Sheet

Assessors Guidelines:

Instructions and safety requirements should be clearly explained to the learner at the beginning of the assessment event, including the permitted time – to be indicated onthe Unit Skills Test Task Sheet (USTS) cover page.

Recommended time allowed – 1 hour and 30 minutes.

The learner will require access to current versions of the following documents:

- AS/NZS 3000
- AS/NZS 3008.1.1
- Local Service and Installation Rules (SIRs).
- Worked solutions to this test have been determined using AS/NZS 3000:2018 and AS/NZS 3008.1.1:2017, and are provided as Attachment A of this document. Note that a learner ‘s responses do notneed to be identical to these worked solutions – successful performance should be considered as the appropriate application of standards resulting in equipment selections that are practical, economical, sustainable, whilst meeting all safety and performance requirements.

1. Planning the Unit Skills Test

Your assessor will provide the details of the equipment required for this UnitSkills Test.

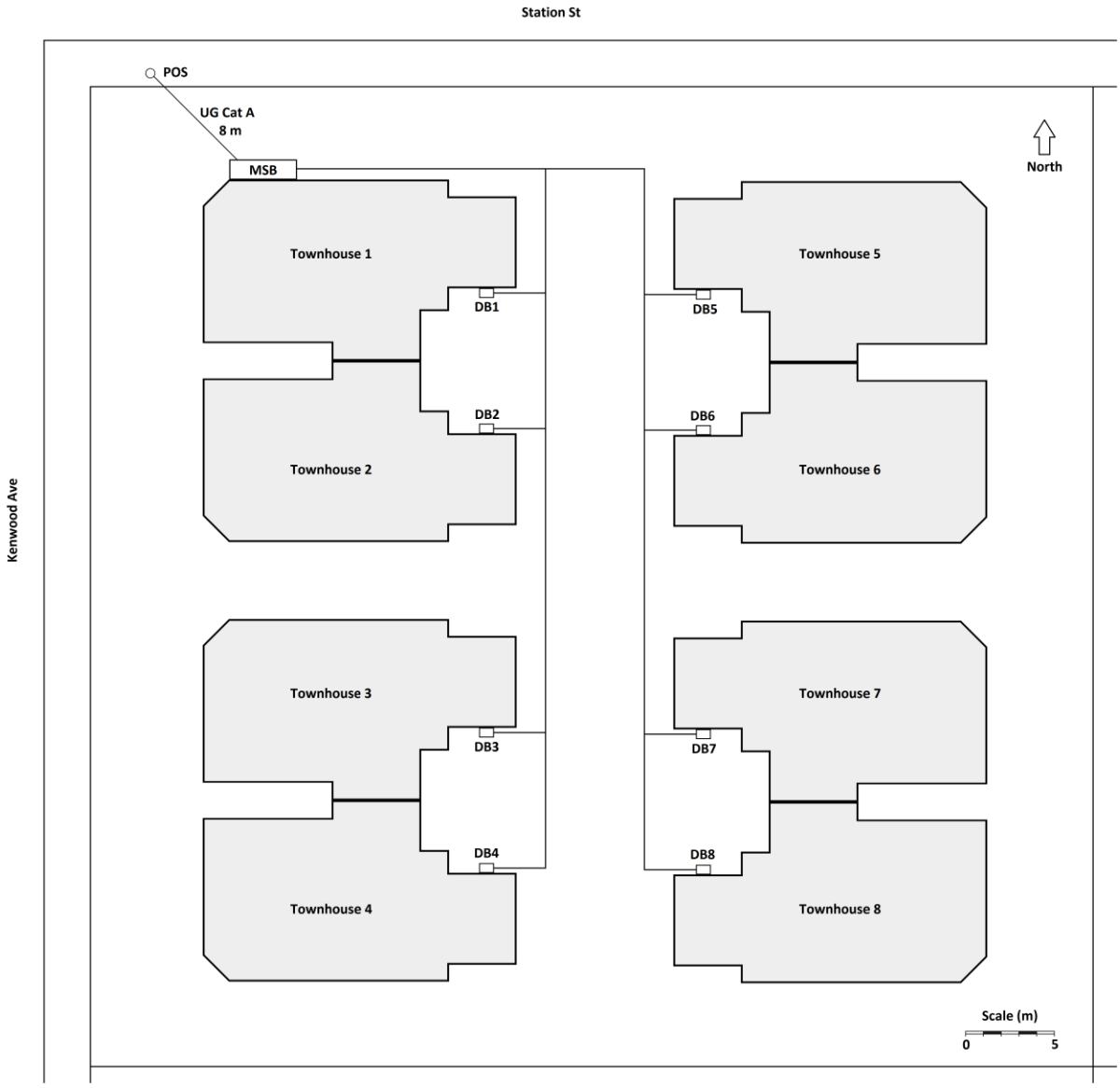
1.1 Equipment:	**1.2 Suggested Materials:**	**1.3 MiscellaneousItems:**
• AS/NZS 3000 • AS/NZS 3008.1.1 • Local Service and Installation Rules	• Ruler • Calculator	• Pens/Pencils

1.4 Installation Specifications

You are required to plan certain portions of the electrical installation for ablock of 8 luxury townhouses. In preparation for the task, review the jobspecification drawings and schedules for the installation, provided below.

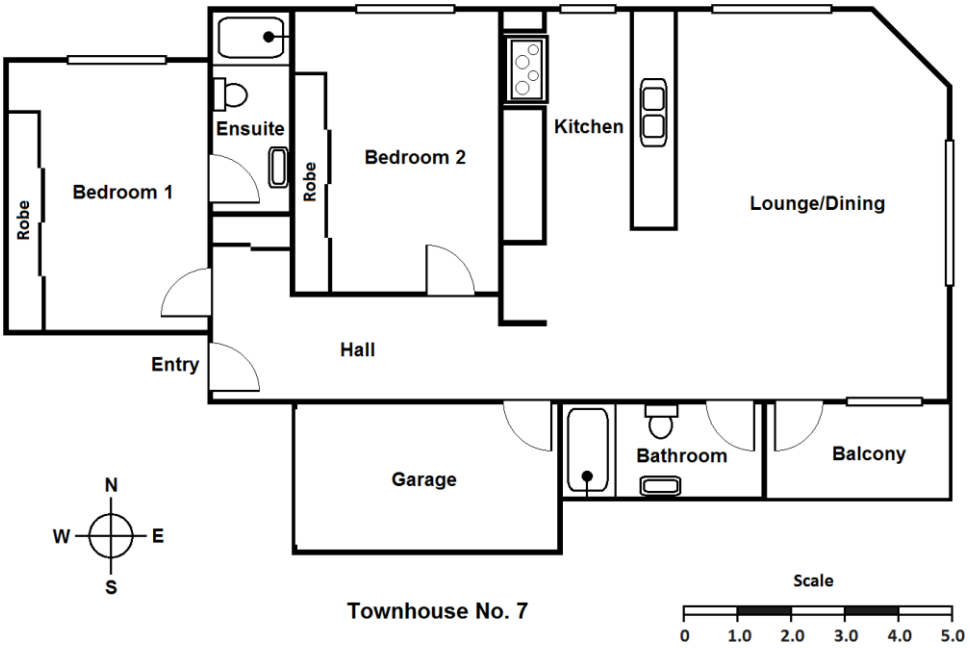
<u>Part 1 – Site Plan</u>

1. Planning the Unit Skills Test



Part 2 – Floor Plan

1. Planning the Unit Skills Test



Schedule of Common Loads	
Qty.	**Type**
29	14 W, 230 V CFL bollard fitting
12	200 W, 230 V halogen floodlight
10	10 A, 230 V double socket-outlet
6	15 A, 230 V single socket-outlet (for clothes dryers)
Schedule of Loads per Townhouse	
Qty.	**Type**
2	230 V twin 24 W tube T5 fluorescent fitting (0.3 A)
2	Five light 40 W, 230 V LED pendant fitting (0.2 A)
24	230 V LED downlight (0.7 A)
17	10 A, 230 V double socket-outlet
1	10 A, 230 V single socket-outlet
1	11 kW, 230 V upright stove
1	12.5 kW, 400 V three phase instantaneous water heater
1	230 V reverse cycle air-conditioner (18.4 A max)

Part 3 – Wiring Systems **(1MARK)**

1. Planning the Unit Skills Test

Mains and Submains

Mains and submains cables shall be XLPE SDI Cu cables installedunderground in HDPVC conduit at a minimum depth of 500 mm.

Each submain set is to be installed in a separate conduit.

Submain wiring systems will share a common trench until their routes diverge, and wiring systems in common trenches will be separated by aminimum clearance of 300 mm.

Voltage drop in the consumer mains shall be limited to 0.5%.Voltage drop in

submains shall be limited to 1.5%.

Final Subcircuits

Final subcircuits shall be supplied by V90 flat multicore TPS Cu cables.

V90 cables shall be selected based on a maximum operatingtemperature of 75^{o}C.

Voltage drop in final subcircuits shall be limited to 3%.ASSESSOR

Students will EACH have a copy of the standards students are NOTallowed to share relevant standards.

1.5 Risk Assessment (1MARK)

Risk assessment procedure:

- Identify 2 hazards that may exist with this skills practice below
- List the supervision level you will be working under – Direct (D),General (G) or Broad (B)
- List the risk classification – High (H), Medium (M) or Low (L) risk
- List the control measures required for each identified hazard.

Hazard/s Identified	Supervision Level (D, G or B)	Risk Classification (H, M or L)	Control Measure/s
Bags in the clear way	D	L	House keeping
Sore body (any part ofthe body)	D	M/L	Take breaks ergonomics

The assessor must assess your work at this point. **(Checkpoint 1)Checkpoint 1 – Planning the Work (Pass 2/2)**

Checkpoint 1 – Planning the Work (Pass 2/2)

1. Planning the Unit Skills Test

Item	Description of Item	Naming
1	Learner receives and understands job instructions,seeking clarification as required.	Job Instructions
2	Learner completes risk assessment in consultationwith assessor, including: • Identification of hazards. • Assessment of risks. • Selection of controls **Full marks will be awarded only after assessoraffirms that the above checklist has been met.**	Risk Assessment

Checkpoint 1 – Planning the Work

Satisfactory Yes/No

Item	Description of Item	1st	2nd
1	Job Instructions		
2	Risk Assessment		
	Assessor Initial:		

2. Carrying Out the Unit Skills Test

Part A – Select Consumer Mains Cables

You are required to use Australian Standards and the job specification provided to select suitable cables for the installation consumer mains.**(1MARK)**

1. Determine the maximum demand on the installation consumer mains anddocument details in the following table using as many rows as necessary.

(1MARK)

Maximum Demand on Consumer Mains					
AS/NZS 3000	**Table:**		**Column:**		
Load	**Load Group**	**Calculation**	**A Phase**	**B Phase**	**C Phase**

2. Carrying Out the Unit Skills Test

Maximum Demand on Consumer Mains:					

Maximum Demand on Consumer's Mains					
AS/NZS 3000	**Table:** C1		**Column:** 3 (See Table C1 Note 2)		
Load	**Load Group**	**Calculation**	**A Phase**	**B Phase**	**C Phase**
Communal Lighting	h	(29 x 14) + (12 x 200) = 2806 W 2806/ 230 = 12.2 A			12.2 A
Communal 10 A Socket Outlets	i	3 x 2 = 6 points 6 x 2 = 12 A 4 x 2 = 8 points8 x 2 = 16 A15 A max	12 A	12 A	15 A
Communal 15 A Socket Outlets	j(i)	2 x 15 = 30 30 x 0.5 = 15 A	15 A	15 A	15 A
Townhouse Lighting	a(i)	6 A	6 A	6 A	6 A
10 A Socket Outlets	b(i)	10 + (5 x 3) = 25 A 10 + (5 x 2) = 20 A	25 A	25 A	20 A
Stoves	c	15 A	15 A	15 A	15 A
Water heaters	e	12.5x1000x0.333x8/ 1.7321x400	48 A	48 A	48A
Air Conditioners	d	18.4 x 3 x 0.75 = 41.4 A 18.4 x 2 x 0.75 = 27.6 A	41.4 A	41.4 A	27.6 A
Maximum Demand on Consumer's Mains:			132. A	132.A	123 A

2. *Carrying Out the Unit Skills Test*

Assessor is to use the above table for expected answers.
Tolerance of 1A is accepted for maximum demand.

Assessor is to make certain student correctly identifies consumer's mains installation details from job specificationsAssessor is to make certain student calculates the maximumdemand for the circuit

all phases must be in total of 387A TO 388 A

2. Select the minimum acceptable cable size for the consumer mains basedon the installation conditions and required current carrying capacity. Document the details of your cable selection by completing all applicablefields in the table below.

(1MARK)

Current Carrying Capacity of Consumer Mains				
Minimum Cable Size	Current Carrying Capacity		Rating/Derating	
	Table	Column	Table	Column
35 mm^2 (137 A)	8	24	N/A	N/A

*Based on the selection of stranded V90-SDI installed in UG conduit at 0.5 m depth (other cabletypes and UG systems would also be acceptable)

- **Assessor is to use the above table for expected answers.**
- **Assessor is to make certain student correctly selects the minimumacceptable cable size based on current carrying capacity**

2. *Carrying Out the Unit Skills Test*

3. Now select the minimum acceptable cable size for the consumer mains based on both current carrying capacity and voltage drop. The route length of the consumer mains is 8 m. Document the details of your cableselection by completing all applicable fields in the table below.

(1MARK)

- **Assessor is to use the above table for expected answers. Tolerance of 1 Ais accepted for Volts and %.**
- **Assessor is to make certain student correctly selects the minimumacceptable cable size based on voltage drop**

Voltage Drop in Consumer Mains						
Working: **Vc = 1.18 mV/A.m** **(1.18 x 132 x 8) / 1000 = 1.25 V** **1.25 / 400 X 100 = 0.313%**						
Cable Size	**Circuit Load**	**Route Length**	**Voltage Drop**		**AS/NZS 3008.1.1**	
			Volts	**%**	**Table**	**Column**
35 mm^2	**132 A**	**8 m**	**1..25 V**	**0.313%**	**41**	**8**

4. The assessor must assess your work at this point. **(Checkpoint 2)**

2. Carrying Out the Unit Skills Test

Checkpoint 2 – Select Consumer Mains Cables (Pass 4/4)**Checkpoint 2 – Select Consumer Mains Cables (Pass 4/4)**

Item	Description of Item	Naming
1	Learner correctly identifies consumer mains installation details from job specifications.	Consumer Mains Requirements
2	Learner correctly calculates the maximum demand for thecircuit.	Consumer Mains Maximum Demand
3	Learner correctly selects the minimum acceptablecable size based on current carrying capacity.	Consumer Mains CCC
4	Learner correctly selects the minimum acceptablecable size based on voltage drop. **Full marks will be awarded only after assessoraffirms that the above checklist has been met.**	Consumer Mains VoltageDrop

	Checkpoint 2 – Select Consumer MainsCables	Satisfactory Yes/No	
Item	**Description of Item**	**1st**	**2nd**
1	Consumer Mains Requirements		

2. Carrying Out the Unit Skills Test			
2	Consumer Mains Maximum Demand		
3	Consumer Mains CCC		
4	Consumer Mains Voltage Drop		
	Assessor Initial:		

Part B – Select Submains Cables

You are required to use Australian Standards and the job specification provided to select suitable submains cables for the supply of townhouse 7.

(1MARK)

1. Determine the maximum demand on the submains and document detailsin the following table using as many rows as necessary. **(1MARK)**

Part B – Select Submains Cables

Maximum Demand on Townhouse 7 Submains					
AS/NZS 3000	**Table: C1**		**Column: 2**		
Load	**Load Group**	**Calculation**	**A Phase**	**B Phase**	**C Phase**
Lighting	**A(i)**	**2 + 2 + 24 = 28 points** **3 + 2 = 5 A**	**-**	**-**	**5 A**
10 A Socket Outlets	**B(i)**	**(17 x 2) + 1 = 35 points** **10 + 5 = 15 A**	**15 A**	**-**	**-**
Stove	**C**	**11000 / 230 = 47.8 A** **47.8 x 0.5 = 23.9 A**	**-**	**24 A**	**-**
Water heater	**E**	**12500 / (√3 x 400) = 18 A** **18 x 0.333 = 6 A**	**6 A**	**6 A**	**6 A**
Air Conditioner	**D**	**18.4 x 0.75 = 13.8 A**	**-**	**-**	**14 A**
Maximum Demand on Submains:			**21 A**	**30 A**	**25 A**

Assessor is to use the above table for expected answers.Tolerance of 1A is accepted for maximum demand.

2. Carrying Out the Unit Skills Test

Assessor is to make certain student correctly identifies consumer's mains installation details from job specifications

- **Assessor is to make certain student calculates the maximumdemand for the circuit**

2. Select the minimum acceptable cable size for the submains based on the installation conditions and required current carrying capacity. Document the details of your cable selection by completing all applicable fields in thetable below. **(1MARK)**

Assessor:

- **Assessor to use the below checklist for expected candidate responses**
- **Assessor is to make certain the student correctly identifies installation details and requirements from job specifications and standards**
- **Assessor is to make certain the student correctly identifies TABLE from AS/NZS 3008.1.1 2017 specifications**

Current Carrying Capacity of Townhouse 7 Submains				
Minimum Cable Size	Current Carrying Capacity		Rating/Derating	
	Table	Column	Table	Column
4 mm^2 (32 A after derating)	8	24	26(2)	3

3. Now select the minimum acceptable cable size for the submains based onboth current carrying capacity requirements and voltage drop limitations.The route length of the submain is 55 m. Document the details of your cable selection by completing all applicable fields in the table below. **(1MARK)**

- **Assessor is to use the below table for expected answers. Tolerance of1 A is accepted for Volts and %.**
- **Assessor is to make certain student correctly selects the minimumacceptable cable size based on voltage drop**

2. Carrying Out the Unit Skills Test

Voltage Drop in Townhouse 7 Submains
Working: **4 mm² Vc = 10.2 mV/A.m** **(10.2 x 30 x 55) / 1000 = 16.83 V** **16.83 / 400 = 4.2% >1.5% per specification** **16mm = (2.55 x 30 x 55) / 1000 = 4.21 v** **(4.21 / 400) x 100 = 1.05% meets specificaton**

Cable Size	Circuit Load	Route Length	Voltage Drop		AS/NZS 3008.1.1	
			Volts	%	Table	Column
16 mm²	30 A	55 m	4.21 V	1.05%	41	8

4. Your assessor must check your work at this point. **(Checkpoint 3)Select Submains Cables (Pass 4/4)**

Select Submains Cables (Pass 4/4)

Item	Description of Item	Naming
1	Learner correctly identifies submains installationdetails from job specifications.	Submain Requirements
2	Learner correctly calculates the maximum demand for thecircuit.	Submain Maximum Demand
3	Learner correctly selects the minimum acceptablecable size based on current carrying capacity.	Submain CCC
4	Learner correctly selects the minimum acceptablecable size based on voltage drop.	Submain Voltage Drop

2. Carrying Out the Unit Skills Test

	Full marks will be awarded only after assessoraffirms that the above checklist has been met.	

Checkpoint 3 – Select Submains Cables		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Submain Requirements		
2	Submain Maximum Demand		
3	Submain CCC		
4	Submain Voltage Drop		
	Assessor Initial:		

Part C – Select Final Subcircuit Cables and Protection

You are required to use Australian Standards and the job specification provided to select a suitable cable for the supply of the following final subcircuit in townhouse 7. **(1MARK)**

Final Subcircuit Installation Details	
Connected Load	12.5 kW, 400 V three phase instantaneous waterheater
Cable Type	V90 circular four-core and earth TPS Cu cable
Route Length	15 m
Installation Method	Clipped to timber ceiling joists and partially surrounded by thermal insulation in wall cavities.

1. Determine the maximum demand for the final subcircuit and select asuitable circuit breaker for its protection. Document details below. **(1MARK)**

Assessor to use the above checklist for expected candidate responses

Assessor is to make certain the student correctly identifies installation detailsand requirements from job specifications and standards clauses

Assessor is to make certain the student select an appropriate number poles

2. *Carrying Out the Unit Skills Test*

Assessor is to make certain the student correctly identifies protection requirements from job specifications and applicable Australian standards

Assessor is to make certain the student selects suitable circuit breakers foreach circuit, ensuring coordination with wiring, i.e satisfying the equation:

- For circuit breakers: $I_B \leq I_N \leq I_Z$

Assessor is to make certain the student correctly identifies the need for 30MaRCD protection for each circuit.

Final Subcircuit Demand and Protection (1MARK)		
Working (if applicable): **12500 / (√3 x 400) = 18 A**		
Circuit Breaker		
Poles	**Type**	**Nominal Current**
3	**B or C**	**20 A**
Maximum Demand		
Demand	**Method Used**	**AS/NZS 3000 Ref.**
18 A	**Assessment**	**C2.5.1 (a)**

Select the minimum acceptable cable size for the final subcircuit based on the installation conditions and required current carrying capacity. Document your cableselection by completing applicable fields in the table below. (1MARK)

Assessor to use the below checklist for expected candidate responses

- **Assessor is to make certain the student correctly identifies installation details and requirements from job specifications and standards**
- **Assessor is to make certain the student correctly identifies TABLE from AS/NZS 3008.1.1 2017 specifications**

2. Carrying Out the Unit Skills Test

2.

Current Carrying Capacity of Final Subcircuit				
Minimum Cable Size	Current Carrying Capacity		Rating/Derating	
	Table	Column	Table	Column
4 mm^2 (23 A)	13	15	N/A	N/A

3. Now select the minimum acceptable cable size for the final subcircuit based on both current carrying capacity requirements and voltage drop limitations. Document the details of your cable selection by completing allapplicable fields in the table below. **(1MARK)**

- **Assessor is to use the below table for expected answers. Toleranceof 1 A is accepted for Volts and %.**
- **Assessor is to make certain student correctly selects the minimumacceptable cable size based on voltage drop**

Voltage Drop in Final Subcircuit
Working: **4 mm^2 Vc = 9.71 mV/A.m** **(9.71 x 18 x 15) / 1000 = 2.62 V** **2.62 / 400 x100 = 0.66%**

Cable Size	Circuit Load	Route Length	Voltage Drop		AS/NZS 3008.1.1	
			Volts	%	Table	Column

2. Carrying Out the Unit Skills Test

4 mm²	**18 A**	**15 m**	**2.62 V**	**0.66%**	**42**	**6**

Total voltage drop (%) at terminals of the equipment: **(1MARK)**	**2.02 %**	%

4. Determine the earth fault loop impedance in the selected final subcircuitcable, and confirm that the selected cable complies with earth fault loopimpedance limitations. Document the details of your cable selection by completing all applicable fields in the table below. **(1MARK)**

- **Assessor is to use the below table for expected answers. Tolerance of 0.5ohmsis accepted for rounding up**
- **Assessor is to make certain student correctly selects the minimumacceptable cable size.**

Earth Fault Loop Impedance of Final Subcircuit
Working:

4 mm² Rc = 5.61 Ω/km

Rph = (5.61 x 15) / 1000 = 0.08415 Ω

2.5 mm² Rc = 9.01 Ω/km

Re = (9.01 x 15) / 1000 = 0.13515 Ω

Rphe = 0.08415 + 0.13515 = 0.2193 Ω

AS/NZS 3000:2018 Table 8.2 states that the max value of Rphe for a circuit protected by a 20 A circuit breaker is 1.0 Ω (Type C) or 1.8 Ω (Type B)

2. Carrying Out the Unit Skills Test

Cable Size	Route Length	Resistance		Reactance	
		Table	Column	Table	Column
4 mm^2	15 m	35	4	N/A	N/A

Earth fault loop impedance complies with Wiring Rules: **(1MARK)**	□ Yes	□ No

5. Your assessor must check your work at this point. **(Checkpoint 4)Select Final Subcircuit Cables and Protection (Pass 8/8)**

Select Final Subcircuit Cables and Protection (Pass 8/8)

Item	Description of Item	Naming
1	Learner correctly identifies submains installation details from job specifications.	Final Subcircuit Requirements
2	Learner correctly calculates the maximum demand for the circuit.	Final Subcircuit Maximum Demand
3	Learner correctly selects the minimum acceptable cable size based on current carrying capacity.	Final Subcircuit Protection
4	Learner correctly selects the minimum acceptable cable size based on voltage drop.	Final Subcircuit CCC
5	Learner correctly identifies submains installation details from job specifications.	Final Subcircuit Voltage Drop
6	Learner correctly calculates the maximum demand for the circuit.	Compliance with Voltage Drop Limitations
7	Learner correctly selects the minimum acceptable cable size based on current carrying capacity.	Final Subcircuit EFLZ
8	Learner correctly selects the minimum acceptable cable size based on voltage drop.	Compliance with EFLZ Limitations

Full marks will be awarded only after assessor affirms that the above checklisthas been met.

2. Carrying Out the Unit Skills Test

 **Checkpoint 4 – Select Final SubcircuitCables and Protection**		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Final Subcircuit Requirements		
2	Final Subcircuit Maximum Demand		
3	Final Subcircuit Protection		
4	Final Subcircuit CCC		
5	Final Subcircuit Voltage Drop		
6	Compliance with Voltage Drop Limitations		
7	Final Subcircuit EFLZ		
8	Compliance with EFLZ Limitations		
	Assessor Initial:		

Part D – Apply Local Service and Installation Rules

You are required to answer the following questions on the installation aboveusing your State/Territory Service and Installation Rules (SIR). Indicate applicable clause(s) to support each answer.

1. According to your local SIRs, does the installation require CT metering?
(1MARK)

YES when over 100 Amps. Clause 4.15 latest SIR

As the current is more than 100A, it needs CT metering (NSW SIR Clause 4.15)

Instructions to Assessor:

- **Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.**

2. According to your local SIRs, what is the minimum insulation resistance tobe measured between the installation service line conductors and earth?

(1MARK)

Not less than 50 mega ohms. Clause 1.11.3.1 or 1.12.3.1

According to Clause 1.11.3.1 or 1.12.3.1 of NSW SIR the minimum insulation resistance tobe measured between the installation service line

mustrconductors and earth must be minumum 50 mega ohm

3. Which Section of your local SIRs state the requirements for overheadservices?
(1MARK)

Section 3

The requirements for overheadservices are outlined in Section 3 of NSW SIR

Instructions to Assessor:

- **Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.**

4. Which Section of your local SIRs state the requirements for high voltageinstallations? **(1MARK)**

Section 7

The requirements for high voltage installations are outlined in Section 7 of NSW SIR

Instructions to Assessor:

- **Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.**

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5. Your assessor must check your work at this point. **(Checkpoint 5)Apply Local SIRs**

(Pass 4/4)

Apply Local SIRs (Pass 4/4)

Item	Description of Item	Naming
1	Q. According to your local SIRs, does the installation require CT metering?	Local SIR Requirements 1
2	Q. According to your local SIRs, what is the minimuminsulation resistance to be measured between the installation service line conductors and earth?	Local SIR Requirements 2
3	Q. Which Section of your local SIRs state the requirements for overhead services?	Local SIR Requirements 3
4	Q. Which Section of your local SIRs state therequirements for high voltage installations?	Local SIR Requirements 4

Full marks will be awarded only after assessor affirms that the above checklisthas been met.

 **Checkpoint 5 – Apply Local SIRs**		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Local SIR Requirements 1		
2	Local SIR Requirements 2		
3	Local SIR Requirements 3		
4	Local SIR Requirements 4		
	Assessor Initial:		

3. Completing the Unit Skills Test

Finalise all equipment selections and documentation to ensure the selectedequipment complies with the relevant Australian Standards and requirements. Then answer the following questions.

Completion Questions

1. What are three “harmful effects” against which the design of an electricalinstallation must provide protection? **(1MARK)**

   Electric shock, excessive temperatures, physical injury.

   Electric shock can be caused by damage insulation to iron body

   Excessive temperature can be caused by sparking at loosed electrical connection

   Physical injury can be caused by unenclosed rotational parts

   Assessor is to use the above as a guide to the expected answers. Wording does nothave to match but must mean the same.

2. The instantaneous water heater in Townhouse No. 7 is protected by a circuit breaker and has integral functional controls. According to the Wiring Rules, are any further control devices required to be provided inthis final subcircuit? **(1MARK)**

Yes, an additional isolator is required to be installed adjacent to the water heater,as per AS/NZS 3000:2018 Clause 4.8.2.3.

According to AS/NZS 3000:2018 Clause 4.8.2.3, additional isolator needs to be installed adjacent to water heater because circuit breaker should only operate at fault connection. Frequent switching on/off in normal operation can cause mechanical fatigue to the mechanism of circuit breaker contact that will not properly operate when electrical fault occurs.

Assessor is to use the above as a guide to the expected answers. Wording does nothave to match but must mean the same.

3. What are three cable installation factors that require the current carryingcapacity of a conductor to be de-rated? **(1MARK)**

Presence of third harmonics, bunched cables, grouped circuits, ambient temperature, depth of laying underground cables, thermal resistivity of soil(underground cables).

Third harmonic current can add to additional heating effect in cable

Ambient temperature can increase cable temperature rise causing rise in resistance value and power loss

Mutual induction effect can cause the increase in current in group circuits.

To overcome such impacts, cables need to be derated and suitable cable size need to be chosen to meet the derated value of the current.

Assessor is to use the above as a guide to the expected answers. Wording does nothave to match but must mean the same.

3. Completing the Unit Skills Test

4. Electrical equipment used in Australian electrical installations is requiredto comply with applicable Australian Standards. **(1MARK)**

   True or False? (*tick*)

   ☐ True ☐ False

5. The townhouse garages have brick walls and a concrete slab roof. What isa suitable wiring system to be installed within the garage, for the supply of two twin fluorescent luminaires mounted on the ceiling? **(1MARK)**

   surface mounted conduit or conduit embedded in the slab.

   The cable needs to be enclosed in the conduit embedded in the slab or surface mounted conduit.

   Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.

6. List at least two different types of electricity tariffs in your jurisdiction. **(1MARK)**

Controlled load tariff kVA demand type tariff single tariff whole current metering.

~~single phase, multiple tariff~~ ~~three phase, single tariff~~

three phase, multiple tariff

Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.

Flat rate or single rate tariff. With a flat or single rate tariff, you pay the same amount for the electricity you use from the grid, whatever time you use it. ...

- Block tariff. ...
- Time of use tariff. ...
- Controlled load tariff. ...
- Demand charge tariff. ...
- Variable feed-in tariffs.

7. The space below is to allow for an additional question to be provided atthe time of your assessment ***if deemed necessary by your assessor***.

Q The maximum permissible voltage drop in a 230 V and 400 Vinstallation is? **(1MARK)**

A 230 V = 11.5V400

V = 20V

8. The assessor must assess your work at this point. **(Checkpoint 6)**

3. Completing the Unit Skills Test

Item	Description of Item	Naming
1	Learner finalises equipment selections, ensuringcompliance with manufacturer's data and regulatory requirements.	Local SIR Requirements 1
2	All work planned, carried out and completed in accordance with relevant workplace policies and procedures (i.e. anti-discrimination, health and safety, dealing with unplanned events .).	Local SIR Requirements 2

Completion Questions (Pass 7/7)

1	What are three "harmful effects" against which the design of an electrical installation must provide protection?	Local SIR Requirements 1
2	The instantaneous water heater in Townhouse No. 7 is by a circuit breaker and has integral functional controls. According to the Wiring Rules, are any further control devices required to be provided in this final subcircuit?	Local SIR protected Requirements 2
3	What are three cable installation factors that require the current carrying capacity of a conductor to be de-rated?	Local SIR Requirements 3
4	Electrical equipment used in Australian electrical installations is required to comply with applicable Australian Standards. True or False?	Local SIR Requirements 4
5	The townhouse garages have brick walls and a concrete slab roof. What is a suitable wiring system to be installed within the garage, for the supply of two twin fluorescent luminaires mounted on the ceiling?	Local SIR Requirements 1
6	List at least two different types of electricity tariffs in your jurisdiction.	Local SIR Requirements 2
7	Q. Which Section of your local SIRs state the requirements for overhead services?	Local SIR Requirements 3

Full marks will be awarded only after assessor affirms that the above checklisthas been met.

3. Completing the Unit Skills Test

 **Checkpoint 6 – Completing the Work**		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Confirm Compliance		
2	Follow Procedures		
3	Completion Question 1		
4	Completion Question 2		
5	Completion Question 3		
6	Completion Question 4		
7	Completion Question 5		
8	Completion Question 6		
9	Completion Question 7 (Optional)		
	Assessor Initial:		

Assessor Guide

UEEEL0018

[redacted]

Competency Standard Unit (CSU)	**UEEEL0018 – Select wiring systems and select cables for low voltage electrical installations**	
CSU Descriptor	This unit involves the skills and knowledge required to select wiring systems and cables for electrical installations operating at voltages up to 1,000 volt (V) alternating current (a.c.) or 1,500 V direct current (d.c.). It includes application of wiring systems and cable types, selecting wiring system compatible with the installation conditions, selecting cables that comply with required current-carrying capacity and voltage drop and earth fault-loop impedance limitations, coordinating between protective devices and conductors, and documenting selection decisions. The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.. Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required. Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.	
Purpose of Assessor Guide	The purpose of the Unit Assessment Plan (UAP) is to provide the specification and mapping for the evidence gathering tools required to satisfy the Assessment Requirements of this Competency Standard Unit (CSU).	
Sequence	Before undertaking the evidence gathering events in this UAP, a learner is to have met the requirements of: • UEECD0007 Apply work health and safety regulations, codes and practices in the workplace • UEECD0019 Fabricate, assemble and dismantle utilities industry components • UEECD0020 Fix and secure electrotechnology equipment • UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications • UEEEL0003 Arrange circuits, control and protection for electrical installations • UEEEL0020 Solve problems in low voltage a.c. circuits • UEEEL0023 Terminate cables, cords and accessories for low voltage circuits • UEEEL0019 Solve problems in direct current (d.c.) machines • UEEEL0021 Solve problems in magnetic and electromagnetic devices • UEEEL0008 Evaluate and modify low voltage heating equipment and controls • UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls • UEEEL0010 Evaluate and modify low voltage socket outlets circuits • UEEEL0024 Test and connect alternating current (a.c.) rotating machines • UEEEL0025 Test and connect transformers and • UEECD0043 Solve problems in direct current circuits or • UEECD0044 Solve problems in multiple path circuits • UEECD0046 Solve problems in single path circuits	
Unit aspects addressed in this UAP	**Code**	**Specification Title**
	PC-UEEEL0018	Performance Citeria

	KE-UEEEL0018	Knowledge Evidence	
	PE-UEEEL0018 RC-UEEEL0018	Performance Evidence Range of Conditions	
Number of Evidence Sources	3	UEEEL0018-UKT	Unit Knowledge Test
		UEEEL0018-UST	Unit Skills Test
		UEEEL0018-WPE	Work Performance Experience

Note: This unit mandates collection of workplace evidence, as stated in theunit Assessment Conditions:

"In addition, evidence of Performance Evidence items of this unit marked witha hash (#) must be gathered in authentic workplace operational conditions (not simulated) before final determination of competence in this unit can be made."

2.4. Assessment Conditions and Context

Using the Evidence Gathering Tools/Activities provided and the detailed mapping within this document will assist RTOs in determining if sufficient evidence has beengathered to ensure full coverage of the unit.

Identified gaps in knowledge, skills or work performance evidence may be addressedthrough a variety of means including, but not limited to, written tests, online quizzes,practical tests, and/or technical interviews and work performance.

Evidence Gathering Tools/Activities	**Conditions**	**Reporting Requirement**
Unit Knowledge Test (UEEEL0018-UKT)	Knowledge Test undertaken from nationally developed question knowledge test bank.	**Graded Result**
Unit Skills Test (UEEEL0018-UST)	Unit Skills Test covers the selection of wiring systems and cables that complywith required current-carrying capacityand voltage drop and earth fault-loop impedance limitations for LV electrical installations..	Satisfactory/ Not Satisfactory Recorded on customized marking forms. Then result logged into Energy Space records.
Work Performance (UEEEL0018-WPE)	Recording of activities undertaken in a simulated or real workplace environmentto meet the requirements and scope of this competency standard unit	Satisfactory/ Not Satisfactory E- Profiling work cards logged into system. Unit report generated

Evidence Gathering Tools Specifications:

2.5. Unit Knowledge Test

Event Type	**Unit Knowledge Test**
Types of Items	Learner is required to complete a knowledge test (38 questions) based on multiple choice (50% of marks), matching (24% of marks), diagram type (13% of marks) and calculations (13% of marks).
Coverage	Knowledge Evidence (KE-UEEEL0018). Essential Performance Capabilities (EPC) 10, 20, 21, 22, 23, 24.
Staging	After Unit Learning Plan (ULP) Knowledge and Skills Topics 1 to 10 have been completed.
Duration	2 hours
Assessment Conditions	Supervised (invigilated) classroom environment (off the job). Relevant Australian Standards and Codes of Practice can be used. This is to be conducted at the facility in a classroom environment (off the job). It must be supervised. The student will log in to Energy Space. The student will be set up to do the computer-generated test from national E-Oz Energy Skills Australia online test bank.
Resources required	Computer and log in for Energy Space Computer generated test from national E-Oz Energy Skills Australia online test bank.
Application	The Unit Knowledge Test aligns directly to the knowledge that underpins the safe and correct application of skills. It should be noted that the evidence gathered by Knowledge Tests is limited in its capacity to indicate whether a person can actually plan, carry out or complete a skills-based task, with some exceptions, for example: • Evidence of problem solving skills can be gathered by UKTs in some contexts. • Performance criteria (PCs) relating to the selection of tools, materials and equipment are heavily reliant on certain knowledge dot points that are addressed in UKTs. The evidence collected by a Unit Knowledge Test is not as directly aligned to what constitutes competency as other forms of evidence (such as that gathered by a Skills Test). It is recommended that Knowledge Test evidence is interpreted primarily as an indicator of: • The reliability of other evidence. • The likelihood that a learner will be capable of applying related skills safely and autonomously in different contexts.

	• The likelihood that the learner will be capable of dealing with nonstandard situations.

Unit Skills Test

Event Type	**Unit Skills Test**
Staging	After ULP Knowledge and Skills Topics 1 to 10 have been completed.
Types of Items	Skills Test covering the following tasks: • Selecting consumermains cables • Selecting submains cables • Selecting final subcircuits cables and protection • Applying local service andinstallation rules (SIRs)
Coverage	Performance Criteria (PC-UEEEL0018), Performance Evidence (PEUEEEL0018), and some aspects of the Range of Conditions (RC-UEEEL0018) and Knowledge Evidence (KE-UEEEL0018). Essential Performance Capabilities (EPC) 10, 20, 21, 22, 23, 24.
Duration	4 hours
Assessment Conditions	This is to be conducted at the facility. It must be supervised. classroom. Relevant Australian Standards, Non-programmable calculators and basic drawing instruments may be used.
Resources required	customized Unit Skills Tests facility and task supporting documents and attachments.UST recording forms Results are recorded on forms then transferred to the Energy Space LMS student records. Unit Skills Test Assessor Guide (USAG),

	calculators, AS/NZS 3000 Wiring Rules – current edition, AS/NZS 3008.1.1 Electrical Installations – Selection of Cables.
Application	The Unit Skills Test gathers direct evidence of a learner's ability to plan, carry out and complete the required tasks in a simulated/controlled environment. It also indirectly gathers evidence that a learner has or does not have the knowledge underpinning safe and correct application of these skills.

2.6. Work

Performance

Event Type	On the job workplace activities carried out as part of the candidates daily work activities (not simulated).
Types of Items	Selecting LV wiring and equipment, including cables, supports and enclosures, protection devices, control and isolation devices, earthing equipment, alternate supply equipment Arranging LV wiring and equipment, including determining maximum demand, division of circuits, coordination of wiring and circuit protection devices Installing, maintaining and repairing LV appliances and accessories
Coverage	Performance Criteria (PC-UEEEL0018), Range of Conditions (RC-UEEEL0018) and Performance Evidence (PE-UEEEL0018).
Staging	Evidence collected from the workplace via profiling on a regular basis.
Duration	n Duration will reflect the learner's record of workplace activities undertaken to meet the requirements and scope of this competency standard unit.
Conditions	Supervised electrical work environment
Resources	Typical domestic/non-domestic, commercial and/or industrial electrical installations, relevant workplace safety and operational documentation.
Application	The Exemplar Profiling evidence gathering tool is designed to: • Facilitate progressive monitoring of a learner's competency development in the workplace. • Assist an RTO assessor, in conjunction with other forms of evidence, to make a judgement of a learner's competency. The evidence gathered is directly aligned to planning, carrying out and completing tasks in an actual workplace, and unlike other tools, highlights the learner's competency development over time. The following indicators are embedded within the tool, and can be assessed using the various reporting functions: • Autonomy (level of support received) Participation (plan, carry out and complete)

	• Technical ability (range of activities and equipment)

UEEEL0018

Assessor Instructions For the set-up of SkillsTest Assessments at Workshop

PRIOR to assessment

Instructions to Assessor one (1) week prior to actual test day:

1. Assessors are to gather students in classroom to handout 'UEEEL0018 Assessment overview' whichoutlines the assessments on a part by part basis and gives detailed and clear instructions to students before undertaking any assessments.
2. Assessor can answer questions regarding **'Units Skills Test'** for student clarification.

Instructions to Assessor on actual test day

3. Assessors will be conducting Part A and completion questions consecutively.
   'Planning' and 'Carrying out the task' will be conducted in workshop and 'Completing the UnitSkills Test' will be conducted in the classroom.
   Students are allowed 1 hour to complete

   ALL PARTS –Assessors are to prepare training facility for Part A 60 min prior to commencing student assessment:

   - Assessors will be implementing hazards for this skills test:
     - **Bags on the floor**
     - **Also students need to address body fatigue due to ergonomics**
   - Assessors to complete ' **Inspection Test plan' for Assessment**
     Note: The planning phase for unit skills test is done prior to any students 'Carrying out the task'. Ensure all 'Equipment, Suggested Materials and Miscellaneous items'from the Unit Skills Test Task Sheet are ready in the classroom for students to use.
   - Gather students that are being assessed in Classroom prior to commencement ofunit skills test.
   - Assessors to hand out **Unit Skills Test Task Sheets which includes instructions tostudents**.
   - Assessor to engage students in a Q/A session regarding **'Unit Skills Test'** for studentclarification purposes.
   - Check/Verify ALL notes that students will have prior to student commencingassessment.
   - Collect all mobile phones/tablets from students and place into locker room
   - Assessor 1 is to take first group of4 x students conducting assessment in classroom
   - ***Note: Only 4 x students will be allowed to enter the classroom at any given timeunder supervision.***

Handouts	Checklist
AS/NZS 3000: Wiring Rules	1 copy per 4 students – resource library
AS/NZS 3008.1.1	1 copy per 4 students – resource library
Local Service and installation Rules	1 copy per 4 students – resource library
UEEEL0018 Unit Skills Test Task Sheet	1 per student - printed

Unit Skills Test Task Sheet

UEEEL0018 Select wiring systems and select cables for lowvoltage electrical installations

Learner Name:	**<STUDENT NAME>**	**ID:**	**<STUDENT ID>**
College/ Campus:	Revesby	**Group/ Class:**	**1 or 2**
Learner Signature:	**<STUDENT SIGNATURE>**	**Date:**	**<DATE>**

Final Result of UEEEL0018 UST		
The learner has demonstrated a satisfactory performance ofidentified steps listed.	Yes	No

Assessor Name:			
Assessor Signature:		**Date:**	

Comments: **THIS UNIT SKILLS TEST WILL BE CONDUCTED IN THE CLASS ROOM**

Instruction:

This test is broken into four parts – Parts A to D. In Parts A, B and C, you will apply Australian Standards to select consumer mains, submains and final subcircuit cablesfor a given multiple domestic electrical installation. In Part D you will apply your local Service and Installation Rules to determine particular requirements in your jurisdiction.

- Time Allowed (to be specified by assessor):
- Orange shaded checkpoints are for assessor use only. Entering information inthese areas may invalidate your assessment.
- Mobile phones and smart devices must be turned off and not accessed.
- Wait for the assessor to mark your work when requested.
- You will be allowed two (2) attempts at each check point to demonstrate thetask described.
- If you are unsure about what you need to do, you should ask your assessorfor guidance.

Whilst carrying out skills activities you must follow all standard workplace procedures (i.e. anti-discrimination, health and safety, unplanned events .) andensure efficient / sustainable use of materials.

Unit Skills Test Task Sheet

Assessors Guidelines:

Instructions and safety requirements should be clearly explained to the learner at the beginning of the assessment event, including the permitted time – to be indicated onthe Unit Skills Test Task Sheet (USTS) cover page.

Recommended time allowed – 1 hour and 30 minutes.

The learner will require access to current versions of the following documents:

- AS/NZS 3000
- AS/NZS 3008.1.1
- Local Service and Installation Rules (SIRs).
- Worked solutions to this test have been determined using AS/NZS 3000:2018 and AS/NZS 3008.1.1:2017, and are provided as Attachment A of this document. Note that a learner ‘s responses do notneed to be identical to these worked solutions – successful performance should be considered as the appropriate application of standards resulting in equipment selections that are practical, economical, sustainable, whilst meeting all safety and performance requirements.

1. Planning the Unit Skills Test

Your assessor will provide the details of the equipment required for this UnitSkills Test.

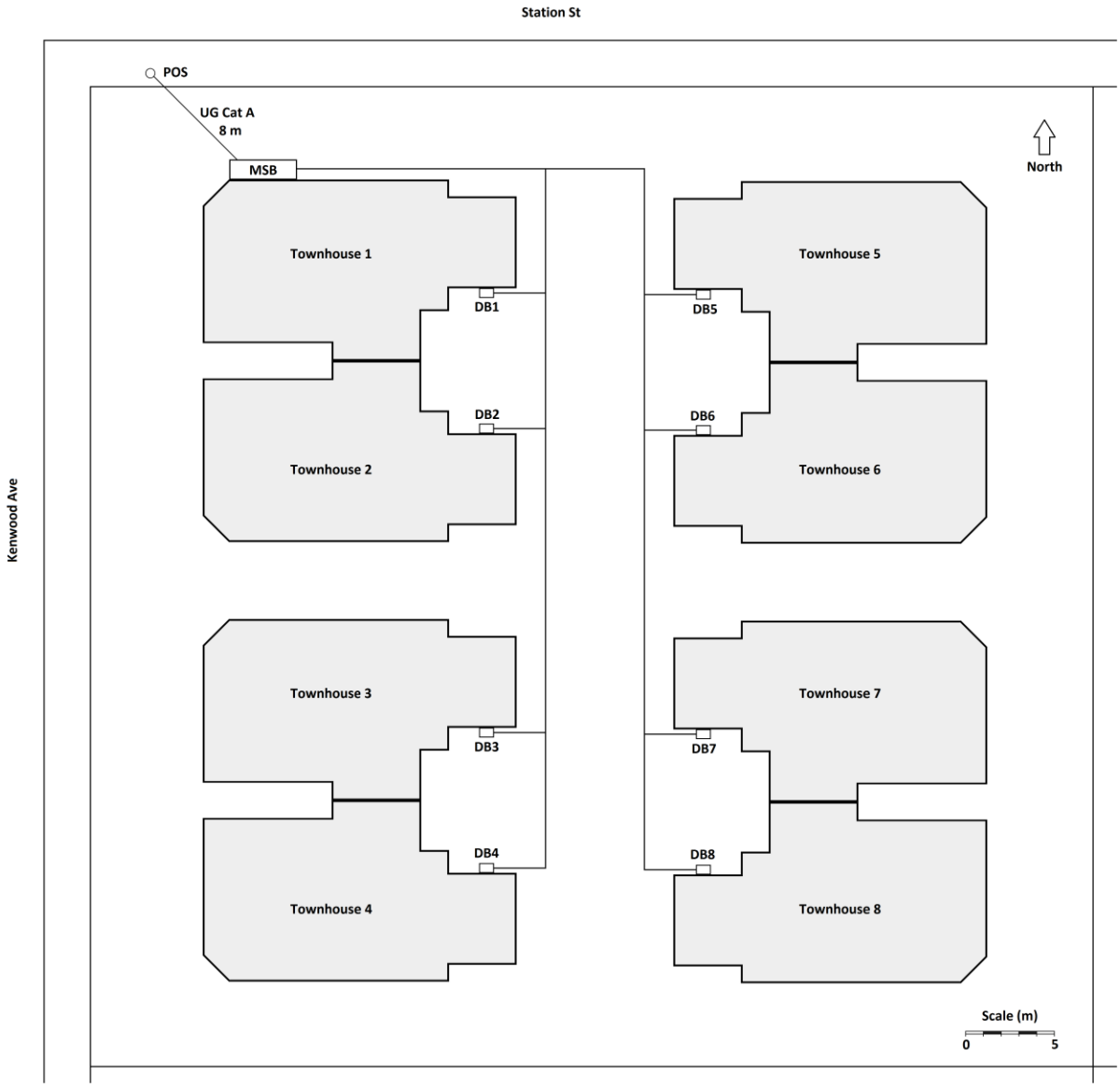
1.1 Equipment:	**1.2 Suggested Materials:**	**1.3 MiscellaneousItems:**
• AS/NZS 3000 • AS/NZS 3008.1.1 • Local Service and Installation Rules	• Ruler • Calculator	• Pens/Pencils

1.4 Installation Specifications

You are required to plan certain portions of the electrical installation for ablock of 8 luxury townhouses. In preparation for the task, review the jobspecification drawings and schedules for the installation, provided below.

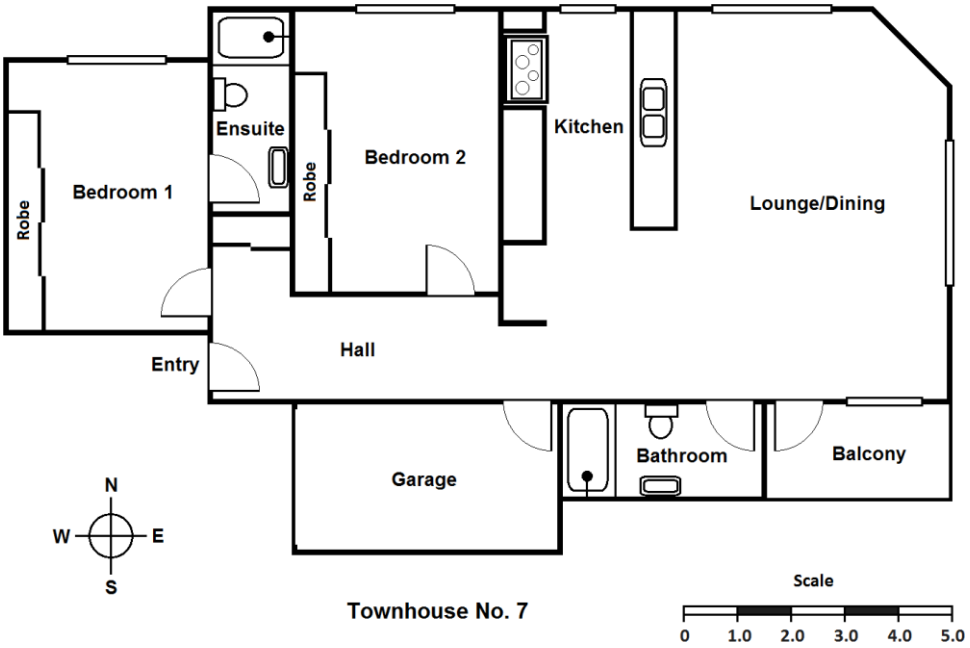
<u>Part 1 – Site Plan</u>

1. Planning the Unit Skills Test



Part 2 – Floor Plan

3. Planning the Unit Skills Test



Schedule of Common Loads	
Qty.	**Type**
29	14 W, 230 V CFL bollard fitting
12	200 W, 230 V halogen floodlight
10	10 A, 230 V double socket-outlet
6	15 A, 230 V single socket-outlet (for clothes dryers)
Schedule of Loads per Townhouse	
Qty.	**Type**
2	230 V twin 24 W tube T5 fluorescent fitting (0.3 A)
2	Five light 40 W, 230 V LED pendant fitting (0.2 A)
24	230 V LED downlight (0.7 A)
17	10 A, 230 V double socket-outlet
1	10 A, 230 V single socket-outlet
1	11 kW, 230 V upright stove
1	12.5 kW, 400 V three phase instantaneous water heater
1	230 V reverse cycle air-conditioner (18.4 A max)

Part 3 – Wiring Systems **(1MARK)**

1. Planning the Unit Skills Test

Mains and Submains

Mains and submains cables shall be XLPE SDI Cu cables installedunderground in HDPVC conduit at a minimum depth of 500 mm.

Each submain set is to be installed in a separate conduit.

Submain wiring systems will share a common trench until their routes diverge, and wiring systems in common trenches will be separated by aminimum clearance of 300 mm.

Voltage drop in the consumer mains shall be limited to 0.5%.Voltage drop in

submains shall be limited to 1.5%.

Final Subcircuits

Final subcircuits shall be supplied by V90 flat multicore TPS Cu cables.

V90 cables shall be selected based on a maximum operatingtemperature of 75^{o}C.

Voltage drop in final subcircuits shall be limited to 3%.ASSESSOR

Students will EACH have a copy of the standards students are NOTallowed to share relevant standards.

1.6 Risk Assessment (1MARK)

Risk assessment procedure:

- Identify 2 hazards that may exist with this skills practice below
- List the supervision level you will be working under – Direct (D),General (G) or Broad (B)
- List the risk classification – High (H), Medium (M) or Low (L) risk
- List the control measures required for each identified hazard.

Hazard/s Identified	Supervision Level (D, G or B)	Risk Classification (H, M or L)	Control Measure/s
Bags in the clear way	D	L	House keeping
Sore body (any part ofthe body)	D	M/L	Take breaks ergonomics

The assessor must assess your work at this point. **(Checkpoint 1)Checkpoint 1 – Planning the Work (Pass 2/2)**

Checkpoint 1 – Planning the Work (Pass 2/2)

1. Planning the Unit Skills Test

Item	Description of Item	Naming
1	Learner receives and understands job instructions,seeking clarification as required.	Job Instructions
2	Learner completes risk assessment in consultationwith assessor, including: • Identification of hazards. • Assessment of risks. • Selection of controls **Full marks will be awarded only after assessoraffirms that the above checklist has been met.**	Risk Assessment

Checkpoint 1 – Planning the Work

Satisfactory Yes/No

Item	Description of Item	1st	2nd
1	Job Instructions		
2	Risk Assessment		
	Assessor Initial:		

2. Carrying Out the Unit Skills Test

Part A – Select Consumer Mains Cables

You are required to use Australian Standards and the job specification provided to select suitable cables for the installation consumer mains.**(1MARK)**

1. Determine the maximum demand on the installation consumer mains anddocument details in the following table using as many rows as necessary.

(1MARK)

Maximum Demand on Consumer Mains					
AS/NZS 3000	**Table:**		**Column:**		
Load	**Load Group**	**Calculation**	**A Phase**	**B Phase**	**C Phase**

2. Carrying Out the Unit Skills Test

Maximum Demand on Consumer Mains:					

Maximum Demand on Consumer's Mains					
AS/NZS 3000	**Table:** C1		**Column:** 3 (See Table C1 Note 2)		
Load	**Load Group**	**Calculation**	**A Phase**	**B Phase**	**C Phase**
Communal Lighting	h	(29 x 14) + (12 x 200) = 2806 W 2806/ 230 = 12.2 A			12.2 A
Communal 10 A Socket Outlets	i	5 x 2 = 6 points 6 x 2 = 12 A 6 x 2 = 8 points8 x 2 = 16 A15 A max	12 A	12 A	15 A
Communal 15 A Socket Outlets	j(i)	2 x 15 = 30 30 x 0.5 = 15 A	15 A	15 A	15 A
Townhouse Lighting	a(i)	6 A	6 A	6 A	6 A
10 A Socket Outlets	b(i)	10 + (5 x 3) = 25 A 10 + (5 x 2) = 20 A	25 A	25 A	20 A
Stoves	c	15 A	15 A	15 A	15 A
Water heaters	e	12.5x1000x0.333x8/ 1.7321x400	48 A	48 A	48A
Air Conditioners	d	18.4 x 3 x 0.75 = 41.4 A 18.4 x 2 x 0.75 = 27.6 A	41.4 A	41.4 A	27.6 A
Maximum Demand on Consumer's Mains:			132. A	132.A	123 A

4. *Carrying Out the Unit Skills Test*

Assessor is to use the above table for expected answers.
Tolerance of 1A is accepted for maximum demand.

Assessor is to make certain student correctly identifies consumer's mains installation details from job specificationsAssessor is to make certain student calculates the maximumdemand for the circuit

all phases must be in total of 387A TO 388 A

3. Select the minimum acceptable cable size for the consumer mains basedon the installation conditions and required current carrying capacity. Document the details of your cable selection by completing all applicablefields in the table below.

(1MARK)

Current Carrying Capacity of Consumer Mains				
Minimum Cable Size	Current Carrying Capacity		Rating/Derating	
	Table	Column	Table	Column
35 mm^2 (137 A)	8	24	N/A	N/A

*Based on the selection of stranded V90-SDI installed in UG conduit at 0.5 m depth (other cabletypes and UG systems would also be acceptable)

- **Assessor is to use the above table for expected answers.**
- **Assessor is to make certain student correctly selects the minimumacceptable cable size based on current carrying capacity**

5. *Carrying Out the Unit Skills Test*

6. Now select the minimum acceptable cable size for the consumer mains based on both current carrying capacity and voltage drop. The route length of the consumer mains is 8 m. Document the details of your cableselection by completing all applicable fields in the table below.

(1MARK)

- **Assessor is to use the above table for expected answers. Tolerance of 1 Ais accepted for Volts and %.**
- **Assessor is to make certain student correctly selects the minimumacceptable cable size based on voltage drop**

Voltage Drop in Consumer Mains						
Working: **Vc = 1.18 mV/A.m** **(1.18 x 132 x 8) / 1000 = 1.25 V** **1.25 / 400 X 100 = 0.313%**						
Cable Size	**Circuit Load**	**Route Length**	**Voltage Drop**		**AS/NZS 3008.1.1**	
			Volts	**%**	**Table**	**Column**
35 mm^2	**132 A**	**8 m**	**1..25 V**	**0.313%**	**41**	**8**

7. The assessor must assess your work at this point. **(Checkpoint 2)**

2. Carrying Out the Unit Skills Test

Checkpoint 2 – Select Consumer Mains Cables (Pass 4/4)**Checkpoint 2 – Select Consumer Mains Cables (Pass 4/4)**

Item	Description of Item	Naming
1	Learner correctly identifies consumer mains installation details from job specifications.	Consumer Mains Requirements
2	Learner correctly calculates the maximum demand for thecircuit.	Consumer Mains Maximum Demand
3	Learner correctly selects the minimum acceptablecable size based on current carrying capacity.	Consumer Mains CCC
4	Learner correctly selects the minimum acceptablecable size based on voltage drop. **Full marks will be awarded only after assessoraffirms that the above checklist has been met.**	Consumer Mains VoltageDrop

	Checkpoint 2 – Select Consumer MainsCables	Satisfactory Yes/No	
Item	**Description of Item**	**1st**	**2nd**
1	Consumer Mains Requirements		

2. Carrying Out the Unit Skills Test			
2	Consumer Mains Maximum Demand		
3	Consumer Mains CCC		
4	Consumer Mains Voltage Drop		
	Assessor Initial:		

Part B – Select Submains Cables

You are required to use Australian Standards and the job specification provided to select suitable submains cables for the supply of townhouse 7.

(1MARK)

1. Determine the maximum demand on the submains and document detailsin the following table using as many rows as necessary. **(1MARK)**

Part B – Select Submains Cables

Maximum Demand on Townhouse 7 Submains					
AS/NZS 3000	**Table: C1**		**Column: 2**		
Load	**Load Group**	**Calculation**	**A Phase**	**B Phase**	**C Phase**
Lighting	**A(i)**	**2 + 2 + 24 = 28 points** **3 + 2 = 5 A**	**-**	**-**	**5 A**
10 A Socket Outlets	**B(i)**	**(17 x 2) + 1 = 35 points** **10 + 5 = 15 A**	**15 A**	**-**	**-**
Stove	**C**	**11000 / 230 = 47.8 A** **47.8 x 0.5 = 23.9 A**	**-**	**24 A**	**-**
Water heater	**E**	**12500 / (√3 x 400) = 18 A** **18 x 0.333 = 6 A**	**6 A**	**6 A**	**6 A**
Air Conditioner	**D**	**18.4 x 0.75 = 13.8 A**	**-**	**-**	**14 A**
Maximum Demand on Submains:			**21 A**	**30 A**	**25 A**

Assessor is to use the above table for expected answers.Tolerance of 1A is accepted for maximum demand.

2. Carrying Out the Unit Skills Test

Assessor is to make certain student correctly identifies consumer's mains installation details from job specifications

- **Assessor is to make certain student calculates the maximumdemand for the circuit**

4. Select the minimum acceptable cable size for the submains based on the installation conditions and required current carrying capacity. Document the details of your cable selection by completing all applicable fields in thetable below. **(1MARK)**

Assessor:

- **Assessor to use the below checklist for expected candidate responses**
- **Assessor is to make certain the student correctly identifies installation details and requirements from job specifications and standards**
- **Assessor is to make certain the student correctly identifies TABLE from AS/NZS 3008.1.1 2017 specifications**

Current Carrying Capacity of Townhouse 7 Submains				
Minimum Cable Size	Current Carrying Capacity		Rating/Derating	
	Table	Column	Table	Column
4 mm^2 (32 A after derating)	8	24	26(2)	3

5. Now select the minimum acceptable cable size for the submains based onboth current carrying capacity requirements and voltage drop limitations.The route length of the submain is 55 m. Document the details of your cable selection by completing all applicable fields in the table below. **(1MARK)**

- **Assessor is to use the below table for expected answers. Tolerance of1 A is accepted for Volts and %.**
- **Assessor is to make certain student correctly selects the minimumacceptable cable size based on voltage drop**

2. Carrying Out the Unit Skills Test

Voltage Drop in Townhouse 7 Submains
Working: **4 mm² Vc = 10.2 mV/A.m** **(10.2 x 30 x 55) / 1000 = 16.83 V** **16.83 / 400 = 4.2% >1.5% per specification** **16mm = (2.55 x 30 x 55) / 1000 = 4.21 v** **(4.21 / 400) x 100 = 1.05% meets specificaton**

Cable Size	Circuit Load	Route Length	Voltage Drop		AS/NZS 3008.1.1	
			Volts	%	Table	Column
16 mm²	30 A	55 m	4.21 V	1.05%	41	8

4. Your assessor must check your work at this point. **(Checkpoint 3)Select Submains Cables (Pass 4/4)**

Select Submains Cables (Pass 4/4)

Item	Description of Item	Naming
1	Learner correctly identifies submains installationdetails from job specifications.	Submain Requirements
2	Learner correctly calculates the maximum demand for thecircuit.	Submain Maximum Demand
3	Learner correctly selects the minimum acceptablecable size based on current carrying capacity.	Submain CCC
4	Learner correctly selects the minimum acceptablecable size based on voltage drop.	Submain Voltage Drop

2. Carrying Out the Unit Skills Test

	Full marks will be awarded only after assessoraffirms that the above checklist has been met.	

Checkpoint 3 – Select Submains Cables		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Submain Requirements		
2	Submain Maximum Demand		
3	Submain CCC		
4	Submain Voltage Drop		
	Assessor Initial:		

Part C – Select Final Subcircuit Cables and Protection

You are required to use Australian Standards and the job specification provided to select a suitable cable for the supply of the following final subcircuit in townhouse 7. **(1MARK)**

Final Subcircuit Installation Details	
Connected Load	12.5 kW, 400 V three phase instantaneous waterheater
Cable Type	V90 circular four-core and earth TPS Cu cable
Route Length	15 m
Installation Method	Clipped to timber ceiling joists and partially surrounded by thermal insulation in wall cavities.

1. Determine the maximum demand for the final subcircuit and select asuitable circuit breaker for its protection. Document details below. **(1MARK)**

Assessor to use the above checklist for expected candidate responses

Assessor is to make certain the student correctly identifies installation detailsand requirements from job specifications and standards clauses

Assessor is to make certain the student select an appropriate number poles

3. *Carrying Out the Unit Skills Test*

Assessor is to make certain the student correctly identifies protection requirements from job specifications and applicable Australian standards

Assessor is to make certain the student selects suitable circuit breakers foreach circuit, ensuring coordination with wiring, i.e satisfying the equation:

- For circuit breakers: $I_B \leq I_N \leq I_Z$

Assessor is to make certain the student correctly identifies the need for 30MaRCD protection for each circuit.

Final Subcircuit Demand and Protection (1MARK)		
Working (if applicable): **12500 / (√3 x 400) = 18 A**		
Circuit Breaker		
Poles	**Type**	**Nominal Current**
3	**B or C**	**20 A**
Maximum Demand		
Demand	**Method Used**	**AS/NZS 3000 Ref.**
18 A	**Assessment**	**C2.5.1 (a)**

Select the minimum acceptable cable size for the final subcircuit based on the installation conditions and required current carrying capacity. Document your cableselection by completing applicable fields in the table below. (1MARK)

Assessor to use the below checklist for expected candidate responses

- **Assessor is to make certain the student correctly identifies installation details and requirements from job specifications and standards**
- **Assessor is to make certain the student correctly identifies TABLE from AS/NZS 3008.1.1 2017 specifications**

2. Carrying Out the Unit Skills Test

2.

Current Carrying Capacity of Final Subcircuit				
Minimum Cable Size	Current Carrying Capacity		Rating/Derating	
	Table	Column	Table	Column
4 mm^2 (23 A)	13	15	N/A	N/A

4. Now select the minimum acceptable cable size for the final subcircuit based on both current carrying capacity requirements and voltage drop limitations. Document the details of your cable selection by completing allapplicable fields in the table below. **(1MARK)**

- **Assessor is to use the below table for expected answers. Toleranceof 1 A is accepted for Volts and %.**
- **Assessor is to make certain student correctly selects the minimumacceptable cable size based on voltage drop**

Voltage Drop in Final Subcircuit
Working: **4 mm^2 Vc = 9.71 mV/A.m** **(9.71 x 18 x 15) / 1000 = 2.62 V** **2.62 / 400 x100 = 0.66%**

Cable Size	Circuit Load	Route Length	Voltage Drop		AS/NZS 3008.1.1	
			Volts	%	Table	Column

2. Carrying Out the Unit Skills Test

4 mm^2	**18 A**	**15 m**	**2.62 V**	**0.66%**	**42**	**6**

Total voltage drop (%) at terminals of the equipment: **(1MARK)**	**2.02 %**	%

5. Determine the earth fault loop impedance in the selected final subcircuitcable, and confirm that the selected cable complies with earth fault loopimpedance limitations. Document the details of your cable selection by completing all applicable fields in the table below. **(1MARK)**

- **Assessor is to use the below table for expected answers. Tolerance of 0.5ohmsis accepted for rounding up**
- **Assessor is to make certain student correctly selects the minimumacceptable cable size.**

Earth Fault Loop Impedance of Final Subcircuit
Working:

4 mm^2 Rc = 5.61 Ω/km

Rph = (5.61 x 15) / 1000 = 0.08415 Ω

2.5 mm^2 Rc = 9.01 Ω/km

Re = (9.01 x 15) / 1000 = 0.13515 Ω

Rphe = 0.08415 + 0.13515 = 0.2193 Ω

AS/NZS 3000:2018 Table 8.2 states that the max value of Rphe for a circuit protected by a 20 A circuit breaker is 1.0 Ω (Type C) or 1.8 Ω (Type B)

2. Carrying Out the Unit Skills Test

Cable Size	Route Length	Resistance		Reactance	
		Table	Column	Table	Column
4 mm^2	15 m	35	4	N/A	N/A

Earth fault loop impedance complies with Wiring Rules: **(1MARK)**	□ Yes	□ No

6. Your assessor must check your work at this point. **(Checkpoint 4)Select Final Subcircuit Cables and Protection (Pass 8/8)**

Select Final Subcircuit Cables and Protection (Pass 8/8)

Item	Description of Item	Naming
1	Learner correctly identifies submains installation details from job specifications.	Final Subcircuit Requirements
2	Learner correctly calculates the maximum demand for the circuit.	Final Subcircuit Maximum Demand
3	Learner correctly selects the minimum acceptable cable size based on current carrying capacity.	Final Subcircuit Protection
4	Learner correctly selects the minimum acceptable cable size based on voltage drop.	Final Subcircuit CCC
5	Learner correctly identifies submains installation details from job specifications.	Final Subcircuit Voltage Drop
6	Learner correctly calculates the maximum demand for the circuit.	Compliance with Voltage Drop Limitations
7	Learner correctly selects the minimum acceptable cable size based on current carrying capacity.	Final Subcircuit EFLZ
8	Learner correctly selects the minimum acceptable cable size based on voltage drop.	Compliance with EFLZ Limitations

Full marks will be awarded only after assessor affirms that the above checklisthas been met.

2. Carrying Out the Unit Skills Test

 **Checkpoint 4 – Select Final SubcircuitCables and Protection**		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Final Subcircuit Requirements		
2	Final Subcircuit Maximum Demand		
3	Final Subcircuit Protection		
4	Final Subcircuit CCC		
5	Final Subcircuit Voltage Drop		
6	Compliance with Voltage Drop Limitations		
7	Final Subcircuit EFLZ		
8	Compliance with EFLZ Limitations		
	Assessor Initial:		

Part D – Apply Local Service and Installation Rules

You are required to answer the following questions on the installation aboveusing your State/Territory Service and Installation Rules (SIR). Indicate applicable clause(s) to support each answer.

3. According to your local SIRs, does the installation require CT metering?
(1MARK)

YES when over 100 Amps. Clause 4.15 latest SIR

As the current is more than 100A, it needs CT metering (NSW SIR Clause 4.15)

Instructions to Assessor:

- **Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.**

4. According to your local SIRs, what is the minimum insulation resistance tobe measured between the installation service line conductors and earth?

(1MARK)

Not less than 50 mega ohms. Clause 1.11.3.1 or 1.12.3.1

According to Clause 1.11.3.1 or 1.12.3.1 of NSW SIR the minimum insulation resistance tobe measured between the installation service line

mustrconductors and earth must be minumum 50 mega ohm

4. Which Section of your local SIRs state the requirements for overheadservices?
(1MARK)

Section 3

The requirements for overheadservices are outlined in Section 3 of NSW SIR

Instructions to Assessor:

- **Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.**

6. Which Section of your local SIRs state the requirements for high voltageinstallations? **(1MARK)**

Section 7

The requirements for high voltage installations are outlined in Section 7 of NSW SIR

Instructions to Assessor:

- **Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.**

---

7. Your assessor must check your work at this point. **(Checkpoint 5)Apply Local SIRs**

(Pass 4/4)

Apply Local SIRs (Pass 4/4)

Item	Description of Item	Naming
1	Q. According to your local SIRs, does the installation require CT metering?	Local SIR Requirements 1
2	Q. According to your local SIRs, what is the minimuminsulation resistance to be measured between the installation service line conductors and earth?	Local SIR Requirements 2
3	Q. Which Section of your local SIRs state the requirements for overhead services?	Local SIR Requirements 3
4	Q. Which Section of your local SIRs state therequirements for high voltage installations?	Local SIR Requirements 4

Full marks will be awarded only after assessor affirms that the above checklisthas been met.

 **Checkpoint 5 – Apply Local SIRs**		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Local SIR Requirements 1		
2	Local SIR Requirements 2		
3	Local SIR Requirements 3		
4	Local SIR Requirements 4		
	Assessor Initial:		

3. Completing the Unit Skills Test

Finalise all equipment selections and documentation to ensure the selectedequipment complies with the relevant Australian Standards and requirements. Then answer the following questions.

Completion Questions

1. What are three “harmful effects” against which the design of an electricalinstallation must provide protection? **(1MARK)**

   Electric shock, excessive temperatures, physical injury.

   Electric shock can be caused by damage insulation to iron body

   Excessive temperature can be caused by sparking at loosed electrical connection

   Physical injury can be caused by unenclosed rotational parts

   Assessor is to use the above as a guide to the expected answers. Wording does nothave to match but must mean the same.

2. The instantaneous water heater in Townhouse No. 7 is protected by a circuit breaker and has integral functional controls. According to the Wiring Rules, are any further control devices required to be provided inthis final subcircuit? **(1MARK)**

Yes, an additional isolator is required to be installed adjacent to the water heater,as per AS/NZS 3000:2018 Clause 4.8.2.3.

According to AS/NZS 3000:2018 Clause 4.8.2.3, additional isolator needs to be installed adjacent to water heater because circuit breaker should only operate at fault connection. Frequent switching on/off in normal operation can cause mechanical fatigue to the mechanism of circuit breaker contact that will not properly operate when electrical fault occurs.

Assessor is to use the above as a guide to the expected answers. Wording does nothave to match but must mean the same.

3. What are three cable installation factors that require the current carryingcapacity of a conductor to be de-rated? **(1MARK)**

Presence of third harmonics, bunched cables, grouped circuits, ambient temperature, depth of laying underground cables, thermal resistivity of soil(underground cables).

Third harmonic current can add to additional heating effect in cable

Ambient temperature can increase cable temperature rise causing rise in resistance value and power loss

Mutual induction effect can cause the increase in current in group circuits.

To overcome such impacts, cables need to be derated and suitable cable size need to be chosen to meet the derated value of the current.

Assessor is to use the above as a guide to the expected answers. Wording does nothave to match but must mean the same.

3. Completing the Unit Skills Test

4. Electrical equipment used in Australian electrical installations is requiredto comply with applicable Australian Standards. **(1MARK)**

   True or False? (*tick*)

   ☐ True ☐ False

5. The townhouse garages have brick walls and a concrete slab roof. What isa suitable wiring system to be installed within the garage, for the supply of two twin fluorescent luminaires mounted on the ceiling? **(1MARK)**

   surface mounted conduit or conduit embedded in the slab.

   The cable needs to be enclosed in the conduit embedded in the slab or surface mounted conduit.

   Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.

6. List at least two different types of electricity tariffs in your jurisdiction. **(1MARK)**

Controlled load tariff kVA demand type tariff single tariff whole current metering.

~~single phase, multiple tariff~~ ~~three phase, single tariff~~

three phase, multiple tariff

Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.

Flat rate or single rate tariff. With a flat or single rate tariff, you pay the same amount for the electricity you use from the grid, whatever time you use it. ...

- Block tariff. ...
- Time of use tariff. ...
- Controlled load tariff. ...
- Demand charge tariff. ...
- Variable feed-in tariffs.

7. The space below is to allow for an additional question to be provided atthe time of your assessment ***if deemed necessary by your assessor***.

Q The maximum permissible voltage drop in a 230 V and 400 Vinstallation is? **(1MARK)**

A 230 V = 11.5V400

V = 20V

8. The assessor must assess your work at this point. **(Checkpoint 6)**

3. Completing the Unit Skills Test

Item	Description of Item	Naming
1	Learner finalises equipment selections, ensuringcompliance with manufacturer's data and regulatory requirements.	Local SIR Requirements 1
2	All work planned, carried out and completed in accordance with relevant workplace policies and procedures (i.e. anti-discrimination, health and safety, dealing with unplanned events .).	Local SIR Requirements 2

Completion Questions (Pass 7/7)

8	What are three "harmful effects" against which the design of an electrical installation must provide protection?	Local SIR Requirements 1
9	The instantaneous water heater in Townhouse No. 7 is by a circuit breaker and has integral functional controls. According to the Wiring Rules, are any further control devices required to be provided in this final subcircuit?	Local SIR protected Requirements 2
10	What are three cable installation factors that require the current carrying capacity of a conductor to be de-rated?	Local SIR Requirements 3
11	Electrical equipment used in Australian electrical installations is required to comply with applicable Australian Standards. True or False?	Local SIR Requirements 4
12	The townhouse garages have brick walls and a concrete slab roof. What is a suitable wiring system to be installed within the garage, for the supply of two twin fluorescent luminaires mounted on the ceiling?	Local SIR Requirements 1
13	List at least two different types of electricity tariffs in your jurisdiction.	Local SIR Requirements 2
14	Q. Which Section of your local SIRs state the requirements for overhead services?	Local SIR Requirements 3

Full marks will be awarded only after assessor affirms that the above checklisthas been met.

3. Completing the Unit Skills Test

 **Checkpoint 6 – Completing the Work**		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Confirm Compliance		
2	Follow Procedures		
3	Completion Question 1		
4	Completion Question 2		
5	Completion Question 3		
6	Completion Question 4		
7	Completion Question 5		
8	Completion Question 6		
9	Completion Question 7 (Optional)		
	Assessor Initial:		

Assessor Guide

UEEEL0018

Competency Standard Unit (CSU)	**UEEEL0018 – Select wiring systems and select cables for low voltage electrical installations**	
CSU Descriptor	This unit involves the skills and knowledge required to select wiring systems and cables for electrical installations operating at voltages up to 1,000 volt (V) alternating current (a.c.) or 1,500 V direct current (d.c.). It includes application of wiring systems and cable types, selecting wiring system compatible with the installation conditions, selecting cables that comply with required current-carrying capacity and voltage drop and earth fault-loop impedance limitations, coordinating between protective devices and conductors, and documenting selection decisions. The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 V a.c. or 120 V d.c.. Competency development activities in this unit are subject to regulations directly related to licensing. Where a licence or permit to practice is not held, a relevant contract of training, such as an Australian Apprenticeship, may be required. Additional and/or other conditions may apply in some jurisdictions subject to regulations related to electrical work. Practice in the workplace and during training is also subject to work health and safety (WHS)/occupational health and safety (OHS) regulations.	
Purpose of Assessor Guide	The purpose of the Unit Assessment Plan (UAP) is to provide the specification and mapping for the evidence gathering tools required to satisfy the Assessment Requirements of this Competency Standard Unit (CSU).	
Sequence	Before undertaking the evidence gathering events in this UAP, a learner is to have met the requirements of: • UEECD0007 Apply work health and safety regulations, codes and practices in the workplace • UEECD0019 Fabricate, assemble and dismantle utilities industry components • UEECD0020 Fix and secure electrotechnology equipment • UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications • UEEEL0003 Arrange circuits, control and protection for electrical installations • UEEEL0020 Solve problems in low voltage a.c. circuits • UEEEL0023 Terminate cables, cords and accessories for low voltage circuits • UEEEL0019 Solve problems in direct current (d.c.) machines • UEEEL0021 Solve problems in magnetic and electromagnetic devices • UEEEL0008 Evaluate and modify low voltage heating equipment and controls • UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls • UEEEL0010 Evaluate and modify low voltage socket outlets circuits • UEEEL0024 Test and connect alternating current (a.c.) rotating machines • UEEEL0025 Test and connect transformers and • UEECD0043 Solve problems in direct current circuits or • UEECD0044 Solve problems in multiple path circuits • UEECD0046 Solve problems in single path circuits	
Unit aspects addressed in this UAP	**Code**	**Specification Title**
	PC-UEEEL0018	Performance Citeria

	KE-UEEEL0018	Knowledge Evidence	
	PE-UEEEL0018 RC-UEEEL0018	Performance Evidence Range of Conditions	
Number of Evidence Sources	3	UEEEL0018-UKT	Unit Knowledge Test
		UEEEL0018-UST	Unit Skills Test
		UEEEL0018-WPE	Work Performance Experience

Note: This unit mandates collection of workplace evidence, as stated in theunit Assessment Conditions:

"In addition, evidence of Performance Evidence items of this unit marked witha hash (#) must be gathered in authentic workplace operational conditions (not simulated) before final determination of competence in this unit can be made."

2.7. Assessment Conditions and Context

Using the Evidence Gathering Tools/Activities provided and the detailed mapping within this document will assist RTOs in determining if sufficient evidence has beengathered to ensure full coverage of the unit.

Identified gaps in knowledge, skills or work performance evidence may be addressedthrough a variety of means including, but not limited to, written tests, online quizzes,practical tests, and/or technical interviews and work performance.

Evidence Gathering Tools/Activities	**Conditions**	**Reporting Requirement**
Unit Knowledge Test (UEEEL0018-UKT)	Knowledge Test undertaken from nationally developed question knowledge test bank.	**Graded Result**
Unit Skills Test (UEEEL0018-UST)	Unit Skills Test covers the selection of wiring systems and cables that complywith required current-carrying capacityand voltage drop and earth fault-loop impedance limitations for LV electrical installations..	Satisfactory/ Not Satisfactory Recorded on customized marking forms. Then result logged into Energy Space records.
Work Performance (UEEEL0018-WPE)	Recording of activities undertaken in a simulated or real workplace environmentto meet the requirements and scope of this competency standard unit	Satisfactory/ Not Satisfactory E- Profiling work cards logged into system. Unit report generated

Evidence Gathering Tools Specifications:

2.8. Unit Knowledge Test

Event Type	**Unit Knowledge Test**
Types of Items	Learner is required to complete a knowledge test (38 questions) based on multiple choice (50% of marks), matching (24% of marks), diagram type (13% of marks) and calculations (13% of marks).
Coverage	Knowledge Evidence (KE-UEEEL0018). Essential Performance Capabilities (EPC) 10, 20, 21, 22, 23, 24.
Staging	After Unit Learning Plan (ULP) Knowledge and Skills Topics 1 to 10 have been completed.
Duration	2 hours
Assessment Conditions	Supervised (invigilated) classroom environment (off the job). Relevant Australian Standards and Codes of Practice can be used. This is to be conducted at the facility in a classroom environment (off the job). It must be supervised. The student will log in to Energy Space. The student will be set up to do the computer-generated test from national E-Oz Energy Skills Australia online test bank.
Resources required	Computer and log in for Energy Space Computer generated test from national E-Oz Energy Skills Australia online test bank.
Application	The Unit Knowledge Test aligns directly to the knowledge that underpins the safe and correct application of skills. It should be noted that the evidence gathered by Knowledge Tests is limited in its capacity to indicate whether a person can actually plan, carry out or complete a skills-based task, with some exceptions, for example: • Evidence of problem solving skills can be gathered by UKTs in some contexts. • Performance criteria (PCs) relating to the selection of tools, materials and equipment are heavily reliant on certain knowledge dot points that are addressed in UKTs. The evidence collected by a Unit Knowledge Test is not as directly aligned to what constitutes competency as other forms of evidence (such as that gathered by a Skills Test). It is recommended that Knowledge Test evidence is interpreted primarily as an indicator of: • The reliability of other evidence. • The likelihood that a learner will be capable of applying related skills safely and autonomously in different contexts.

	• The likelihood that the learner will be capable of dealing with nonstandard situations.

Unit Skills Test

Event Type	**Unit Skills Test**
Staging	After ULP Knowledge and Skills Topics 1 to 10 have been completed.
Types of Items	Skills Test covering the following tasks: • Selecting consumermains cables • Selecting submains cables • Selecting final subcircuits cables and protection • Applying local service andinstallation rules (SIRs)
Coverage	Performance Criteria (PC-UEEEL0018), Performance Evidence (PEUEEEL0018), and some aspects of the Range of Conditions (RC-UEEEL0018) and Knowledge Evidence (KE-UEEEL0018). Essential Performance Capabilities (EPC) 10, 20, 21, 22, 23, 24.
Duration	4 hours
Assessment Conditions	This is to be conducted at the facility. It must be supervised. classroom. Relevant Australian Standards, Non-programmable calculators and basic drawing instruments may be used.
Resources required	customized Unit Skills Tests facility and task supporting documents and attachments.UST recording forms Results are recorded on forms then transferred to the Energy Space LMS student records. Unit Skills Test Assessor Guide (USAG),

	calculators, AS/NZS 3000 Wiring Rules – current edition, AS/NZS 3008.1.1 Electrical Installations – Selection of Cables.
Application	The Unit Skills Test gathers direct evidence of a learner's ability to plan, carry out and complete the required tasks in a simulated/controlled environment. It also indirectly gathers evidence that a learner has or does not have the knowledge underpinning safe and correct application of these skills.

2.9. Work

Performance

Event Type	On the job workplace activities carried out as part of the candidates daily work activities (not simulated).
Types of Items	Selecting LV wiring and equipment, including cables, supports and enclosures, protection devices, control and isolation devices, earthing equipment, alternate supply equipment Arranging LV wiring and equipment, including determining maximum demand, division of circuits, coordination of wiring and circuit protection devices Installing, maintaining and repairing LV appliances and accessories
Coverage	Performance Criteria (PC-UEEEL0018), Range of Conditions (RC-UEEEL0018) and Performance Evidence (PE-UEEEL0018).
Staging	Evidence collected from the workplace via profiling on a regular basis.
Duration	n Duration will reflect the learner's record of workplace activities undertaken to meet the requirements and scope of this competency standard unit.
Conditions	Supervised electrical work environment
Resources	Typical domestic/non-domestic, commercial and/or industrial electrical installations, relevant workplace safety and operational documentation.
Application	The Exemplar Profiling evidence gathering tool is designed to: • Facilitate progressive monitoring of a learner's competency development in the workplace. • Assist an RTO assessor, in conjunction with other forms of evidence, to make a judgement of a learner's competency. The evidence gathered is directly aligned to planning, carrying out and completing tasks in an actual workplace, and unlike other tools, highlights the learner's competency development over time. The following indicators are embedded within the tool, and can be assessed using the various reporting functions: • Autonomy (level of support received) Participation (plan, carry out and complete)

	• Technical ability (range of activities and equipment)

UEEEL0018

Assessor Instructions For the set-up of SkillsTest Assessments at Workshop

PRIOR to assessment

Instructions to Assessor one (1) week prior to actual test day:

1. Assessors are to gather students in classroom to handout 'UEEEL0018 Assessment overview' whichoutlines the assessments on a part by part basis and gives detailed and clear instructions to students before undertaking any assessments.
2. Assessor can answer questions regarding **'Units Skills Test'** for student clarification.

Instructions to Assessor on actual test day

3. Assessors will be conducting Part A and completion questions consecutively.
   'Planning' and 'Carrying out the task' will be conducted in workshop and 'Completing the UnitSkills Test' will be conducted in the classroom.
   Students are allowed 1 hour to complete

   ALL PARTS –Assessors are to prepare training facility for Part A 60 min prior to commencing student assessment:

   - Assessors will be implementing hazards for this skills test:
     - **Bags on the floor**
     - **Also students need to address body fatigue due to ergonomics**
   - Assessors to complete ' **Inspection Test plan' for Assessment**
     Note: The planning phase for unit skills test is done prior to any students 'Carrying out the task'. Ensure all 'Equipment, Suggested Materials and Miscellaneous items'from the Unit Skills Test Task Sheet are ready in the classroom for students to use.
   - Gather students that are being assessed in Classroom prior to commencement ofunit skills test.
   - Assessors to hand out **Unit Skills Test Task Sheets which includes instructions tostudents**.
   - Assessor to engage students in a Q/A session regarding **'Unit Skills Test'** for studentclarification purposes.
   - Check/Verify ALL notes that students will have prior to student commencingassessment.
   - Collect all mobile phones/tablets from students and place into locker room
   - Assessor 1 is to take first group of4 x students conducting assessment in classroom
   - ***Note: Only 4 x students will be allowed to enter the classroom at any given timeunder supervision.***

Handouts	Checklist
AS/NZS 3000: Wiring Rules	1 copy per 4 students – resource library
AS/NZS 3008.1.1	1 copy per 4 students – resource library
Local Service and installation Rules	1 copy per 4 students – resource library
UEEEL0018 Unit Skills Test Task Sheet	1 per student - printed

Unit Skills Test Task Sheet

UEEEL0018 Select wiring systems and select cables for lowvoltage electrical installations

Learner Name:	**<STUDENT NAME>**	**ID:**	**<STUDENT ID>**
College/ Campus:	Revesby	**Group/ Class:**	**1 or 2**
Learner Signature:	**<STUDENT SIGNATURE>**	**Date:**	**<DATE>**

Final Result of UEEEL0018 UST		
The learner has demonstrated a satisfactory performance ofidentified steps listed.	Yes	No

Assessor Name:			
Assessor Signature:		**Date:**	

Comments: **THIS UNIT SKILLS TEST WILL BE CONDUCTED IN THE CLASS ROOM**

Instruction:

This test is broken into four parts – Parts A to D. In Parts A, B and C, you will apply Australian Standards to select consumer mains, submains and final subcircuit cablesfor a given multiple domestic electrical installation. In Part D you will apply your local Service and Installation Rules to determine particular requirements in your jurisdiction.

- Time Allowed (to be specified by assessor):
- Orange shaded checkpoints are for assessor use only. Entering information inthese areas may invalidate your assessment.
- Mobile phones and smart devices must be turned off and not accessed.
- Wait for the assessor to mark your work when requested.
- You will be allowed two (2) attempts at each check point to demonstrate thetask described.
- If you are unsure about what you need to do, you should ask your assessorfor guidance.

Whilst carrying out skills activities you must follow all standard workplace procedures (i.e. anti-discrimination, health and safety, unplanned events .) andensure efficient / sustainable use of materials.

Unit Skills Test Task Sheet

Assessors Guidelines:

Instructions and safety requirements should be clearly explained to the learner at the beginning of the assessment event, including the permitted time – to be indicated onthe Unit Skills Test Task Sheet (USTS) cover page.

Recommended time allowed – 1 hour and 30 minutes.

The learner will require access to current versions of the following documents:

- AS/NZS 3000
- AS/NZS 3008.1.1
- Local Service and Installation Rules (SIRs).
- Worked solutions to this test have been determined using AS/NZS 3000:2018 and AS/NZS 3008.1.1:2017, and are provided as Attachment A of this document. Note that a learner ‘s responses do notneed to be identical to these worked solutions – successful performance should be considered as the appropriate application of standards resulting in equipment selections that are practical, economical, sustainable, whilst meeting all safety and performance requirements.

1. Planning the Unit Skills Test

Your assessor will provide the details of the equipment required for this UnitSkills Test.

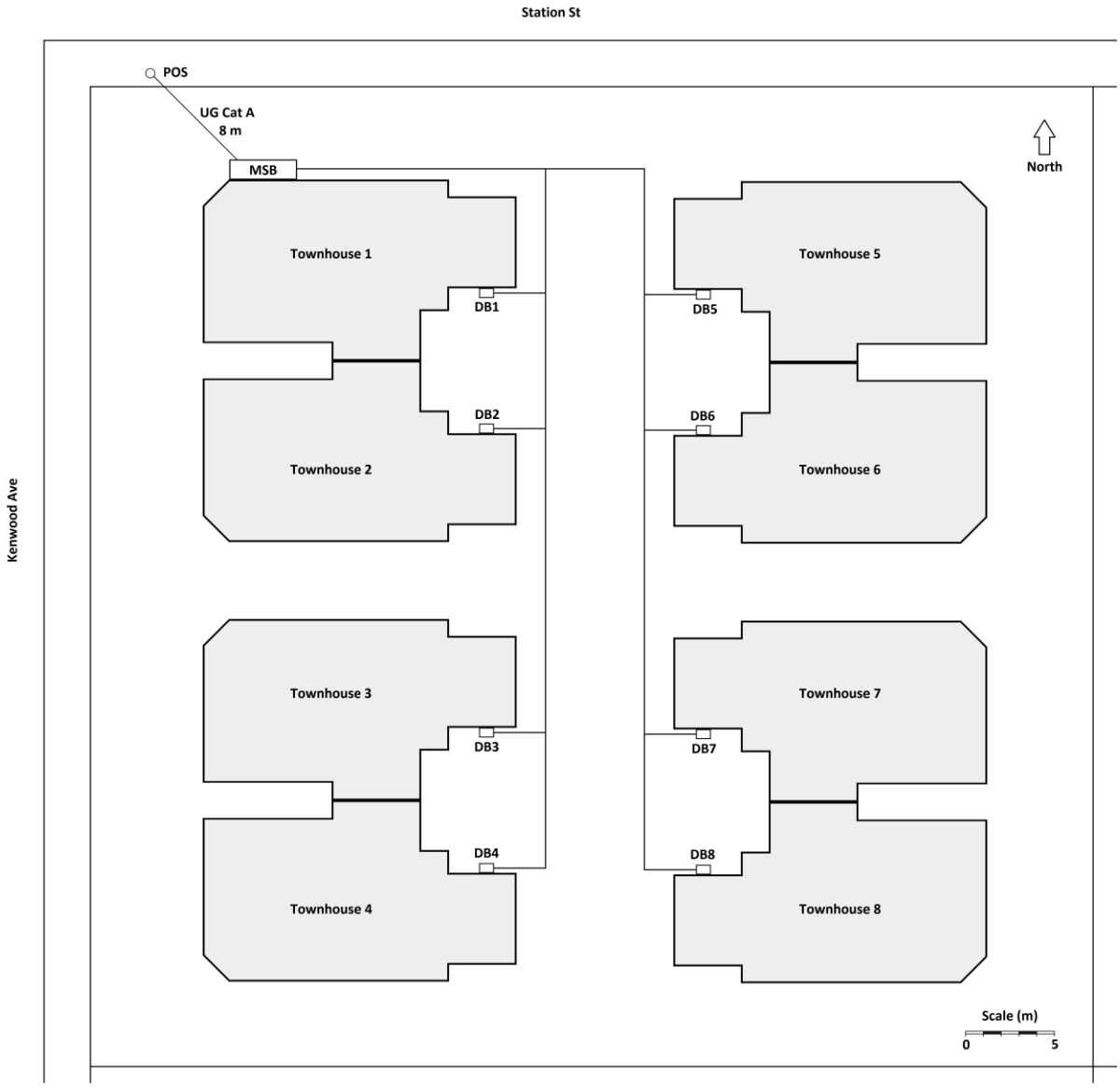
1.1 Equipment:	**1.2 Suggested Materials:**	**1.3 MiscellaneousItems:**
• AS/NZS 3000 • AS/NZS 3008.1.1 • Local Service and Installation Rules	• Ruler • Calculator	• Pens/Pencils

1.4 Installation Specifications

You are required to plan certain portions of the electrical installation for ablock of 8 luxury townhouses. In preparation for the task, review the jobspecification drawings and schedules for the installation, provided below.

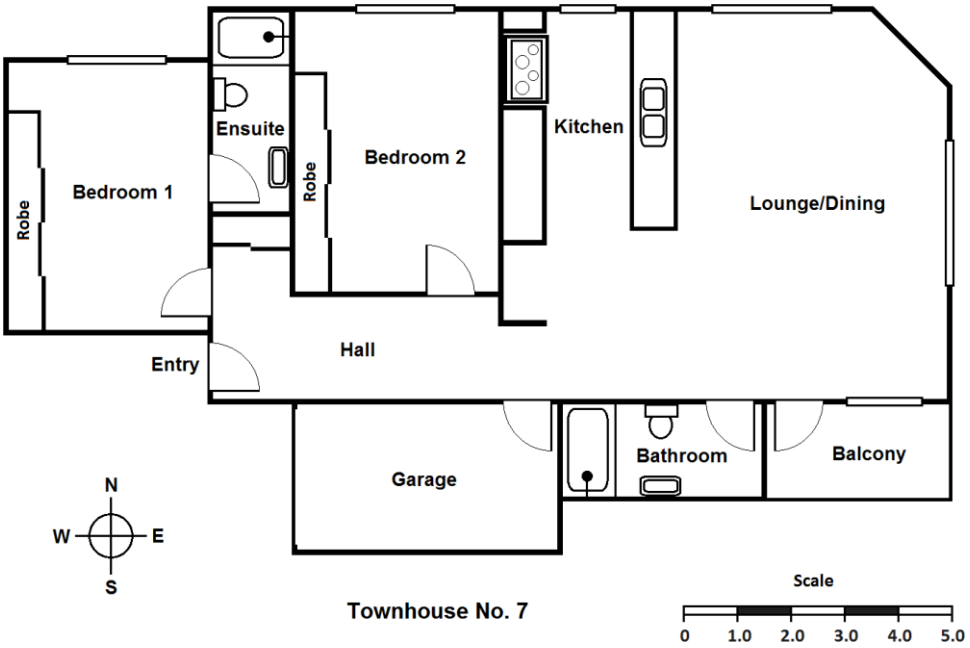
<u>Part 1 – Site Plan</u>

1. Planning the Unit Skills Test



Part 2 – Floor Plan

5. Planning the Unit Skills Test



Schedule of Common Loads	
Qty.	**Type**
29	14 W, 230 V CFL bollard fitting
12	200 W, 230 V halogen floodlight
10	10 A, 230 V double socket-outlet
6	15 A, 230 V single socket-outlet (for clothes dryers)
Schedule of Loads per Townhouse	
Qty.	**Type**
2	230 V twin 24 W tube T5 fluorescent fitting (0.3 A)
2	Five light 40 W, 230 V LED pendant fitting (0.2 A)
24	230 V LED downlight (0.7 A)
17	10 A, 230 V double socket-outlet
1	10 A, 230 V single socket-outlet
1	11 kW, 230 V upright stove
1	12.5 kW, 400 V three phase instantaneous water heater
1	230 V reverse cycle air-conditioner (18.4 A max)

Part 3 – Wiring Systems **(1MARK)**

1. Planning the Unit Skills Test

Mains and Submains

Mains and submains cables shall be XLPE SDI Cu cables installedunderground in HDPVC conduit at a minimum depth of 500 mm.

Each submain set is to be installed in a separate conduit.

Submain wiring systems will share a common trench until their routes diverge, and wiring systems in common trenches will be separated by aminimum clearance of 300 mm.

Voltage drop in the consumer mains shall be limited to 0.5%.Voltage drop in

submains shall be limited to 1.5%.

Final Subcircuits

Final subcircuits shall be supplied by V90 flat multicore TPS Cu cables.

V90 cables shall be selected based on a maximum operatingtemperature of 75^{o}C.

Voltage drop in final subcircuits shall be limited to 3%.ASSESSOR

Students will EACH have a copy of the standards students are NOTallowed to share relevant standards.

1.7 Risk Assessment (1MARK)

Risk assessment procedure:

- Identify 2 hazards that may exist with this skills practice below
- List the supervision level you will be working under – Direct (D),General (G) or Broad (B)
- List the risk classification – High (H), Medium (M) or Low (L) risk
- List the control measures required for each identified hazard.

Hazard/s Identified	Supervision Level (D, G or B)	Risk Classification (H, M or L)	Control Measure/s
Bags in the clear way	D	L	House keeping
Sore body (any part ofthe body)	D	M/L	Take breaks ergonomics

The assessor must assess your work at this point. **(Checkpoint 1)Checkpoint 1 – Planning the Work (Pass 2/2)**

Checkpoint 1 – Planning the Work (Pass 2/2)

1. Planning the Unit Skills Test

Item	Description of Item	Naming
1	Learner receives and understands job instructions,seeking clarification as required.	Job Instructions
2	Learner completes risk assessment in consultationwith assessor, including: • Identification of hazards. • Assessment of risks. • Selection of controls **Full marks will be awarded only after assessoraffirms that the above checklist has been met.**	Risk Assessment

Checkpoint 1 – Planning the Work

Satisfactory Yes/No

Item	Description of Item	1st	2nd
1	Job Instructions		
2	Risk Assessment		
	Assessor Initial:		

2. Carrying Out the Unit Skills Test

Part A – Select Consumer Mains Cables

You are required to use Australian Standards and the job specification provided to select suitable cables for the installation consumer mains.**(1MARK)**

1. Determine the maximum demand on the installation consumer mains anddocument details in the following table using as many rows as necessary.

(1MARK)

Maximum Demand on Consumer Mains					
AS/NZS 3000	**Table:**		**Column:**		
Load	**Load Group**	**Calculation**	**A Phase**	**B Phase**	**C Phase**

2. Carrying Out the Unit Skills Test

Maximum Demand on Consumer Mains:					

Maximum Demand on Consumer's Mains					
AS/NZS 3000	**Table:** C1		**Column:** 3 (See Table C1 Note 2)		
Load	**Load Group**	**Calculation**	**A Phase**	**B Phase**	**C Phase**
Communal Lighting	h	(29 x 14) + (12 x 200) = 2806 W 2806/ 230 = 12.2 A			12.2 A
Communal 10 A Socket Outlets	i	7 x 2 = 6 points 6 x 2 = 12 A 8 x 2 = 8 points8 x 2 = 16 A15 A max	12 A	12 A	15 A
Communal 15 A Socket Outlets	j(i)	2 x 15 = 30 30 x 0.5 = 15 A	15 A	15 A	15 A
Townhouse Lighting	a(i)	6 A	6 A	6 A	6 A
10 A Socket Outlets	b(i)	10 + (5 x 3) = 25 A 10 + (5 x 2) = 20 A	25 A	25 A	20 A
Stoves	c	15 A	15 A	15 A	15 A
Water heaters	e	12.5x1000x0.333x8/ 1.7321x400	48 A	48 A	48A
Air Conditioners	d	18.4 x 3 x 0.75 = 41.4 A 18.4 x 2 x 0.75 = 27.6 A	41.4 A	41.4 A	27.6 A
Maximum Demand on Consumer's Mains:			132. A	132.A	123 A

6. *Carrying Out the Unit Skills Test*

Assessor is to use the above table for expected answers.
Tolerance of 1A is accepted for maximum demand.

Assessor is to make certain student correctly identifies consumer's mains installation details from job specificationsAssessor is to make certain student calculates the maximumdemand for the circuit

all phases must be in total of 387A TO 388 A

4. Select the minimum acceptable cable size for the consumer mains basedon the installation conditions and required current carrying capacity. Document the details of your cable selection by completing all applicablefields in the table below.

(1MARK)

Current Carrying Capacity of Consumer Mains				
Minimum Cable Size	Current Carrying Capacity		Rating/Derating	
	Table	Column	Table	Column
35 mm^2 (137 A)	8	24	N/A	N/A

*Based on the selection of stranded V90-SDI installed in UG conduit at 0.5 m depth
(other cabletypes and UG systems would also be acceptable)

- **Assessor is to use the above table for expected answers.**
- **Assessor is to make certain student correctly selects the minimumacceptable cable size based on current carrying capacity**

8. *Carrying Out the Unit Skills Test*

9. Now select the minimum acceptable cable size for the consumer mains based on both current carrying capacity and voltage drop. The route length of the consumer mains is 8 m. Document the details of your cableselection by completing all applicable fields in the table below.

(1MARK)

- **Assessor is to use the above table for expected answers. Tolerance of 1 Ais accepted for Volts and %.**
- **Assessor is to make certain student correctly selects the minimumacceptable cable size based on voltage drop**

Voltage Drop in Consumer Mains						
Working: **Vc = 1.18 mV/A.m** **(1.18 x 132 x 8) / 1000 = 1.25 V** **1.25 / 400 X 100 = 0.313%**						
Cable Size	**Circuit Load**	**Route Length**	**Voltage Drop**		**AS/NZS 3008.1.1**	
			Volts	**%**	**Table**	**Column**
35 mm^2	**132 A**	**8 m**	**1..25 V**	**0.313%**	**41**	**8**

10. The assessor must assess your work at this point. **(Checkpoint 2)**

2. Carrying Out the Unit Skills Test

Checkpoint 2 – Select Consumer Mains Cables (Pass 4/4)**Checkpoint 2 – Select Consumer Mains Cables (Pass 4/4)**

Item	Description of Item	Naming
1	Learner correctly identifies consumer mains installation details from job specifications.	Consumer Mains Requirements
2	Learner correctly calculates the maximum demand for thecircuit.	Consumer Mains Maximum Demand
3	Learner correctly selects the minimum acceptablecable size based on current carrying capacity.	Consumer Mains CCC
4	Learner correctly selects the minimum acceptablecable size based on voltage drop. **Full marks will be awarded only after assessoraffirms that the above checklist has been met.**	Consumer Mains VoltageDrop

	Checkpoint 2 – Select Consumer MainsCables	Satisfactory Yes/No	
Item	**Description of Item**	**1st**	**2nd**
1	Consumer Mains Requirements		

2. Carrying Out the Unit Skills Test			
2	Consumer Mains Maximum Demand		
3	Consumer Mains CCC		
4	Consumer Mains Voltage Drop		
	Assessor Initial:		

Part B – Select Submains Cables

You are required to use Australian Standards and the job specification provided to select suitable submains cables for the supply of townhouse 7.

(1MARK)

1. Determine the maximum demand on the submains and document detailsin the following table using as many rows as necessary. **(1MARK)**

Part B – Select Submains Cables

Maximum Demand on Townhouse 7 Submains					
AS/NZS 3000	**Table: C1**		**Column: 2**		
Load	**Load Group**	**Calculation**	**A Phase**	**B Phase**	**C Phase**
Lighting	**A(i)**	**2 + 2 + 24 = 28 points** **3 + 2 = 5 A**	**-**	**-**	**5 A**
10 A Socket Outlets	**B(i)**	**(17 x 2) + 1 = 35 points** **10 + 5 = 15 A**	**15 A**	**-**	**-**
Stove	**C**	**11000 / 230 = 47.8 A** **47.8 x 0.5 = 23.9 A**	**-**	**24 A**	**-**
Water heater	**E**	**12500 / (√3 x 400) = 18 A** **18 x 0.333 = 6 A**	**6 A**	**6 A**	**6 A**
Air Conditioner	**D**	**18.4 x 0.75 = 13.8 A**	**-**	**-**	**14 A**
Maximum Demand on Submains:			**21 A**	**30 A**	**25 A**

Assessor is to use the above table for expected answers.Tolerance of 1A is accepted for maximum demand.

2. Carrying Out the Unit Skills Test

Assessor is to make certain student correctly identifies consumer's mains installation details from job specifications

- **Assessor is to make certain student calculates the maximumdemand for the circuit**

6. Select the minimum acceptable cable size for the submains based on the installation conditions and required current carrying capacity. Document the details of your cable selection by completing all applicable fields in thetable below. **(1MARK)**

Assessor:

- **Assessor to use the below checklist for expected candidate responses**
- **Assessor is to make certain the student correctly identifies installation details and requirements from job specifications and standards**
- **Assessor is to make certain the student correctly identifies TABLE from AS/NZS 3008.1.1 2017 specifications**

Current Carrying Capacity of Townhouse 7 Submains				
Minimum Cable Size	Current Carrying Capacity		Rating/Derating	
	Table	Column	Table	Column
4 mm^2 (32 A after derating)	8	24	26(2)	3

7. Now select the minimum acceptable cable size for the submains based onboth current carrying capacity requirements and voltage drop limitations.The route length of the submain is 55 m. Document the details of your cable selection by completing all applicable fields in the table below. **(1MARK)**

- **Assessor is to use the below table for expected answers. Tolerance of1 A is accepted for Volts and %.**
- **Assessor is to make certain student correctly selects the minimumacceptable cable size based on voltage drop**

2. Carrying Out the Unit Skills Test

Voltage Drop in Townhouse 7 Submains
Working: **4 mm² Vc = 10.2 mV/A.m** **(10.2 x 30 x 55) / 1000 = 16.83 V** **16.83 / 400 = 4.2% >1.5% per specification** **16mm = (2.55 x 30 x 55) / 1000 = 4.21 v** **(4.21 / 400) x 100 = 1.05% meets specificaton**

Cable Size	Circuit Load	Route Length	Voltage Drop		AS/NZS 3008.1.1	
			Volts	%	Table	Column
16 mm²	30 A	55 m	4.21 V	1.05%	41	8

4. Your assessor must check your work at this point. **(Checkpoint 3)Select Submains Cables (Pass 4/4)**

Select Submains Cables (Pass 4/4)

Item	Description of Item	Naming
1	Learner correctly identifies submains installationdetails from job specifications.	Submain Requirements
2	Learner correctly calculates the maximum demand for thecircuit.	Submain Maximum Demand
3	Learner correctly selects the minimum acceptablecable size based on current carrying capacity.	Submain CCC
4	Learner correctly selects the minimum acceptablecable size based on voltage drop.	Submain Voltage Drop

2. Carrying Out the Unit Skills Test

	Full marks will be awarded only after assessoraffirms that the above checklist has been met.	

Checkpoint 3 – Select Submains Cables		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Submain Requirements		
2	Submain Maximum Demand		
3	Submain CCC		
4	Submain Voltage Drop		
	Assessor Initial:		

Part C – Select Final Subcircuit Cables and Protection

You are required to use Australian Standards and the job specification provided to select a suitable cable for the supply of the following final subcircuit in townhouse 7. **(1MARK)**

Final Subcircuit Installation Details	
Connected Load	12.5 kW, 400 V three phase instantaneous waterheater
Cable Type	V90 circular four-core and earth TPS Cu cable
Route Length	15 m
Installation Method	Clipped to timber ceiling joists and partially surrounded by thermal insulation in wall cavities.

1. Determine the maximum demand for the final subcircuit and select asuitable circuit breaker for its protection. Document details below. **(1MARK)**

Assessor to use the above checklist for expected candidate responses

Assessor is to make certain the student correctly identifies installation detailsand requirements from job specifications and standards clauses

Assessor is to make certain the student select an appropriate number poles

4. *Carrying Out the Unit Skills Test*

Assessor is to make certain the student correctly identifies protection requirements from job specifications and applicable Australian standards

Assessor is to make certain the student selects suitable circuit breakers foreach circuit, ensuring coordination with wiring, i.e satisfying the equation:

- For circuit breakers: $I_B \leq I_N \leq I_Z$

Assessor is to make certain the student correctly identifies the need for 30MaRCD protection for each circuit.

Final Subcircuit Demand and Protection (1MARK)		
Working (if applicable): **12500 / (√3 x 400) = 18 A**		
Circuit Breaker		
Poles	**Type**	**Nominal Current**
3	**B or C**	**20 A**
Maximum Demand		
Demand	**Method Used**	**AS/NZS 3000 Ref.**
18 A	**Assessment**	**C2.5.1 (a)**

Select the minimum acceptable cable size for the final subcircuit based on the installation conditions and required current carrying capacity. Document your cableselection by completing applicable fields in the table below. (1MARK)

Assessor to use the below checklist for expected candidate responses

- **Assessor is to make certain the student correctly identifies installation details and requirements from job specifications and standards**
- **Assessor is to make certain the student correctly identifies TABLE from AS/NZS 3008.1.1 2017 specifications**

2. Carrying Out the Unit Skills Test

2.

Current Carrying Capacity of Final Subcircuit				
Minimum Cable Size	Current Carrying Capacity		Rating/Derating	
	Table	Column	Table	Column
4 mm^2 (23 A)	13	15	N/A	N/A

5. Now select the minimum acceptable cable size for the final subcircuit based on both current carrying capacity requirements and voltage drop limitations. Document the details of your cable selection by completing allapplicable fields in the table below. **(1MARK)**

- Assessor is to use the below table for expected answers. Toleranceof 1 A is accepted for Volts and %.
- Assessor is to make certain student correctly selects the minimumacceptable cable size based on voltage drop

Voltage Drop in Final Subcircuit
Working: 4 mm^2 Vc = 9.71 mV/A.m (9.71 x 18 x 15) / 1000 = 2.62 V 2.62 / 400 x100 = 0.66%

Cable Size	Circuit Load	Route Length	Voltage Drop		AS/NZS 3008.1.1	
			Volts	%	Table	Column

2. Carrying Out the Unit Skills Test

4 mm^2	**18 A**	**15 m**	**2.62 V**	**0.66%**	**42**	**6**

Total voltage drop (%) at terminals of the equipment: **(1MARK)**	**2.02 %**	%

6. Determine the earth fault loop impedance in the selected final subcircuitcable, and confirm that the selected cable complies with earth fault loopimpedance limitations. Document the details of your cable selection by completing all applicable fields in the table below. **(1MARK)**

- **Assessor is to use the below table for expected answers. Tolerance of 0.5ohmsis accepted for rounding up**
- **Assessor is to make certain student correctly selects the minimumacceptable cable size.**

Earth Fault Loop Impedance of Final Subcircuit
Working:

4 mm^2 Rc = 5.61 Ω/km

Rph = (5.61 x 15) / 1000 = 0.08415 Ω

2.5 mm^2 Rc = 9.01 Ω/km

Re = (9.01 x 15) / 1000 = 0.13515 Ω

Rphe = 0.08415 + 0.13515 = 0.2193 Ω

AS/NZS 3000:2018 Table 8.2 states that the max value of Rphe for a circuit protected by a 20 A circuit breaker is 1.0 Ω (Type C) or 1.8 Ω (Type B)

2. Carrying Out the Unit Skills Test

Cable Size	Route Length	Resistance		Reactance	
		Table	Column	Table	Column
4 mm^2	15 m	35	4	N/A	N/A

Earth fault loop impedance complies with Wiring Rules: **(1MARK)**	□ Yes	□ No

7. Your assessor must check your work at this point. **(Checkpoint 4)Select Final Subcircuit Cables and Protection (Pass 8/8)**

Select Final Subcircuit Cables and Protection (Pass 8/8)

Item	Description of Item	Naming
1	Learner correctly identifies submains installation details from job specifications.	Final Subcircuit Requirements
2	Learner correctly calculates the maximum demand for the circuit.	Final Subcircuit Maximum Demand
3	Learner correctly selects the minimum acceptable cable size based on current carrying capacity.	Final Subcircuit Protection
4	Learner correctly selects the minimum acceptable cable size based on voltage drop.	Final Subcircuit CCC
5	Learner correctly identifies submains installation details from job specifications.	Final Subcircuit Voltage Drop
6	Learner correctly calculates the maximum demand for the circuit.	Compliance with Voltage Drop Limitations
7	Learner correctly selects the minimum acceptable cable size based on current carrying capacity.	Final Subcircuit EFLZ
8	Learner correctly selects the minimum acceptable cable size based on voltage drop.	Compliance with EFLZ Limitations

Full marks will be awarded only after assessor affirms that the above checklisthas been met.

2. Carrying Out the Unit Skills Test

 **Checkpoint 4 – Select Final SubcircuitCables and Protection**		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Final Subcircuit Requirements		
2	Final Subcircuit Maximum Demand		
3	Final Subcircuit Protection		
4	Final Subcircuit CCC		
5	Final Subcircuit Voltage Drop		
6	Compliance with Voltage Drop Limitations		
7	Final Subcircuit EFLZ		
8	Compliance with EFLZ Limitations		
	Assessor Initial:		

Part D – Apply Local Service and Installation Rules

You are required to answer the following questions on the installation aboveusing your State/Territory Service and Installation Rules (SIR). Indicate applicable clause(s) to support each answer.

5. According to your local SIRs, does the installation require CT metering?
(1MARK)

YES when over 100 Amps. Clause 4.15 latest SIR

As the current is more than 100A, it needs CT metering (NSW SIR Clause 4.15)

Instructions to Assessor:

- **Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.**

6. According to your local SIRs, what is the minimum insulation resistance tobe measured between the installation service line conductors and earth?

(1MARK)

Not less than 50 mega ohms. Clause 1.11.3.1 or 1.12.3.1

According to Clause 1.11.3.1 or 1.12.3.1 of NSW SIR the minimum insulation resistance tobe measured between the installation service line

mustrconductors and earth must be minumum 50 mega ohm

5. Which Section of your local SIRs state the requirements for overheadservices?
(1MARK)

Section 3

The requirements for overheadservices are outlined in Section 3 of NSW SIR

Instructions to Assessor:

- **Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.**

8. Which Section of your local SIRs state the requirements for high voltageinstallations? **(1MARK)**

Section 7

The requirements for high voltage installations are outlined in Section 7 of NSW SIR

Instructions to Assessor:

- **Note: Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.**

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9. Your assessor must check your work at this point. **(Checkpoint 5)Apply Local SIRs**

(Pass 4/4)

Apply Local SIRs (Pass 4/4)

Item	Description of Item	Naming
1	Q. According to your local SIRs, does the installation require CT metering?	Local SIR Requirements 1
2	Q. According to your local SIRs, what is the minimuminsulation resistance to be measured between the installation service line conductors and earth?	Local SIR Requirements 2
3	Q. Which Section of your local SIRs state the requirements for overhead services?	Local SIR Requirements 3
4	Q. Which Section of your local SIRs state therequirements for high voltage installations?	Local SIR Requirements 4

Full marks will be awarded only after assessor affirms that the above checklisthas been met.

 **Checkpoint 5 – Apply Local SIRs**		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Local SIR Requirements 1		
2	Local SIR Requirements 2		
3	Local SIR Requirements 3		
4	Local SIR Requirements 4		
	Assessor Initial:		

3. Completing the Unit Skills Test

Finalise all equipment selections and documentation to ensure the selectedequipment complies with the relevant Australian Standards and requirements. Then answer the following questions.

Completion Questions

1. What are three “harmful effects” against which the design of an electricalinstallation must provide protection? **(1MARK)**

   Electric shock, excessive temperatures, physical injury.

   Electric shock can be caused by damage insulation to iron body

   Excessive temperature can be caused by sparking at loosed electrical connection

   Physical injury can be caused by unenclosed rotational parts

   Assessor is to use the above as a guide to the expected answers. Wording does nothave to match but must mean the same.

2. The instantaneous water heater in Townhouse No. 7 is protected by a circuit breaker and has integral functional controls. According to the Wiring Rules, are any further control devices required to be provided inthis final subcircuit? **(1MARK)**

Yes, an additional isolator is required to be installed adjacent to the water heater,as per AS/NZS 3000:2018 Clause 4.8.2.3.

According to AS/NZS 3000:2018 Clause 4.8.2.3, additional isolator needs to be installed adjacent to water heater because circuit breaker should only operate at fault connection. Frequent switching on/off in normal operation can cause mechanical fatigue to the mechanism of circuit breaker contact that will not properly operate when electrical fault occurs.

Assessor is to use the above as a guide to the expected answers. Wording does nothave to match but must mean the same.

3. What are three cable installation factors that require the current carryingcapacity of a conductor to be de-rated? **(1MARK)**

Presence of third harmonics, bunched cables, grouped circuits, ambient temperature, depth of laying underground cables, thermal resistivity of soil(underground cables).

Third harmonic current can add to additional heating effect in cable

Ambient temperature can increase cable temperature rise causing rise in resistance value and power loss

Mutual induction effect can cause the increase in current in group circuits.

To overcome such impacts, cables need to be derated and suitable cable size need to be chosen to meet the derated value of the current.

Assessor is to use the above as a guide to the expected answers. Wording does nothave to match but must mean the same.

3. Completing the Unit Skills Test

4. Electrical equipment used in Australian electrical installations is requiredto comply with applicable Australian Standards. **(1MARK)**

   True or False? (*tick*)

   ☐ True ☐ False

5. The townhouse garages have brick walls and a concrete slab roof. What isa suitable wiring system to be installed within the garage, for the supply of two twin fluorescent luminaires mounted on the ceiling? **(1MARK)**

   surface mounted conduit or conduit embedded in the slab.

   The cable needs to be enclosed in the conduit embedded in the slab or surface mounted conduit.

   Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.

6. List at least two different types of electricity tariffs in your jurisdiction. **(1MARK)**

Controlled load tariff kVA demand type tariff single tariff whole current metering.

~~single phase, multiple tariff~~ ~~three phase, single tariff~~

three phase, multiple tariff

Assessor is to use the above as a guide to the expected answers. Wording does not have to match but must mean the same.

Flat rate or single rate tariff. With a flat or single rate tariff, you pay the same amount for the electricity you use from the grid, whatever time you use it. ...

- Block tariff. ...
- Time of use tariff. ...
- Controlled load tariff. ...
- Demand charge tariff. ...
- Variable feed-in tariffs.

7. The space below is to allow for an additional question to be provided atthe time of your assessment ***if deemed necessary by your assessor***.

Q The maximum permissible voltage drop in a 230 V and 400 Vinstallation is? **(1MARK)**

A 230 V = 11.5V400

V = 20V

8. The assessor must assess your work at this point. **(Checkpoint 6)**

3. Completing the Unit Skills Test

Item	Description of Item	Naming
1	Learner finalises equipment selections, ensuringcompliance with manufacturer's data and regulatory requirements.	Local SIR Requirements 1
2	All work planned, carried out and completed in accordance with relevant workplace policies and procedures (i.e. anti-discrimination, health and safety, dealing with unplanned events .).	Local SIR Requirements 2

Completion Questions (Pass 7/7)

15	What are three "harmful effects" against which the design of an electrical installation must provide protection?	Local SIR Requirements 1
16	The instantaneous water heater in Townhouse No. 7 is by a circuit breaker and has integral functional controls. According to the Wiring Rules, are any further control devices required to be provided in this final subcircuit?	Local SIR protected Requirements 2
17	What are three cable installation factors that require the current carrying capacity of a conductor to be de-rated?	Local SIR Requirements 3
18	Electrical equipment used in Australian electrical installations is required to comply with applicable Australian Standards. True or False?	Local SIR Requirements 4
19	The townhouse garages have brick walls and a concrete slab roof. What is a suitable wiring system to be installed within the garage, for the supply of two twin fluorescent luminaires mounted on the ceiling?	Local SIR Requirements 1
20	List at least two different types of electricity tariffs in your jurisdiction.	Local SIR Requirements 2
21	Q. Which Section of your local SIRs state the requirements for overhead services?	Local SIR Requirements 3

Full marks will be awarded only after assessor affirms that the above checklisthas been met.

3. Completing the Unit Skills Test			
 **Checkpoint 6 – Completing the Work**		**Satisfactory Yes/No**	
Item	**Description of Item**	**1st**	**2nd**
1	Confirm Compliance		
2	Follow Procedures		
3	Completion Question 1		
4	Completion Question 2		
5	Completion Question 3		
6	Completion Question 4		
7	Completion Question 5		
8	Completion Question 6		
9	Completion Question 7 (Optional)		
	Assessor Initial:		

PRACTICAL TASKS

UEE30820 Certificate III in electrotechnology electrician

NOTE to assessors – Ensure all assessment resources are available for applicant. Applicant is encouraged to use own tools and meters. Tasks chosen must be completed to specified performance standard. Where knowledge or skill is demonstrated at below industry standard performance level, the assessor is to record as a skill gap.

All practical tasks require a risk assessment with appropriate documentation completed

Note: It is not the intention that all tasks must be completed. The assessor is to choose the task/s that will confirm candidate's knowledge and application of skills to provide sufficient evidence to make a judgment of competence

Unit of	Practical Task

Competency	
UEECD0007 Apply work health and safety regulations, codes and practices in the workplace **Core**	**Task 1** You have received a service call to perform electrical repairs in a customer's factory. The factory supervisor informs you that you will be working within proximity to moving automated equipment next to a switch board. Explain the steps you would take to ensure the safety of yourself and others, before, during and after entering the work area. **Task 2** Describe the procedures that you would use to remove someone from what is believed to be a live electrical situation.
UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work **Core**	**Task 3** Using risk assessment and control documentation from your workplace or as provided by the assessor, complete the documentation for a jobsite you are about to begin work in. • Jobsite location to be agreed upon by assessor and candidate After completion of documentation an unforseen hazard (chosen by the assessor) has now been identified. Complete document variations and implement new risk control measures
UEECD0019 Fabricate, assemble and dismantle utilities industry components **Core**	**Task 4** This task requires you to show your assessor how you assemble and disassemble electrotechnology components using a variety of tools. The assessor will discuss with you an appropriate job to complete either in your work place or in a simulated environment. Source an assembly/ disassembly specification and select tools and equipment and complete your normal steps. **Task 5** This task requires you to show your assessor how you fabricate electrotechnology components using a variety of fabrication tools. The assessor will discuss with you an appropriate job to complete either in your work place or in a simulated environment. Source a fabrication procedure specification and select tools and equipment and complete your normal steps. In addition, you are to demonstrate how you sharpen drill bits for two different types of materials.
UEECD0046 Solve problems in single path circuits **Core**	**Task 6** This task will enable you to demonstrate to the assessor your ability to solve ELV circuit problems by the use of measuring instruments and calculations. In your workplace or in a simulated environment develop and connect an ELV circuit that includes a circuit protection device, switch, resistive load and ELV supply. By measurement determine actual power dissipated by load. By calculation determine a suitable resistor to reduce the voltage across the load by 50%, and then connect resistor into the circuit and retest.

	Once task is completed provide responses to your assessor for the following questions: • What are the effects of electrical current? • What are other sources of electrical energy and how are they produced? • What are the possible causes of loss of supply to a load?
UEECD0020 Fix and secure electrotechnology equipment **Core**	**Task 7** This task requires you to demonstrate to your assessor how you fix and secure electrotechnology equipment in the workplace. The assessor will discuss with you an appropriate fixing and securing job to complete either in your workplace or in a simulated environment.
UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications **Core**	**Task 8** These tasks will enable you to demonstrate to the assessor your ability to use electrical, mechanical and site drawings. **8 a)** Using drawings from your workplace or as provided by the assessor, read, interpret and explain details and functions of symbols of the drawings. **8 b)** Based on the drawings supplied neatly freehand draw a variation as outlined by the assessor. **Task 9** Using freehand drawing skills neatly draw a control circuit that activates a relay using stop and start switches. Also draw a three-dimensional electrical enclosure to house this circuit, according to the assessor's requirements.
UEECD0044 Solve problems in multiple path circuits **Core**	**Task 10** **10 a)** **Practical** This task will allow you to demonstrate how you are able to **solve problems in multipath d.c. circuits**. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • Develop and connect a d.c. series – parallel circuit. • Determine the operating parameters using measured and calculated values. • Alter circuit to specified operating parameters. • Deal with an unplanned event using essential knowledge and skills to provide appropriate solutions. Your assessor will discuss with you the appropriate equipment, resources and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks.** **10 b)** **Theory** This task will allow you to demonstrate your understanding of d.c. electrical principles as applied to solving problems in multipath d.c. circuits.

	Your demonstration will include providing knowledge of: • factors that affect resistance • effects of resistance on cables • resistor types, characteristics, power ratings and applications • specifying resistors according to application • colour coded resistor identification • procedures for connecting series / parallel d.c. circuits: ○ Measuring and calculating values and solving problems using resistance, voltage, current and power calculations • voltage drops, resistance and applied voltage relationships including voltage divider network • voltage and current levels of cells connected in series, in parallel and in series/parallel • relationship between currents entering and leaving a junction and resistance relationships • relationship between voltages, currents, and resistances in a bridge network • hazards involved in using electrical instruments and safety control measures • meter selection and operating characteristics of digital and analogue meters • measuring resistance using direct, voltammeter and bridge methods • field instruments and measurement applications • capacitance, units of and how stores charge • capacitance, voltage, and charge relationships • behaviour of series resistance/capacitance circuits • hazards and safety control measures for capacitance effects • factors effecting capacitance values and effects of capacitors connected in series and in parallel • testing of capacitors to determine serviceability.
UEEEL0023 Terminate cables, cords and accessories for low voltage circuits **Core**	**Task 11** **11 a)** **Practical** This task will allow you to demonstrate how you **lay wiring /cabling and terminate accessories for extra-low voltage in power and control circuits**. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • scope work and material requirements • select appropriate tools, cables, and accessories • follow appropriate cable routes • install cable and accessories to requirements • terminate cables and accessories to manufacture's specifications and requirements • clean and make safe worksite • apply communication protocols on completion of work using established procedures. Your assessor will discuss with you the appropriate equipment, resources, and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks.** **11 b)** **Theory** This task will allow you to demonstrate your understanding of: • cable protection and support • cable types and applications

	• cables in buildings, structures, and premises
	• basic cable and conductor terminations
	• technical standards, regulations, and codes for extra-low voltage work
	• environmental and heritage awareness.
	
	You are required to provide a written or verbal response to the assessor detailing your understanding and knowledge of:
	
	1. Cable protection and support
	• Requirements to protect and support cables adequately:
	  o mechanical damage, adverse temperatures, corrosion, and magnetic fields
	• Types of cable support and protection devices, accessories, and typical applications:
	  o metallic and non-metallic conduits, duct and trunking, cable ladder and tray, cable, clips and ties and related accessories
	• Installation techniques encompassing:
	  o cable installation equipment
	  o cable drawing and hauling techniques
	
	2. Demonstrate understanding of cable types and applications and include knowledge of:
	• Structural components of cables and their purpose including:
	  o conductors and conductor material; insulation; sheathings and servings
	  o application of various cable types.

	• Cable types:
	  o single cables, flexible cables, flexible cords, shielded cables, armoured cables, ribbon cables, other similar and like cables.
	• Typical characteristics and use of power circuit cables and control circuit cables.
	
	3. Demonstrate understanding of cables in buildings, structures and premises and include knowledge of:
	• building construction method and construction sequence
	• typical cable routes through buildings, structures and premises
	• building codes affecting the installation of cables in buildings, structures and premises:
	  o building codes include limitation on penetration of structural elements and maintenance of fire protection interiority.
	• Cable segregation requirements.
	
	4. Demonstrate understanding of basic cable and conductor terminations and include knowledge of:
	• insulation removal and replacement
	• conductor handling and cable terminations encompassing:
	  o general aspects and soldering involving pins on electronic components and stranded conductors carrying current up to 25 amperes
	  o application of connecting devices for conductors and terminals
	  o continuity through connections and insulation resistance testing
	  o stress release on cables/conductors.
	
	5. Demonstrate understanding of technical standards, regulations and codes for extra low voltage work and include knowledge of:
	• limitation imposed by regulations

	• reading and applying standards • aspects of technical Standards that apply to extra-low voltage work. **6. Demonstrate understanding of environmental and heritage awareness and include knowledge of:** • purpose of environmental and heritage regulations • typical issues affecting electrotechnology services and systems • meeting requirements.
UEEEL0021 Solve problems in magnetic and electromagnetic devices **Core**	**Task 12** **12 a)** **Practical** This task will allow you to demonstrate how you **determine correct operation of electromagnetic circuits and providing solutions** as they apply to electrical installations and equipment. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • Determine the operating parameters of an existing electromagnetic circuit. • Listing control measures that apply to electrical devices and machines operating at low voltage. • Correctly and safely using voltage, current and resistance measuring devices and providing solutions derived from measurements and calculations to predictable problems in electromagnetic circuits. • Altering an existing electromagnetic circuit to comply with specified operating parameters. • Dealing with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions. Your assessor will discuss with you the appropriate equipment, resources, and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks.**
UEEEL0019 Solve problems in direct current (d.c.) machines **Core**	**Task 12** **12 b)** **Theory** This task will allow you to demonstrate your understanding of **electromagnetic principles, d.c. machines** and **electrical safe working practices.** **I)** You are required to provide a written or verbal response to the assessor detailing your understanding and knowledge of **electromagnetic principles** including: • principles of magnetic shielding and its application • practical uses in electromagnets • force between current-carrying conductors • magnetic losses and the resulting effects on the performance of electrical machines • electromagnetic induction and types of inductors • self-inductance, mutual inductance, and factors affecting inductance growth/decay of current in an inductor and time constant of a series L-R circuit • application of electromagnetic principles • hazards and situations associated with induced voltages

UEEEL0008 Evaluate and modify low voltage heating equipment and control **Core**	**Task 13** **13 a)** **Practical** This unit involves the skills and knowledge required to evaluate and modify low voltage (LV) heating equipment and controls. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • work safely, • identify faults in heating equipment, • repair heating equipment, • ensure all work complies with relevant Australian Standards and legislation, and completing work and documenting activities.. Your assessor will discuss with you the appropriate equipment, resources, and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks.** **The tasks** . • Testing water heater • Testing control thermostat • Interpret the water heater wiring diagram and connection • Note water heater specifications • Rectify the fault
UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls **Core**	**Task 13** **13 b)** **Practical** This unit involves the skills and knowledge required to evaluate and modify low voltage (LV) lighting circuits, equipment and controls. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • work safely, • identify faults in luminaires and associated control equipment, • repair/replace luminaire and control equipment components, • ensure all work complies with relevant Australian Standards and legislation • complete work and documenting activities. Your assessor will discuss with you the appropriate equipment, resources, and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks**

UEEEL0010 Evaluate and modify low voltage socket outlets circuits **Core**	This unit involves the skills and knowledge required to evaluate and modify low voltage (LV) socket outlets circuits. **Task 13** **13 c)** **Practical** The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • work safely, • identify and repaire/replacing faulty socket outlets, • ensure all work complies with relevant Australian Standards and legislation complete work and documenting activities
UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories Part 1- Install low voltage wiring, appliances **Core**	**Task 14** **14 a)** **Practical** This task will allow you to demonstrate how you **install wiring and accessories for a low voltage final sub circuit (lighting, socket outlet or appliance) and verify circuit for connection to supply**. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • Read and interpret drawings related to cable layouts, cable schedules and apparatus locations. • Routing, placing, and securing cables to comply with requirements. • Placing and securing accessories accurately. • Maintaining fire integrity. • Terminating cable and conductors to comply with requirements. • Deal with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions. Your assessor will discuss with you the appropriate equipment, resources, and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks.** **14 b)** **Theory** This task will allow you to demonstrate your understanding of: • power cable and conductor terminations • technical standards, regulations, and codes for general electrical installations • electrical installations, wiring and accessories • electrical wiring systems • electrical installation, equipment requirements. You are required to provide a written or verbal response to the assessor detailing your understanding and knowledge of: **1) Power cable and conductor terminations:** • types of cable glands and their application • terminal types and applications • conductor and cable termination techniques.

	2) Applying Standards, regulations, and codes for general electrical installations: • protection for safety • installation design, selection, and installation of electrical equipment • testing and verification. **3) Electrical installations, wiring and accessories.** • standards, codes, and requirements applicable to installing wiring and accessories. • techniques for installing wiring and accessories.
Continued	**4) Electrical wiring systems:** Regulatory requirement for the installation of: • flat and circular TPS cables • cable enclosures such as metallic and non-metallic conduit and trunking • fire related cable • armoured cable • catenary supported cables and pendant-type socket outlets. Installation methods used for: • exposed circular TPS cable of a final sub circuit (lighting, socket outlet, appliance) • TPI cable enclosed in conduit and trunking, of a final sub circuit (lighting, socket outlet, appliance) • fire related cable, of a final sub circuit (lighting, socket outlet, appliance) • armoured cable of a final sub circuit for a socket outlet or appliance • catenary support cable system of a final sub circuit (lighting, socket outlet, appliance) • requirements for testing final sub circuit for connection to supply. Aerial conductors including: • pole/post/strut selection; conductor selection and spacing • clearance requirements and safety measures. Underground wiring including: • categories, cables, enclosures, depth • protection and other safety measures. **5) Electrical installations, equipment requirements** • Standards, codes, and requirements applicable to installing electrical equipment • typical locations for various equipment • terminal configuration for connection of phase, neutral and earthing.
UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories **Part 2** Install appliances, switchgear and associated accessories for low voltage electrical	**Task 15** **15 a) Practical** This task will allow you to demonstrate how you **install and connect electrical apparatus** and associated equipment to comply with industry standards and regulatory requirements. Examples of apparatus for this demonstration can be: ○ motor staters and associated control devices ○ switchgear and control gear ○ protective devices; Control devices ○ fixed appliances/accessories ○ single and three phase motors and their controls ○ transformers and their controls ○ metering devices. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: ○ read and interpret drawings related to cable layouts, cable schedules and

installations **Core**	apparatus locations ○ placing and securing apparatus accurately ○ maintaining fire integrity ○ terminating and connecting apparatus and associated equipment to comply with requirements. ○ deal with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions. Your assessor will discuss with you the appropriate electrical apparatus, resources, and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks.** **15 b) Theory** This task will allow you to demonstrate your understanding of: • alternating current rotating machines • single and three phase transformers • luminaries and lighting systems. You are required to provide a written or verbal response to the assessor detailing your understanding and knowledge of: **1. Alternating current rotating machines** including: • three phase motor principles and operation characteristics • protection requirements of motors against overcurrent and undervoltage. • purpose of limiting starting current of machines • connection methods of three phase starters • wiring Rules and service rule requirements • three phase induction motor controls – speed control, starting and braking methods • single phase motor principles and characteristics • single phase motor construction • single phase motor applications • fault testing • three-phase synchronous machine types, construction, and operating principles • three-phase synchronous machines loading and excitation effect • single phase synchronous machine types, construction, and operating characteristics.
	2. Single & three-phase transformers including: • transformer construction and operating principles • transformer parameters: ratings, impedance, voltage regulation, losses, efficiency • cooling methods, auxiliary equipment • instrument transformers: current and voltage transformers, safety techniques • transformer connections • parallel operation: polarity markings, loading and connections • harmonics in transformers: causes, problems, and solutions • high voltage isolation: isolation procedures, access permits, clearances, ‘step’ and ‘touch’ potential **3. Luminaires and lighting systems** including: • types and applications of luminaires • operating principles and connection arrangements • installation and operating requirements and limitations • typical fault symptoms and related conditions of lighting circuits: • testing techniques • supply authority requirements for lighting circuits: • requirements for power factor correction • evacuation lighting systems: types, Building Codes and Standards requirements, maintenance requirements.

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations **Core**	**Task 16** **16 a)** **Practical** This unit involves the skills and knowledge required to design, install, inspect and test to verify an electrical installation is safe and complies with regulatory requirements. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to do the tasks in • working safely; • designing, installing, • commissioning and fault finding of electrical installations; • visual inspections and mandatory testing; • following workplace procedures; and completing mandatory reporting requirements. • demonstrating currency for regulatory purposes may be required to undertake this unit to demonstrate their currency with verification of compliance requirements • possession of sufficient to evidence current knowledge of applicable standards and regulations. The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.). . Your assessor will discuss with you the appropriate resources and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks.** **16 b)** **Theory** **<u>1.Prepare to design, install, inspect and test an electrical installation</u>** 1.1 WHS/OHS control measures for the site are identified and applied 1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work 1.3 Safety hazards, which have not previously been identified, are noted and risk control measures are implemented 1.4 Installation documentation and/or relevant industry standard are reviewed and applied 1.5 Appropriate person/s is consulted to ensure work is coordinated with others involved on the worksite 1.6 Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace safety

	procedures 1.7 Circuits, machines and/or plant are isolated in accordance with WHS/OHS job requirements and workplace procedures 1.8 Installation of wiring, appliances, switchgear, control gear and associated accessories is planned and appropriately sequenced in consultation with relevant person/s 1.9 Locations of appliances, switchgear, accessories and cable routes are planned within the constraints of building structure, other services, specifications and regulatory requirements 1.10 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with workplace procedures and checked for correct operation and safety 1.11 Preparatory work is checked to ensure it complies with planned specifications and no damage has occurred **2.Select wiring systems, cables, control and protection for general electrical installations** 2.1 Wiring system is selected and suitable for the environments in which it will operate 2.2 Cable conductor sizes are selected to meet current-carrying capacity requirements and voltage-drop and earth fault-loop impedance limitations in accordance with relevant industry standards 2.3 Protective devices are selected to meet the required switching and tripping currents coordination and discrimination for overload and short circuit protection in accordance with relevant industry technical standards 2.4 Earthing system components are selected to meet multiple earthed neutral (MEN) system in accordance with relevant industry standards 2.5 Residual current devices (RCDs) are selected to meet the required circuit switching and tripping currents in accordance with relevant industry technical standards 2.6 Switchgear/control gear is selected to meet current and voltage requirements and confirmed suitable for environmental conditions (ingress protection (IP) ratings) and functional requirements 2.7 Switchboards are arranged to accommodate control and protective devices, links, safety services and other distributor equipment in accordance with relevant industry technical standards **3 Install low voltage (LV) wiring and associated accessories** 3.1 Wiring and accessories are installed and terminated to comply with technical standards and job specifications and requirements 3.2 Cables and conductors are terminated at accessories in accordance with manufacturer specifications and regulatory requirements 3.3 Ongoing compliance and safety inspection of installed wiring systems and testing of installed circuits is undertaken 3.4 Defects revealed through ongoing compliance and safety inspection and tests are rectified **4.Install and connect LV Appliances, switchgear and accessories appliances, switchgear** 4.1 Appliances, switchgear and accessories are installed to comply with technical standards and job specifications and requirements with sufficient access to affect

	terminations, adjustment and maintenance 4.2 Wiring is terminated at appliances, switchgear and accessories in accordance with manufacturer specifications and functional and regulatory requirements 4.3 Ongoing compliance and safety inspections of the installed appliances, switchgear and accessories are undertaken 4.4 Defects revealed through ongoing compliance and safety inspection are rectified **5 Visually inspect and conduct safety testing on electrical installation** 5.1 Wiring is checked for suitability within the environments in which it is installed to ensure it is suitably protected from damage or overheating in accordance with relevant industry standards 5.2 Cable conductor sizes are compliant with current-carrying capacity, voltage-drop and fault-loop impedance limitations in accordance with relevant industry standards 5.3 Protection methods and devices are verified as meeting coordination requirements for overload and short-circuit protection in accordance with relevant industry standards 5.4 Switchgear and control gear rating is verified as being appropriate and meets functional requirements in accordance with relevant industry standards 5.5 Electrical equipment inspection and testing evidence is cited and verified in accordance with WHS/OHS safety regulations 5.6 Earthing system and components are located correctly, and conductor selection sizes are verified 5.7 Markings on switchboards are checked for accuracy and clarity and comply with requirements 5.8 Mandatory tests are conducted in accordance with relevant industry standards 5.9 Testing is conducted to verify fault-loop impedance is sufficiently low and RCDs operate in accordance with relevant industry standards **6.Report inspection and test findings** 6.1 WHS/OHS risk control work completion measures and procedures are followed 6.2 Worksite is cleaned and made safe in accordance with workplace procedures 6.3 Non-compliance defects are identified and reported in accordance with workplace procedures 6.4 Recommendations for rectifying defects are made in accordance with workplace procedures 6.5 Mandatory documentation is completed in accordance with workplace procedures
UEEEL0018 Select wiring systems and select cables for low voltage electrical installations* **Core**	**Task 17** **17 a)** **Practical** This task requires you to demonstrate how you **Select wiring systems and cables for low voltage general electrical installations**. Selection and arrangement of equipment will be demonstrated as they apply to an electrical installation containing a main switchboard that supplies lighting circuits, socket outlet circuits fixed appliance circuits and a three-phase connected load.

	The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • arrange electrical installations to comply with safety and other regulatory and functional requirements • select appropriate type and size of cables • select protection methods and devices that meet co-ordination requirements for overload and short-circuit protection • select switchgear and control gear that meet current, voltage and IP ratings and functional requirements • select appropriate earthing components • document installation arrangement, specification for items selected and reasons for the selections made. Your assessor will discuss with you the appropriate resources and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks.** **17 b)** **Theory** You are required to provide a written or verbal response to the assessor detailing your understanding and knowledge of: • electrical control devices • technical standards, regulations and codes for special electrical installations • technical manuals and catalogues • protection devices and applications • switchboards/distribution boards • electrical installations, safety principles and requirements • electrical installations, protection methods and devices • electrical installations, circuit arrangements and equipment selection. Your assessor will discuss with you the extent of demonstration and will supply appropriate assessment material for collecting evidence of your knowledge and skills as they relate to the unit **UEENEEG107A Select wiring systems and cables for low voltage general electrical installations**.
UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits* **Core**	**Task 18** **18 a)** **Practical** This task requires you to demonstrate how you **Trouble-shoot and repair faults in low voltage electrical apparatus and circuits** using appropriate fault-finding techniques. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • determine the likely extent of the fault from breakdown reports and using discussion to elicit information on the fault/breakdown with appropriate person/s • use appropriate tools and resources, and methodical fault-finding techniques • locate and find faults efficiently • conduct tests or measurements in strict accordance with OHS and electrical safe working requirements • rectify faults effectively • report and complete documentation correctly • deal with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions.

	Your assessor will discuss with you the appropriate resources and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks.** **18 b)** **Theory** You are required to provide a written or verbal response to the assessor detailing your understanding and knowledge of: • fault finding techniques • lighting fundamentals • electrical heating • electronic components and systems, industrial applications Your assessor will discuss with you the extent of demonstration and will supply appropriate assessment material for collecting evidence of your knowledge and skills as they relate to the unit "G008B Trouble-shoot and repair faults in low voltage electrical apparatus and circuits".
UEEEL0005 Develop and connect electrical control circuits* **Core**	**Task 19** **10 a)** **Practical** This task requires you to demonstrate how you **Develop and connect electrical control circuits** and test for correct functionality. Control circuits from the list below may be chosen for the exercise: • multiple light switching circuit • single stop-start circuit • multiple stop-start circuit • time controlled circuit • machine interlocked circuit • motor jogging circuit. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • determine control scenarios • develop schematic arrangement of control circuits • connect control circuit function correctly • identify and correct non-compliant control functions • document 'as-connected' control circuit • deal with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions. Your assessor will discuss with you the appropriate resources and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks.** **10 b)** **Theory** You are required to provide a written or verbal response to the assessor detailing your understanding and knowledge of: Control circuit fundamentals including:

	• conversion of circuit diagrams • design and connection of control circuits • sequence of operation of basic control circuits • electrical control devices. Your assessor will discuss with you the extent of demonstration and will supply appropriate assessment material for collecting evidence of your knowledge and skills as they relate to the unit **UEEEL0005** Develop and connect electrical control circuits
UEEEL0025 Test and connect transformers. **Core**	**Task 20 a)** This written task will allow you to demonstrate your understanding of essential knowledge and associated skills as they relate to **UEEEL0025** Test and connect transformers. <u>Single and three phase transformers</u> • Outline the types of laminations and core construction of transformers. • Outline the different winding styles/ types used in transformers. • Describe transformer auxiliary equipment and their functions. • List applications for transformers. • Describe the principles of mutual induction of a transformer. • Outline the factors that determine induced voltage of a transformer winding. • Determine the value of a transformer's secondary voltage and current given one winding's electrical details and turns ratio. • Identify voltage and current components of a phaser diagram for a transformer on no-load. • Identify the safety features specified in AS/NZS3000 with respect to transformers and isolating transformers. • What is the purpose of a risk analysis and how would you conduct one? • Describe how you would prevent/limit environmental damage during the normal course of your workday. • Describe the tests which allow the power losses of a transformer be determined. • Describe the methods used for natural and forced cooling of transformers. • Outline the reasons for voltage variation in the output of a transformer • Explain the term "Percentage Impedance" • Determine the percentage impedance by calculation. • Outline the conditions/ restrictions required before connecting two transformers in parallel. • Describe the precautionary methods when connecting and disconnecting instrument transformers. • Outline applications for auto transformers and instrument transformers.
UEEEL0024 Test and connect alternating current (a.c.) rotating machines **Core**	**Task 20 b)** This written task will allow you to demonstrate your understanding of essential knowledge and associated skills as they relate to **UEEEL0024** Test and connect alternating current (a.c.) rotating machines <u>Alternating current rotating machines</u> • Describe the grip rule and Flemings left and right rule • Describe the relationship between rotor speed, slip and rotor frequency • Describe the basic component of a three-phase induction motor and the types of rotors used.

	• Explain the three phase motor connections in both star and delta. • Describe the dead tests performed on an AC rotating machine. • Outline the common types of single-phase motors. • Describe the basis construction and characteristics of a split phase induction motor. • Describe the principal operation of single phase capacitor start, capacitor start/ run and PSC motors. Explain how to reverse each of the motors outlined in previous point.
	Task 20c) <u>Motor Protection.</u> Outline the reasons for motor protection and the requirements specified in AS/NZS3000. Explain the adverse effect of repetitive starting and/ or reversing motors. Explain the operating principles of phase failure protection. Describe the selection process for suitable protective devices for a given motor and starter combination.
	Task 20 d) <u>Alternators and generators</u> Discuss the principles of operation of a synchronous motor/ alternator and an asynchronous generator (induction generator). Describe the methods of excitation for a synchronous machine. Describe the different types of prime movers used with single and three phase machines. Provide applications of single and three phase portable/ standby alternators. Describe construction details of single and three phase portable/ standby alternators and common faults found in portable/ standby alternators.
UEEAS0007 Assemble, mount and connect control gear and switchgear **Core**	**Task 21** This task requires you to demonstrate how you select, **assemble, mount and connect switchgear and control gear** and test against work instructions and industry standards. Equipment and apparatus from list below will be chosen for the exercise: • Busbars and bus ties • Isolators • Current and voltage transformers • Core balance protective devices • HRC Fuses • Meters and measuring equipment • Air circuit breakers and/or oil circuit breakers. • Relays, contactors, motor starters The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • Follow assembly instructions • Correctly select and place, switchgear, and control gear • Make connections without damaging switchgear/control • Adhere to quality procedures • Deal with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions • Labelling /identification • Use of terminal strips to assist fault finding • Component layout encompassing schematic diagrams with power and control circuits. • Choice of control and switchgear encompassing voltage and current ratings

	• Equipment and layout methods. Your assessor will discuss with you the appropriate resources and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks.** **Theory** You are required to provide a written or verbal response to the assessor detailing your understanding and knowledge of switchgear and control gear to an extent indicated by the following aspects: • types and applications • operating principles • interlocking systems • control and protection • installation requirements • Regulations, Standards and Codes.
UEECS0033 Use engineering applications software on personal computers* **Group A Elective**	**Task 22** This task will allow you to demonstrate how you **use computer applications in the workplace** or in a simulated environment. You are required to • correctly switch on computer • open a spreadsheet and develop a materials list based on the last service job you performed (or list as advised by assessor) • create an invoice in a Word document • save and print the documents • open email and type information detailing what the documents are • attach documents and forward • shutdown computer correctly.
UEERE0001 Apply environmentally and sustainable procedures in the energy sector **Core**	**Task 25** This task will allow you to demonstrate your knowledge of and how you **apply sustainable work practices**. You are required to identify and outline the sustainable work practices that occur on your work site and to include what techniques are used to reduce energy and how materials wastage is minimised. Your assessor will discuss with you a typical unplanned event that may occur in your work area, and you will need to outline the steps you would take in managing situation.

UEECO0023 Participate in electrical work and competency development activities **Core**	**Task 26** This task will allow you to demonstrate how you **monitor your competency development** and ensure you **maintain progression of knowledge and skills** in accordance with your gap training plan. Based on the requirements of your gap training plan you are to: • Demonstrate understanding of your training schedule, support service provisions and administration costs. • Confirm the context, requirements, and responsibilities of a competency development plan • Ensure you seek clarification of how particular work is carried out and the procedures involved (work record book entry). • Identify and confirm the critical industry, enterprise and regulatory policies, procedures, and context applicable to work activities. • Ensure you request assistance to overcome difficulties when developing competency (work record book entry). • Progress successfully against periodic or staged evaluative performance events and report and review your competency development activities and modifying development activities through consultation with supervisor and assessor. • Have competency development reports validated by an appropriate person. • Pursue strategies for developing opportunities in gaining range of workplace experiences and exposure. • Deal with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions.
UEEEL0003 Arrange circuits, control and protection for electrical installations* **Core**	**Task 27** This task will allow you to demonstrate how you arrange circuits, control and protection for general electrical installations and test against work instructions and industry standards. Equipment and apparatus from the list below will be chosen for the exercise. • Switchboard • RCD's • RCBO's • MCB's The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • Demonstrate an understanding of circuit arrangements, control and protection of electrical installations that comply with Wiring Rules and Service Rules. Your assessor will discuss with you the appropriate resources and location for demonstration. All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks. You are required to provide a written or verbal response to the assessor detailing your understanding and knowledge of Arrange circuits, control and protection for general electrical installations indicated by the following aspects: • Safety principles with reference to Section 1 of the Wiring Rules and deemed to comply requirements from Section 2 to 8. • Calculation of Maximum Demand • Consideration for the number and type of circuits • Protection methods (Direct) • Protection methods (Indirect)

	• Earthing system • Protection devices against overload and short circuit • Coordination requirements between protective devices and conductors • Devices for automatic disconnection • Fault loop impedance • Switch types, current and voltage and IP rating and where these apply • Switchboards and their requirements encompassing metering, physical circuit arrangements, identification and marking.
UEEEL0020 Solve problems in low voltage a.c. circuits **Core**	**Task 28 (a)** **Practical (A)** This task will allow you to demonstrate how you determine correct operation of low voltage AC circuits. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • Develop and connect an AC series parallel LRC circuit, take resistance, voltage, and current measurements, and using measured or given values show relationships between components (impedance triangle). • Alter circuit to improve power factor. • Determine conditions that may cause an existing circuit to be unsafe. Your assessor will discuss with you the appropriate equipment, resources, and location for demonstration. All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks. **Theory (B)** This task will allow you to demonstrate your understanding of alternating current power circuits. You are required to provide a written or verbal response or where online testing may be applicable. This will be forwarded to the assessor detailing your understanding and knowledge of alternating current power circuits. • Generation of a sinusoidal voltage and phase relationships; r.m.s values, peak values, instantaneous values, time period and frequency. • Phaser diagrams and relationship between voltage and current in an AC circuit. • Inductance in ac circuits, inductive reactance; relationship between inductive reactance and frequency.

	• Relationship between capacitive reactance and frequency • AS/NZS 3000 requirements for the installation of capacitors • Definition of “impedance” • Determining the impedance of series, and series parallel circuits and diagrams showing the relationship between resistive, inductive, and capacitive components (impedance triangle). • Phaser diagram to solve problems and show the relationship between V and I • Relationship between resonance, frequency, and the effect on current in series resonance and parallel resonance conditions; applications where resonance is applied. • Difference between true power, apparent power and reactive power and the units. • Multiphase system and voltages generated by single and multiphase alternators • Generation of three phase r.m.s. values and the determination of phase sequence. • Effects of low power factor and AS/NZS 3000 Requirements and power factor improvement equipment. • Define the term “power factor’ and phase angle. • List and explain methods to improve “power factor • Determine the branch currents of a parallel circuit that contain RL, RC or LC in two branches. • Use a phasor diagram to determine the total circuit current and phase angle in parallel RL, RC or LC circuits • Define “Harmonics” and the relationship it has on a sinusoidal wave form of an AC power system. • Explain the condition when a circuit is in “resonance”. • Dangers of parallel and series resonant circuits. • Explain the purpose of a neutral conductor • The effects of high impedance in the neutral conductor supplying an unbalanced load. • AS/NZS 3000 requirements of neutral conductors. • Three phase delta and star system connections, I and V phase relationships. • Determine r.m.s, value of line and phase current relationships of a star/delta connected system. • Determine r.m.s, value of line and phase voltage relationship of a star / delta connected system. • Effects of phase reversal on a star / delta system. • Purpose and methods used for measuring power, energy, power factor and maximum demand of AC power systems and loads. • Term fault loop impedance of an AC power system. • Measure fault loop impedance of typical circuits • Procedures for testing fault loop impedance.
	Task 28 b

	Practical This task will allow you to demonstrate how you **determine correct operation of single and three phase circuits and solve circuit problems**. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • Develop and connect an a.c. series parallel LRC circuit, take resistance, voltage and current measurements and using measured or given values show relationship between components (impedance triangle). • Alter circuit to improve power factor. • Determine conditions that may cause an existing circuit to be unsafe. Your assessor will discuss with you the appropriate equipment, resources, and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks.** **Theory** This task will allow you to demonstrate your understanding of **alternating current power principles.** You are required to provide a written or verbal response to the assessor detailing your understanding and knowledge of **alternating current power principles** including: • generation of a sinusoidal voltage and phase relationships; r.m.s. values and frequency • Phasors diagrams and relationship between voltage drops and current in a resistive a.c. circuit • inductance in a.c. circuits; inductive reactance; relationship between inductive reactance and frequency • examples of inductive components, phase shift effect; current limiting characteristics of inductors • relationship between capacitive reactance and frequency • examples of capacitive components their effect on the phase relationship between V and I • definition of 'impedance' • impedance of series, parallel and series-parallel circuits and diagrams showing the relationship between resistive, inductive, and capacitive components (impedance triangle) • voltage, current or impedance values from measured or given values of any two of these quantities • Phasor diagram to solve problems and show the relationship between V and I • relationship between resonance, frequency, and the effect on current in series resonance and parallel resonance conditions; applications where resonance is applied ……. /cont.
	• difference between true power, apparent power and reactive power and the units • effects of low power factor and AS/NZS 3000 requirements and power factor improvement equipment • multiphase system and voltages generated by single and multiphase alternators • generation of three-phases, r.m.s. values and the determination of phase sequence • three-phase star system connections, I and V phase/line relationships and r.m.s. value of line and phase V and I • examples of balanced and unbalanced loads in typical power systems

	• purpose of the neutral conductor in three-phase four wire systems • effects of a high impedance in the neutral conductor supplying an unbalanced load • value and phase relationship of neutral current in unbalanced three-phase four wire systems given line currents and power factors • AS/NZS 3000 requirements regarding neutral conductors • three-phase delta system connections, I and V phase/line relationships • determine r.m.s. value of line and phase voltage and current • example of delta-connection loads in typical power systems • relationship between line and phase voltages and line and phase currents in a system with a star-connected supply device and a delta-connected load • relationship between line and phase voltages and line and phase currents in a system with a delta-connected supply device and a star-connected load • purpose and methods used for measuring power, energy, power factor and maximum demand of a.c. power systems and loads • power factor improvement of a three-phase installation • harmonics in an a.c. power system; sources that produce harmonics and problems caused by harmonics and how these are overcome.
	Task 28 c **Practical** This task will allow you to demonstrate how you **determine correct operation of single and three phase circuits and solve circuit problems**. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • Develop and connect an a.c. series parallel LRC circuit, take resistance, voltage and current measurements and using measured or given values show relationship between components (impedance triangle). • Alter circuit to improve power factor. • Determine conditions that may cause an existing circuit to be unsafe. Your assessor will discuss with you the appropriate equipment, resources, and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks.** **Theory** This task will allow you to demonstrate your understanding of **alternating current power principles.** You are required to provide a written or verbal response to the assessor detailing your understanding and knowledge of **alternating current power principles** including: • generation of a sinusoidal voltage and phase relationships; r.m.s. values and frequency • Phasors diagrams and relationship between voltage drops and current in a resistive a.c. circuit • inductance in a.c. circuits; inductive reactance; relationship between inductive reactance and frequency • examples of inductive components, phase shift effect; current limiting characteristics of inductors • relationship between capacitive reactance and frequency • examples of capacitive components their effect on the phase relationship between V and I • definition of ‘impedance’

	• impedance of series, parallel and series-parallel circuits and diagrams showing the relationship between resistive, inductive, and capacitive components (impedance triangle) • voltage, current or impedance values from measured or given values of any two of these quantities • Phasor diagram to solve problems and show the relationship between V and I • relationship between resonance, frequency, and the effect on current in series resonance and parallel resonance conditions; applications where resonance is applied • difference between true power, apparent power and reactive power and the units • effects of low power factor and AS/NZS 3000 requirements and power factor improvement equipment • multiphase system and voltages generated by single and multiphase alternators • generation of three-phases, r.m.s. values and the determination of phase sequence • three-phase star system connections, I and V phase/line relationships and r.m.s. value of line and phase V and I • examples of balanced and unbalanced loads in typical power systems • purpose of the neutral conductor in three-phase four wire systems • effects of a high impedance in the neutral conductor supplying an unbalanced load • value and phase relationship of neutral current in unbalanced three-phase four wire systems given line currents and power factors • AS/NZS 3000 requirements regarding neutral conductors • three-phase delta system connections, I and V phase/line relationships • determine r.m.s. value of line and phase voltage and current • example of delta-connection loads in typical power systems • relationship between line and phase voltages and line and phase currents in a system with a star-connected supply device and a delta-connected load • relationship between line and phase voltages and line and phase currents in a system with a delta-connected supply device and a star-connected load • purpose and methods used for measuring power, energy, power factor and maximum demand of a.c. power systems and loads • power factor improvement of a three-phase installation • harmonics in an a.c. power system; sources that produce harmonics and problems caused by harmonics and how these are overcome.
UETDRRF004 Perform rescue from a live LV panel* **Core**	**Task 29** **Practical** This unit covers the performance of rescue procedures from live low voltage (LV) apparatus, not including overhead lines and underground cables in the workplace The practical demonstration of Rescuing a person from a live LV panel in the context of transmission, distribution or rail work functions. The responsibilities for health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work. ○
UEEIC0013 Develop, enter and verify discrete control	**Task 30** **Practical** Develop enter and verify discrete control programs for programmable controllers.

programs for programmable controllers* **Group A Elective**	Observation on site. Practical Tasks: Candidate needs to list verbally the WH&S essential requirements relating to the task of developing, verifying, and implementing a program for a programmable controller. Show evidence at workplace of control system development and data entry and final test run or operational function. Identify functions applied/ implemented and adaptions introduced when necessary. Without interference of established system, indicate method(s) used for system storage and backup facilities.
HLTAID009 Provide cardiopulmonary resuscitation **Core**	**Task 31** **Practical** This unit applies to all persons who may be required to provide CPR, in a range of situations, including community and workplace settings, 1.Respond to an emergency situation 1.1. Recognise and assess an emergency situation. 1.2. Ensure safety for self, bystanders and casualty. 1.3. Assess the casualty and recognise the need for cardiopulmonary resuscitation (CPR). 1.4. Seek assistance from emergency services 2. Perform CPR procedures. 2.1. Perform CPR in accordance with the ARC guidelines. 2.2. Display respectful behaviour towards casualty. 2.3. Operate an automated external defibrillator (AED) according to manufacturers' instructions. 3. Communicate details of the incident. 3.1. Accurately convey incident details to emergency services. 3.2. Report details of incident in line with appropriate workplace or site procedures. 3.3. Maintain privacy and confidentiality of information in line with statutory or organisational policies 4.Review the incident. 4.1. Recognise the possible psychological impacts on self and other rescuers and seek help when required. 4.2. Contribute to a review of the first aid response as required.
UEEEL0047 Identify, shut down and restart systems with alternate supplies*	**Task 32** **Practical** This unit involves the skills and knowledge required to identify, shut down and restart systems with alternate supplies. The demonstration will occur in the workplace or in a simulated environment and

Core	will include evidence of your ability to • identify the system configuration, • work safely with electricity generation systems and inverters, • identify hazards and controlling the associated risks, • isolate and test for de-energisation, • reinstate the system after isolation • complete relevant documentation.

OBSERVATION RECORDING SHEET

Practical Tasks

CANDIDATE'S NAME: _____ SIGNATURE: _____ **DATE:** _____

ASSESSOR'S NAME: _____ SIGNATURE: _____ **DATE:** _____

LOCATION: _____

NB: The skills listed below must be verified by a competent assessor through observed demonstration either in the candidate's workplace as part of the candidate's normal work duty OR as part of a practical assessment/demonstration set by the assessor.

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEECD0007 Apply work health and safety regulations, codes and practices in the workplace. Core					
1	Obtains and applies WH&S instructions in specified work functions and work areas. Applies enterprise policies and procedures to all work. Follows safety instructions where provided. Consults others in identifying hazards and implementing and monitoring control measures. Establishes appropriate risk control measures. Processes and interprets job plans and sets out sequence of activities. Works comfortably with other crew members. Prioritises work and adapts to problem situations. Asks questions of supervisors and colleagues. Discusses problems with supervisors, colleagues, and industry representatives. Obtains and apply instructions, work permits, clearances and isolation permissions from supervisors. Prepares for electrical and non-electrical isolation to established	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Low Voltage Rescue CPR			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
1	procedures. Considers and acts on environmentally friendly working methods. Leaves the worksite clear of debris and waste and stores equipment. Monitors condition of equipment, tools, and meters to regulatory requirements.	Elevated Work Platforms Permit Emergency evacuation procedures			
2	Isolate supply, if possible, avoid becoming another victim. Call for help (000). If unable to turn off supply, disconnect the victim from the electricity supply by the use of dry non-conducting material, e.g., rescue hook. Avoid direct skin to skin contact. Move/drag victim to safe area (with rescue hook). Smother fire (if any). Assess the victim's condition. Apply, if necessary, CPR and/or treatment of injuries: • 2 breathes per 30 compressions at a rate of 100 per minute. Place in recovery position. Monitor victim. Record and report incident. Follows all workplace procedures for an emergency situation.	CPR LVR LVR rescue kit			
UEECD0019 Fabricate, assemble and dismantle utilities industry components Core					

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
4	Performs risk assessment and completes documentation. Reads and interprets specifications correctly. Selects and safely uses a variety of appropriate tools and techniques (hand and power). Marks or tags components to ensure correct assembly. Replaces or repairs components to manufacturer specifications. Stores parts to protect against loss or damage. Works with minimising waste of materials. Follows appropriate techniques for close fitting parts. Assembles to manufacturer's user guides and completes task to established procedures and techniques.	Electrical Safety Act & Regulations Electrical Code of Practice Manufacturer's instructions for materials and equipment Correct use of MSDS data Engineering references/ specifications, plans, drawings Workplace documentation Workplace policies and procedures			
5	Performs risk assessment and completes documentation Follows drawings and instructions accurately. Sources suitable materials to established procedures Calculates and measures accurately for component dimensions from information given in job drawings and instructions. Selects and safely uses a variety of appropriate tools and techniques (hand and power): • cutting • shaping • drilling • threading and tapping Sharpens drills correctly to manufacturer's specifications. Fabricates components efficiently minimising waste of materials and damage to environment and services. Performs routine quality checks.				

UEECD0020 Fix and secure electrotechnology equipment. Core

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
7	Selects the appropriate hand and power tools. Selects the appropriate fixing devices according to suitability of the load, environment, and the material structure they are to be installed. Fixed and secured to: • industry time frames • minimise wastage and disposes according to workplace practice • prevent damage to surrounding environment • Sustainable Energy principles and practices. Shows knowledge and understanding of environment and building regulation including the protocols for working in and around protected environments and heritage sites.	Workplace Health and Safety Act: 1995 Queensland Electricity Act Queensland Electricity Safety Regulations Electrical Code of Practice AS/NZS 3000:2007 Workplace documentation (SOP) Engineering references - specifications plans and drawings Workplace documentation Environmental and building regulation Manufacturer's instructions for materials and equipment			
UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications Core					

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
8	Correctly reads and interprets given drawings: • symbols and functions • drawing layouts • conventions and symbols • dimensions • location of equipment • schematics and wiring diagrams • cable schedules • termination schedule • site and architectural drawings and plans • services, apparatus plant and machinery.	Workplace Health and Safety Act: 1995 Queensland Electricity Act Queensland Electricity Safety Regulations Electrical Code of Practice AS/NZS 3000:2007 Workplace documentation (SOP) Engineering references - specifications plans and drawings Workplace documentation Environmental and building regulation Manufacturer's instructions for materials and equipment			
9	Uses drawing conventions in neat freehand drawing: • electrical (Symbols, lines, layouts, naming conventions) • mechanical (3 dimensional and 2 dimensional planes).				
Task No.	**Observable behaviours in task**	**Industry requirements**	**Assessor's comments**	Indicate if behaviour observed	**Date assessed**
UEECD0016 Document and apply measures to control WHS risks associated with					

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
electrotechnology work. Core					
3	Identifies and documents hazards using appropriate processes while consulting with other. Identifies risk classification to established procedures: • high (potential to kill) • medium (potential to cause injury) • low (potential to cause minor injury). Develops control measures to eliminate risk according to classification • uses different approaches to work or redesign • fixes defective equipment • PPE. Seeks agreement on control measures and documents. Understands principles and legal responsibilities and regulatory requirements in managing hazards and assessing risks in the workplace. Monitors and reviews control measures and modifies in consultation with others. Makes changes to documentation for unforseen hazards. Files documentation according to established procedures.	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEECO0023 Participate in electrical work and competency development activities Core					
26	• Responsibilities under a competency development plan • Methods of monitoring and reporting competency development activities • Enterprise work activities policies and procedures	Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEECD0046 Solve problems in single path circuits Core					
6	• Using methodological techniques to solve single path d.c. circuit problems from measure and calculated values • Determining the operating parameters of an existing circuit. • Altering an existing circuit to comply with specified operating parameters. • Developing circuits to comply with a specified function and operating parameters. • Dealing with unplanned events	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEENEEE104A - Solve problems in d.c. circuits Core					
10	• Using methodological techniques to solve multi path d.c. circuit problems from measure and calculated values • Determining the operating parameters of an existing circuit. • Altering an existing circuit to comply with specified operating parameters. • Developing circuits to comply with a specified function and operating parameters. • Dealing with unplanned events	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0025 Test and connect transformers Core					
20a	• Determining the operating parameters of existing transformer.. • Altering an existing machine to comply with specified operating parameters. • Developing transformer circuit to comply with a specified function and operating parameters. • Determining the cause of low efficiency in an existing machine. • Determining conditions causing an existing circuit to be unsafe. • Dealing with unplanned events	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0024 Test and connect alternating current (a.c.) rotating machines*Core					
20 b c d	• Determining the operating parameters of existing machines. • Altering an existing machine to comply with specified operating parameters. • Developing machines/circuits to comply with a specified function and operating parameters. • Determining the cause of low efficiency in an existing machine. • Determining conditions causing an existing circuit to be unsafe. • Dealing with unplanned events	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0008 Evaluate and modify low voltage heating equipment and controls Core					
13a	• Testing water heater • Testing control thermostat • Interpret the water heater wiring diagram and connection • Note water heater specifications • Rectify the fault	Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and controls Core					
13b	• Basic electrical concepts • Basic electrical circuit • Ohm's Law • Electrical power • Effects of electrical current • EMF sources energy sources and conversion electrical energy • identify faults in luminaires and associated control equipment, • repair/replace luminaire and control equipment components, • ensure all work complies with relevant Australian Standards and legislation • complete work and documenting activities.	Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0010 Evaluate and modify low voltage socket outlets circuits Core					
13c	• work safely, • identify and repaire/replacing faulty socket outlets, • ensure all work complies with relevant Australian Standards and legislation complete work and documenting activities	Competent performance with inherent safe working practices is expected in the industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0003 Arrange circuits, control and protection for electrical installations Core					
	• Determining the extent and nature of the installation for job specifications • Obtaining and understand the safety and other regulatory requirements to which the electrical installation shall comply • Determining individual load requirements. • Arranging and terminate circuits, control, and protective devices to comply with all requirements • Selecting circuit protective devices residual current device that comply with all requirements. • Selecting switchgear and control gear that meet current, voltage and IP ratings and functional requirements. • Obtaining evidence of compliance for the equipment selected • Documenting installation arrangement, specification for items selected and reasons for the selections made. • Dealing with unplanned events	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0021 Solve problems in magnetic and electromagnetic devices Core					
12a	• Using methodological techniques to solve problems in circuits with an electromagnetic device from measure and calculated values • Determining the operating parameters of an existing circuit with an electromagnetic device. • Alternating an existing circuit with an electromagnetic device to comply with specified operating parameters. • Developing circuits with electromagnetic devices to comply with a specified function and operating parameters. • Dealing with unplanned events	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0019 Solve problems in direct current (d.c.) machines Core					
12b	• Using methodological techniques to solve problems in circuits with an electromagnetic device from measure and calculated values • Determining the operating parameters of dc machines • Alternating an existing circuit with a dc machine to comply with specified operating parameters. • Developing circuits with electromagnetic devices to comply with a specified function and operating parameters. • Dealing with unplanned events	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0020 Solve problems in low voltage a.c. circuits Core					
28	• Using methodological techniques to solve problems in circuits in a.c. circuits from measure and calculated values • Determining the operating parameters of existing circuits • Altering an existing circuit to comply with specified operating parameters. • Developing circuits to comply with a specified function and operating parameters. • Determining the cause of low power factor in an existing circuit. • Determining conditions causing an existing circuit to be unsafe. • Dealing with unplanned events	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories Core					
14	**Task 14** **14 a)** **Practical** This task will allow you to demonstrate how you **install wiring and accessories for a low voltage final sub circuit (lighting, socket outlet or appliance) and verify circuit for connection to supply**. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to: • Read and interpret drawings related to cable layouts, cable schedules and apparatus locations. • Routing, placing, and securing cables to comply with requirements. • Placing and securing accessories accurately. • Maintaining fire integrity. • Terminating cable and conductors to comply with requirements. • Deal with unplanned events by drawing on essential knowledge and skills to provide appropriate solutions. Your assessor will discuss with you the appropriate equipment, resources, and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks.** **14 b)** **Theory** This task will allow you to demonstrate your understanding of: • power cable and conductor terminations • technical standards, regulations, and codes for general electrical	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
	installations • electrical installations, wiring and accessories • electrical wiring systems • electrical installation, equipment requirements. You are required to provide a written or verbal response to the assessor detailing your understanding and knowledge of: **6) Power cable and conductor terminations:** • types of cable glands and their application • terminal types and applications • conductor and cable termination techniques. **7) Applying Standards, regulations, and codes for general electrical installations:** • protection for safety • installation design, selection, and installation of electrical equipment • testing and verification. **8) Electrical installations, wiring and accessories.** • standards, codes, and requirements applicable to installing wiring and accessories. • techniques for installing wiring and accessories.				

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0039 Design, install and verify compliance and functionality of general electrical installations Core					
16	**Task 16** **16 a)** **Practical** This unit involves the skills and knowledge required to design, install, inspect and test to verify an electrical installation is safe and complies with regulatory requirements. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to do the tasks in • working safely; • designing, installing, • commissioning and fault finding of electrical installations; • visual inspections and mandatory testing; • following workplace procedures; and completing mandatory reporting requirements. • demonstrating currency for regulatory purposes may be required to undertake this unit to demonstrate their currency with verification of compliance requirements • possession of sufficient to evidence current knowledge of applicable standards and regulations. The skills and knowledge described in this unit require a licence or permit to practice in the workplace where work is carried out on	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
	electrical installations which are designed to operate at voltages greater than 50 volt (V) alternating current (a.c.) or 120 V direct current (d.c.). . Your assessor will discuss with you the appropriate resources and location for demonstration. **All OHS, risk assessment and isolation procedures must be followed using safe work procedures and will be monitored when performing all tasks.** **16 b)** **Theory** **<u>1.Prepare to design, install, inspect and test an electrical installation</u>** 1.1 WHS/OHS control measures for the site are identified and applied 1.2 WHS/OHS risk control measures and workplace procedures are followed in preparation for work 1.3 Safety hazards, which have not previously been identified, are noted and risk control measures are implemented 1.4 Installation documentation and/or relevant industry standard are reviewed and applied 1.5 Appropriate person/s is consulted to ensure work is coordinated with others involved on the worksite 1.6 Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace safety procedures 1.7 Circuits, machines and/or plant are isolated in accordance with WHS/OHS job requirements and workplace procedures 1.8 Installation of wiring, appliances, switchgear, control gear and associated accessories is planned and appropriately sequenced in consultation with relevant				

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
	person/s 1.9 Locations of appliances, switchgear, accessories and cable routes are planned within the constraints of building structure, other services, specifications and regulatory requirements 1.10 Tools, equipment and testing devices needed to verify compliance are obtained in accordance with workplace procedures and checked for correct operation and safety 1.11 Preparatory work is checked to ensure it complies with planned specifications and no damage has occurred **2.Select wiring systems, cables, control and protection for general electrical installations** 2.1 Wiring system is selected and suitable for the environments in which it will operate 2.2 Cable conductor sizes are selected to meet current-carrying capacity requirements and voltage-drop and earth fault-loop impedance limitations in accordance with relevant industry standards 2.3 Protective devices are selected to meet the required switching and tripping currents coordination and discrimination for overload and short circuit protection in accordance with relevant industry technical standards 2.4 Earthing system components are selected to meet multiple earthed neutral (MEN) system in accordance with relevant industry standards 2.5 Residual current devices (RCDs) are selected to meet the required circuit switching and tripping currents in accordance with relevant industry technical standards 2.6 Switchgear/control gear is selected to meet current and voltage requirements and confirmed suitable for environmental conditions (ingress protection (IP) ratings) and functional requirements 2.7 Switchboards are arranged to accommodate control and protective devices, links, safety services and other distributor equipment in				

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
	accordance with relevant industry technical standards **<u>3 Install low voltage (LV) wiring and associated accessories</u>** 3.1 Wiring and accessories are installed and terminated to comply with technical standards and job specifications and requirements 3.2 Cables and conductors are terminated at accessories in accordance with manufacturer specifications and regulatory requirements 3.3 Ongoing compliance and safety inspection of installed wiring systems and testing of installed circuits is undertaken 3.4 Defects revealed through ongoing compliance and safety inspection and tests are rectified **<u>4.Install and connect LV Appliances, switchgear and accessories appliances, switchgear</u>** 4.1 Appliances, switchgear and accessories are installed to comply with technical standards and job specifications and requirements with sufficient access to affect terminations, adjustment and maintenance 4.2 Wiring is terminated at appliances, switchgear and accessories in accordance with manufacturer specifications and functional and regulatory requirements 4.3 Ongoing compliance and safety inspections of the installed appliances, switchgear and accessories are undertaken 4.4 Defects revealed through ongoing compliance and safety inspection are rectified				

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
	5 Visually inspect and conduct safety testing on electrical installation 5.1 Wiring is checked for suitability within the environments in which it is installed to ensure it is suitably protected from damage or overheating in accordance with relevant industry standards 5.2 Cable conductor sizes are compliant with current-carrying capacity, voltage-drop and fault-loop impedance limitations in accordance with relevant industry standards 5.3 Protection methods and devices are verified as meeting coordination requirements for overload and short-circuit protection in accordance with relevant industry standards 5.4 Switchgear and control gear rating is verified as being appropriate and meets functional requirements in accordance with relevant industry standards 5.5 Electrical equipment inspection and testing evidence is cited and verified in accordance with WHS/OHS safety regulations 5.6 Earthing system and components are located correctly, and conductor selection sizes are verified 5.7 Markings on switchboards are checked for accuracy and clarity and comply with requirements 5.8 Mandatory tests are conducted in accordance with relevant industry standards 5.9 Testing is conducted to verify fault-loop impedance is sufficiently low and RCDs operate in accordance with relevant industry standards **6.Report inspection and test findings** 6.1 WHS/OHS risk control work completion measures and procedures are followed 6.2 Worksite is cleaned and made safe in accordance with workplace				

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
	procedures 6.3 Non-compliance defects are identified and reported in accordance with workplace procedures 6.4 Recommendations for rectifying defects are made in accordance with workplace procedures 6.5 Mandatory documentation is completed in accordance with workplace procedures •				

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0023 Terminate cables, cords and accessories for low voltage circuits Core					
11	• Selecting appropriate cable/cord and conductor devices • Cutting cable ends and stripping sheath/insulation to a sufficient length • Fitting and securing cable glands/retaining devices correctly • Preparing and terminating conducts to suit the type of terminal at which there are to be connected. • Testing completed cables to ensure compliant continuity and insulation resistance • Dealing with unplanned events	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0018 Select wiring systems and select cables for low voltage electrical installations Core					
17	• Determining cable routes, the route lengths of cables and the conditions in which the wiring system is to operate. • Selecting wiring system suitable for the environment requirements. • Selecting cable conductor sizes in consideration to current-carrying capacity and voltage-drop / earth fault-loop limitation. • Ensuring co-ordination between circuit protective device and conductor current-carrying capacity. • Selecting compliant earthing system components • Documenting wiring systems and cables to be used, specification for items selected and reasons for the selections made. • Dealing with unplanned events	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits Core					
18	• Envisaging the likely extent of the fault and the work from fault/breakdown reports and/or discussion to elicit information on the fault/breakdown with appropriate person(s). • Using appropriate tools and resources, and methodical fault-finding techniques. • Locating and trouble-shooting faults efficiently. • Conducting tests or measurements in strict accordance with OHS and electrical safe working requirements. • Rectifying faults effectively. • Reporting cause of the fault and justifying the repairs undertaken.	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0005 Develop and connect electrical control circuits Core					
10	• Identification of given circuit diagrams (schematic) symbols and explain the operation of the components represented • labelling wires and terminal (numbering systems) • control relay - operating principles, basic contact configurations and identification and common applications • push button - switching configurations and common applications • selecting pushbuttons/pilot lamps from manufacturer's catalogues for specific applications • development of simple stop-start relay circuit that incorporates pilot lights and latching circuit. • connection and testing of control circuits	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			
	• selecting relays from manufacturers' catalogue for specified applications • circuit development of electrical control circuit in accordance with a written description (specification) and list the sequence of operation of the circuit • connecting simple electrical control circuit from circuit diagrams • applying safe working practices when testing an electrical control circuit				
	• Determining control scenarios specifications. • Developing schematic arrangement of control circuits that meets the required scenario as specified. • Connecting control circuit to function as specified. • Conducting safety and functional testing correctly • Identifying and correcting non-compliant control functions.				

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
	• Documenting 'as-connected' control circuit.				

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEERE0001 Apply environmentally and sustainable procedures in the energy sector Core					
25	• Sustainable work practices • Techniques for reducing carbon produced energy and hence greenhouse gases	Competent performance with inherent safe working practices is expected in the Industry to which this unit applies. This requires that the specified essential knowledge and associated skills are assessed in a structured environment which is primarily intended for learning/assessment and incorporates all necessary equipment and facilities for learners to develop and demonstrate the essential knowledge and skills described in this unit.			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEECS0033 Use engineering applications software on personal computers Group A Elective					
22	• Starting up • Selecting application • Entering information • Saving • Printing	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UETDRRF004 Perform rescue from a live LV panel*Group A Elective					
29	The practical demonstration of Rescuing a person from a live LV panel in the context of transmission, distribution or rail work functions. The responsibilities for health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEIC0013 Develop, enter and verify discrete control programs for programmable controllersGroup B Elective					
30	• Basic Programming • Program modification • Ladder diagram development • Connecting the programmable controller.	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			
	• Installation precaution • Safety systems • AS/NZS requirements				
	• PLC Fault Finding • Controller Status • I/O Faults • Program Faults				

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEAS0007 Assemble, mount and connect control gear and switchgear Group A Elective					
21	• wiring and schematic diagrams • placement /layout of power circuit devices and components • placement/layout of control circuit devices and components	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			
	• earthing • size of power and control circuit conductors • equipment layout methods and accessories				
	• Correctly selecting and placing, switchgear and control gear.				
	• Making connection without damaging switchgear/control.				

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UEEEL0047 Identify, shut down and restart systems with alternate supplies Core					
32	**Practical** This unit involves the skills and knowledge required to identify, shut down and restart systems with alternate supplies. The demonstration will occur in the workplace or in a simulated environment and will include evidence of your ability to • identify the system configuration, • work safely with electricity generation systems and inverters, • identify hazards and controlling the associated risks, • isolate and test for de-energisation, • reinstate the system after isolation complete relevant documentation	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
UETDRRF004 Perform rescue from a live LV panel Core					
29	The practical demonstration of Rescuing a person from a live LV panel in the context of transmission, distribution or rail work functions. The responsibilities for health, safety and risk management processes at all operative levels and adherence to safety practices as part of the normal way of doing work.	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
HLTAID009 Provide cardiopulmonary resuscitation Core					
31	**Task 31** **Practical** Practical demonstration of 1.Respond to an emergency situation 1.1. Recognise and assess an emergency situation. 1.2. Ensure safety for self, bystanders and casualty. 1.3. Assess the casualty and recognise the need for cardiopulmonary resuscitation (CPR). 1.4. Seek assistance from emergency services 2. Perform CPR procedures. 2.1. Perform CPR in accordance with the ARC guidelines. 2.2. Display respectful behaviour towards casualty. 2.3. Operate an automated external defibrillator (AED) according to manufacturers' instructions. 3. Communicate details of the incident. 3.1. Accurately convey incident details to emergency services. 3.2. Report details of incident in line with appropriate workplace or site procedures. 3.3. Maintain privacy and confidentiality of information in line with statutory or organisational policies 4.Review the incident.	Workplace Health and Safety Act: 1995 Electrical Safety Act & Regulations Electrical Code of Practice AS/NZS3000:2007 Environmental protection Manufacturer's instructions for materials and equipment Correct use of MSDS data Workplace documentation (SOP, Work permits, Safety checklists, incident reports) Elevated Work Platforms Permit			

Task No.	Observable behaviours in task	Industry requirements	Assessor's comments	Indicate if behaviour observed	Date assessed
	4.1. Recognise the possible psychological impacts on self and other rescuers and seek help when required. 4.2. Contribute to a review of the first aid response as required.				

SECTION F

Return

Resources for Practical Tasks

Please refer to Section D – Practical Tasks:

The resource requirements for individual practical tasks and scenarios can be determined by the assessor.

The resources required to adequately conduct assessment will be dependent on the workplace or simulated environment chosen for each task/scenario. This will also apply to written tasks.

SECTION G

Return

Third Party Verification

The preferred approach in gaining third party validation is to take the forms in this section to the candidate's previous employers or referees to gain confirmation of the candidate's skills against the required competencies. This would be done during a conversation or interview with these people.

It may be beneficial to contact the employers/referees early in the recognition process to make appointments, particularly if you have to travel some distance to visit them. This may be done on the same day as a practical assessment in the workplace if appropriate.

It is recommended that verification be obtained from one or two referees who can confirm the candidate's industry skills in context over time.

After completing verification conversation for student's referee's Assessor to make notes to confirm the verification conversation occurred.

Details required, date _____/ Time of call: _____
Person contacted: _____

Verification of skills/knowledge as advised by the referee for student units of competency (verified by Assessor)

Assessor Signature: _____ Date: _____

REFEREE TESTIMONIAL

(Date)
To whom it may concern,

RE: _____skills in/as _____
(insert candidate name) *(insert industry/job title)*

I certify that the above-named person has:

worked at _____ for a period of _____ years

regularly undertaken the following activities within the workplace since commencing employment with this organisation:

➔ *Initial those skills/ competencies (below) that the candidate has or can successfully perform in the workplace*

_____ Acts in accordance with Workplace Health & Safety regulations
_____ Works effectively with other team members and supervisors
_____ Able to Fabricate, dismantle, assemble of utilities industry components
_____ Solves problems in single and three phase low voltage electrical apparatus and circuits
_____ Solves problems in D.C. circuits
_____ Fix and secure electrotechnology equipment
_____ Uses drawings, diagrams, schedules and manuals
_____ Lays wiring and terminates accessories
_____ Documents occupational hazards and risks in electrical
_____ Solves problems in electromagnetic circuits
_____ Solves problems in low voltage A.C. circuits
_____ Installs wiring and accessories
_____ Installs low voltage electrical apparatus and associated equipment
_____ Verifies compliance and functionality of general electrical installations
_____ Selects and arranges equipment for general electrical installations
_____ Trouble shoot and repair faults in low voltage electrical apparatus and circuits
_____ Develops and connects control circuits
_____ Apply environmental and sustainable procedures in the energy sector
_____ Install appliances, switchgear, and associated accessories for low voltage electrical installations
_____ Use basic computer application relevant to an energy sector workplace
_____ Assemble, mount, and connect switchgear and control gear
_____ Develop, enter, and verify discrete control programs for programmable controllers
_____ Source and purchase materials for installation/service jobs.

If you would like any further information or would like to discuss any of the above, I can be contacted on _____

Yours sincerely
Signature
License number:
Phone number:

SECTION H

Return

Assessment Tables

You use these tables as a reference tool to see at a glance which units/elements of competency are within the qualification.

Question numbers refer to those found in **SECTION C** of this kit.

Practical assessment/scenarios numbers refer to those found in **SECTION D** of this kit.

It is important to note that this section is used for validation purposes only. Any mapping should be done after questions and tasks have been selected.

ASSESSMENT TABLE

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

ELEMENTS		PERFORMANCE CRITERIA		QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Prepare to enter an electrotechnology workplace**	**1.1**	Work area access permits are obtained from appropriate person/s in accordance with workplace procedures	1	1
		1.2	Relevant workplace WHS/OHS safety regulations and codes of practices are identified and followed when entering the electrotechnology work area	1	1
		1.3	Safe work methods for controlling risks are obtained, read and applied prior to undertaking work activity in accordance with WHS/OHS workplace procedures	1	1
		1.4	Preparation for electrical and non-electrical isolation is carried out to prevent creation of hazards from loss of machine/system/process control in accordance with WHS/OHS workplace procedures	1	1
		1.5	Tools, equipment and chemicals required for the electrotechnology work are checked for safety and correct functionality in accordance with workplace procedures and regulatory requirements	1	1
		1.6	Personal protective equipment (PPE) is worn appropriate to the electrotechnology work area and in accordance with workplace procedures	1	1
2	**Apply safe electrotechnology working practices**	**2.1**	Risk control work measures are implemented in accordance with WHS/OHS workplace procedures	1,2	1
		2.2	Procedures for dealing with accidents, fires and emergencies are followed in accordance with workplace procedures, scope of responsibility and capabilities	3	2
		2.3	Safe work methods are applied when working at heights including safe and effective use of safety equipment	3	2

		2.4	Safe work methods are used when undertaking lifting, lowering, pushing, pulling, carrying or otherwise moving, holding or restraining workplace tasks in accordance with relevant code of practice	3	2
		2.5	Safe work methods for removing an electric shock victim from a live electrical situation are demonstrated in accordance with workplace emergency management procedures	3	2
		2.6	Working area is kept clean, neat and tidy in accordance with workplace housekeeping procedures	3	2
3	**Follow electrotechnology workplace procedures for hazard identification and risk control**	**3.1**	Hazards are identified, control measures implemented and reviewed through regular active participation in the consultation process with employer and other employees	2	1
		3.2	Hazards in the work area are identified and reported to relevant person/s in accordance with workplace procedures	2	1
		3.3	WHS/OHS documentation and incident records are completed in accordance with regulatory requirements and workplace procedures	3	2
		3.4	Workplace instructions are followed in accordance with regulatory requirements and workplace procedures	3	1

UEECD0016 Document and apply measures to control WHS risks associated with electrotechnology work

ELEMENTS		PERFORMANCE CRITERIA		QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Identify and document hazards and risks associated with electrotechnology work**	**1.1**	Hazards are identified and documented by undertaking a job analysis and worksite inspection in consultation with relevant person/s and in accordance with workplace procedures	4	3
		1.2	Risks associated with identified hazards are assessed in consultation with relevant person/s, taking into account existing control measures and documented in accordance with workplace procedures	4	3
2	**Assign levels of risk and develop and document control measures**	**2.1**	Level of risk is assessed and prioritised for each identified hazard in consultation with relevant/s persons and in accordance with regulations and WHS/OHS workplace compliance procedures	4	3
		2.2	Control measures for identified hazards are determined by applying the hierarchy of control and activities to eliminate and/or mitigate the risk	4	3
		2.3	Level of risk is re-assessed to confirm the required control measures reduce the risk level to as low as reasonably practicable	4	3
		2.4	Hazards risk level and control measures are agreed to in consultation with relevant stakeholders and documented in accordance with workplace procedures	4	3
3	**Monitor, review and document risk control measures**	**3.1**	Documented control measures are recorded in workplace risk register and made available for reference by relevant person/s	4	3
		3.2	Control measures are reviewed and modified, as required, in consultation with relevant person/s in accordance with workplace procedures	4	3
		3.3	Document and apply measures to control WHS/OHS risks associated with electrotechnology work	4	3
		3.4	Changes and updates are made to relevant documentation, risk register as additional hazards are identified	4	3

UEECD0019 Fabricate, assemble and dismantle utilities industry components

ELEMENTS	PERFORMANCE CRITERIA	QUESTION	PRACTICAL TASK
Elements describe	Performance criteria describe the performance needed to demonstrate achievement of the		

the essential outcomes.		element.			
1	**Prepare for dismantling, assembling and fabrication work**	**1.1**	Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified and applied in accordance with workplace procedures	1	1
		1.2	WHS/OHS risk control measures and workplace procedures are followed in preparation for the work	1.4	1
		1.3	Work instructions and relevant workplace procedures, industry standards, codes of practice and regulations for dismantling, assembling and fabrication are identified and applied	4	1
		1.4	Scope of work to be undertaken is obtained from relevant documentation and from work supervisor	5	Core
		1.5	Advice is sought from work supervisor to ensure work is coordinated effectively with other persons	5	Core
		1.6	Materials required for work are identified and obtained in accordance with workplace procedures	5	Core
		1.7	Tools, equipment and measuring devices needed to carry out the work are obtained and checked for correct operation and safety	10	5
2	**Dismantle and assemble utilities industry apparatus**	**2.1**	WHS/OHS risk control measures and workplace procedures for dismantling and assembling apparatus are followed	1,2,4	1
		2.2	Circuits/apparatus/plant are checked and isolation confirmed in accordance with WHS/OHS workplace requirements and procedures	1,2	1
		2.3	Relevant tools are selected and used correctly and safely in accordance with manufacturer instructions and workplace procedures	5	4
		2.4	Relevant manufacturer guides and instructions are followed when dismantling and assembling apparatus	9	5
		2.5	Apparatus components are marked or tagged correctly during dismantling to ensure correct and efficient reassembly in accordance with workplace procedures	9	5
		2.6	Dismantled components and parts are stored to protect them against loss or damage in accordance with manufacturer instructions and workplace procedures	9	5
		2.7	Apparatus is dismantled and assembled without waste of materials and energy, damage to apparatus, the surrounding environment or services	8	core
		2.8	Unplanned events are referred to supervisor for directions in accordance with workplace procedures	4	core
		2.10	Worksite is tidied, tools and equipment cleaned and securely stored in accordance with workplace procedures	6	core
		2.11	Work supervisor is notified of dismantling and assembling apparatus completion in	9	4

			accordance with workplace procedures		
3	**Fabricate utilities industry components**	**3.1**	WHS/OHS risk control measures and workplace procedures for fabricating components are followed	1,2,4	core
		3.2	Circuits/apparatus/plant are checked and isolated in accordance WHS/OHS workplace requirements and procedures	1,2	core
		3.3	Relevant tools and equipment are selected, used correctly and safely in accordance with manufacturer instructions and workplace procedures	5	core
		3.4	Drawings, diagrams and instructions for fabrication of mechanical components are followed in accordance with workplace procedures	5.10	core
		3.5	Component dimensions are determined directly by measuring, or by calculation from information supplied in job drawings and instructions	10	core
		3.6	Mechanical components are fabricated by measuring, marking out, cutting, joining and fixing accurately using relevant equipment and tools, minimising waste of materials and energy and/or damage to the surrounding environment or services	5	5
		3.7	Unplanned events are referred to supervisor for directions in accordance with workplace procedures	8	core
		3.8	Quality checks are carried out in accordance with workplace procedures	8	core
		3.9	Worksite is tidied, tools and equipment cleaned and securely stored in accordance with workplace procedures	6	core
		3.10	Work supervisor is notified of fabrication completion in accordance with workplace procedures	10	5

UEECD0020 Fix and secure electrotechnology equipment

ELEMENTS		PERFORMANCE CRITERIA		QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	Prepare to Fix and secure	1.1	OHS procedures for a given work area are identified, obtained and understood. Prepare to Fix and secure electrotechnology equipment.	1 1,4	1 1
		1.2	OHS risk control work preparation measures and procedures are followed.	5	

	electrotechnology equipment.	1.3 1.4 1.5 1.6 1.7 1.8	The scope of work to be undertaken is obtained from documentation or from work supervisor. Advice is sought from the work supervisor to ensure the work is coordinated effectively with others. Sources of materials that may be required for the work are identified and accessed in accordance with established procedures. Fixing devices are selected for their suitable ability for the environment, the load they are to support and substrata into which they Supporting accessories/equipment is selected for suitability for the environment and ability to support and protect from damage that which they are intended to support. Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.	5 5 12 12 5	Core Core Core 7 7 Core
2	Install fixing and support devices.	2.1 2.2 2.3 2.4 2.5	Electrical isolation is arranged where work is within arms-reach of exposed conductive parts, plant or machinery in strict accordance OHS requirements and procedures. Install fixing and support devices. Other OHS risk control measures relevant to the work site are followed. Fixing devices are installed in accordance with manufacturer instructions. Support accessories/equipment is install accurately and to comply with technical standards and job specifications. Work is carried out efficiently without waste of materials or damage to apparatus, circuits, the surrounding environment or services and using sustainable energy principles.	1, 1 12 12 8 1	1 1 7 7 Core core
3	Complete fixing and support work.	3.1 3.2 3.3	OHS risk control work completion measures and procedures are followed. Work site is tidied and tools and equipment cleaned and securely stored. Complete fixing and support work. Appropriate personnel are notified of the work completion.	1,2,4,7 8 7	1, Core Core Core

UEECD0051 Use drawings, diagrams, schedules, standards, codes and specifications*					
ELEMENTS		**PERFORMANCE CRITERIA**		**QUESTION**	**PRACTICAL TASK**
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	Prepare to Use drawings, diagrams, schedules, standards, codes and	1.1 1.2	Established OHS risk control measures and procedures are followed. Prepare to use drawings, diagrams, schedules and manuals. The need for drawings, diagrams, schedules or manuals is determined from the nature of the work to be	1 5	1 Core

	specifications.	1.3	undertaken. Established routines and procedures are followed to obtain drawings, diagrams, schedules or manuals required for the work to be undertaken.	5	Core
2	Use drawings, diagrams, schedules, standards, codes and specifications to obtain job information.	2.1 2.2 2.3 2.4 2.5 2.6	Drawings, diagrams, schedules and/or manuals are selected, appropriate to the work being undertaken. Use drawings, diagrams, schedules and manuals to obtain job information. Drawings, diagrams and schedules are interpreted using knowledge of drawing layouts, conventions and symbols. Dimensions are extracted from drawings and diagrams for application to work undertaken. Location of equipment is determined from equipment schedules and location diagrams. Manuals are reviewed to ascertain their format and where information relevant to the work to be undertaken is located. Information given in manuals is interpreted in relation to the work to be undertaken.	13 13 13 13 13 13	8 8 8 8 8 8
3	Use drawings, diagrams, schedules, standards, codes and specifications to convey information and ideas.	3.1 3.2 3.3	Drawing conventions are used in neat freehand drawings to convey information and ideas to others involved in the work to be undertaken. Drawing conventions are used to neatly correct freehand original job drawing to show final 'as installed' arrangement. Use drawings, diagrams, schedules, standards, codes and specifications to convey information and ideas. Corrected drawings are forwarded to appropriate person(s) in accordance with established procedures.	13 13 5	9 9 Core

	UEECD0044 Solve problems in multiple path circuits		
ELEMENTS	**PERFORMANCE CRITERIA**	**QUESTION**	**PRACTICAL TASK**

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Prepare to work on multiple path circuits**	**1.1**	Scope of work to be undertaken is determined from relevant documentation, electrical drawings or relevant person/s	1,14	1,3,10
		1.2	Work health and safety (WHS)/occupational health and safety (OHS) workplace procedures for a given work area are identified and applied	1,4,14	1,3,10
		1.3	Electrical hazards are identified, risks are assessed, and control measures are implemented	5,14	Core, 10
		1.4	Advice is sought from the relevant person/s to ensure the work is coordinated effectively with others	5,14	Core, 10
		1.5	Materials required for work are identified and accessed in accordance with workplace procedures	5,14	Core, 10
		1.6	Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety	5,14	Core, 10
2	**Solve multiple path circuit problems**	**2.1**	The need to test or measure live is determined in accordance with WHS/OHS requirements and when necessary conducted in accordance with workplace procedures	1,14	1,10
		2.2	Circuits are checked as isolated in accordance with workplace procedures and regulatory	1,14	1,10

			requirements		
		2.3	Expected circuit parameters are calculated from relevant component ratings/specifications	1,14	10
		2.4	Circuit parameters are measured in accordance with industry standards and checked against expected values	14	10
		2.5	Circuit problems are assessed using measured and calculated values as they apply to multiple path circuits	14	10
		2.6	Circuit solutions are determined from measured and calculated values of resistance, voltage, current and power in extra-low voltage (ELV) multiple path circuits	14	10
		2.7	Solutions are tested in accordance with workplace procedures and industry standards	14	10
		2.8	Problems are resolved without damage to equipment, circuits, the surrounding environment or services using sustainable energy practices	14	10
		2.9	Unplanned situations are responded to in accordance with workplace procedures, in a manner that minimises risk to personnel and equipment	14	10
3	**Complete work and document problem-solving activities**	**3.1**	WHS/OHS work completion risk control measures and procedures are followed	1,2,4,7,14	1,10
		3.2	Worksite is cleaned and made safe in accordance with workplace procedures	8,14	Core, 10

		3.3	Justification for solutions used to resolve circuit problems is documented	7.14	Core, 10
		3.4	Work completion is documented, electrical drawings are updated, and relevant personnel are notified in accordance with workplace procedures	8,14	Core, 10

		# UEECD0046 Solve problems in single path circuits			
ELEMENTS		**PERFORMANCE CRITERIA**		**QUESTION**	**PRACTICAL TASK**
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Prepare to work on multiple path circuits**	**1.1**	Scope of work to be undertaken is determined from relevant documentation, electrical drawings or relevant person/s	1,14	1,3,10
		1.2	Work health and safety (WHS)/occupational health and safety (OHS) workplace procedures for a	1,4,14	1,3,10

			given work area are identified and applied		
		1.3	Electrical hazards are identified, risks are assessed, and control measures are implemented	5,14	Core, 10
		1.4	Advice is sought from the relevant person/s to ensure the work is coordinated effectively with others	5,14	Core, 10
		1.5	Materials required for work are identified and accessed in accordance with workplace procedures	5,14	Core, 10
		1.6	Tools, equipment and testing devices needed to carry out work are obtained and checked for correct operation and safety	5,14	Core, 10
2	**Solve multiple path circuit problems**	**2.1**	The need to test or measure live is determined in accordance with WHS/OHS requirements and when necessary conducted in accordance with workplace procedures	1,14	1,10
		2.2	Circuits are checked as isolated in accordance with workplace procedures and regulatory requirements	1,14	1,10
		2.3	Expected circuit parameters are calculated from relevant component ratings/specifications	1,14	10
		2.4	Circuit parameters are measured in accordance with industry standards and checked against expected values	14	10
		2.5	Circuit problems are assessed using measured and calculated values as they	14	10

			apply to single path, single source circuits		
		2.6	Circuit solutions are determined from measured and calculated values of resistance, voltage, current, and power in single path circuits	14	10
		2.7	Solutions are tested in accordance with workplace procedures and industry standards	14	10
		2.8	Problems are resolved without damage to equipment, circuits, the surrounding environment or services using sustainable energy practices	14	10
		2.9	Unplanned situations are responded to in accordance with workplace procedures, in a manner that minimises risk to personnel and equipment	14	10
3	**Complete work and document problem-solving activities**	**3.1**	WHS/OHS work completion risk control measures and procedures are followed	1,2,4,7,14	1,10
		3.2	Worksite is cleaned and made safe in accordance with workplace procedures	8,14	Core, 10
		3.3	Justification for solutions used to resolve circuit problems is documented	7.14	Core, 10
		3.4	Work completion is documented, electrical drawings are updated, and relevant personnel are notified in accordance with workplace procedures	8,14	Core, 10

	UEEEL0023 Terminate cables, cords and accessories for low voltage circuits			
	ELEMENTS	**PERFORMANCE CRITERIA**	**QUESTION**	**PRACTICAL TASK**
	Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.		
1	Prepare to terminate cables, cords and conductors.	1.1 OHS procedures for a given work area are identified, obtained and understood. 1.2 Health and safety risks are identified and established risk control measures and procedures in preparation for the work are followed 1.3 Safety hazards that have not previously been identified are noted and established risk control measures are Implemented. 1.4 The junction box/ terminal enclosures and terminal types are inspected to select the type and size of cable and Conductor termination devices needed .1.5 Tools, materials and testing devices needed to for terminating cables and cords are obtained in accordance with Established procedures and checked for correct operation and safety.	32	11
2	Terminate cables, cords and conductors.	2.1 OHS risk control measures and procedures for carrying out the work are 2.2 Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.	32	11

		2.3	Cable /cord ends are cut and sheath/ insulation stripped with sufficient length to prevent strain on terminations and Without undue waste .		
		2.4	Cable glands/ retaining devices are fitted and secured to ensure cable/cord cannot be pulled out of entry into junction Box/ terminal enclosure.		
		2.5	Conductors are terminated to suit the type of terminal they are connected to.		
		2.6	Conductors are terminated to ensure continuity across the terminal.		
		2.7	Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.		
		2.8	Unexpected situations are dealt with safely and with the approval of an authorised person. .		
3	Test terminated cables and cords	3.1	OHS work completion risk control measures and procedures are followed.	32	11
		3.2	Terminated cables are tested to ensure continuity and insulation resistance comply with requirements. .		

UEEEL0021 Solve problems in magnetic and electromagnetic devices

ELEMENTS		PERFORMANCE CRITERIA		QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Prepare to work with electromagnetic devices and circuits**	**1.1**	WHS/OHS requirements and workplace procedures for a given work area are identified and applied	1,16	1.12
		1.2	Device/s and/or circuit/s problems are identified from documentation or work supervisor to determine scope of work	1	1.12
		1.3	Hazards are identified, risks are assessed and control measures are implemented	16	12
		1.4	Tools, equipment and testing devices to carry out work are obtained and checked for correct operation and safety	5	core

		1.5	Circuits are checked and isolated in accordance with workplace procedures and regulatory requirements	5	core
		1.6	Advice is sought from the work supervisor to ensure work is coordinated effectively with others	5	core
2	**Solve electromagnetic device and/or circuit problems**	2.1	WHS/OHS risk control measures and workplace procedures for carrying out work are followed	1	1
		2.2	Need to test or measure live work is determined in accordance with WHS/OHS job safety assessment requirements and work is conducted using safety control measures workplace procedures	1	1
		2.3	Relevant circuits and devices are checked as being isolated, as required, in accordance with WHS/OHS requirements and workplace procedures	1	1
		2.4	Operating parameters of an existing circuit with an electromagnetic device are determined	16	12
		2.5	Methodical techniques are used to resolve circuit problems from measured and calculated values as they apply to electromagnetic devices/circuits	6	core
		2.6	Existing circuit with an electromagnetic device is altered to comply with specified operating parameters	6	core

		2.7	Circuit with electromagnetic device is developed to comply with a specified function and operating parameters	6	core
		2.8	Electrical equipment is connected and tested to determine correct operation	6	core
		2.9	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment	6	core
		2.10	Problems are resolved without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices	6	core
3	**Complete work and documentation**	3.1	WHS/OHS work completion risk control measures and workplace procedures are followed	1	1
		3.2	Worksite is cleaned and made safe in accordance with workplace procedures	8	core
		3.3	Justification for solutions used to resolve problems is documented in accordance with established workplace procedures	7	core
		3.4	Work completion is documented and appropriate person/s notified in accordance with workplace procedures	7	core

UEEEL0019 Solve problems in direct current (d.c.) machines

ELEMENTS		PERFORMANCE CRITERIA		QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Prepare to work with dc machine**	**1.1**	WHS/OHS requirements and workplace procedures for a given work area are identified and applied	1,16	1.12
		1.2	Device/s and/or circuit/s problems are identified from documentation or work supervisor to determine scope of work	1	1.12
		1.3	Hazards are identified, risks are assessed and control measures are implemented	16	12
		1.4	Tools, equipment and testing devices to carry out work are obtained and checked for correct operation and safety	5	core
		1.5	Circuits are checked and isolated in accordance with workplace procedures and regulatory requirements	5	core
		1.6	Advice is sought from the work supervisor to ensure work is coordinated effectively with others	5	core

2	**Solve electromagnetic device and/or circuit problems**	2.1	WHS/OHS risk control measures and workplace procedures for carrying out work are followed	1	1
		2.2	Need to test or measure live work is determined in accordance with WHS/OHS job safety assessment requirements and work is conducted using safety control measures workplace procedures	1	1
		2.3	Relevant circuits and devices are checked as being isolated, as required, in accordance with WHS/OHS requirements and workplace procedures	1	1
		2.4	Operating parameters of a machine are determined from nameplate details	16	12
		2.5	Electrical measurements are completed and readings compared with nameplate ratings	6	core
		2.6	Methodical techniques are used to identify and resolve problems from measured and calculated values as they apply to machines	6	core
		2.7	Machine is connected and tested to determine correct operation	6	core
		2.8	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment	6	core
		2.9	Problems are resolved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices	6	core

3	**Complete work and documentation**	3.1	WHS/OHS work completion risk control measures and workplace procedures are followed	1	1
		3.2	Worksite is cleaned and made safe in accordance with workplace procedures	8	core
		3.3	Justification for solutions used to resolve problems is documented in accordance with established workplace procedures	7	core
		3.4	Work completion is documented and appropriate person/s notified in accordance with workplace procedures	7	core

UEEEL0008 Evaluate and modify low voltage heating equipment and controls

ELEMENTS	PERFORMANCE CRITERIA	QUESTION	PRACTICAL TASK

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Prepare to work on heating equipment**	**1.1**	Scope of work is obtained from relevant documentation, electrical drawings or relevant person/s	1	1,13
		1.2	WHS/OHS requirements and workplace procedures for a given work area are identified and applied	1	1,13
		1.3	Hazards are identified, risks are assessed and control measures are implemented	1	Core
		1.4	Advice is sought from work supervisor to ensure the work is coordinated effectively with others	5	Core
		1.5	Sources of materials required for work are determined in accordance with workplace procedures	5	Core
		1.6	Tools, equipment and testing devices required to carry out work are obtained and checked for correct operation and safety	5	Core
2	**Evaluate and modify heating equipment**	**2.1**	Equipment and circuits are checked and arrangement identified	1,17	1,13
		2.2	Circuits are checked and isolated in accordance with workplace procedures and regulatory requirements	1	1

		2.3	The need to test or measure live work is determined in accordance with WHS/OHS requirements and, as necessary, conducted in accordance with workplace procedures	17	13
		2.4	Fault/s and probable cause/s are identified from measured and calculated values as they apply to heating equipment	17	13
		2.5	Required components are identified and replaced in accordance with manufacturer specifications and industry standards	17	13
		2.6	Unexpected situations are dealt with safely and with the approval of relevant person/s	6	core
3	**Complete work and document activities**	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed	1	1
		3.2	Worksite is cleaned and made safe in accordance with workplace procedures	8	Core
		3.3	Justification for solutions used to modify circuits and equipment is documented	7	Core
		3.4	Work completion is documented and an appropriate person/s notified in accordance with workplace procedures	8	core

UEEEL0010 Evaluate and modify low voltage socket outlets circuits

ELEMENTS		PERFORMANCE CRITERIA		QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Prepare to work on**	**1.1**	Scope of work is obtained from relevant documentation, electrical drawings or	1	1,13

	socket outlet circuits		relevant person/s		
		1.2	WHS/OHS requirements and workplace procedures for a given work area are identified and applied	1	1,13
		1.3	Hazards are identified, risks are assessed and control measures are implemented	1	Core
		1.4	Advice is sought from work supervisor to ensure the work is coordinated effectively with others	5	Core
		1.5	Sources of materials required for work are determined in accordance with workplace procedures	5	Core
		1.6	Tools, equipment and testing devices required to carry out work are obtained and checked for correct operation and safety	5	Core
2	**Evaluate and modify socket outlet circuits**	**2.1**	Socket outlets and circuits are checked and arrangement identified	1,17	1,13
		2.2	Circuits are checked and isolated in accordance with workplace procedures and regulatory requirements	1	1
		2.3	The need to test or measure live work is determined in accordance with WHS/OHS requirements and, as necessary, conducted in accordance with workplace procedures	17	13

		2.4	Fault/s and probable cause/s are identified from measure and calculated values as they apply to socket outlet circuits	17	13
		2.5	Components are identified and replaced in accordance with manufacturer specifications and industry standards	17	13
		2.6	Unexpected situations are dealt with safely and with the approval of relevant person/s	6	core
3	**Complete work and document activities**	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed	1	1
		3.2	Worksite is cleaned and made safe in accordance with workplace procedures	8	Core
		3.3	Justification for solutions used to modify circuits and equipment is documented	7	Core
		3.4	Work completion is documented and an appropriate person/s notified in accordance with workplace procedures	8	core

UEEEL0009 Evaluate and modify low voltage lighting circuits, equipment and control

ELEMENTS	PERFORMANCE CRITERIA		QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.			
1 Prepare to work on lighting circuits	**1.1**	Scope of work is obtained from relevant documentation, electrical drawings or relevant person/s	1	1,13
	1.2	WHS/OHS requirements and workplace procedures for a given work area are identified and applied	1	1,13

		1.3	Hazards are identified, risks are assessed and control measures are implemented	1	Core
		1.4	Advice is sought from work supervisor to ensure the work is coordinated effectively with others	5	Core
		1.5	Sources of materials required for work are determined in accordance with workplace procedures	5	Core
		1.6	Tools, equipment and testing devices required to carry out work are obtained and checked for correct operation and safety	5	Core
2	**Evaluate and modify lighting circuits**	**2.1**	Equipment and circuits are checked and arrangement identified	1,17	1,13
		2.2	Circuits are checked and isolated in accordance with workplace procedures and regulatory requirements	1	1
		2.3	The need to test or measure live work is determined in accordance with WHS/OHS requirements and when necessary conducted in accordance with workplace procedures	17	13
		2.4	Fault/s and probable cause/s are identified from measured and calculated values as they apply to lighting equipment	17	13
		2.5	Required components are identified and replaced in accordance with manufacturer specifications and industry standards	17	13

		2.6	Unexpected situations are dealt with safely and with the approval of relevant person/s	6	core
3	**Complete work and document activities**	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed	1	1
		3.2	Worksite is cleaned and made safe in accordance with workplace procedures	8	Core
		3.3	Justification for solutions used to modify circuits and equipment is documented	7	Core
		3.4	Work completion is documented and an appropriate person/s notified in accordance with workplace procedures	8	core

UEEEL0012 Install low voltage wiring, appliances, switchgear and associated accessories

ELEMENTS		PERFORMANCE CRITERIA		QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Prepare to install low voltage (LV) wiring, appliances, switchgear and associated accessories**	**1.1**	Nature and location of work is determined from workplace documentation, drawings or relevant person/s to determine the scope of work	1	1
		1.2	WHS/OHS requirements and workplace procedures are applied	1	1
		1.3	Risks are identified and control measures implemented in accordance with workplace procedures	1	1
		1.4	Need to test or measure live work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace safety procedures	1	1
		1.5	Circuits/machines/plant are checked as being isolated, where necessary, in strict	4	core

			accordance with WHS/OHS requirements and procedures.		
		1.6	Installation of wiring, appliances, switchgear, control gear and associated accessories is planned and appropriately sequenced in consultation with relevant person/s	5	core
		1.7	Locations of appliances, switchgear, accessories and cable routes are planned within the constraints of building structure, other services, specifications and regulatory requirements	5	core
		1.8	Material required for installation work is obtained in accordance with workplace procedures and checked against job specifications	5	core
		1.9	Tools, equipment and measuring devices required for the installation and work environment are obtained in accordance with workplace procedures and checked for correct operation and safety	5	core
		1.10	Preparatory work is inspected and checked to ensure no damage has occurred and compliance with job specifications	5	core
2	**Install LV wiring and associated accessories**	**2.1**	Wiring and accessories are installed and terminated to comply with technical standards and job specifications and requirements	18	14
		2.2	Accessories are installed straight and square in the required locations and within acceptable tolerances	18	14

		2.3	Cables and conductors are terminated at accessories in accordance with manufacturer specifications and regulatory requirements	18	14
		2.4	Ongoing compliance and safety inspection of installed wiring systems and testing of installed circuits is undertaken	1	1
		2.5	Defects revealed through on-going compliance and safety inspection and tests are rectified	5	core
		2.6	Cable installation and termination is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment using sustainable energy practices	8	core
		2.7	Unexpected situations are dealt with safely and with the approval of an authorised person	6	core
3	**Install and connect LV appliances, switchgear and associated accessories**	**3.1**	Appliances, switchgear and accessories are installed to comply with technical standards and job specifications and requirements with sufficient access to affect terminations, adjustment and maintenance	19	15
		3.2	Accessories are installed straight and square in the required locations and within acceptable tolerances	19	15
		3.3	Wiring is terminated at appliances, switchgear and accessories in accordance with manufacturer specifications and functional and regulatory requirements	19	15

		3.4	Ongoing compliance and safety inspections of the installed appliances, switchgear and accessories are undertaken	6	core
		3.5	Defects revealed through on-going compliance and safety inspection are rectified	6	core
		3.6	Installation is carried out efficiently without unnecessary waste of materials or damage to apparatus, circuits, the surrounding environment or services using sustainable energy principles	19	15
		3.7	Unexpected situations are dealt with safely and with the approval of an authorised person	6	core
4	**Complete work and document activities**	**4.1**	WHS/OHS work completion risk control measures and procedures are followed	1	1
		4.2	Worksite is cleaned and made safe in accordance with workplace procedures	8	Core
		4.3	'As-installed' cables/wiring, appliances, switchgear and accessories are documented and an appropriate person/s notified in accordance with workplace procedures	7,19	15

UEEEL0039 Design, install and verify compliance and functionality of general electrical installations

ELEMENTS		PERFORMANCE CRITERIA		QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Prepare to design, install, inspect and test an electrical installation**	**1.1**	WHS/OHS control measures for the site are identified and applied	1	1
		1.2	WHS/OHS risk control measures and workplace procedures are followed in preparation for work	1	1
		1.3	Safety hazards, which have not previously been identified, are noted and risk control measures are implemented	4	core
		1.4	Installation documentation and/or relevant industry standard are reviewed and applied	1	1

		1.5	Appropriate person/s is consulted to ensure work is coordinated with others involved on the worksite	5	core
		1.6	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted in accordance with workplace safety procedures	1	1
		1.7	Circuits, machines and/or plant are isolated in accordance with WHS/OHS job requirements and workplace procedures	20	16
		1.8	Installation of wiring, appliances, switchgear, control gear and associated accessories is planned and appropriately sequenced in consultation with relevant person/s	Gap 1	Gap 1
		1.9	Locations of appliances, switchgear, accessories and cable routes are planned within the constraints of building structure, other services, specifications and regulatory requirements	20	16
		1.10	Tools, equipment and testing devices needed to verify compliance are obtained in accordance with workplace procedures and checked for correct operation and safety	5	core
		1.11	Preparatory work is checked to ensure it complies with planned specifications and no damage has occurred	5	core

2	**Select wiring systems, cables, control and protection for general electrical installations**	**2.1**	Wiring system is selected and suitable for the environments in which it will operate	20	16
		2.2	Cable conductor sizes are selected to meet current-carrying capacity requirements and voltage-drop and earth fault-loop impedance limitations in accordance with relevant industry standards	20	16
		2.3	Protective devices are selected to meet the required switching and tripping currents coordination and discrimination for overload and short circuit protection in accordance with relevant industry technical standards	20	16
		2.4	Earthing system components are selected to meet multiple earthed neutral (MEN) system in accordance with relevant industry standards	20	16
		2.5	Residual current devices (RCDs) are selected to meet the required circuit switching and tripping currents in accordance with relevant industry technical standards	Gap 2	Gap 2
		2.6	Switchgear/control gear is selected to meet current and voltage requirements and confirmed suitable for environmental conditions (ingress protection (IP) ratings) and functional requirements	20	16
		2.7	Switchboards are arranged to accommodate control and protective devices, links, safety services and other distributor equipment in accordance with relevant industry technical standards	20	16

3	**Install low voltage (LV) wiring and associated accessories**	**3.1**	Wiring and accessories are installed and terminated to comply with technical standards and job specifications and requirements	19	15
		3.2	Cables and conductors are terminated at accessories in accordance with manufacturer specifications and regulatory requirements	19	15
		3.3	Ongoing compliance and safety inspection of installed wiring systems and testing of installed circuits is undertaken	Gap 3	Gap 3
		3.4	Defects revealed through ongoing compliance and safety inspection and tests are rectified	Gap 4	Gap 4
4	**Install and connect LV appliances, switchgear and associated accessories**	**4.1**	Appliances, switchgear and accessories are installed to comply with technical standards and job specifications and requirements with sufficient access to affect terminations, adjustment and maintenance	19	15
		4.2	Wiring is terminated at appliances, switchgear and accessories in accordance with manufacturer specifications and functional and regulatory requirements	19	15
		4.3	Ongoing compliance and safety inspections of the installed appliances, switchgear and accessories are undertaken	Gap 4	Gap 4
		4.4	Defects revealed through ongoing compliance and safety inspection are rectified	Gap 4	Gap 4
5	**Visually inspect and conduct safety testing**	**5.1**	Wiring is checked for suitability within the environments in which it is installed	20	16

	on electrical installation		to ensure it is suitably protected from damage or overheating in accordance with relevant industry standards		
		5.2	Cable conductor sizes are compliant with current-carrying capacity, voltage-drop and fault-loop impedance limitations in accordance with relevant industry standards	20	16
		5.3	Protection methods and devices are verified as meeting coordination requirements for overload and short-circuit protection in accordance with relevant industry standards	20	16
		5.4	Switchgear and control gear rating is verified as being appropriate and meets functional requirements in accordance with relevant industry standards	20	16
		5.5	Electrical equipment inspection and testing evidence is cited and verified in accordance with WHS/OHS safety regulations	Gap 5	Gap 5
		5.6	Earthing system and components are located correctly, and conductor selection sizes are verified	20	16
		5.7	Markings on switchboards are checked for accuracy and clarity and comply with requirements	20	16
		5.8	Mandatory tests are conducted in accordance with relevant industry standards	20	16
		5.9	Testing is conducted to verify fault-loop impedance is sufficiently low and	20	16

			RCDs operate in accordance with relevant industry standards		
6	**Report inspection and test findings**	**6.1**	WHS/OHS risk control work completion measures and procedures are followed	1	1
		6.2	Worksite is cleaned and made safe in accordance with workplace procedures	8	core
		6.3	Non-compliance defects are identified and reported in accordance with workplace procedures	7	core
		6.4	Recommendations for rectifying defects are made in accordance with workplace procedures	7	core

Installation of wiring, appliances, switchgear, control gear and associated accessories is planned and appropriately sequenced in consultation with relevant person/s	Gap 1

TASKS

- Outline cable types used in electrical ionstallation
- Explain selecting wiring system compatible with the installation conditions,
- Explain selecting cables that comply with required current-carrying capacity and voltage
- What is earth fault-loop impedance limitations, ?
- Write down the procedures on coordination between protective devices

Residual current devices (RCDs) are selected to meet the required circuit switching and tripping currents in accordance with	Gap 2

relevant industry technical standards	

TASKS

- Skh the RCD and explain its operation.
- What are the types of RCDs?

Ongoing compliance and safety inspection of installed wiring systems and testing of installed circuits is undertaken	Gap 3

TASKS

- What are safety measures to be taken while installing electrical wiring?
- How often should wiring be inspected?
- What are the safety practices and procedures that need to be observed when wiring and testing electrical equipment?
- Why do we have to inspect the wiring installation?
- What Australian standard gives recommended testing arrangements for ongoing periodic inspection of the general electrical installations?
- Who is responsible for verifying that electrical installation work is safe and complies with Australian standards under the relevant legislation?

Defects revealed through ongoing compliance and safety inspection are rectified	Gap 4

TASKS

- What are common problems occur during electrical installation?
- What are the common faults in domestic electrical installation?
- What are three hazards to be aware of when carrying out maintenance or breakdown electrical work?
- What are the 3 safety components in the wiring system?
- What should be checked for the assurance of safety when using electrical equipment?

Electrical equipment inspection and testing evidence is cited and verified in accordance with WHS/OHS safety regulations	Gap 5

TASKS

- Describe Periodic inspection and testing
- Explain Visual inspection.
- What items shall be checked, where applicable during the visual inspection, to assess that the relevant requirements of AS 3000 are satisfied?

Fill the blank

- Clause _____ on the electrical installation to verify that it complies with the requirements of this Standard and that it is suitable for the use intended.
- Which section of AS3000:2018 outline Verification and Testing of electrical installation?

UEEEL0018 Select wiring systems and select cables for low voltage electrical installations

ELEMENTS		PERFORMANCE CRITERIA		QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Plan wiring systems for general electrical installations**	**1.1**	Scope and nature of the electrical installation is determined from job specifications	5	GC
		1.2	WHS/OHS requirements and workplace procedures and other regulatory requirements are identified and applied	1	1
		1.3	Cable routes, the route lengths of cable, and the conditions in which the wiring system is to operate is determined from job specifications or from consultation with appropriate person/s	21	17

2	**Select wiring systems and cables for general electrical installations**	**2.1**	Wiring system is selected and suitable for the environments in which it will operate	21	17
		2.2	Cable conductor sizes are selected to meet current-carrying capacity requirements and voltage-drop and earth fault-loop impedance limitations in accordance with relevant industry standards	21	17
		2.3	Circuit protective devices are selected to meet requirement for co-ordination with conductor current-carrying capacity in accordance with relevant industry standards	21	17
		2.4	Earthing system components are selected to meet multiple earthed neutral (MEN) system in accordance with relevant industry standards	21	17
3	**Document electrical installation**	**3.1**	Manufacturer data is referenced in selection of equipment to ensure materials comply with safety requirements and relevant industry standards	21	17
		3.2	Rationale for wiring system selections and calculations are documented in accordance with workplace procedures	21	17
		3.3	Electrical installation arrangement and specifications for all selected items are documented in accordance with workplace procedures and forwarded to	21	17

			appropriate person/s		

UEEEL0014 Isolate, test and troubleshoot low voltage electrical circuits

ELEMENTS		PERFORMANCE CRITERIA		QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Prepare to isolate, test and troubleshoot electrical circuits**	**1.1**	Scope of work to be undertaken is determined from relevant documentation, electrical drawings or relevant person/s	5	Core
		1.2	WHS/OHS requirements and workplace procedures for a given work area are identified and applied	1	1
		1.3	Electrical hazards are identified, risks are assessed, and control measures are implemented	1	1
		1.4	Relevant industry standards, regulation, legislation and workplace procedures are identified and applied	1	1
		1.5	Advice is sought from the work supervisor to ensure the work is coordinated	5	Core

			effectively with others		
2	**Apply safe isolation, lock-out and tag-out procedures**	**2.1**	Electrical circuits and conductors, all of their energy sources, and isolation points are identified	5	Core
		2.2	Electrical circuits are isolated from all energy sources and secured in accordance with industry and regulatory standards	5	Core
		2.3	Safe isolation from all sources of energy is confirmed	5	Core
		2.4	Isolation is secured using appropriate devices, tags, lock-out or permit system	5	Core
		2.5	Any stored energy is discharged and deenergisation proved	5	Core
		2.6	Unused conductors and equipment are dealt with in accordance with regulatory requirements	5	Core
3	**Conduct compliance inspection and testing on electrical circuits**	**3.1**	Electrical circuits are visually inspected for compliance with regulatory requirements	5	Core
		3.2	Mandatory tests are identified, including sequence of tests and equipment required	22	18
		3.3	Continuity of the earthing system is tested for compliance with regulatory requirements	22	18

		3.4	Insulation resistance of the circuit is tested for compliance with regulatory requirements	20	16
		3.5	Polarity of the circuit is tested for compliance with regulatory requirements	20	16
		3.6	Correct circuit connections is tested for compliance with regulatory requirements	20	16
		3.7	Alternative supply systems are inspected and tested for compliance with industry and regulatory standards	20	16
		3.8	Earth fault loop impedance is verified for compliance with regulatory requirements	20	16
		3.9	Operation of residual current devices (RCDs) is tested for compliance with regulatory requirements	20	16
		3.10	Compliance test results are documented and reported in accordance with industry and workplace requirements	8	Core
		3.11	Non-compliances are identified and reported to relevant personnel	8	Core
		3.12	Requirements for the verification of circuits are completed in accordance with regulatory requirements	8	Core
4	**Locate, identify and repair faults in**	**4.1**	Circuits/machines/plant are checked as being isolated, where necessary, in strict	8	Core

	electrical circuits		accordance WHS/OHS requirements and procedures		
		4.2	Safety hazards resulting from the fault or breakdown are documented and risk control measures identified and implemented in consultation with appropriate person/s	1	1
		4.3	Troubleshooting of electrical circuits is undertaken methodically using measured and calculated values of circuit parameters	22	18
		4.4	Circuit components are dismantled and parts stored to protect against loss or damage	22	18
		4.5	Faulty circuits/components are rechecked and their fault status identified	22	18
		4.6	Materials/replacement parts required to rectify faults are sourced and obtained in accordance with workplace procedures	22	18
		4.7	Effectiveness of the repair is tested in accordance with workplace procedures	22	18
		4.8	Circuit is reassembled, tested and prepared for return to service	22	18
		4.9	Unexpected situations are dealt with safely and with the approval of authorised person/s	22	18
		4.10	Troubleshooting and repair activities are carried out without damage to	22	18

			equipment, circuits, the surrounding environment or services using sustainable energy practices		
5	**Complete work and document activities**	**5.1**	WHS/OHS work completion risk control measures and workplace procedures are followed	1	1
		5.2	Work area is cleaned and made safe in accordance with workplace procedures	8	Core
		5.3	Work completion is documented and appropriate person/s notified in accordance with workplace procedures	8	Core

UEEEL0005 Develop and connect electrical control circuits			
ELEMENTS	**PERFORMANCE CRITERIA**	**QUESTION**	**PRACTICAL**

					TASK
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Develop electrical control circuits**	**1.1**	WHS/OHS requirements and workplace procedures for a given work area are identified obtained and applied	1	1
		1.2	Control circuit/s requirements are determined from discussions with relevant person/s and documented in accordance with workplace procedures	1	1
		1.3	Agreement for the control circuit/s requirement is sought from appropriate person/s and documented in accordance with workplace procedures	1	1
		1.4	Schematic arrangement of control circuits that complies with agreed requirement is documented in accordance with workplace procedures	4	3
		1.5	Wiring diagram of control circuits is developed from schematic diagram in accordance with workplace procedures	5	Core
		1.6	Materials needed to connect control circuit/s are obtained in accordance with workplace procedures and checked against job requirements	5	Core
		1.7	Tools, equipment and testing devices needed to connect control circuit/s are obtained in accordance with workplace procedures and checked for correct operation and safety	5	Core

		1.8	Preparatory work is checked to ensure no damage has occurred and complies with control circuit/s application requirements	5	Core
2	**Connect and test electrical control circuits**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed	1	1
		2.2	Need to test or measure live electrical work is determined in accordance with WHS/OHS requirements and conducted within established safety workplace procedures	1	1
		2.3	Circuits/machines/plant are checked and isolated as required in accordance with WHS/OHS requirements and workplace procedures	23	19
		2.4	Control circuit component/s are connected to comply with the agreed control requirements	23	19
		2.5	Control circuit operation is tested for functionality and in accordance with WHS/OHS requirements and workplace safety procedures	23	19
		2.6	Non-compliant control functions are rectified	6	Core
		2.7	Unplanned situations are dealt with safely and with the approval of an authorised person in accordance with workplace procedures in a manner that minimises risk to personnel and equipment	6	Core
		2.8	Control circuits are connected, inspected and tested without unnecessary waste	8	Core

			of materials or damage to apparatus, circuits, the surrounding environment or services using sustainable energy practice		
3	**Complete and document circuit development activities**	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed	1	1
		3.2	Worksite is cleaned and made safe in accordance with workplace procedures	8	Core
		3.3	'As-connected' control circuits are documented using standard drawing conventions and appropriate person/s notified in accordance with workplace procedures	7	Core

UEEEL0024 Test and connect alternating current (a.c.) rotating machines

ELEMENTS	PERFORMANCE CRITERIA	QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.		

1	**Prepare to test and connect a.c. rotating machines**	**1.1**	Nature of machine/s problem is obtained from relevant documentation or work supervisor to determine scope of work	11	20
		1.2	WHS/OHS requirements and workplace procedures for a given work area are identified and applied	11	20
		1.3	Hazards are identified, risks are assessed, and control measures are implemented	11	20
		1.4	Materials required for work are determined in accordance with workplace procedures	11	20
		1.5	Tools, equipment and testing devices required for work are obtained and confirmed fit for purpose and serviceable in accordance with workplace procedures	11	20
2	**Test and connect a.c. rotating machines**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed	11	20
		2.2	Need to test or measure live work is determined in accordance with WHS/OHS job safety assessment requirements and work is conducted using safety control measures and workplace procedures	11	20
		2.3	Relevant circuits, machines and/or plant are checked as being isolated, as	11	20

			required in accordance with WHS/OHS requirements and workplace procedures		
		2.4	Problem-solving techniques are used to resolve problems from measured and calculated values as they apply to a.c. rotating machines	11	20
		2.5	Machine is verified as electrically safe and connected to electrical supply and commisioned in accordance with workplace procedures and industry standards	11	20
		2.6	Unplanned situations are dealt with safely and with the approval of an authorised person/s	11	20
		2.7	Problems dealt with safely and without damage to machines, the surrounding environment or services using sustainable energy practices	11	20
3	**Complete work and document activities**	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed	11	20
		3.2	Worksite is cleaned and made safe in accordance with workplace procedures	11	20
		3.3	Justification for solutions used to solve problems is documented in accordance with workplace procedures	11	20
		3.4	Work completion is documented and an appropriate person/s notified in accordance with workplace procedures	11	20

UEEEL0021 Solve problems in magnetic and electromagnetic devices

ELEMENTS		PERFORMANCE CRITERIA		QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Prepare to work with electromagnetic devices and circuits**	**1.1**	WHS/OHS requirements and workplace procedures for a given work area are identified and applied	11	20

		1.2	Device/s and/or circuit/s problems are identified from documentation or work supervisor to determine scope of work	11	20
		1.3	Hazards are identified, risks are assessed and control measures are implemented	11	20
		1.4	Tools, equipment and testing devices to carry out work are obtained and checked for correct operation and safety	11	20
		1.5	Circuits are checked and isolated in accordance with workplace procedures and regulatory requirements	11	20
		1.6	Advice is sought from the work supervisor to ensure work is coordinated effectively with others	11	20
2	**Solve electromagnetic device and/or circuit problems**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed	11	20
		2.2	Need to test or measure live work is determined in accordance with WHS/OHS job safety assessment requirements and work is conducted using safety control measures workplace procedures	11	20
		2.3	Relevant circuits and devices are checked as being isolated, as required, in accordance with WHS/OHS requirements and workplace procedures	11	20
		2.4	Operating parameters of an existing circuit with an electromagnetic device are determined	11	20

		2.5	Methodical techniques are used to resolve circuit problems from measured and calculated values as they apply to electromagnetic devices/circuits	11	20
		2.6	Existing circuit with an electromagnetic device is altered to comply with specified operating parameters	11	20
		2.7	Circuit with electromagnetic device is developed to comply with a specified function and operating parameters	11	20
		2.8	Electrical equipment is connected and tested to determine correct operation	11	20
		2.9	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment	11	20
		2.10	Problems are resolved without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices	11	20
3	**Complete work and documentation**	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed	11	20
		3.2	Worksite is cleaned and made safe in accordance with workplace procedures	11	20
		3.3	Justification for solutions used to resolve problems is documented in accordance with established workplace procedures	11	20
		3.4	Work completion is documented and appropriate person/s notified in	11	20

			accordance with workplace procedures		

UEEEL0020 Solve problems in low voltage a.c. circuits					
ELEMENTS		**PERFORMANCE CRITERIA**		**QUESTION**	**PRACTICAL TASK**
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Identify low voltage (LV) a.c. circuit problem**	**1.1**	WHS/OHS requirements and workplace procedures for work area are identified and applied	15	28
		1.2	Hazards are identified, risks are assessed and control measures and workplace procedures are implemented	15	28
		1.3	Safety hazards which have not previously been identified are noted on job	15	28

			safety assessments and existing risk control measures are implemented		
		1.4	Circuit problems are identified from documentation or work supervisor to determine the scope of work	15	28
		1.5	Advice is sought from the work supervisor to ensure work is coordinated effectively with others	15	28
		1.6	Sources of materials required for work are identified in accordance with workplace procedures	15	28
		1.7	Tools, equipment and testing devices to carry out work are obtained and checked for correct operation and safety	15	28
2	**Solve LV a.c. circuit problems**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed	15	28
		2.2	Need to test or measure live work is determined in accordance with WHS/OHS requirements and, as required, conducted in accordance with workplace safety procedures	15	28
		2.3	Circuits/machines/plant are checked and isolated, as required, in accordance with WHS/OHS requirements and workplace procedures	15	28
		2.4	Methodical techniques are used to resolve circuit problems from measured and calculated values as they apply to single and three phase LV circuits in	15	28

			accordance with workplace procedures		
		2.5	Existing circuits are altered to comply with power factor correction in compliance with industry standards	15	28
		2.6	Power factor of a circuit is calculated from given measurements	15	28
		2.7	Low power factor is improved by altering the reactive power of a circuit	15	28
		2.8	Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment	15	28
		2.9	Problems are resolved without damage to apparatus, circuits, the surrounding environment or services using sustainable energy practices	15	28
3	**Complete work and document activities**	**3.1**	WHS/OHS work completion risk control measures and workplace procedures are followed	15	28
		3.2	Worksite is cleaned and made safe in accordance with workplace procedures	15	28
		3.3	Justification for solutions used to resolve circuit problems is documented in accordance with workplace procedures	15	28
		3.4	Work completion is documented and an appropriate person/s notified in accordance with workplace procedures	15	28

UEEAS0007 Assemble, mount and connect control gear and switchgear

ELEMENTS		PERFORMANCE CRITERIA		QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Plan to assemble, mount and connect control gear and switchgear**	**1.1**	Switchgear and control gear assembly installation is determined and planned in accordance with job specifications, wiring and schematic diagrams	26	21
		1.2	Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied	26	21
		1.3	Work instructions, including layout and wiring diagrams, are applied in accordance with workplace procedures	26	21

		1.4	Advice is sought from supervisor to ensure work is coordinated effectively with relevant person/s	26	21
		1.5	Materials required for the control gear and switchgear installation work are obtained in accordance with workplace procedures	26	21
		1.6	Tools, equipment and measuring devices required to carry out work are obtained and checked for correct operation and safety	26	21
2	**Assemble, mount and connect control gear and switchgear**	**2.1**	Switchgear and control gear assembly hazards are identified, risks assessed and control measures are implemented in accordance with workplace procedures	26	21
		2.2	Circuits are checked and isolated in accordance with WHS/OHS workplace requirements and procedures	26	21
		2.3	Component layout is in accordance with job specifications, wiring and schematic diagrams	26	21
		2.4	Switchgear/control gear is fitted in accordance with work instructions, industry standards, manufacturer specifications and workplace procedures	26	21
		2.5	Interconnections are made in accordance with work instructions, industry standards and workplace procedures	26	21
		2.6	Regular quality checks are carried out in accordance with workplace procedures	26	21

		2.7	Completed switchboard function is tested in accordance with workplace procedures, industry standards and manufacturer specifications	26	21
		2.8	Labelling and numbering cable are undertaken in accordance with industry standards, wiring and schematic diagrams	26	21
		2.9	Unplanned events are referred to supervisor for directions in accordance with workplace procedures	26	21
		2.10	Assembly work is carried out without waste of materials or damage to apparatus, the surrounding environment or services and using sustainable energy practices	26	21
3	**Finalise and inspect assembled control gear and switchgear installation**	**3.1**	Assembled switchboard panel is visually inspected and checked against work instructions, industry standards and manufacturer specifications in accordance with workplace procedures	26	21
		3.2	Problem-solving techniques are used where corrective actions to assembled components are required in accordance with regulatory requirements and industry standards	26	21
		3.3	Work completion is documented and relevant person/s notified in accordance with workplace procedures	26	21

UEECS0033 Use engineering applications software on personal computers

ELEMENTS		PERFORMANCE CRITERIA		QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Prepare to use computer application software**	**1.1**	Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for an engineering work area are identified, obtained and applied	1,2	1
		1.2	WHS/OHS risk control measures and procedures in relation to computer and keyboard use are followed in accordance with workplace procedures	1	1
		1.3	Application software and information/instructions required for use are obtained	5	Core
		1.4	On-screen instructions in relation to any anomaly are followed in accordance with workplace procedures	5	Core
		1.5	Help menu is used to resolve any common start-up, access issues or anomalies	27	23
2	**Use engineering software application**	**2.1**	WHS/OHS risk control measures and workplace procedures for carrying out work are followed	27	1

		2.2	Techniques specific to software packages are used to produce relevant files and engineering information	27	23
		2.3	Checks are made to ensure accuracy of information produced	27	21
3	**Output information from software application**	**3.1**	Completed files are stored appropriately in accordance with workplace policies and procedures	27	23
		3.2	Files are printed and stored electronically as formal records and/or forwarded to relevant personnel	27	23
4	**Shut down computer**	**4.1**	Files are named, arranged, saved and backed up in accordance with workplace policies and procedures	27	23
		4.2	Computer shutdown procedures are followed in accordance with workplace procedures and computer powered off	27	23

UEEEL0003 Arrange circuits, control and protection for electrical installations

ELEMENTS		PERFORMANCE CRITERIA		QUESTION	PRACTICAL TASK
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Prepare electrical circuits, control and protection installation**	**1.1**	The extent and nature of the electrical installation is determined from job specifications	31	27
		1.2	Hazards are identified, risks are assessed and control measures are implemented	31	27
		1.3	Load requirements for individual current-using equipment is determined from job specifications and/or consultation with appropriate persons	31	27
2	**Arrange electrical circuits, control and protection**	**2.1**	Circuits, control and protective devices are arranged to ensure safe and functional operation of the installation and to comply with relevant industry technical standards and job specification requirements	31	27
		2.2	Earthing is arranged and terminated to comply with the multiple earthed neutral (MEN) system requirements	31	27
		2.3	Protective devices are selected to meet the required switching and tripping currents coordination and discrimination for overload and short circuit	31	27

			protection in accordance with relevant industry technical standards		
		2.4	Residual current devices (RCDs) are selected to meet the required circuit switching and tripping currents, in accordance with relevant industry technical standards	31	27
		2.5	Switchgear/control gear is selected to meet current and voltage requirements and confirmed suitable for environmental conditions (ingress protection (IP) ratings) and functional requirements	31	27
		2.6	Switchboards are arranged to accommodate control and protective devices, links, safety services and other distributor equipment in accordance with relevant industry technical standards	31	27
3	**Document electrical installation circuits, control and protection arrangements**	**3.1**	Evidence is obtained from manufacturer/suppliers that electrical equipment selected complies with safety requirements in accordance with workplace procedures	31	27
		3.2	Device selection/s rationale and calculations are documented in accordance with workplace procedures	31	27
		3.3	Electrical installation and specifications for selected items are documented in accordance with workplace procedures and forwarded to appropriate person/s	31	27

UEEIC0013 Develop, enter and verify discrete control programs for programmable controllers			
ELEMENTS	**PERFORMANCE CRITERIA**	**QUESTION**	**PRACTICAL TASK**

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Identify control system requirements**	**1.1**	PLC operating functions, parameters and specifications are determined from relevant documentation, electrical drawings or persons to determine the control system scope of work	24	30
		1.2	Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified and applied	1	Core
		1.3	Control system scenario is developed from job specifications of process/plant/machine controlled through consultation with relevant person/s	24	30
		1.4	PLC block diagram is developed using industry standard symbols	24	30
		1.5	Infotechnology equipment, software and measuring devices needed to carry out the PLC work are obtained and checked for correct operation and safety	24	30
		1.6	Installation of PLC is checked for compliance with relevant industry standards, regulations and job specifications	24	30
2	**Develop control system, enter and test program**	**2.1**	Established WHS/OHS risk control measures and procedures for carrying out the work are followed.	6	Core
		2.2	Circuits/machines/plant are checked and isolated in accordance with workplace	24	30

			procedures		
		2.3	Control system solutions are developed and documented based on specified control mode and using acceptable methods for designing control systems	24	30
		2.4	Developed control system is converted to an appropriate form	24	30
		2.5	Program is entered into the PLC using appropriate infotechnology and software	24	30
		2.6	Entered instructions and settings are tested in accordance with job specifications by control system scenario	24	30
		2.7	Appropriate methods and tools are used to test control system and operating faults and anomalies are identified and rectified	24	30
		2.8	Unplanned situations are responded to in accordance with workplace procedures, in a manner that minimises risk to persons and equipment		
3	**Verify document and report programming activities**	**3.1**	WHS/OHS work completion risk control measures and procedures are followed	1	Core
		3.2	Program is transferred from PLC to external medium for storage	24	30
		3.3	Control system specification and program are documented in accordance with workplace procedures	24	30
		3.4	Work completion is documented and relevant persons notified in accordance	24	30

			with workplace procedures		

	UEECO0023 Participate in electrical work and competency development activities		
ELEMENTS	**PERFORMANCE CRITERIA**	**QUESTION**	**PRACTICAL TASK**
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.		

1	**Engage in a competency development plan**	**1.1**	Context and conditions under which the competency development plan is to be undertaken are identified and confirmed	30	26
		1.2	Roles and obligations of all parties/stakeholders with respect to the competency development plan are identified and confirmed	30	26
		1.3	Competency development plan is agreed upon, finalised and executed by all relevant parties/stakeholders	30	26
2	**Participate in electrical competency development work activities**	**2.1**	Industry/organisational policies and procedures for work and competency development activities are identified, obtained and reviewed	30	26
		2.2	Electrical work is undertaken in accordance with the competency development plan and applicable industry/organisational policies and procedures	30	26
		2.3	Opportunities to practise skills and apply knowledge relevant to the development of competency are utilised	30	26
3	**Monitor and report on competency development**	**3.1**	Records of competency development work activities are maintained and updated on a regular basis	30	26
		3.2	Obligations are met for periodic and timely reporting of competency development activities	30	26

		3.3	Periodic competency development report is verified and validated by appropriate person/s within accepted industry timelines	30	26
		3.4	Progress in the competency development plan is self-monitored and assistance is sought from appropriate person/s to overcome difficulties or deficiencies	30	26
		3.5	Modifications to the competency development plan are made in consultation with appropriate person/s	30	26

UEERE0001 Apply environmentally and sustainable procedures in the energy sector

ELEMENTS	PERFORMANCE CRITERIA	QUESTION	PRACTICAL TASK
Elements describe the	Performance criteria describe the performance needed to demonstrate achievement of the element.		

essential outcomes.					
1	**Identify sustainable work practice**	**1.1**	Activities are planned, prepared and sequenced to ensure work health and safety (WHS)/occupational health and safety (OHS) policies and workplace procedures are followed in accordance with work requirements	1	Core
		1.2	Relevant personnel are consulted to ensure work is coordinated effectively with others	5	Core
		1.3	Materials required for the work are obtained and checked in accordance with workplace procedures and compliance with work requirements	5	Core
		1.4	Location that activities are to be undertaken is determined from job requirements	5	Core
		1.5	Workplace environmental risks and resource efficiency issues are identified	4	Core
2	**Apply sustainable work practice**	**2.1**	WHS/OHS policies and workplace procedures for undertaking administrative functions are followed	1	1
		2.2	Energy assessment is undertaken in accordance with requirements to implement techniques which produce energy reduction directly or indirectly	8.29	Core,25
		2.3	Approval is obtained for suggested improvements to energy efficient methods and components from relevant person/s before any contingencies are implemented	6	25

		2.4	Unplanned events or conditions are responded to in accordance with workplace procedures in a manner that minimises risk to personnel, equipment and environment	5	Core
		2.5	On-going checks of the quality of the work are undertaken in accordance with established procedures	5	Core
		2.6	Work is carried out efficiently without unnecessary waste of materials or damage to the surrounding environment while using sustainable work practices which minimise wastage of energy and materials either directly or indirectly	8	Core
3	**Complete workplace documentation**	**3.1**	Documentation/reports are completed to ensure detailed promotional activities requirements are met	7,29	25
		3.2	Suggestions are made to relevant person/s for improvement/s to workplace practices to minimise energy and materials wastage	5.29	25
		3.3	Workplace documentation is completed in accordance with workplace procedures	7	Core

UETDRRF004 Perform rescue from a live LV panel Core					
ELEMENTS		**PERFORMANCE CRITERIA**		**QUESTION**	**PRACTICAL TASK**
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Prepare to perform rescue procedures from live LV panel**	**1.1**	Instruction in hazards and risk control measures for specific work functions and work areas are identified and obtained	33	33
		1.2	Electricity isolation point is identified and labelled, where appropriate	33	33

		1.3	Tools and emergency equipment are checked for safety, functionality and placed in an accessible location to facilitate response and rescue according to established procedures	33	33
2	**Carry out rescue from live LV panel**	**2.1**	Workplace procedures and work instructions for controlling risk are followed	33	33
		2.2	Workplace procedures for accessing and isolating the LV panel and removing the victim, where necessary, from contact with live apparatus are followed	33	33
		2.3	Workplace procedures for applying cardiopulmonary resuscitation (CPR), if required at the site, and gaining access to treatment by a medical professional, if necessary, are followed	33	33
		2.4	The worksite is secured and entry controlled until appropriate authorities inspect and release the site	33	33
3	**Complete the LV panel rescue procedure**	**3.1**	Processes for reporting accidents and/or incidents to authorised personnel are confirmed in accordance with established procedures	33	33

HLTAI009 Provide cardiopulmonary Resuscitation Core					
ELEMENTS		**PERFORMANCE CRITERIA**		**QUESTION**	**PRACTICAL TASK**
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	Respond to an emergency situation	1.1	Recognise and assess an emergency situation.	32	32
		1.2	Ensure safety for self, bystanders and casualty.	32	32
		1.3	Assess the casualty and recognise the need for cardiopulmonary resuscitation (CPR).	32	32
		1.4	Seek assistance from emergency services	32	32
2	Perform CPR procedures	2.1	Perform CPR in accordance with the ARC guidelines.	32	32

		2.2	Display respectful behaviour towards casualty..	32	32
		2.3	Operate an automated external defibrillator (AED) according to manufacturers' instructions	32	32
3	Communicate details of the incident.	3.1	Accurately convey incident details to emergency services..	32	32
		3.2	Report details of incident in line with appropriate workplace or site procedures.	32	32
		3.3	Maintain privacy and confidentiality of information in line with statutory or organisational policies	32	32
4	Review the incident.	4.1	Recognise the possible psychological impacts on self and other rescuers and seek help when required.	32	32
		4.2	Contribute to a review of the first aid response as required.	32	32

UEEEL0047 Identify, shut down and restart systems with alternate supplies. Core					
ELEMENTS		**PERFORMANCE CRITERIA**		**QUESTION**	**PRACTICAL TASK**
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.			
1	**Prepare to work on systems with alternate supplies**	**1.1**	Nature of the installation is obtained from appropriate written documentation, electrical drawings and/or relevant person/s to determine the scope of work	34	34
		1.2	WHS/OHS workplace procedures are obtained, interpreted and applied	34	34
		1.3	Hazards are identified, risks are assessed, and control measures are implemented	34	34
		1.4	Tools, equipment and circuit testing devices are obtained and checked for correct operation and safety in accordance with workplace procedures	34	34
		1.5	Work supervisor is consulted to ensure work is coordinated effectively with others	34	34

2	**Identify and isolate alternate supplies**	**2.1**	Labelling indicating generation system/s connected on site is located, interpreted and checked against electrical diagrams	34	34
		2.2	Switchboard, circuits and known supply are identified	34	34
		2.3	Site procedures for isolation and shutdown are obtained and interpreted	34	34
		2.4	Circuit to be isolated is identified and tested	34	34
		2.5	Shutdown procedures are completed in accordance with industry standards and workplace procedures	34	34
		2.6	Isolation of energy sources is completed and proved in accordance with workplace procedures, industry standards and regulatory requirements	34	34
		2.7	Systems are inspected and tested for compliance with industry and regulatory standards	34	34
		2.8	Battery storage system integrity is checked in accordance with industry standards and regulatory requirements	34	34
		2.9	System is re-instated after isolation	34	34
3	**Complete work and document records**	**3.1**	WHS/OHS work completion risk control measures and procedures are followed	34	34
		3.2	Worksite is cleaned and made safe in accordance with workplace procedures	34	34

		3.3	Work completion is documented, electrical drawings are updated, and relevant personnel are notified in accordance with workplace procedures and regulatory requirements	34	34

SECTION I

Return

RPL Outcome and Further Action

Unit		RPL Granted	RPL Pending	Further action to grant RPL
UEECO0023	Participate in electrical work and competency development activities	X		
HLTAID009	Provide cardiopulmonary resuscitation			
UEECD0007	Apply work health and safety regulations, codes and practices in the workplace	X		
UEECD0019	Fabricate, assemble and dismantle utilities industry components	X		
UEECD0044	Solve problems in multipath circuits	X		
UEECD0046	Solve problems in single path circuits	X		
UEECD0020	Fix and secure electrotechnology equipment	X		
UEECD0051	Use diagrams, diagrams, schedules, standards, codes and specifications	X		
UEECD0016	Document and apply measures to control WHS risks associated with electrotechnology work	X		
UEEEL0024	Test and connect alternating current (a.c) rotating machines	X		
UEEEL0025	Test and connect transformers	X		
UEEEL0008	Evaluate and modify low voltage heating equipment and controls	X		
UEEEL0009	Evaluate and modify low voltage lighting circuits,equipment and controls	X		

UEEEL0010	Evaluate and modify low voltage socket outlets circuits	X		
UEEEL0003	Arrange circuits, control and protection for electrical installations	X		
UEEEL0019	Solve problems in direct current (d.c.) machines	X		
UEEEL0021	Solve problems in magnetic and electromagnetic devices	X		
UEEEL0020	Solve problems in low voltage a.c. circuits	X		
UEEEL0012	Install low voltage wiring, appliances, switchgear and associated accessories	X		
UEEEL0039	Design, install and verify compliance and functionality of general electrical installations			
UEEEL0023	Terminate cables, cords and accessories for low voltage circuits*	X		
UEEEL0018	Select wiring systems and select cables for low voltage electrical installations	X		
UEEEL0014	Isolate, test and troubleshoot low voltage electrical circuits	X		
UEEEL0005	Develop and connect electrical control circuits	X		
UEERE0001	Apply environmentally and sustainable	X		
UEEEL0047	Identify, shut down and restart systems with alternate supplies	X		
UETDRRF004	Perform rescue from a live LV panel*			
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services	X		
UEEEL0033	Conduct electrical tests on LV electrical machines			
UEECS0033	Unse engineering application softwares on personal computer	X		
UEEIC0013	Develop enter and verify discrete control for PLC	X		
UEEAS0007	Assemble mount and connect control gear and switch gear	X		

SECTION J

ACTION RECORD

Return

END