

Course outline: 241 AC Methods G033A
UEENEEG033A - Solve problems in single and three phase low voltage electrical apparatus and circuits

Qualification:	Certificate III in Electrotechnology Electrician - UEE30811
Applicable to:	Learners, industry/employers, governments, community and Global Energy Training Solutions as the provider
Unit of competency:	Accessible from: http://training.gov.au/Training/Details/UEENEEG033A
Related policies:	<p>Policy & Procedure 1 – Enrolment Policy</p> <p>Policy & Procedure 2 – Credit Transfer & Recognition of Prior Learning</p> <p>Policy & Procedure 3 – Learner Support</p> <p>Policy & Procedure 4 – Assessment</p> <p>Policy & Procedure 5 – Academic Misconduct</p> <p>Policy & Procedure 6 – Alcohol & Other Drugs</p> <p>Policy & Procedure 7 – Access, Equity & Diversity</p> <p>Policy & Procedure 8 – Vulnerable People</p> <p>Policy & Procedure 9 – Work, Health & Safety</p> <p>Policy & Procedure 10 – Incident, Injury & Rehabilitation</p> <p>Policy & Procedure 11 – Competency, & Qualification Assessment Decisions</p> <p>Policy & Procedure 12 – Complaints & Appeals</p> <p>Policy & Procedure 13 – Privacy</p> <p>Policy & Procedure 14 – Fees</p> <p>Policy & Procedure 15 – Industry & Employer Engagement</p> <p>Policy & Procedure 16 – Trainers & Assessors</p> <p>Policy & Procedure 17 – Administration & Other Staff</p> <p>Policy & Procedure 18 – Quality Assurance</p> <p>Policy & Procedure 19 – Business & Financial Risk Management</p> <p>Policy & Procedure 20 – Changes to Qualifications or Business</p> <p>Policy & Procedure 21 – Conflict of Interest</p> <p>Policy & Procedure 22 – Records Management</p> <p>Policy & Procedure 23 – Marketing & Advertising</p>
Monitor and review:	Policy & Procedure 18 – Quality Assurance
Responsibility:	Ben Murphy – as Proprietor
Questions/queries:	Feedback and suggestions welcomed: office@gets.com.au (+61) 02 6262 0077

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1. Material requirements

- AS/NZS 3000:2007 incorporating amendment 1 and 2
- Scientific calculator, ruler, pens and pencils
- Note book
- Hand tools
- Covered footwear
- Internet access (provided)

2. Session summaries

Day 1	
Required Skills and Knowledge	<p>T1 Lighting circuits – looping at the light/switch encompassing:</p> <ul style="list-style-type: none"> • the “loop at the light” method of wiring lighting circuits. • the “loop at the switch” method of wiring lighting circuits • wiring diagrams for the lighting circuit of an installation that incorporates one-way, two-way and two-way and intermediate switching of light points using the loop at the light/switch methods of TPS wiring. • TPS cabling requirement for the loop at the light/switch circuit. • installation methods of accessories and wiring for a lighting circuit incorporating one-way, two-way and two-way and intermediate switching of lighting points using the loop at the light/switch method of TPS wiring. • correct operation of the install circuits including testing for correct compliance with Australian Standards. <p>T2 Circuits for socket outlets encompassing:</p> <ul style="list-style-type: none"> • the purpose of socket outlets. • requirements concerning the polarity of switched socket outlets. • correct cable size to supply 10 A, 15 A and 20 A socket outlets (single and three phase), for given installation conditions. • number of socket outlets connected to a 16 A and 20 A circuit breaker. • installation methods of a single phase socket outlet circuits. • correct operation of the installed circuits including testing (dead testing only) for correct compliance with Australian Standards. <p>T3 Final sub-circuits and segregation encompassing:</p> <ul style="list-style-type: none"> • purpose of mixed circuits.

	<ul style="list-style-type: none"> • circuit loading for a mixed circuit. • purpose of segregation of circuits and the AS/NZS3000 requirements. • Installation methods a single phase mixed circuits. • correct operation of the installed circuits including testing for correct compliance with Australian Standards.
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Day 2	
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Required Skills and Knowledge	T4	<p>Electrical heating control devices encompassing:</p> <ul style="list-style-type: none"> • methods of manual heat control. • methods of automatic heat control. • types and application for common thermostats. • operation of common thermostats. • sensitivity and differential of thermostats. • testing of a thermostat (including differential and correct operation) • applications of simmerstats (infinite controls). • operation of a simmerstat. • electronic heat control (phase control and zero voltage switching).
	T5	<p>Fixed electrical heating appliances encompassing:</p> <ul style="list-style-type: none"> • Terms: heat energy, temperature, specific heat capacity, thermal conductivity and thermal stability. • determining the heat energy in joules and kWh in a simple heating process. • methods of heat transfer. • Determining the heat energy input and output of a heating process. • connections to a two phase stove. • operation of reverse cycle air conditioning.
	T6	<p>Electrical water heater operation encompassing:</p> <ul style="list-style-type: none"> • types of water heaters (instantaneous and storage) and their methods of control. • intrinsic safety (pressure relief and thermal cut-out). • testing of over temperature cut-out point of a thermostat. • switchboard requirements to supply a controlled load water heater. • internal circuit of a twin element water heater, and supply connections. • tariffs employed by local supply authorities. • solar heating system and its integration into an installation.

Day 3	
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Required Skills and Knowledge	T7	<p>Alternative supplies encompassing:</p> <ul style="list-style-type: none"> • reasons for the installation of alternative supplies. • types of alternative supply systems. • characteristics and operation of UPSs. • Australian Standards and local requirements for safety services supply systems.
	T8	<p>Installation of batteries encompassing:</p> <ul style="list-style-type: none"> • common types of primary cells and secondary batteries and typical applications. • terminal voltage of common primary cells and secondary cells. • correct storage, handling and disposal techniques for cells and batteries. • charge/discharge cycle for a secondary cell. • effect of internal resistance on a secondary cell. • state of charge of a secondary cell. • installation of batteries as per AS/NZS3011 • commissioning procedures for various secondary batteries. • safe working procedures when working with secondary cells and batteries.

	<p>T9 Fire protection – residential fire and smoke alarms encompassing:</p> <ul style="list-style-type: none"> • types of fire and smoke alarms. • regulations and standards requirements regarding residential fire and smoke alarms. • locations for residential fire and smoke alarms. • wiring methods for residential fire and smoke alarms. • operation of typical residential fire and smoke alarms
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Day 4

Required Skills and Knowledge	<p>T10 Emergency and evacuation lighting and lighting control encompassing:</p> <ul style="list-style-type: none"> • factors and requirements of emergency and evacuation lighting concerning illumination levels, luminaire positioning and operating period. • characteristics of maintained, non maintained and sustained emergency lighting systems. • arrangement of batteries in point and central bank emergency lighting supply systems. • lighting control methods
	<p>T11 Lighting concepts and incandescent lighting encompassing:</p> <ul style="list-style-type: none"> • basic concepts of lighting. • terminology, principles and standards relevant to lighting (energy efficiency as per BCA new lamp types and permitted replacements and their efficacy).. • basic types of luminaires. • operation of an incandescent lamp. • types of incandescent lamps. • expected lamp life, colour rendering and efficacy for typical incandescent lamps. • lighting layout in terms of visual comfort and relevant Australian standards
	<p>T12 Fluorescent low intensity discharge lighting encompassing:</p> <ul style="list-style-type: none"> • types of low intensity discharge lamps. • expected lamp life, colour rendering and efficacy for typical types of low intensity discharge lamps. • operation of low intensity discharge luminaires including their control equipment. • Australian Standard and local requirements for low intensity discharge lighting. • methods for satisfying Australian Standards and local supply authority requirements regarding low intensity discharge lighting.

Day 5

Required Skills and Knowledge	<p>T13 High intensity discharge lighting encompassing:</p> <ul style="list-style-type: none"> • types of high intensity discharge lamps. • expected lamp life, colour rendering and efficacy for typical types of high intensity discharge lamps. • operation of high intensity discharge luminaires including their control equipment. • Australian Standard and local requirements for high intensity discharge lighting. • methods for satisfying Australian Standards and local supply authority requirements regarding high intensity discharge lighting. • LED lighting and its applications. • Neon, Argon and Xenon lighting and their applications. • comparison of incandescent, low intensity discharge, high intensity discharge, LED and other types of lighting
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3. Elements and Performance Criteria

Elements and Performance Criteria require practice and demonstration in the work place.

Element	Performance Criteria	Work Performance
1: Prepare to solve single and three phase low voltage electrical apparatus and circuit problems.	1.1 OHS procedures for a given work area are identified, obtained and understood.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	1.2 Established OHS risk control measures and procedures in preparation for the work are followed.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	1.3 Safety hazards, which have not previously been identified, are noted and established risk control measures are implemented.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	1.4 The nature of the apparatus/circuit(s) problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	1.5 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	1.6 Sources of materials that may be required for the work are established in accordance with established procedures.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	1.7 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
2: Solve single and three phase low voltage electrical apparatus and circuit problems.	2.1 OHS risk control measures and procedures for carrying out the work are followed.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	2.2 The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safety procedures.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	2.3 Apparatus/circuits/plant is checked as being isolated where necessary in strict accordance OHS requirements and procedures.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	2.4 Established methods are used to solve apparatus/circuit problems from measure and calculated values as they apply to single and three-phase low voltage apparatus/circuit.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	2.5 Established methods for dealing with unexpected situations are discussed with appropriate person or persons and documented.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	2.6 Unexpected situations are dealt with safely and with the approval of an authorised person.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	2.7 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
3: Complete work and	3.1 OHS work completion risk control measures and procedures are followed.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed

document problem solving activities.	3.2	Work site is cleaned and made safe in accordance with established procedures.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	3.3	Justification for solutions used to solve apparatus/circuit problems is documented.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed
	3.4	Work completion is documented and an appropriate person or persons notified in accordance with established procedures.	<input type="checkbox"/> Satisfactory <input type="checkbox"/> Needs improvement <input type="checkbox"/> Not performed

4. Assessments

Assessment	When	Satisfactory mark/outcome
Theory assessment 1	Day 2	70%
Theory assessment 2	Day 3	70%
Theory assessment 3	Day 4	70%
Theory assessment 4	Day 5	70%
Practical assessment 1	Day 5	100%
Workplace Observation	After theory and practical assessments	Must be valid, sufficient, authentic and current
Employer Competency report		
Structured workplace experience interview		
Note: Once all theory, practical and on-site assessments are complete, competency assessment decisions can be made in conjunction with the learner, employer and registered training organisation.		

5. Version control

Version	Date of release	Author	Authorised by	Position	Rational for change
V1	5/10/2015	Ben Murphy	Ben Murphy	Proprietor	Initial release
V2	7/2/2017	Ben Murphy	Ben Murphy	Proprietor	Added Elements and Performance Criteria