UEE62220

Advanced Diploma of Electrical Engineering

Assessment Mapping+ Student Assessment Guide

+Assessment Observation

Australian Government

UEE62220 Advanced Diploma of Electrical - Engineering

Release: 4

UEE62220 Advanced Diploma of Electrical - Engineering

Modification History

Release 4. This is the second release of this qualification in the UEE Electrotechnology Training Package. Modifications include:

- Updated and/or replaced superseded and deleted elective units
- The following units added to electives (see UEE Release 5.0 Companion Volume Implementation Guide for mapping of deleted UEE units to imported ICT and MEM units):
  - ICTNWK426
  - ICTPRG440
  - ICTPRG534
  - MEM234010A

Release 3. Updated superseded elective units.

Release 2. Two units added to general electives. Imported elective units updated.

Release 1. This is the first release of this qualification in the UEE Electrotechnology Training Package

Qualification Description

This qualification covers competencies to design and validate/evaluate electrical equipment and systems, manage risk, estimate and manage projects and provide technical advice/sales.

It develops competencies in the ethical and responsible application of mathematics, science, engineering techniques, standards and codes of practice, engineering design practices, supervision and management of physical, human and financial resources in engineering.

The core competencies of this qualification meet the prescribed requirements for Engineering Associate membership of Engineers Australia.

Participants seeking Engineers Australia membership should ensure that their training provider is accredited by that body to provide Engineering Education Programs at the level of Engineering Associate.

No licensing, legislative or certification requirements apply to this qualification at the time of publication.

Entry Requirements

The entry requirement for this qualification is:

- UEE30820 Certificate III in Electrotechnology Electrician

or

- a current ‘Unrestricted Electricians Licence’ or its equivalent issued in an Australian state or territory.

Packaging Rules

A total of **1320 weighting points** comprising:

840 core weighting points listed below; plus

480 general elective weighting points from the general elective units listed below.

Choose a total of **480 weighting points** elective units from the list below, of which between **0 and 220 weighting points** can be taken from Group A; between **0 and 60 weighting points** can be taken from Group B; between **0 and 100 weighting points** can be taken from Group C; between **0 and 60 weighting points** can be taken from Group D; and between **260 and 480 weighting points** can be taken from Group E (or all **480 elective weighting points** can be taken from Group E).

Up to **220 weighting points** of the general elective units Group A, may be selected, with appropriate contextualisation, from any relevant nationally endorsed Training Package or accredited course, provided selected units contribute to the vocational outcome of the qualification. Previously assigned weighting points are listed in the UEE Electrotechnology Training Package Companion Volume Implementation Guide (CVIG), if not listed weighting points will be 10 points, unless directed from the Electrotechnology Industry Reference Committee (IRC).

There are units of competency within this qualification that contain pre-requisites. Units of competency that have a pre-requisite requirement are identified by this symbol *. Refer directly to the units of competency to identify pre-requisite requirements to ensure all are complied with. A list of all pre-requisites is also provided in the UEE Pre-requisite Companion Volume.

Where imported units are selected, care must be taken to ensure all pre-requisite units specified are complied with.

Core units		**Weighting Points**
UEECD0003	Apply industry and community standards to engineering activities	20
UEECD0004	Apply material science to solving electrotechnology engineering problems	60
UEECD0005	Apply physics to solving electrotechnology engineering problems	60
UEECD0010	Compile and produce an energy sector detailed report	60
UEECD0014	Develop design briefs for electrotechnology projects	40
UEECD0017	Establish and follow a competency development plan in an	120

	electrotechnology engineering discipline	
UEECD0024	Implement and monitor energy sector WHS policies and procedures	20
UEECD0026	Manage risk in electrotechnology activities	60
UEECD0036	Provide engineering solutions for problems in complex multiple path circuits	60
UEECD0039	Provide solutions to basic engineering computational problems*	60
UEECD0056	Apply methods to maintain currency of industry developments	20
UEECD0059	Write specifications for electrical engineering projects	40
UEECS0033	Use engineering applications software on personal computers	40
UEEEL0015	Manage large electrical projects*	40
UEEEL0058	Plan large electrical projects*	60
UEEEL0062	Provide engineering solutions to problems in complex polyphase power circuits*	60
UEERE0013	Develop strategies to address environmental and sustainability issues in the energy sector	20

Group B = 60 points

Group C= 60 points

Group D= 60 points

Group E= 300 points

Total = 480 points

Group A: Imported and common elective units		**Weighting Points**
BSBINS501	Implement information and knowledge management systems	50
BSBLDR522	Manage people performance	70
BSBSTR501	Establish innovative work environments	50
BSBSTR502	Facilitate continuous improvement	60

BSBTWK502	Manage team effectiveness	60

Group B: General elective units (60 points)		**Weighting Points**
UEEAS0007	Assemble, mount and connect control gear and switchgear*	40
UEEAS0008	Fabricate and assemble bus bars*	40
UEEAS0009	Mount and wire control panel equipment*	40
UEECD0028	Plan an integrated cabling installation system*	40
UEEDV0005	Install and maintain cabling for multiple access to telecommunication services*	80
UEEDV0008	Install, modify and verify coaxial and structured communication copper cabling*	40
UEEEC0003	Assemble and set up basic security systems*	80
UEEEC0060	Repairs basic electronic apparatus faults by replacement of components*	40
UEEEC0075	Troubleshoot single phase input d.c power supplies*	40
UEEEL0004	Carry out basic repairs to electrical components and equipment*	40
UEEEL0016	Provide advice on effective and energy efficient lighting products	20
UEEEL0017	Repair and maintain mechanical components of electrical machines*	40
UEEEL0022	Supply effective and efficient lighting products for domestic and small commercial applications*	40
UEEEL0026	Align and install traction lift equipment*	20
UEEEL0033	Conduct electrical tests on LV electrical machines*	40
UEEEL0034	Conduct mechanical tests on electrical machines and components*	40
UEEEL0045	Diagnose and rectify faults in traction lift systems*	80
UEEEL0046	Find and repair faults in LV d.c. electrical apparatus and circuits*	60

UEEEL0049	Install and maintain emergency safety systems*	60
UEEEL0052	Maintain and service traction lift systems and equipment*	40
UEEEL0053	Maintain operation of electrical marine equipment and systems*	60
UEEEL0054	Maintain operation of electrical mining equipment and systems*	60
UEEEL0055	Overhaul and repair major switchgear and control gear*	60
UEEEL0056	Place and connect electrical coils*	40
UEEEL0061	Provide advice on the application of energy efficient lighting for ambient and aesthetic effect*	20
UEEEL0066	Rewind LV direct current machines*	60
UEEEL0067	Rewind single phase machines*	40
UEEEL0068	Rewind three phase low voltage induction machines*	60
UEEEL0069	Select and arrange equipment for special LV electrical installations*	60
UEEEL0074	Wind electrical coils*	40
UEEEL0075	Inspect, test and maintain emergency alarm systems and equipment*	20
UEEEL0076	Inspect, test and maintain emergency lighting systems*	20
UEEEL0078	Install and commission whole current electricity meters*	20
UEEHA0020	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0022	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0025	Install explosion-protected equipment and associated apparatus and wiring systems*	60
UEEHA0026	Maintain equipment associated with hazardous areas*	60
UEEIC0002	Assemble, enter and verify operating instructions in microprocessor equipped devices*	20
UEEIC0011	Develop electrical integrated systems*	20

UEEIC0013	Develop, enter and verify discrete control programs for programmable controllers*	60
UEEIC0024	Plan the electrical installation of integrated systems*	20
UEEIC0025	Provide solutions to extra-low voltage (ELV) electro-pneumatic control systems and drives*	60
UEEIC0038	Solve problems in density/level measurement components and systems*	40
UEEIC0039	Solve problems in flow measurement components and systems*	40
UEEIC0041	Solve problems in pressure measurement components and systems*	40
UEEIC0043	Solve problems in temperature measurement components and systems*	40
UEEIC0047	Use instrumentation drawings, specifications, standards and equipment manuals*	40
UEERA0035	Establish the basic operating conditions of air conditioning systems*	20
UEERA0036	Establish the basic operating conditions of vapour compression systems*	60
UEERA0059	Prepare and connect refrigerant tubing and fittings*	40
UEERE0001	Apply environmentally and sustainable procedures in the energy sector	20
UEERE0054	Conduct site survey for grid-connected photovoltaic and battery storage systems	30
UEERE0080	Install photovoltaic power conversion equipment to grid *	30
UEERE0081	Install photovoltaic systems to power conversion equipment *	30
UETDRIS017	Perform high voltage field switching operation to a given schedule *	40
UETDRIS032	Solve problems in network equipment*	80
UETDRIS033	Solve problems in network protection*	40

Group C: General elective units (60 points)		**Weighting Points**

CPPHES4005	Assess household energy use and efficiency improvements	40
UEECD0013	Develop and implement energy sector maintenance programs	60
UEECO0001	Estimate electrotechnology projects	40
UEEEL0007	Develop detailed electrical drawings*	60
UEEEL0027	Carry out low voltage electrical field testing and report findings*	60
UEEEL0029	Conduct compliance inspection of LV electrical installations with demand exceeding 100 A per phase*	40
UEEEL0030	Conduct compliance inspection of single phase LV electrical installations*	60
UEEEL0031	Conduct compliance inspection of special LV electrical installations*	60
UEEEL0032	Conduct electrical tests on HV electrical machines*	60
UEEEL0036	Design effective and efficient lighting for residential and commercial buildings*	20
UEEEL0040	Develop compliance policies and plans to conduct an electrical contracting business*	80
UEEEL0044	Diagnose and rectify faults in complex lift systems*	40
UEEEL0050	Install and replace low voltage current transformer metering*	20
UEEEL0051	Investigate and report on electrical incidents and causes*	60
UEEEL0057	Plan electrical installations with a low voltage demand up to 400 A per phase*	40
UEEEL0059	Plan low voltage switchboard and control panel layouts*	40
UEEEL0060	Prepare quotations for the supply of effective and efficient lighting products for lighting projects*	20
UEEEL0063	Provide photometric data for illumination system design	60
UEEEL0064	Rewind HV three phase induction machines rated for voltages above 3.3 kV*	60
UEEEL0065	Rewind HV three phase induction machines rated for voltages to 3.3 kV*	60

UEEEL0070	Select effective and efficient light sources and luminaries for given locations and designs*	60
UEEEL0071	Select low voltage power factor correction equipment*	40
UEEEL0072	Set up and place LV electrical apparatus and associated circuits into service*	40
UEEEL0073	Verify compliance and functionality of special LV electrical installations*	40
UEEHA0004	Enter a classified hazardous area to undertake work related to electrical equipment	40
UEEHA0020	Conduct detailed inspection of electrical installations for hazardous areas*	40
UEEHA0022	Determine the explosion-protection requirements to meet a specified classified hazardous area*	40
UEEHA0023	Develop and manage periodic electrical inspection and maintenance programs for hazardous areas*	20
UEEHA0026	Maintain equipment associated with hazardous areas*	60
UEEHA0038	Conduct visual and close inspection of electrical installations for hazardous areas*	40
UEEIC0009	Develop an electrical integrated system interface for access through a touch screen*	20
UEEIC0012	Develop structured programs to control external devices*	40
UEEIC0014	Develop, enter and verify programs in supervisory control and data acquisition systems*	60
UEEIC0015	Develop, enter and verify word and analogue control programs for programmable logic controllers*	60
UEEIC0018	Diagnose and rectify faults in digital controls systems*	60
UEEIC0020	Fault find and repair analogue circuits and components in electronic control systems*	60
UEEIC0026	Provide solutions to fluid circuit operations*	60
UEEIC0027	Provide solutions to pneumatic-hydraulic system operations*	80
UEEIC0028	Provide solutions to problems in industrial control systems*	60

UEEIC0034	Set up industrial field control devices*	60
UEEIC0040	Solve problems in polyphase electronic power control circuits*	60
UEEIC0042	Solve problems in single phase electronic power control circuits*	60
UEERE0052	Assess energy loads and uses for energy efficiency in commercial facilities*	40
UEERE0053	Assess energy loads and uses for energy efficiency in industrial properties and enterprises*	40
UEERE0061	Design grid-connected photovoltaic power supply systems*	60
UEERE0068	Develop strategies to address sustainability issues for electrical installations*	20
UEERE0015	Implement and monitor energy sector environmental and sustainable policies and procedures	20

Group D: General elective units 60 points		**Weighting Points**
UEECO0014	Prepare tender submissions for electrotechnology projects*	60
UEECS0016	Develop energy sector directory services*	80
UEEEL0011	Evaluate performance of low voltage electrical apparatus*	40
UEEEL0037	Design electrical installations with a low voltage demand greater than 400 A per phase*	40
UEEHA0029	Plan electrical installations for hazardous areas*	20
UEEIC0001	Analyse complex electronic circuits controlling fluids	80
UEEIC0005	Configure and maintain industrial control system networks*	60
UEERE0066	Develop effective engineering strategies for energy reduction in buildings*	60
UETDRIS025	Diagnose and resolve faults in distribution systems*	60
UETDRIS026	Diagnose and resolve faults in electrical apparatus*	60
UETDRIS027	Diagnose and resolve faults in transmission systems*	60

Group E: General elective units 3000 Points		**Weighting Points**
ICTNWK426	Install and configure client-server applications and services	60
ICTPRG440	Apply introductory programming skills in different languages	60
ICTPRG534	Deploy applications to production environments	40
MEM234010A	Design microcontroller applications	40
UEECD0049	Use advanced computational processes to provide solutions to energy sector engineering problems*	80
UEECO0003	Manage contract variations	40
UEECS0012	Design embedded controller control systems	80
UEECS0015	Develop energy sector computer network applications infrastructure	80
UEECS0017	Develop industrial control programs for microcomputer equipped devices	60
UEECS0027	Provide programming solution for computer systems engineering problems	60
UEEEL0038	Design switchboards rated for high fault levels (greater than 400 A)*	60
UEEEL0043	Develop engineering solutions for induction machine and control problems*	60
UEEIC0006	Design and configure Human-Machine Interface (HMI) networks	60
UEEIC0007	Design and use advanced programming tools, PC networks and HMI Interfacing	120
UEEIC0010	Develop and test code for microcontroller devices	60
UEEIC0016	Diagnose and rectify faults in a.c. motor drive systems*	60
UEEIC0017	Diagnose and rectify faults in d.c. motor drive systems*	60
UEEIC0019	Diagnose and rectify faults in servo drive systems*	60

Qualification Mapping Information

This qualification replaces and is not equivalent to UEE62211 Advanced Diploma of Electrical - Engineering

Links

Companion Volume Implementation Guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b8a8f136-5421-4ce1-92e0-2b50341431b6

Assessment Mapping - Template

(streamlined training package)

This template to be used for "new" endorsed streamlined training packages.

Instruction for use: These instructions in RED should be deleted from the completed document. Instructions in **BLUE** should be written over with appropriate information.

- This template is to be completed by the assessment developer to ensure the assessments meet the training package requirements for the unit of competency.
- It must be used during the assessment validation process.
- Record of this document must be retained in the faculty TAS teamshare teaching section.
- Add rows and columns as required below.

This document should be viewed concurrently with K151A Assessment Mapping+Performance .pdf

Click HERE

Faculty:		**College:**	
Teaching Section:	Electrical Engineering		
Qualification Number and Name:	Advanced Diploma of Engineering Technology-Electrical/ Advanced Diploma of Electrical Engineering		
Unit of Competency Number and Name:	UEERE0066- Develop effective engineering strategies for energy reduction in buildings		

Copy and paste the following table for each element as required

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Assessment event 1 Written Test**	**Assessment event 2 Practical & Observation**	**Assessment event 3 Assignment**
1.Prepare to develop strategies for effective energy reduction in buildings	1.1	OHS procedures for a given work area are identified, obtained and understood	Q1 of K151A Assessment Mapping+ Performance .pdf (Page 1)		
	1.2	Established OHS risk control measures and procedures are followed in preparation for the work	Q2 of K151A Assessment Mapping+ Performance .pdf (Page 1)		
	1.3	The extent of evaluation is determined from specifications of building(s) and services, plant and machinery and discussed with appropriate personnel	Q1 ,2, 5 of Test 1		
	1.4	Advice is sought from the work supervisor to ensure the work is coordinated effectively with others		Observation Assessment Mapping+ Performance .pdf (Page 2)	
	1.5	Tools, testing devices, and materials needed to carryout the work are obtained and checked for correct operation and safety	Q3, 4 of Test 1		
2 Develop strategies for effective energy reduction in buildings.	2.1	OHS risk control measures and procedures for carrying out the work are followed	Q2 of K151A Assessment Mapping+ Performance .pdf (Page 3)		
	2.2	Tests and measurements are carried out in strict accordance with OHS requirements safety procedures	Q6, 8 of Test 2		
	2.3	In-depth knowledge of the energy use of building services, plant and machinery is applied to the	Q1a of Test 2	**Practical (1)** Measure energy	Advanced Diploma in Electrical

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Assessment event 1 Written Test**	**Assessment event 2 Practical & Observation**	**Assessment event 3 Assignment**
		evaluation process		usage in the building .	Engineering Exercises (Page 271/272) Q1 to 27
	2.4	Energy evaluation tests are set up in accordance with established test methods and procedures for each particular parameter under scrutiny	Q3,4 of Test 2		Advanced Diploma in Electrical Engineering Exercises (Page 271/272) Q62 to 72
	2.5	Strategies to reduce energy use with compromising occupancy standards are developed from knowledge of energy management and evaluation			Advanced Diploma in Electrical Engineering Exercises (Page 271/272) Q84 to 102
	2.6	Unexpected situations are dealt with safely and with the approval of an authorised person		Q4 of K151A Assessment Mapping+ Performance .pdf (Page 10)	
	2.7	Evaluation is carried out without damage to systems, circuits, the surrounding environment or services and using sustainable energy practice		Observation – Practical 2 Solar panel installation practical	
3 Document and report strategies for effective energy reduction in buildings	3.1	OHS work completion risk control measures and procedures are followed	As per 1.1 & 1.2		
	3.2	Work site is cleaned and made safe in accordance with established procedures		Observation – Housekeeping Activity	
	3.3	Results of energy use evaluation and recommended strategies			Advanced Diploma

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Assessment event 1 Written Test**	**Assessment event 2 Practical & Observation**	**Assessment event 3 Assignment**
		and their criterion for energy reduction are documented in accordance with established procedures			in Electrical Engineering Exercises (Page 271/272) Q103 to 115
	3.4	Energy reduction report is forwarded to appropriate persons		Practical 3-Preparing energy reduction plan report	

Add rows to the following table as required

Performance Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
Risk assessment in installing solar panel on rooftop	Q1,2 of K151A Assessment Mapping+ Performance .pdf (Page 1)		
Passive solar design, Assessing comfort conditions			Advanced Diploma in Electrical Engineering Exercises (Page 271/272) Q1 to 27
Ventilation system design & application of psychrometric chart, Determination of energy usage			Advanced Diploma in Electrical Engineering Exercises (Page 271/272) Q62 to 72
Measure energy usage in the building		Practical 1	
Solar panel installation		Practical 2	

Performance Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
Design for climate, Determining Solar effect & wind condition.			Advanced Diploma in Electrical Engineering Exercises (Page 271/272) Q84 to 102
Matching solar panel to load		Q4 of K151A Assessment Mapping+ Performance .pdf (Page 10)	
Energy use evaluation and recommended strategies			Advanced Diploma in Electrical Engineering Exercises (Page 271/272) Q103 to 115
Energy reduction report preparation		Practical 3	

Add rows to the following table as required

Knowledge Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
T1 Climate and thermal comfort	Test 2 Q6		
T2 Solar geometry and radiation	Test 1 Q2		
T3 Heat transfer	Test 1 Q1 & Q6		
T4 Glazing Systems	Test 1 Q2		
T5 Insulation	Test 1 Q1 & Q5		
T6 Thermal mass	Test 1 Q1 & Q7		
T7 Comfort control strategies	Test 2 Q1a, Q6,Q7		

Knowledge Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
T8 Energy efficiency in buildings + T11 Energy rating schemes			Advanced Diploma in Electrical Engineering Exercises (Page 271/272) Q103 to 115
T10 Integration of active solar system			Advanced Diploma in Electrical Engineering Exercises (Page 271/272) Q84 to 102
T12 Sustainable and safe building materials			Advanced Diploma in Electrical Engineering Exercises (Page 271/272) Q56 to 67

Assessment Conditions	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the welectrical workshop K2.11. Application of safe working practice & regarding the housekeeping rules are to be observed. Emergency procedures are to be informed. Safety equipments & first aids equipments are to be available. The students get the access to • Relevant practical equipments • Records relating to electrical engineering resources	Test 1+2	Practical 1,2,3	All assignments

Created by (Name)	U Kyaw Naing (Joe)	Date created	

Approved by (Name)		**Date approved**	
Signature		**Date modified**	

UEENEEK151A

Develop effective engineering strategies for energy reduction in buildings

ASSESSMENT QUESTIONS & TESTS ARE BASED ON THE FOLLOWINGS,THEY ARE MODIFIED, EXTRACTED SOME PARTS, APPLIED THE SIMILAR ONES,ALTER AND UTILIZED IN ASSESSMENT TASKS & THEORY TESTS FROM TIME TO TIME.

1 Prepare to develop strategies for effective energy reduction in buildings

1.1 OHS procedures for a given work area are identified, obtained and understood

Q1. To install the solar panel on the roof top, outline the OHS aspects to be concerned.

Marking Guide+Question (4 marks)

- Precaution regarding working at height
- Precaution against electrocution due to panel terminal
- Precaution on insulation & heat resistance to protect heating
- Ensure the strength of roof trusses to withstand the weight of equipments and workmen.

1.2 Established OHS risk control measures and procedures are followed in preparation for the work

Q2. List the risk level associated with the tasks in the following table from 1 to 6. 1=The most serious, 6=least serious

Injury caused by falling down from the height	
Electrical fire caused by overheating of solar panels	
No matching of solar panel and inverter	
Electrical interruption when sun set due to lack of battery.	
Equipments damage due to electrical surge	
Appearance of solar panel	

Marking Guide+Question (6 marks)

Injury caused by falling down from the height	1
Electrical fire caused by overheating of solar panels	2
No matching of solar panel and inverter	4
Electrical interruption when sun set due to lack of battery.	6
Equipments damage due to electrical surge	3
Appearance of solar panel	5

1.3 The extent of evaluation is determined from specifications of building(s) and services, plant and machinery and discussed with appropriate personnel

Test 1 Question

Q1+Q2+Q5

1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others

Observation (10 marks)

The practical tasks will be performed by 2 teams

Duties of team 1

Determine total electrical usage by all electrical equipments in a home

Duties of team 2

Estimate the appropriate size of solar panel to meet the electrical usage

The co-ordination between two teams will be assessed.

1.5 Tools, testing devices, and materials needed to carryout the work are obtained and checked for correct operation and safety

Test 1 Q3+4

Location of Evidences (Table 1)

Performnce Criteria	Above	Location of Evidences
Marking Guide/ Assessment Cover/ Feedback own record		
		Assessment Feedback Sheet

Students' work in own record	Summative Assessment- Formal Tests	
	Formative Assessment/Practical+ Class works	
Marking Guide to be presented for audit		
Students' work to be presented for audit		

2 Develop strategies for effective energy reduction in buildings.

2.1 OHS risk control measures and procedures for carrying out the work are followed

Q3. Match the OHS risk & control activities

Injury caused by falling down from the height	Matching solar panel rating & inverter rating
Electrical fire caused by overheating of solar panels	Fall prevention system is utilized
No matching of solar panel and inverter	Design & arrangement according to plan
Electrical interruption when sun set due to lack of battery.	Installation of back up battery
Equipments damage due to electrical surge	Use of insulators under solar panel & proper air ventilation
Appearance of solar panel	Surge protector is applied

Marking Guide+Question (6 marks)

Injury caused by falling down from the height	Fall prevention system is utilized
Electrical fire caused by overheating of solar panels	Use of insulators under solar panel & proper air ventilation
No matching of solar panel and inverter	Matching solar panel rating & inverter rating
Electrical interruption when sun set due to lack of battery.	Installation of back up battery
Equipments damage due to electrical surge	Surge protector is applied
Appearance of solar panel	Design & arrangement according to plan

2.2 Tests and measurements are carried out in strict accordance with OHS requirements safety procedures

Test 2 Question 6+8

Advanced Diploma in Electrical Engineering Exercises (Page 273)

(3) Solar calculation , thermodynamic principle

Slide 1

Q35.Sketch solar irradiation diagram

Slide 2

Q36.Write the equation to calculate solar irradiation.

2.3 In-depth knowledge of the energy use of building services, plant and machinery is applied to the evaluation process

Test 2 Question 1a

Advanced Diploma in Electrical Engineering Exercises (Page 271/272)

(1) Passive solar design

Q1.What is a active solar system?

Q2.What are micro-climates in Australia?

Slide 2+8

Q3.What is passive solar system design?

Slide 3

Q4.What is thermal mass?

Q5.What are the features of hot humid climate?

Slide 4
Q6.Sketch the building glassing system & how it effects the heating in building?
Slide 5
Q7.Sketch the overview & layout of a building for wind and direct entry
Q8.Sketch direct and indirect sun gain system
Slide 6
Q9.Sketch solar collector.
Slide 7
Q10.Sketch (a0 Air based solar system (b) Water based solar system.
Slide 9+10+11
Q11.What are the factors affecting comfort?
Slide 12+13+14
Q12.Explain psychometric chart.
Slide 15
Q13.Explain (a0 Humidity (b) Relative humidity (c) web bulb temperature (d) Dew point temperature
Slide 16+17
Q14.Sketch the construction of air conditioning system for commercial building
Slide 18+20
272
Q15.Explain the methods for measuring air movement and balancing
Slide 19
Q16.Describe basic building construction with sketches.

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(2) climate and human comfort
Slide 1
Q17.What is comfort?
Slide 2
Q18.Write the equation to calculate heating degree day.
Q19.Sketch wind and flow diagram of world
Slide 3+4
Q20.Describe the feature of (a0 Hot arid zone (b) Temperate zone
Slide 5+6
Q21.How does heat produced in human's body?
Slide 7+8
Q22.What change is required to make the comfort when reactive humidity is too high?

Slide 9
Q23.What is shading coefficient?
Slide 10+11
Q24.Sketch incidence & reflected ray diagram.
Slide 11
Q25.Write the equation for environmental temperature & dry resultant temperature.
Slide 12+13
Q26.Write the equation for thermal neutrality.
Slide 14.
Q27.Write the heat gain values for various types of activities.
2.4 Energy evaluation tests are set up in accordance with established test methods and procedures for each particular parameter under scrutiny
Advanced Diploma in Electrical Engineering Exercises (Page 277/278)

Test 2 Question ¾
(6) Ventilation, application of psychrometric chart
Slide 1
Q62.Explain ventilation
Slide 2+3+4+5+6
Q63.Describe air velocity and air volume
Q64.What are the systems of ventilation ? sketch the diagrams.
Slide 7+8
Q65.Sketch air ventilation system for multi storey building.
Slide 9
Q66.Describe the application of psychrometric chart.
Slide 10+11+13+14
Q67.In winter, air at dry bulb temperature of 66°C & 70% RH enters the building through a heating battery. It is heated to dry bulb temperature of 25°C without adding moisture from psychrometric chart. Find
(a) Wet bulb temperature of incoming air
(b) Relative humidity of heated air.
Q68.In Summer, air at dry bulb temperature of 27°C and wet bulb temperature 20°C enters the building through a cooling coil. It is cooled to dry bulb temperature of 19°C
Find
(a) Relative humidity of incoming air

(b) Relative humidity of supply air after cooling.

Q69.The air in a room has a dry bulb temperature of 23°C. Find (a) The relative humidity of air (b) The temperature of walls when condensation occurs.

Q70.Air enters the plant at a dry bulb temperature of 24°C and 80% RH & is required to be cooled to dry bulb temperature of 19°C & 60% RH. Find (a) the temperature of air in washer (b) the reduction in moisture content of supply air.

Slide 16+17+18+19+20

Q71.(a) Calculate heat gain per day from the customers in a 200 m 2 gym, If the gym capacity is 60 customers and the gym is full between 6 am to 8 am and 5 pm to 8:30 pm. At all other times, it is 30% full on average.

(b) Calculate heating contributions from all the appliances in a communal house containing 8 people. The house has one electric hot water system for two bath rooms, 6 bed rooms and one all electric kitchen. One TV, seven music systems, two computers and twenty lights. Assume that the house uses 32 kwh per day and the hot water is 45% of the load. The cooker consumes 20% of the load and 20% of heat generated by cooker is vented outside by the range hood.

(c) In above (b) would it make any difference if the water heater was located outside the building?

(d) What would be the heat gain per month if the cooker in (b) uses bottle gas (Gas is 45MJ/Kg and the house uses 0.5 kg/ day?

(e) The table below lists the power consumption of the appliances used in the house and the hours per day for which they are used. Calculate heat gain from appliances per month.

Appliance Power (watt) Daily usage per appliance (hr)

TV 50 15

Music system 45 3

Computer 100 13

Printer 20 1

Lights 80 2

(7)Thermal mass, centralised air conditioner, cooling load

Slide 1

278

Q72.What are the materials that can be used as thermal mass . Explain the installation method of them.

2.5 Strategies to reduce energy use with compromising occupancy standards are developed from knowledge of energy management and evaluation

Advanced Diploma in Electrical Engineering Exercises (Page 279/280)

Activity

Measure energy usage in the building .

After having applied the energy saving process, compare the energy usage and submit the report.

Test 2 Q 1b

(10) Building service energy management

Slide 1

Q84.Explain building service energy management system.

Slide 2

Q85.Write electricity & oil gas energy unit calculation formula

Slide 3+4

Q86.Compare building load sources

Q87.Express factors influencing room load.

Q88.What are fresh air requirements for various types working spaces.

Slide 5

Q89.Sketch fresh air supply system.

Slide 6

Q90.What are the factors affecting building energy

Slide 7 to 15

Q91.Sketch building water supply system and pipe fitting

Slide 10+11

Q92.Sketch hot water system.

---

(11) Design for climate

Slide 1 to 4

Q93.What are the principles of design for climate?

Slide 5+6

Q94.Explain how to achieve thermal comfort inside building.

280

(12)Air movement

Slide 1

Q95.Explain air movement to get comfort.

Slide 2

Q96.What is evaporative cooling?

Slide 3

Q97.What are the ways of designing the building for Australian climate?

---

(13) Solar effect & wind condition.

Slide 1

Q98.Explain the features of temperate climate & typical home construction method.

Slide 2

Q99.Explain hot arid climate & home construction method.

Slide 3

Q100.Explain hot humid climate & home construction method.

Slide 4

Q101.Sketch diagram for home to access the wind.

Slide 5

Q102.Write the equation to calculate ventilation.

2.6 Unexpected situations are dealt with safely and with the approval of an authorised person

Q4. If the voltage rating of available solar panel can not exactly match the required voltage level, what will you do?

Marking Guide+Question (2 marks)

Connect series/ parallel to get the most appropriate voltage.

Determine appropriate inverter & step up step down transformer.

2.7 Evaluation is carried out without damage to systems, circuits, the surrounding environment or services and using sustainable energy practice

Observation

- Observe students fabrication of solar panel design & connection

www.highlightcomputer.com/electricaldiploma2018.htm

Work performance + Practical Instruction Back up

Click HERE to download practicals

- Refer Solar & Renewable Energy Practicals

Location of Evidences (Table 1)

3 Document and report strategies for effective energy reduction in buildings

3.1 OHS work completion risk control measures and procedures are followed

As per 1.1 & 1.2

3.2 Work site is cleaned and made safe in accordance with established procedures

Observation

Students activity in house keeping after the practical task is observed & evaluated.

3.3 Results of energy use evaluation and recommended strategies and their criterion for energy reduction are documented in accordance with established procedures

Advanced Diploma in Electrical Engineering Exercises (Page 280)

After having applied the energy saving process, compare the energy usage and prepare the comparison chart

14) HVAC

Slide 1

Q103.What are the housekeeping check lists for HVAC system?

Slide 2+3

Q104.Explain the energy efficient operation of air-conditioning system.

Slide 4 to 8

Q105.Execute the building survey activities as described in slide 4+5

281

Q106.What are the building survey procedures for domestic and commercial buildings?

---

(15) Solar hot water system

Slide 1+2

Q107.Sketch solar hot water system.

Slide 3

Q108.Sketch the construction and connection of solar absorber plates

Slide 4

Q109.Describe (a) Collector surface coating (b) Heat transfer medium (c) Insulation (d) Capacity of storage tank (e) Hot water temperature of solar hot water system.

Slide 5

Q110.Sketch connection of collector and storage tank.

Slide 6

Q111.Sketch the hydraulic circuit of solar water.
Slide 7
Q112.Sketch the electrical circuit for solar water heating system.
Slide 8+9
Q113.Describe installation , orientation & sizing of solar collector system.
Slide 10
Q114.Sketch solar assisted heat pump.
Slide 11
Q115.Explain lighting management for commercial building

3.4 Energy reduction report is forwarded to appropriate persons

Observation

After having applied the energy saving process, compare the energy usage and prepare the comparison chart to be included in the report Presentation & assessment.

The students will need to provide the conclusion on the idea regarding the further energy reduction plan. The conclusion is assessed.

EKAS	Delivery & assessment System
KS01-EK151A Energy efficient building design Evidence shall show an understanding of energy efficient building design to an extent indicated by the following aspects: T1 Climate and thermal comfort encompassing: □ characteristics of the different Australian climatic types. □ use of climatic data in published and electronic forms to extract the quantities relevant to energy efficient design. □ relationship between climate and comfort using bioclimatic or psychrometric charts. □ calculation of heating or cooling degree days or degree hours for various locations. □ calculation of thermal neutrality for a given	Record2016/Students/TAFE/Sem 1-2016/Sem1 2016 Students work Assessment 1/K151 Assessment 2 /Question Marking scheme Building Design+Material Science-K041+E047.zip Energy Efficient Building Design K041 Lesson 1-Solar Design.zip http://youtu.be/KF3jT7Wm60I K041 Lesson 2-Basic psychrometric chart.zip http://youtu.be/iVU9d2OrN_c K041 Lesson 3-Total heat resistance.zip

location. T2 Solar geometry and radiation encompassing: ▯ definition of the terms: declination, hour angle, zenith angle, azimuth and altitude angles, the equation of time. ▯ conversion of solar time to local time and vice versa. ▯ position of the sun and the length of shadows with the aid of algorithms, tables, sun charts or computer software. ▯ daily irradiation incident on a wall, window or roof of a given tilt and orientation. ▯ relative summer and winter irradiation of windows facing the cardinal orientations. T3 Heat transfer encompassing: ▯ thermal processes of conduction, convection and radiation apply to the transfer of heat in buildings. ▯ calculation of the summer and winter U-values of building elements using tables and software. ▯ calculation of the infiltration heat transfer in a building. T4 Glazing Systems encompassing: ▯ different types of glazing systems and their characteristics. ▯ different types of shading devices and the window orientations for which they are most appropriate. solar heat gain for different glazing types and	http://youtu.be/QEC3CFN0C0A K041 Lesson 4-U value Heat conductance calculation.zip http://youtu.be/qJWiSnYVYwI K041 Lesson 5-Glazing+Net Heat gain heat loss.zip http://youtu.be/az4jFnDn4eQ K041 Lesson 6-Shading.zip http://youtu.be/srTWLtaPpgg K041 Lesson 7-Insulation+ Thermal mass.zip http://youtu.be/T8D_KeXhB2Q http://youtu.be/Ws5H152tgEo K041 Lesson 8-Thermal mass insulation.zip http://youtu.be/R5Qv2EFjUVU K041 Lesson 9-Airconditioning load calculation.zip http://youtu.be/KrHJkNwbr0I http://youtu.be/mxP4thaiS88 K041 Lesson 10-Heat gain per day.zip http://youtu.be/X5B99-Q6ddU

angles of incidence • calculation of the average daily irradiation of a window partly shaded by eaves, using computer software. • calculation of the average daily heat gain through a window partly shaded by eaves. T5 Insulation encompassing: • different types of insulation and where they are used. • how different types of insulation are installed in roofs, walls and floors. • determination of the minimum R-values of roof insulation for different locations using Australian Standard AS2627 or similar standards. T6 Thermal mass encompassing: • advantages and disadvantages of using substantial thermal mass in different climate types and for different heating and cooling regimes. • where thermal mass can be located in a building. • explain what is meant by the following terms: time lag, decrement factor, admittance, response factor. T7 Comfort control strategies encompassing: • interpretation of the usefulness of a design strategy with the aid of a psychrometric chart showing control	K041 Lesson 11-Ventilation.zip http://youtu.be/LdCEptDVMlY K041 Lesson 12-Building heating load http://youtu.be/VDHl1YbcX3c http://youtu.be/FH1bPDCuLD0 K041 Lesson 13-Design Assessment Tools K041 Lesson 14-Design for Australian climate.zip http://youtu.be/6Vhv5H4Wfps K041 Lesson 15-Domestic solar hot water system.zip http://youtu.be/JCgxvzX5jHY http://youtu.be/j5bfWGOS_zA K041 Lesson 16-Energy efficiency+Lighting.zip http://youtu.be/CVvXJj28pcg K041 Lesson 17-Illumination+Smoke alarm.zip http://youtu.be/piMwahVLYhw http://youtu.be/JBvzyR-_GzA

potential zones for a particular location. ▯ selection of the most useful comfort control strategies for Australian climatic regions. T8 Energy efficiency in buildings encompassing: ▯ determination of the direction of the following: both true and magnetic, north winter and summer sunrise, winter and summer sunset. ▯ solar access in summer and winter to various possible house locations on a site and room locations within the house. ▯ how vegetation can be used to both funnel and deflect wind. ▯ using cross ventilation as a cooling strategy. T9 Thermal performance of a building encompassing: ▯ heating requirements of a building using the heating degree day or hour method. ▯ dynamic performance predicted by a computer simulation program such as NatHERS or BERS. T10 Integration of active solar systems encompassing: ▯ active solar system types available which can provide hot water, space heating and cooling. ▯ the best location on the roof, and the optimum tilt and orientation of the collector panels. ▯ function of the main components of an air or	K041_Lesson_18-Water_supply.zip http://youtu.be/-A96eIUfsNU K041_Lesson_19-Ventilation+Lighting_control.zip http://youtu.be/CO0ClnAFT6A K041_Lesson_20-Electrical_system_design.zip http://youtu.be/KX7E_Nc7_54 K041_Lesson_21-Building_materials.zip http://youtu.be/Gi77wNzXEj4 http://youtu.be/ZkgOHP0RESs http://youtu.be/C6sxFVofvkE http://youtu.be/8BcUJ7BDKlI http://youtu.be/ap0iMZ_Z9Qs

water-based solar space heating system. ▯ schematic of the fluid circuit of an air or water- based space heating system. ▯ main solar cooling system types. T11 Energy rating schemes encompassing: ▯ differences in approach used by house energy rating schemes in Australia. ▯ energy performance of a number of houses using a computer simulation program such as NatHERS or BERS. ▯ other methods to reduce energy consumption within and outside a building including appliance efficiency, human behaviour changes, building management strategies and transportation minimisation. ▯ additional cost of energy efficiency measures and cost savings using life cycle cost or simple pay back methods according to Aust. Standard AS3595 and AS4536. T12 Sustainable and safe building materials encompassing: ▯ common building materials and their embodied energy content. ▯ environmental impact of the production of various building materials. ▯ problems associated with the use or disposal of building	

materials.	

Location of Evidences (Table 1)

Performnce Criteria	Above	Location of Evidences
Marking Guide/ Assessment Cover/ Feedback own record		
Students' work in own record	Summative Assessment- Formal Tests	
	Formative Assessment/Practical+ Class works	
Marking Guide to be presented for audit		
Students' work to be presented for		

audit	

ASSESSMENT SCHEDULE

Performance Criteria	Assessment 1 Practical		Assessment 2 Theory
	Continuous Observation	Written Assessment as part of Practical	Written Assessment
1.1		X	
1.2		X	
1.3		X	X
1.4	X		
1.5		X	X
2.1		X	
2.2		X	X
2.3		X	X
2.4		X	X
2.5	X	X	X
2.6	X		
2.7	X		
3.1	X	X	
3.2	X		
3.3		X	X
3.4		X	X
EKAS Assessment		X	X

Energy Efficiency References

www.highlightcomputer.com/electricaldiploma2018.htm

Advanced Diploma in Electrical Engineering ExercisesClick HERE

Assessment Mapping - Template

(streamlined training package)

This template to be used for "new" endorsed streamlined training packages.

Instruction for use: These instructions in RED should be deleted from the completed document. Instructions in **BLUE** should be written over with appropriate information.

- This template is to be completed by the assessment developer to ensure the assessments meet the training package requirements for the unit of competency.
- It must be used during the assessment validation process.
- Record of this document must be retained in the faculty TAS teamshare teaching section.
- Add rows and columns as required below.

This document is to be viewed concurrently with C007 Attached
Click HERE

Faculty:	Construction, Engineering & Transport (CET)	**College:**	**Ultimo**
Teaching Section:	Electrical Engineering		
Qualification Number and Name:	UEE62111 Advanced Diploma of Engineering Technology-Electrical/ UEE62211 Advanced Diploma of Electrical Engineering		
Unit of Competency Number and Name:	**UEECD0039 Provide solutions to basic engineering computational problems** **UEECD0049 Use advanced computational processes to provide solutions to energy sector engineering problems**		

Copy and paste the following table for each element as required

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment Report**	**Practical**
1.Provide computational solutions to engineering problems.	1.1	OHS procedures for a given work area are identified, obtained and understood.	Concurrently assessed with UEENEEE101A/CD0007		
	1.2	Scope of problem/s is obtained from documentation and/or from work instructions to determine work	Test 3 Q 1/2/3		
	1.3	Problems are documented and/or diagrammatic form and appropriate methods identified to resolve them.	Test 1B Q7		
	1.4	Constants and variables to the problem are obtained from measured values and/or problem documentation	Test 1B Q 1/2		
	1.5	Alternative methods for resolving the problem are considered and, as required, discussed with relevant person/s		Q37 Advanced Diploma in Electrical Engineering Exercises Page 37 Method1- Simultaneous equation method Method 2-Matrice Solution	

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment Report**	**Practical**
	1.6	Problems are resolved using mathematical processes in accordance with workplace procedures		Q117 to 120 Advanced Diploma in Electrical Engineering Exercises Page 39	
2.Complete work and document problem solving activities	2.2	Justification for solutions used to solve engineering problems is documented in work records in accordance with workplace procedures and relevant industry standards	Test 3 Q 1/2/3 Test 2B Q7 Test 2 Q6		
	2.1	Work completion is documented and relevant person/s notified in accordance with workplace procedures		All assignments submission	

Performance Evidence	Test	Assignment Report	Practical
Applying mathematics in electrical problems solving			Test 3 Q 1/2/3
Applying mathematics in mechanical problems solving	Test 2B Q7		
Applying mathematics in financial problems solving	Test 1B Q7		
Applying mathematics in electronic problems solving			Test 2 Q6

Knowledge Evidence	Test	Assignment Report	Practical
T1 Rational, irrational numbers and basic algebra	Test1B Q1/2		
T2 Algebraic manipulation	Test1B Q1/2		
T3 Laws of indices	Test 1B Q3		
T4 Estimations, errors and approximations		Q117 to 120 Advanced Diploma in Electrical Engineering Exercises Page 39	

Knowledge Evidence	Test	Assignment Report	Practical
T5 Plane figures – triangles and basic trigonometry	Test 2B Q2,5,6		
T6 Plane figures - quadrilaterals and circles		Q55 to 63 Advanced Diploma in Electrical Engineering Exercises Page 39	
T7 Graphs of Trigonometric functions	Test 2B Q8		
T8 Graphs of linear functions	Test 2B Q4,6		
T9 Simultaneous equations		Q37 Advanced Diploma in Electrical Engineering Exercises Page 37	
T10 Matrices	Test 3 Q6		
T11 Quadratic functions	Test 1B Q 1/2		
T12 Exponential and logarithmic functions	Test 1 Q 2		
T13 Vectors and Phasors	Test 3 Q6		
T14 Complex numbers	Test 3 Q1		

Add rows to the following table as required

Assessment Conditions	Insert Assessment event 1	Insert Assessment event 2	Insert Assessment event 3
. Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances must be typical of those experienced in the administration – general administration field of work and include access to: • Electrical equipment and resources records relating to business resources			

Created by (Name)		Date created	

Approved by (Name)		**Date approved**	
Signature		**Date modified**	

UEECD0049 Use advanced computational processes to provide solutions to energy sector engineering problems

1	**Provide solutions to engineering problems**	**1.1**	Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied
		1.2	Scope of problems are obtained from documentation and/or work instruction to solve problems
		1.3	Problems are documented and/or provided in diagrammatic form and appropriate methods identified to resolve them
		1.4	Constants and variables to problems are obtained from measured values and/or problem documentation
		1.5	Alternative methods for resolving problems are reviewed and, as required, discussed with relevant person/s
		1.6	Problems are resolved using mathematical processes in accordance with workplace procedures
2	**Complete work and documentation**	**2.1**	Justification for solutions used to solve engineering problems is documented in work records in accordance with workplace procedures and relevant industry standards
		2.2	Work completion is documented and relevant person/s notified in accordance with workplace procedures

Assessment Mapping - Template

(streamlined training package)

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- Add rows and columns as required below.

This document should be viewed concurrently with G143A Assessment Mapping+Performance+Marking Guide.pdf

Click HERE

Faculty:		**College:**	
Teaching Section:	Electrical Engineering		
Qualification Number and Name:	Advanced Diploma of Engineering Technology-Electrical/ Advanced Diploma of Electrical Engineering		
Unit of Competency Number and Name:	UEEEL0041 - Develop engineering solution for synchronous machine and control problems		

Copy and paste the following table for each element as required

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Assessment event 1 Written Test**	**Assessment event 2 Practical & Observation**	**Assessment event 3 Assignment**
1.Prepare to developengineering solution for synchronous machine problems	1.1	OHS procedures for a given work area are obtained and understood through established routines and procedures	Q1+2 of G143A Assessment Mapping+Performance+ Marking Guide.pdf Page 1		
	1.2	Established OHS risk control measures and procedures	Q3+4of G143A Assessment Mapping+Performance+ Marking Guide..pdf Page 2		
	1.3	The extent of the machine problem is obtained from documentation and from work supervisor to establish the scope of work to be undertaken.		Practical- Generator Test	
	1.4	Activities are planned to meet scheduled timelines in consultation with others involved in the work.		Observation in Practical	
	1.5	Effective strategies are formed to ensure solution development and implementation is carried out efficiently.			Advanced Diploma in Electrical Engineering Exercises Page 208) Q 11, 12
2. Develop engineering solution for synchronous machine problems.	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.	As per 1.1,1.2,1.3		
	2.2	Knowledge of synchronous machine construction, operation, characteristics and applications are applied to developing	Q1 to 6 of G143A Assessment Mapping+Performance+		

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Assessment event 1 Written Test**	**Assessment event 2 Practical & Observation**	**Assessment event 3 Assignment**
		solutions to synchronous machine problems.	Marking Guide.pdf Page 5,6		
	2.3	Parameters, specifications and performance requirements in relation to each machine problem are obtained in accordance with established procedures	As above		
	2.4	Approaches to resolving synchronous machine problems are analysed to provide most effective solutions.	As above		
	2.5	Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.	As above		
3 Test, document and implement engineering solution for synchronous machine problem.	3.1	Solutions to machine problems are tested to determine their effectiveness and modified where necessary.	Q 1 to 6 of Test 3		
	3.2	Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed	Q 1 to 6 of Test 3		
	3.3	Appropriately competent and qualified person(s) required to implement solutions to synchronous machine problems are coordinated in accordance with regulatory requirements and enterprise policy	Q 1 to 6 of Test 3		
	3.4	Justification for solutions used to solve synchronous machine problems is documented for inclusion in work/project development records in accordance with professional	Q 1 to 6 of Test 3		

Add rows to the following table as required

Performance Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
Testing generator		Practical	
Measuring Synchronous impedance		Practical	

Performance Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
Investigating the relation between frequency and voltage generated.		Practical	

Add rows to the following table as required

Knowledge Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
T1 a.c. generators – construction, types and cooling	Advanced Diploma in Electrical Engineering Exercises Page 131) Q 64 to 67		
T2 a.c. generators – operating principles and characteristics	Advanced Diploma in Electrical Engineering Exercises Page 131) Q 68 to 70		
T3 Synchronising a.c. generators			Advanced Diploma in Electrical Engineering Exercises Page 131) Q 79 to 87

Knowledge Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
T4 a.c. generators power, torque and efficiency	Advanced Diploma in Electrical Engineering Exercises Page 131) Q 70		
T5 Voltage regulation (AVR)			Advanced Diploma in Electrical Engineering Exercises Page 131) Q 77 to 84
T6 a.c. generator operational stability			Advanced Diploma in Electrical Engineering Exercises Page 131) Q 82 to 85
T7 a.c. generator protection			Advanced Diploma in Electrical Engineering Exercises Page 128) Q 57 , 58
T8 Induction generator			Advanced Diploma in Electrical Engineering Exercises Page 166) Q 64

Knowledge Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
T9 Three phase synchronous motors			Advanced Diploma in Electrical Engineering Exercises Page 167) Q 72 to 76

Add rows to the following table as required

Assessment Conditions	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the welectrical workshop K2.11. Application of safe working practice & regarding the housekeeping rules are to be observed. Emergency procedures are to be informed. Safety equipments & first aids equipments are to be available. The students get the access to • Relevant practical equipments Records relating to electrical engineering resources	Test 1, 2, 3	Practical	All assignments

Created by (Name)	U Kyaw Naing (Joe)	**Date created**	
Approved by (Name)		**Date approved**	
Signature		**Date modified**	

UEENEEG143A Develop engineering solution for synchronous machine

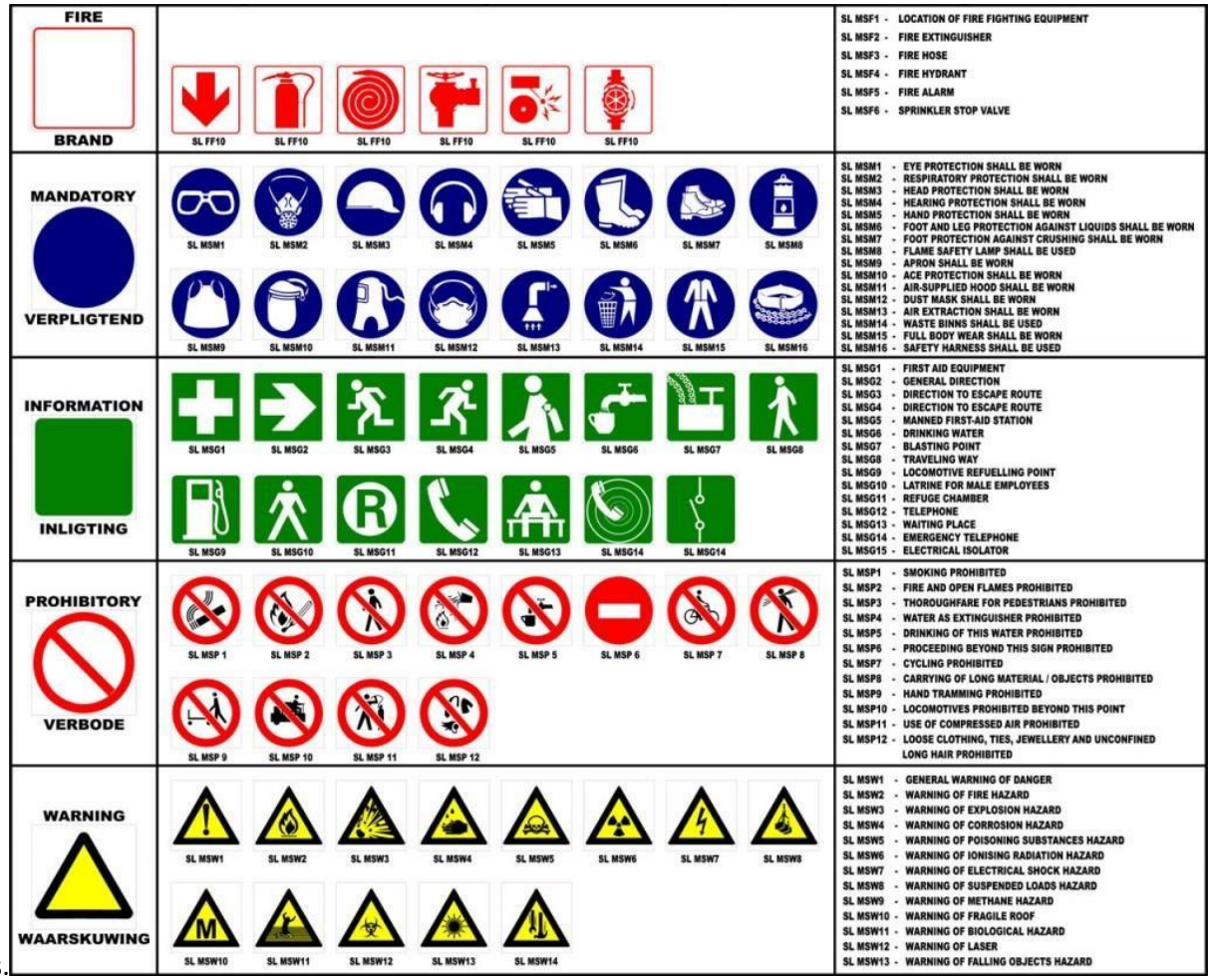
UNIT CAPSTONE ASSESSMENT

ASSESSMENT QUESTIONS & TESTS ARE BASED ON THE FOLLOWINGS,THEY ARE MODIFIED, EXTRACTED SOME PARTS, APPLIED THE SIMILAR ONES,ALTER AND UTILIZED IN ASSESSMENT TASKS & THEORY TESTS FROM TIME TO TIME.

1 1 Prepare to developengineering solution for synchronous machine problems

1.1	OHS procedures for a given work area are obtained and understood through established routines and procedures.

Q1. Identify safety equipments & signs to be used when you are using fitting & machining process.



Answers +Marking Guide (2 marks)

Safety glass

Safety glove

Safety shoe

Ear protection

First aids sign

Q2 Write the safety procedure to operate the drilling machine

Answers +Marking Guide (5 marks)

PRE-OPERATIONAL SAFETY CHECKS

1. **Check workspace and walkways to ensure no slip-hazards are present.**
2. **Check that the drill chuck guard is in position.**
3. **Ensure the chuck key (if used) has been removed from the drill chuck.**
4. **Locate and ensure you are familiar with the operation of the ON/OFF starter and E-Stop (if fitted).**
5. **Follow correct clamping procedures to ensure work is secure.**
6. **If the job obstructs the walkway erect a barricade.**
7. **Adjust spindle speed to suit drill or cutter diameter.**
8. **Faulty equipment must not be used. Immediately report suspect equipment.**

OPERATIONAL SAFETY CHECKS

1. **Never leave the Drill Press while it is running.**
2. **Before making adjustments or before cleaning swarf accumulations switch off and bring the machine to a complete standstill.**
3. **Feed downwards at a sufficient rate to keep the drill cutting.**
4. **Feed with care as the drill breaks through the underside of the work.**
5. **Use a safe working posture (beware of hair catching).**

HOUSEKEEPING

1. **Switch off the machine.**
2. **Leave the machine in a safe, clean and tidy state.**

POTENTIAL HAZARDS

- **Hair/clothing entanglement - rotating spindle/drill**
- **Eye injuries**
- **Flying swarf/chips**
- **Sharp edges & burrs**

1.2 Established OHS risk control measures and procedures

Q3 What are the main source of hazards to use the drilling machine?

Answers +Marking Guide (5 marks)

(1) Hazards related to the machinery or plant, materials or items being processed or internal sources of energy, for example:
- drawing in or trapping hazards;
- entanglement hazards;

- shearing hazards;
- cutting hazards;
- impact hazards;

(2) hazards related to the location of the machine or plant, for example:
- its stability, for instance, whether it could roll or fall over;

(3) hazards related to systems of work associated with the machine or plant, for example manual handling injuries caused when putting materials into them.

To prevent the hazards, the above risks are to be identified & eliminated.

Q4.Write WHS Duty of Care Checklist for Managers/Supervisors

Answers +Marking Guide (8 marks)

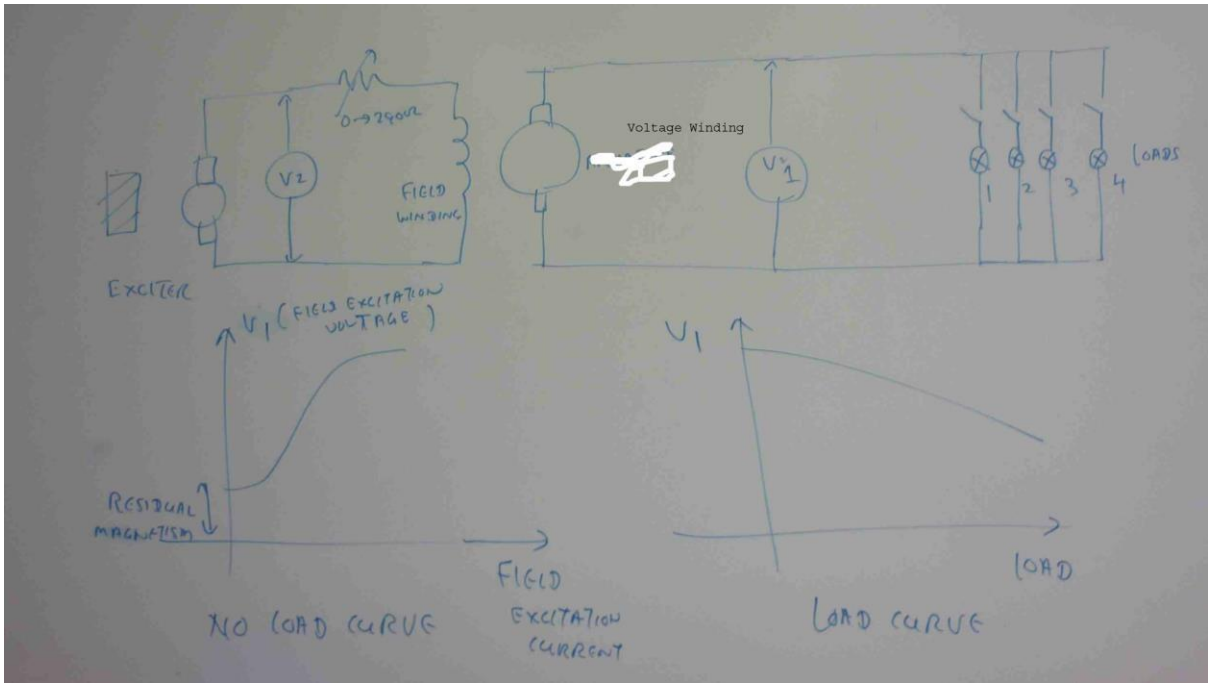
WHS Duty of Care Checklist for Managers/Supervisors

- Familiarise yourself with the organization Work Health & Safety Policy 2016 and Work Health and Safety Procedures to ensure you are aware of your personal responsibility for workplace health and safety (WHS) within your area of delegated authority.
- Ensure that the work for which you are responsible is carried out in accordance with the University's WHS risk management steps to safeguard the health, safety and wellbeing of those involved and others who may be affected.
- Demonstrate active and visible leadership in WHS risk management. Identify hazards or WHS risks associated with different jobs, tasks and projects and assess the risks to the health and safety of those involved. Conduct this risk identification and assessment in consultation with those involved or affected.
- Implement suitable risk controls within agreed timeframes. These may include competency based training, adequate supervision and adoption of safe operating procedures. Choose these risk controls in consultation with those involved or affected.
- Inform staff, students and contractors of WHS requirements and expectations, directing them to relevant information and risk control resources available. This may include local WHS induction (refer to the WHS induction checklist), on-the-job instruction and specific WHS training.
- Promptly address WHS issues that are brought to your attention in consultation with those involved or affected.
- Refer WHS issues that are beyond your control to the relevant manager(s) for their attention, but ensure that interim action is taken to reduce the risks in a practical way.
- Investigate incidents, seeking to identify the causes and take steps to prevent recurrence.

1.3 The extent of the machine problem is obtained from documentation and from work supervisor to establish the scope of work to be undertaken.

The performance characteristics of AC Generator is to be assessed by performing the following practical tasks.

Practical 1-Generator Load Test



In the above circuit, AC Generator is also coupled to motor drive system & its Synchronous characteristics is to be determined.

Students performance in the practical is assessed.

1.4 Activities are planned to meet scheduled timelines in consultation with others involved in

the work.

Students cooperation & performance in the practical is assessed.

1.5 Effective strategies are formed to ensure solution development and implementation is carried out

1.5Effective strategies are formed to ensure solution development and implementation is carried out efficiently.

Ref-Advanced Diploma in Electrical Engineering Exercises Page 208)

(3) Strategy objective

Slide 1+2
Q11.What are the developing of strategies in project?
Q12.How will you examine the effectiveness of activities in project management?

Students co-operation in the practical is evaluated.

2 Develop engineering solution for synchronous machine problems.	
2.1	Established OHS risk control measures and procedures for carrying out the work are followed.

As per 1.1, 1.2 & 1.3

2.2 Knowledge of synchronous machine construction, operation, characteristics and applications are applied to developing solutions to synchronous machine problems.

2.3 Parameters, specifications and performance requirements in relation to each machine problem are obtained in accordance with established procedures.

2.4 Approaches to resolving synchronous machine problems are analysed to provide most effective solutions.

2.5 Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.

2.6 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

ASSESSMENT

The students' performance in the following questions are to be assessed.

1. A 400 hp (300KW) , 6600V 60HZ 200 rpm synchronous motor operates at full load at a leading power factor of 0.8. If the synchronous reactance is 11 ohm Calculate the followings

   (a) The apparent power of the motor per phase
   (b) The ac line current
   (c) The value and phase of Ef
   (d) Determine the torque angle δ (4 marks)

2. The factory has the following loads.

   (i) Two 50 HP 3 phase induction motors PF 0.707 lagging efficiency 90%
   (ii) Three 40 KW 3 phase induction motor power factor 0.8 lagging efficiency 95%
   (iii) If 1 60 KW 3 phase synchronous motor with efficiency 98% 0.6 pf leading is connected in parallel

   Calculate total active and reactive power absorbed from the supply and total power factor.

   (4 marks)

3. Sketch the connection diagram of synchronous induction motor.

   (2 marks)

4. Describe (i) Auxiliary motor starting (ii) Induction motor starting of a synchronous motor.

   (2 marks)

5 .What is significant difference between synchronous motor and induction motor?

   (2 marks)

6. A synchronous capacitor is rated at 160 MVAR 16 KV 1200 rpm 60 HZ. It has a synchronous reactance of 0.8 pu and is connected to a 16 KV line.

   Calculate the value of Ef so that the machine

   (a) absorb 160 MVAR (b) deliver 120 MVAR

3 Test, document and implement engineering solution for synchronous machine problem.

3.1 Solutions to machine problems are tested to determine their effectiveness and modified

where necessary.

3.2 Adopted solutions are documented including instruction for their implementation that

incorporates risk control measure to be followed.

3.3 Appropriately competent and qualified person(s) required to implement solutions to synchronous machine problems are coordinated in accordance with regulatory requirements and enterprise policy. (Note)

3.4 Justification for solutions used to solve synchronous machine problems is documented for inclusion in work/project development records in accordance with professional

EKAS Assessment

SAG Sem 2-2016 –U Kyaw Naing (Joe)/ASSESSMENT Mapping –Sem 2-2016/G143+145 Assessment Mapping/G143+145 Tests—Test 3 Q1,Q2,Q3,Q4,Q5,Q6

DELIVERY TO ACHIEVE THE COMPETENCY

Study Option (1)

Guided study (Online)Resources+Online exercises+Online Practicals

Click HERE

&

Youtube Videos for Electrical Engineering Lessons

http://www.mongroupsydney1.com/youtubevideos.htm

www.electricaldiploma2013.webs.com

Study Option (1)

Guided study (Online)Resources+Online exercises+Online Practicals

Click HERE

Elect Machine-G043+G044+G045.zip

Electrical Machines

AC Machines 1

AC Machines 2

The students will have to answers the following questions

Slide 1+2+3

Q64.Explain the major difference between induction machine and synchronous machine.

Slide 3+4+5+6

Q65.Explain the construction of synchronous machine

---

(12) Synchronous generator

Slide 1

Q66.Sketch the equivalent circuit , vector diagram and write the voltage equation for synchronous generator.

Slide 2

Q67.Sketch the circuit, vector diagram and write the voltage equation for synchronous motor.

---

(13) Effect of field excitation

Slide 1+2

Q68.Explain the effect of field excitation on power factor of synchronous motor.

Slide 3+4+5

Q69.A three phase star connected alternator has a resistance of 0.3Ω and a synchronous reactance of 7 Ω per phase. It is excited to give 6.6KV line voltage on open circuit. Determine the internal voltage and per unit voltage regulation on full load current of 150 amp when the load power factor is (a) 0.707 lagging (b) 0.8 leading.

Slide 6+7

Q70.A 4000 Kw 6.6 KV 50 HZ 250 rpm synchronous motor operates at full load 0.7 leading power factor if the synchronous reactance is 15Ω. Calculate the followings

(a) The apparent power of the motor per phase

(b) The AC line current

(c) The value and phase of Ef

(d) (d) Determine the torque angle δ

Slide 8+9+10

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Q71.A synchronous condenser is rated at 260MVAR 26 KV 1500 rpm, 60HZ. It has a synchronous reactance of 0.8 pu and is connected to 26KV line. Calculate the value of Ef so that the machine (a) absorb 200MVAR (b) deliver 150 MVAR

---

(14) Oscillation of synchronous machines

Slide 1+2

Q72.A 3000KV three phase 4 poles star connected synchronous machine has resistance and synchronous reactance per phase of 0.3Ω and 2Ω respectively. Calculate the emf and rotor displacement when the machine acts as a motor with input of 700MW and pf 0.9 lagging.

If the field current is required to produce emf / ph equal to rated voltage. Determine also field current for field excitation.

Slide 3+4+5+6

Q73.The factory has the following loads.

(a) 3 x 50HP three phase induction motor PF 0.6 lagging , efficiency 85%

(b) 4 x 45 Kw three phase induction motor 0.85 pf lagging, efficiency 90%

Calculate total active and reactive power. If one 100KW three phase synchronous motor with 97% efficiency, 0.65 leading pf is connected in parallel, calculate total active and reactive power and power factor.

Slide 6+7+8

Q74.Explain starting methods for synchronous motor.

Slide 9+10

Q75.Compare synchronous motor & induction motor

Slide 11+12 (Single phase motor)

Q76.Explain (a) cross field theory (b) rotating field theory of single phase motor.

---

(15) Generator control

Slide 1+2

Q77.Explain the control of electric generating system.

Slide 3+4

Q78.Explain voltage regulator.

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Slide 5+6+7

Q79.Explain prime mover & governor

Slide 8+9

Q80.Explain the types of excitations

Slide 10+11

Q81.How will you select the regulator to control generator voltage?

Slide 12+13

Q82.What are the factors affecting voltage stability of generator system?

Slide 14+15

Q83. Sketch remote voltage sensing system

Slide 16

Q84.Explain typical generator instability problem.

Slide 17+18+22+23

Q85.Explain digital excitation system.

Slide 19+20+21

Q86.Sketch generator parallel control system.

Slide 24

Q87.Explain digital voltage regulation system.

Refer Question & Marking Scheme for Tests

EKAS Components	Assessment Tasks
KS01-EG143A Synchronous machine diagnostics Evidence shall show an understanding of developing engineering solutions for synchronous machine problems to an extent indicated by the following aspects: T1 a.c. generators – construction, types and cooling encompassing: - construction of stator and rotor windings - rotor construction (cylindrical and salient pole) - advantages of rotating field construction - excitation methods - cooling methods	www.electricaldiploma2013.webs.com **Youtube Videos for Electrical Engineering Lessons** G043+G045+ G143+145+I145 Page 308 to 329 of http://www.filefactory.com/file/cf9bf8f/n/Video_Lessons.pdf **Induction and synchronous machines & control** G043+G045 Lesson 1 AC Machine Introduction.zip http://youtu.be/-WlfOPhNDn8 G043+G045 Lesson 2 Slip+Equivalent Ckt.zip

▯ prime movers	http://youtu.be/De79cbk2EOQ
T2 a.c. generators – operating principles and characteristics encompassing:	http://youtu.be/gprZTitiOao
▯ a.c. generator equivalent circuits (synchronous reactance and resistance components)	G043+G045 Lesson 3 Power Transfer.zip http://youtu.be/pCMcMPBrUEE http://youtu.be/7tJjDuG5SQc
▯ tests – open circuit, short circuit, stator impedance	http://youtu.be/dV9VFsXeFnY
▯ voltage regulation, island generator's terminal voltage load power factor	G043+G045 Lesson 4 Test for equivalent ckt.zip
▯ determination of excitation voltage and load angle	http://youtu.be/HF4bJ6vWX2c
T3 Synchronising a.c. generators encompassing:	G043+G045 Lesson 5 Equivalent Ckt Problems.zip
▯ conditions for synchronising (infinite bus)	http://youtu.be/PyPQsw0L_o0
▯ methods for synchronising (lamp methods, synchroscope)	http://youtu.be/f8VbD_APNfk http://youtu.be/SROLC5hkoc0
▯ alternator load sharing, parallel operation	
T4 a.c. generators power, torque and efficiency encompassing:	G043+G045 Lesson 6 Motor starting and control.zip http://youtu.be/Utfbzs7Ti6M
▯ power input, input torque, speed	http://youtu.be/VnNlesPgeZk
▯ power losses	http://youtu.be/AMO70oGS2Fs
▯ output power, load power factor, rotor angle, pu power	http://youtu.be/FQVMCMDSTwo G043+G045 Lesson 7 Synchronous machine introduction.zip

▯ efficiency ▯ performance chart interpretation T5 Voltage regulation (AVR) encompassing: ▯ need for AVR's ▯ features of AVR's ▯ effects of rotor inductance ▯ connections of AVRs ▯ operation of AVRs T6 a.c. generator operational stability encompassing: ▯ power output, VAR effects, rotor angle, excitation ▯ control of VAR (OLTC transformers) ▯ voltage dependant nature of stability ▯ critical clearance angle of a.c. generator ▯ stability limits T7 a.c. generator protection encompassing: ▯ restricted, unrestricted primary, back up and duplicated protection ▯ overcurrent, short circuit, differential, reverse power, load unbalance, rotor overload, loss-of-field, rotor earth fault, station	http://youtu.be/KM9TJcr2MBk G043+G045 Lesson 8 Synchronous machine ckt problems.zip http://youtu.be/ZGsmZfLiPoc http://youtu.be/bnpYxKtSz1c G043+G045 Lesson 9 Synchronous machine starting.zip http://youtu.be/p4x03LkgBc8 http://youtu.be/yKmNWaxT2Hk G043+G045 Lesson 10 Single phase motor.zip http://youtu.be/9OgmEb0tFpE G043+G045 Lesson 11 Factors affecting motor operation.zip http://youtu.be/sAqyhDlpwwY

earth fault, under frequency protection - external fault protection T8 Induction generator encompassing: - types operating principles, characteristics - excitation methods - losses and efficiency - synchronising and paralleling T9 Three phase synchronous motors encompassing: - construction – rotor, stator, windings - excitation methods - operating principles (equivalent circuits, synchronous impedance) - hunting and stability limits - power factor correction - paralleling and synchronisation techniques - starting methods - braking methods	

ASSESSMENT SCHEDULE

Performance Criteria	Assessment 1 Practical		Assessment 2 Theory
	Continuous Observation	Written Assessment as part of Practical	Written Assessment
1.1	X		
1.2	X		
1.3	X	X	
1.4		X	X
1.5		X	X
2.1	X		
2.2		X	X
2.3		X	X
2.4		X	X
2.5		X	X
2.6		X	X
2.7		X	X
3.1		X	X
3.2		X	X
3.3		X	X
3.4		X	X
EKAS Assessment		X	X

Location of Evidences (Table 1)

Performnce Criteria	Above	Location of Evidences
Marking Guide/ Assessment Cover/ Feedback own record		

		ASSESSMENT QUESTIONS IN THE TESTS ARE BASED ON THE QUESTIONS ATTACHED WITH THIS ASSESSMENT MAPPING, BUT IN ACTUAL ASSESSMENT,THEY ARE MODIFIED, EXTRACTED SOME PARTS, APPLIED THE SIMILAR ONES,ALTER AND UTILIZED IN ASSESSMENT TASKS & THEORY TESTS FROM TIME TO TIME
Students' work in own record	Summative Assessment- Formal Tests	
	Formative Assessment/Practical+ Class works	
Marking Guide to be presented for audit		
Students' work to be presented for audit		

Assessment Mapping - Template

(streamlined training package)

This template to be used for "new" endorsed streamlined training packages.

Instruction for use: These instructions in RED should be deleted from the completed document. Instructions in **BLUE** should be written over with appropriate information.

- This template is to be completed by the assessment developer to ensure the assessments meet the training package requirements for the unit of competency.
- It must be used during the assessment validation process.
- Record of this document must be retained in the faculty TAS teamshare teaching section.
- Add rows and columns as required below.

This document should be viewed concurrently with G145A Assessment Mapping+Performance+Marking Guide.pdf

Click HERE

Faculty:		**College:**	
Teaching Section:	Electrical Engineering		
Qualification Number and Name:	Advanced Diploma of Engineering Technology-Electrical/ Advanced Diploma of Electrical Engineering		
Unit of Competency Number and Name:	UEEEL0043 - Develop engineering solutions for induction machine and control problems		

Copy and paste the following table for each element as required

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Assessment event 1 Written Test**	**Assessment event 2 Practical & Observation**	**Assessment event 3 Assignment**
1.Prepare to developengineering solution for synchronous machine problems	1.1	OHS procedures for a given work area are obtained and understood through established routines and procedures	Test 1 Q1+2 of G145A Assessment Mapping+Performance+ Marking Guide.pdf Page 1		
	1.2	Established OHS risk control measures and procedures	Test 1 Q3+4of G145A Assessment Mapping+Performance+ Marking Guide..pdf Page 2		
	1.3	The extent of the machine problem is obtained from documentation and from work supervisor to establish the scope of work to be undertaken.		Practical 1, 2,3,4 of G145A Assessment Mapping+Performance +Marking Guide.pdf Page 4+5	
	1.4	Activities are planned to meet scheduled timelines in consultation with others involved in the work.		Observation in Practical 1, 2,3,4 of G145A Assessment Mapping+Performance +Marking Guide.pdf Page 4+5	
	1.5	Effective strategies are formed to ensure solution development and implementation is carried out efficiently.			Advanced Diploma in Electrical Engineering Exercises Page 208) Q 11, 12
2. Develop engineering solution for induction	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.	As per 1.1,1.2,1.3		

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Assessment event 1 Written Test**	**Assessment event 2 Practical & Observation**	**Assessment event 3 Assignment**
machine problems.					
	2.2	Knowledge of induction machine construction, operation, characteristics and applications are applied to developing solutions to synchronous machine problems.	Test 1 Q1 to 12 of G145 A Assessment Mapping+Performance+ Marking Guide.pdf Page 6 to 8		
	2.3	Parameters, specifications and performance requirements in relation to each machine problem are obtained in accordance with established procedures	As above		
	2.4	Approaches to resolving synchronous machine problems are analysed to provide most effective solutions.	As above		
	2.5	Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.	As above		
3 Test, document and implement engineering solution for induction machine problem.	3.1	Solutions to machine problems are tested to determine their effectiveness and modified where necessary.	Q 7 of Test 3 Q 1 to 12 of Test 4		
	3.2	Adopted solutions are documented including instruction for their implementation that incorporates risk control measure to be followed	Q 7 of Test 3 Q 1 to 12 of Test 4		
	3.3	Appropriately competent and qualified person(s) required to implement solutions to synchronous machine problems are coordinated in accordance with regulatory requirements and enterprise policy	Q 7 of Test 3 Q 1 to 12 of Test 4		
	3.4	Justification for solutions used to solve synchronous machine problems is documented for inclusion in work/project development records in accordance with professional	Q 7 of Test 3 Q 1 to 12 of Test 4		

Add rows to the following table as required

Performance Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
Three phase motor No Load Test		Practical 1	
Three phase motor speed measurement		Practical 2	
Testing motor winding impedance		Practical 3	
Testing motor winding polarity		Practical 4	
Three phase induction motor winding design diagram			Project 1

Add rows to the following table as required

Knowledge Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
T1 Operating principles of polyphase induction motors	Test 2 Q1 +2 of G145 A Assessment Mapping+ Performance+ Marking Guide.pdf Page 9		
T2 Construction of polyphase induction motors	Test 2 Q 4+5 of G145 A Assessment Mapping+ Performance+ Marking Guide.pdf Page 9		
T3 Speed-torque relationships in induction motors	Test 2 Q 9, 10, 25 of G145 A Assessment Mapping+ Performance+ Marking Guide.pdf Page 10+11		
T4 Induction motor performance testing	Test 2 Q 26+27 of G145 A Assessment Mapping+ Performance+ Marking Guide.pdf Page 12		

Knowledge Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
T5 Induction motor starters		Refer Practical 6 of UEENEEG006A Direct Online Motor Starter Forward/ Reverse Motor Starter Investigation	Test 2 Q 31+32 of G145 A Assessment Mapping+ Performance+ Marking Guide.pdf Page 13
T6 Reduced voltage starting			Advanced Diploma in Electrical Engineering Exercises Page 164) Q 46 to 51
T7 Speed control of induction motors			Advanced Diploma in Electrical Engineering Exercises Page 165) Q 54, 55, 60
T8 Braking of induction motors			Advanced Diploma in Electrical Engineering Exercises Page 165) Q 54, 55, 60
T9 Motor protection			Advanced Diploma in Electrical Engineering Exercises Page 165) Q 62,63

Knowledge Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
T10 Motor selection criteria and RMS rating			Advanced Diploma in Electrical Engineering Exercises Page 171) Q 110 to 123
T12 Single phase induction motors			Advanced Diploma in Electrical Engineering Exercises Page 171) Q 105, 106

Add rows to the following table as required

Assessment Conditions	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the welectrical workshop K2.11. Application of safe working practice & regarding the housekeeping rules are to be observed. Emergency procedures are to be informed. Safety equipments & first aids equipments are to be available. The students get the access to • Relevant practical equipments Records relating to electrical engineering resources	Test 1, 2, 3,4	Practical	All assignments+ Project

Created by (Name)	U Kyaw Naing (Joe)	**Date created**	
Approved by (Name)		**Date approved**	
Signature		**Date modified**	

UEENEEG145A Develop engineering solutions for induction machine

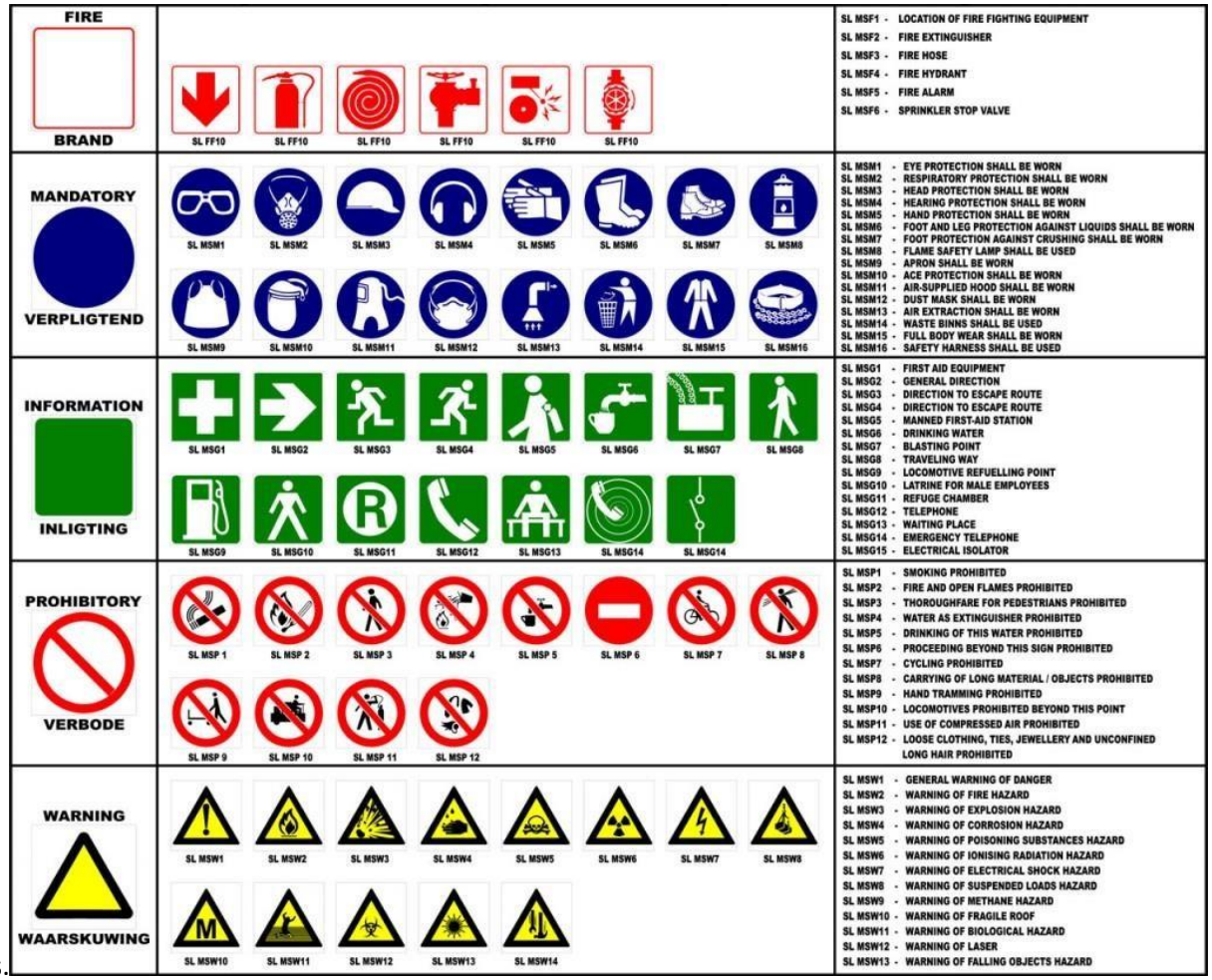
UNIT CAPSTONE ASSESSMENT

ASSESSMENT QUESTIONS & TESTS ARE BASED ON THE FOLLOWINGS,THEY ARE MODIFIED, EXTRACTED SOME PARTS, APPLIED THE SIMILAR ONES,ALTER AND UTILIZED IN ASSESSMENT TASKS & THEORY TESTS FROM TIME TO TIME.

1 1 Prepare to developengineering solution for synchronous machine problems

1.1	OHS procedures for a given work area are obtained and understood through established routines and procedures.

Q1. Identify safety equipments & signs to be used when you are using fitting & machining process.



Answers +Marking Guide (2 marks)

Safety glass

Safety glove

Safety shoe

Ear protection

First aids sign

Q2 Write the safety procedure to operate the drilling machine

Answers +Marking Guide (5 marks)

PRE-OPERATIONAL SAFETY CHECKS

1. **Check workspace and walkways to ensure no slip-hazards are present.**
2. **Check that the drill chuck guard is in position.**
3. **Ensure the chuck key (if used) has been removed from the drill chuck.**
4. **Locate and ensure you are familiar with the operation of the ON/OFF starter and E-Stop (if fitted).**
5. **Follow correct clamping procedures to ensure work is secure.**
6. **If the job obstructs the walkway erect a barricade.**
7. **Adjust spindle speed to suit drill or cutter diameter.**
8. **Faulty equipment must not be used. Immediately report suspect equipment.**

OPERATIONAL SAFETY CHECKS

1. **Never leave the Drill Press while it is running.**
2. **Before making adjustments or before cleaning swarf accumulations switch off and bring the machine to a complete standstill.**
3. **Feed downwards at a sufficient rate to keep the drill cutting.**
4. **Feed with care as the drill breaks through the underside of the work.**
5. **Use a safe working posture (beware of hair catching).**

HOUSEKEEPING

1. **Switch off the machine.**
2. **Leave the machine in a safe, clean and tidy state.**

POTENTIAL HAZARDS

- **Hair/clothing entanglement - rotating spindle/drill**
- **Eye injuries**
- **Flying swarf/chips**
- **Sharp edges & burrs**

1.2 Established OHS risk control measures and procedures

Q3 What are the main source of hazards to use the drilling machine?

Answers +Marking Guide (5 marks)

(1) Hazards related to the machinery or plant, materials or items being processed or internal sources of energy, for example:
- drawing in or trapping hazards;
- entanglement hazards;

- shearing hazards;
- cutting hazards;
- impact hazards;

(2) hazards related to the location of the machine or plant, for example:
- its stability, for instance, whether it could roll or fall over;

(3) hazards related to systems of work associated with the machine or plant, for example manual handling injuries caused when putting materials into them.

To prevent the hazards, the above risks are to be identified & eliminated.

Q4.Write WHS Duty of Care Checklist for Managers/Supervisors

Answers +Marking Guide (8 marks)

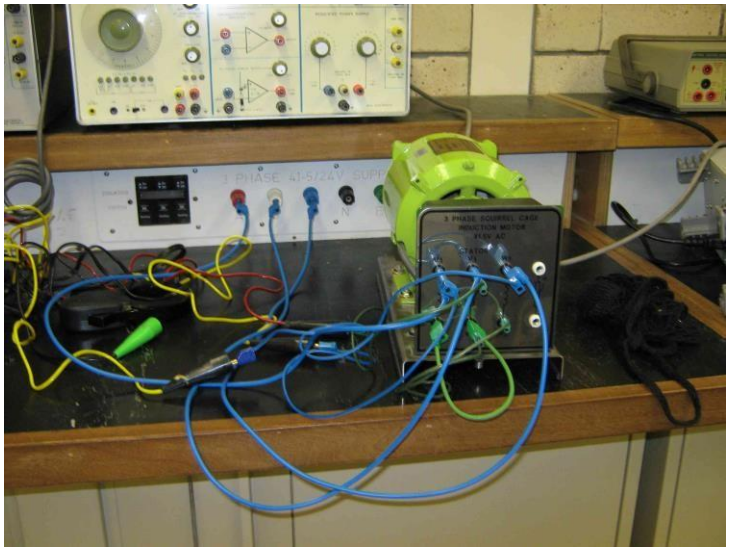
WHS Duty of Care Checklist for Managers/Supervisors

- Familiarise yourself with the organization Work Health & Safety Policy 2016 and Work Health and Safety Procedures to ensure you are aware of your personal responsibility for workplace health and safety (WHS) within your area of delegated authority.
- Ensure that the work for which you are responsible is carried out in accordance with the University's WHS risk management steps to safeguard the health, safety and wellbeing of those involved and others who may be affected.
- Demonstrate active and visible leadership in WHS risk management. Identify hazards or WHS risks associated with different jobs, tasks and projects and assess the risks to the health and safety of those involved. Conduct this risk identification and assessment in consultation with those involved or affected.
- Implement suitable risk controls within agreed timeframes. These may include competency based training, adequate supervision and adoption of safe operating procedures. Choose these risk controls in consultation with those involved or affected.
- Inform staff, students and contractors of WHS requirements and expectations, directing them to relevant information and risk control resources available. This may include local WHS induction (refer to the WHS induction checklist), on-the-job instruction and specific WHS training.
- Promptly address WHS issues that are brought to your attention in consultation with those involved or affected.
- Refer WHS issues that are beyond your control to the relevant manager(s) for their attention, but ensure that interim action is taken to reduce the risks in a practical way.
- Investigate incidents, seeking to identify the causes and take steps to prevent recurrence.

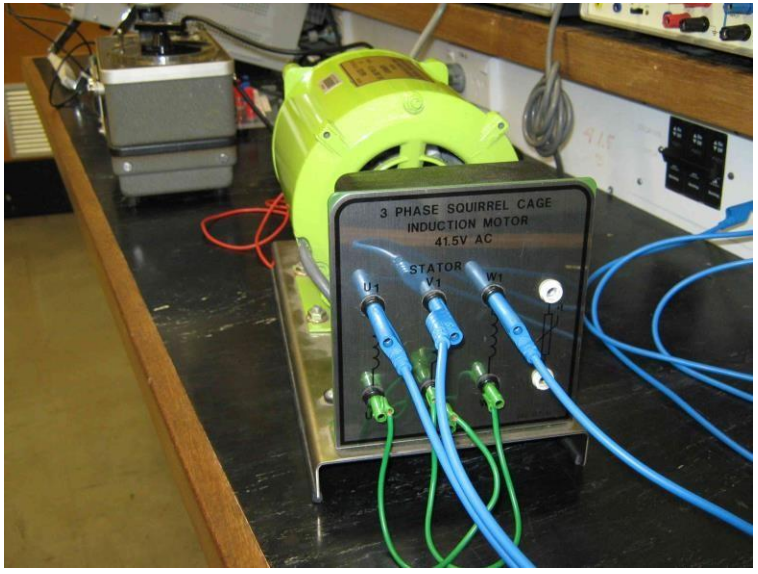
1.3 The extent of the machine problem is obtained from documentation and from work supervisor to establish the scope of work to be undertaken.

The performance characteristics of AC Induction Motors are to be assessed by performing the following practical tasks.

Practical 1-Three phase motor No Load Test

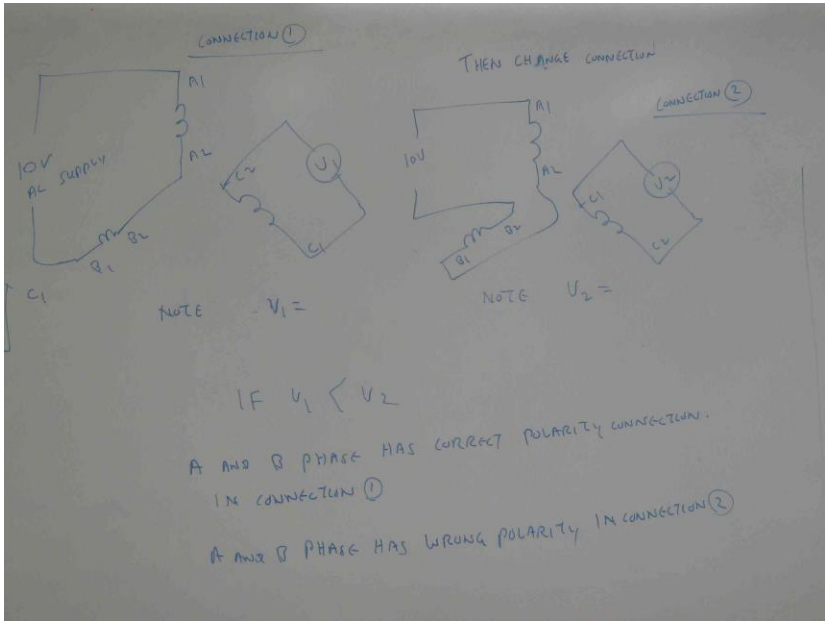


Practical 2 Three phase motor speed measurement



Practical 3 Testing motor winding impedance

Practical 4 Testing motor winding polarity



Students performance in the practical is assessed.

1.4 Activities are planned to meet scheduled timelines in consultation with others involved in

the work.

Students cooperation & performance in the practical is assessed.

1.5 Effective strategies are formed to ensure solution development and implementation is carried out

1.5Effective strategies are formed to ensure solution development and implementation is carried out efficiently.

Ref-Advanced Diploma in Electrical Engineering Exercises Page 208)

(3) Strategy objective

Slide 1+2
Q11.What are the developing of strategies in project?
Q12.How will you examine the effectiveness of activities in project management?

Students co-operation in the practical is evaluated.

2 Develop engineering solution for induction machine problems.	
2.1	Established OHS risk control measures and procedures for carrying out the work are followed.

As per 1.1, 1.2 & 1.3

2.2 Knowledge of induction machine construction, operation, characteristics and applications are applied to developing solutions to synchronous machine problems.

2.3 Parameters, specifications and performance requirements in relation to each machine problem are obtained in accordance with established procedures.

2.4 Approaches to resolving induction machine problems are analysed to provide most effective solutions.

2.5 Unplanned events are dealt with safely and effectively consistent with regulatory requirements and enterprise policy.

2.6 Quality of work is monitored against personal performance agreement and/or established organizational or professional standards.

ASSESSMENT

The students' performance in the following questions are to be assessed.

1. Explain the operation principle of capacitor start motor.

(3 marks)

2. Sketch the vector diagram of capacitor run motor.

(3 marks)

3. Sketch the circuit diagram of capacitor run motor.

(3 marks)

4. How will you reverse the direction of the rotation of single phase motor.

(1 marks)

5. Explain the operation of shaded pole motor.

(3 marks)

6. A small 60Hz hysteresis clock motor possesses 32 poles. In making one complete turn with respect to the revolving field, the hysteresis loss in the rotor amounts to 0.8J

   (i) Calculate (a) The pull in and pull out torques (b) The maximum power out put before the motor stalls (c) The rotor losses when the motor is stalled (d) The rotor losses when the motor runs at synchronous speed.

(4 marks)

7. State (i) Locked rotor torque (ii) Breakdown torque

   (ii) Sketch the shaded pole and indicate the direction of rotation.

(3 marks)

8. Sketch the connection of universal motor.

(2 marks)

9. Compare advantages and disadvantages of 1 phase and 3 phase motors.

(2 marks)

10. What are the abnormal operating conditions for AC induction motors.

(2 marks)

11. A large reel of paper installed at the end of paper machine has a diameter of 1.8 m a length of 5 .6 m and a moment of inertia of 4500 kg-m^2 . It is driven by a directly coupled variable speed dc motor turning at 120rpm. The paper is kept under a constant tension of 6000N.

    (a) Calculate the power of the motor when the reel turns at a constant speed of 120 rpm

(b) If the speed has to be raised from 120 rpm to 160 rpm in 5 s , calculate the torque that the motor must develop during this interval.
(c) Calculate the power of the motor after it has reached the desired speed of 160 rpm.
(d) Calculate the power of the motor after it has reached the desired speed of 160 rpm.

(8 marks)

12. A motor has been idle for several days in an ambient temperature of 19 deg C is found to have a field resistance of 22 ohm. The motor then operates at full load and when temperatures have stabilized, the field resistance is found to be 30 ohm. The corresponding ambient temperature is 24 deg C. If the motor is built with class B insulation.

Calculate the followings

i. The average temperature of the winding at full load
ii. The full load temperature rise by the resistance method.
iii. Whether the motor meets the temperature standards.

(6 marks)

3 Test, document and implement engineering solution for induction machine problem.

3.1 Solutions to machine problems are tested to determine their effectiveness and modified

where necessary.

3.2 Adopted solutions are documented including instruction for their implementation that

incorporates risk control measure to be followed.

3.3 Appropriately competent and qualified person(s) required to implement solutions to synchronous machine problems are coordinated in accordance with regulatory requirements and enterprise policy. (Note)

3.4 Justification for solutions used to solve synchronous machine problems is documented for inclusion in work/project development records in accordance with professional

EKAS Assessment

DELIVERY TO ACHIEVE THE COMPETENCY

Study Option (1)

Guided study (Online)Resources+Online exercises+Online Practicals

Click HERE

&

Youtube Videos for Electrical Engineering Lessons

http://www.mongroupsydney1.com/youtubevideos.htm

www.electricaldiploma2013.webs.com

Study Option (1)

Guided study (Online)Resources+Online exercises+Online Practicals

Click HERE

Elect Machine-G043+G044+G045.zip

Electrical Machines

AC Machines 1

AC Machines 2

The students will have to answers the following questions

(1) AC Machine introduction

Slide 1+2+3

Q1.Derive the formula to calculate rotating magnetic field.

Slide 4+5

Q2.Calculate the synchronous speed of a three phase induction motor having 12 poles , 60HZ.

Slide 6

Q3.Explain the starting characteristics of squirrel cage motor.

Slide 7.

Q4.Sketch the construction of squirrel cage induction motor and wound rotor motor.

Slide 8+9+10+11+12

Q5.Design three phase 48 slots 4 poles winding.

---

(2) Induction motor

Slide 1

Q6.What is distribution factor?

Slide 2

Q7.What is coil span factor?

Slide 3

Q8.How do distribution factor & coil span factor affect the induced emf ?

Slide 4+5

Q9.A 0.7 HP 4 poles induction motor is excited by a single phase 540HZ source is full load speed is

1160 rpm. Calculate the slip.

Slide6+7

Q10.The 4 pole wound rotor induction motor is excited by a three phase 50HZ . Calculate the

frequency of the rotor currentunder the following conditions.

(a) At stand still

158

(b) Motor turning at 600 rpm in the same direction as the revolving field.

(c) Motor turning at 600 rpm in the opposite direction to the revolving field.

(d) Motor turning at 1800 rpm in the same direction to the revolving field.

Slide 8+9+10

Q11.(a) Calculate the approximate full load current . locked rotor current and no load current of a

three phase induction motor having a rating of 600HP, 2400V.

(b) Estimate the apparent power drawn under locked rotor conduction.

(c) State the normal rating of this motor expressed in kilowatt.

---

(3) Motor equivalent circuit.

Slide 1+2

Q12.Sketch the equivalent circuit & equation of induction motor.

---

(4) Wound rotor motor

Slide 1

Q13.Sketch DOL starter

Q14.Write equations for locked rotor current & locked rotor torque.

Slide 2+3+4

Q20.Write the equation for motor current at stand still condition & any slip.

Q21.A 440V 6 poles three phase 50 HZ induction motor has its winding delta connected & its rotor winding star connected. The standstill voltage measured between slip ring with the rotor open circuit 220V. The stator resistance / phase is 0.7 ohm and the stator reactance / phase is 5 ohm. The rotor resistance per phase is 0.07 ohm and rotor reactance per phase is 0.3 ohm. Calculate the rotor current and stator current when slip rings are short circuited to start the motor. Calculate rotor power factor & stator power factor.

Slide 5

Q22.In above problem , calculate rotor current and stator current when slip rings are connected to 5 ohm external resistance and motor is running at 0.04 slip.

Slide 6

Q23.Sketch power transfer in induction machine for (a) motor mode (b) generator mode.

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Slide 7+8

Q24.Write the following equations.

(a) Power absorbed by ideal stator winding

(b) Power dissipated in rotor circuit.

(c) Mechanical power

(d) Power dissipated in rotor resistance

(e) Rotor circuit power loss

(f) Power absorbed by ideal stator winding.

Slide 9

Q25.A 400 V 4 poles three phase 60HZ slip ring induction motor has its stator winding delta connected and rotor winding star connected. The standstill voltage measured between slip rings with the rotor open circuited is 220V. The stator resistance per phase is 4 ohm. The rotor resistance per phase is 0.08 ohm and the rotor reactance per phase is 0.35 ohm. Calculate the maximum torque & slip.

---

(5) Torque +Motor test

Slide 1

Q26.Sketch the power flow diagram in motor.

Q27.Write the equation for

(a) Mechanical power developed by rotor

(b) Mechanical power delivered to load.

(c) Mechanical torque.

---

(6) Synchronous speed + Slip + Power of motor

Slide 1

Q28.A three phase induction motor having synchronous speed of 1200 rpm draws 90kw from three phase feeder. Copper loss & iron loss in stator amount to 7kw. If the motor runs at 1140 rpm, calculate the followings.

(a) Active power transmitted to the rotor

(b) Rotor I 2 R loss.

160

(c) Mechanical power developed.

(d) The mechanical power delivered to the load knowing that the windage & friction losses are equal to 1.5 kw.

(e) The efficiency of motor.

Slide 2+3

Q29.A three phase 8 poles squirrel cage induction motor connected to 50Hz line possesses a rotor speed 1000 rpm. The motor absorbs 45kw and the copper & iron losses in the stator to 6 kw & 2 kw respectively. Calculate the torque developed by motor.

Slide 3+4

Q30.A three phase induction motor having a nominal rating of 80 kw and synchronous speed of 1800 rpm is connected to 660V source. Two meters method show a total power consumption 80kw and an ammeter indicates a line current 77 amp. Rotor speed is 1750 rpm. The following ratings are obtained. Stator iron loss = 2.5 kw, windage and friction loss = 1.5 kw. Resistance between two

stators = 0.3 ohm.

Calculate (a) Power supplied to the rotor.

(b) Rotor I 2 R loss

(c)Mechanical power supplied to the load

(d)Efficiency

(e)Torque developed at 1750 rpm.

---

(7) Motor starters

Slide 1+2

Q31.Describe the motor reduced voltage starting methods.

Slide 3+4+5+6

Q32.Sketch DOL starter.

---

(8) Three phase motor equivalent circuit

Slide 1+2+3

Q33.Explain the tests to determine the equivalent circuit of three phase motor.

Slide 4+5

Q34.A no load test conducted on a 50HP 900 rpm 415 V three phase 50HZ squirrel cage induction

motor yield the following results

No load test

No load voltage (L- L) = 415V

No load current = 15 A

No load power = 1450 watt

Resistance measured between two terminals

Locked rotor test

The locked rotor test conducted at reduced voltage gave the following results

Locked voltage (L to L) = 170V

Locked rotor power = 7500w

Locked rotor current = 70A

Determine the equivalent circuit of motor.

Refer Question & Marking Scheme for Tests

EKAS Components	Assessment Tasks
KS01-EG145A Induction machines diagnostics Evidence shall show an understanding of developing engineering solutions for induction motor problems to an extent indicated by the following aspects: T1 Operating principles of polyphase induction motors encompassing:	SAG Sem 2-2016 –U Kyaw Naing (Joe)/ASSESSMENT Mapping –Sem 2-2016/G143+145 Assessment Mapping/G143+145 Tests www.electricaldiploma2013.webs.com **Youtube Videos for Electrical Engineering Lessons** G043+G045+ G143+145+I145 Page 308 to 329 of

rotating magnetic field torque slip MMF relationships Leakage fluxes T2 Construction of polyphase induction motors encompassing: squirrel cage motors slip-ring motors construction considerations in minimisation of tooth locking T3 Speed-torque relationships in induction motors encompassing: maximum torque torque – slip relationships squirrel cage rotor types power flow in the motors power distribution torque units slip ring rotors T4 Induction motor performance testing encompassing: no-load test	http://www.filefactory.com/file/cf9bf8f/n/Video_Lessons.pdf **Induction and synchronous machines & control** G043+G045 Lesson 1 AC Machine Introduction.zip http://youtu.be/-WlfOPhNDn8 G043+G045 Lesson 2 Slip+Equivalent Ckt.zip http://youtu.be/De79cbk2EOQ http://youtu.be/gprZTitiOao G043+G045 Lesson 3 Power Transfer.zip http://youtu.be/pCMcMPBrUEE http://youtu.be/7tJjDuG5SQc http://youtu.be/dV9VFsXeFnY G043+G045 Lesson 4 Test for equivalent ckt.zip http://youtu.be/HF4bJ6vWX2c G043+G045 Lesson 5 Equivalent Ckt Problems.zip http://youtu.be/PyPQsw0L_o0 http://youtu.be/f8VbD_APNfk http://youtu.be/SROLC5hkoc0 G043+G045 Lesson 6 Motor starting and control.zip

locked rotor tests - development of motor equivalent circuit from test results - analysis of motor performance using circle diagrams T5 Induction motor starters encompassing: - starting requirements - type of starters - starting torque - starting dynamics - static friction - mechanical loads - starting duration T6 Reduced voltage starting encompassing: - starting dynamics - change over conditions - starting duration - acceleration curves T7 Speed control of induction motors encompassing: - constant torque, constant power concepts	http://youtu.be/Utfbzs7Ti6M http://youtu.be/VnNlesPgeZk http://youtu.be/AMO70oGS2Fs http://youtu.be/FQVMCMDSTwo G043+G045 Lesson 7 Synchronous machine introduction.zip http://youtu.be/KM9TJcr2MBk G043+G045 Lesson 8 Synchronous machine ckt problems.zip http://youtu.be/ZGsmZfLiPoc http://youtu.be/bnpYxKtSz1c G043+G045 Lesson 9 Synchronous machine starting.zip http://youtu.be/p4x03LkgBc8 http://youtu.be/yKmNWaxT2Hk G043+G045 Lesson 10 Single phase motor.zip http://youtu.be/9OgmEb0tFpE G043+G045 Lesson 11 Factors affecting motor operation.zip http://youtu.be/sAqyhDlpwwY

torque-flux-voltage relationships rotor resistance control stator impedance control variable frequency control (e.g. PAM, PWM, Flux vector control) T8 Braking of induction motors encompassing: electrical braking systems (plugging, d.c. dynamic, regenerative, capacitor-magnetic) mechanical braking systems (mechanical drum, demag, eddy current) T9 Motor protection encompassing: overload earth fault phase failure T10 Motor selection criteria and RMS rating T11 Induction motor maintenance/repair encompassing: routine maintenance schedules type of repairs (mechanical, electrical) T12 Single phase induction motors encompassing:	

operating principles (especially RMF) construction types speed-torque relationships testing	

ASSESSMENT SCHEDULE

Performance Criteria	Assessment 1 Practical		Assessment 2 Theory
	Continuous Observation	Written Assessment as part of Practical	Written Assessment
1.1	X		
1.2	X		
1.3	X	X	
1.4		X	X
1.5		X	X
2.1	X		
2.2		X	X
2.3		X	X
2.4		X	X
2.5		X	X
2.6		X	X
2.7		X	X
3.1		X	X
3.2		X	X
3.3		X	X
3.4		X	X
EKAS Assessment		X	X

Location of Evidences (Table 1)

Performnce Criteria	Above	Location of Evidences
Marking Guide/ Assessment Cover/ Feedback own record		**ASSESSMENT QUESTIONS IN THE TESTS ARE BASED ON THE QUESTIONS ATTACHED WITH THIS ASSESSMENT MAPPING, BUT IN ACTUAL ASSESSMENT,THEY ARE MODIFIED, EXTRACTED SOME PARTS, APPLIED THE SIMILAR ONES,ALTER AND UTILIZED IN ASSESSMENT TASKS & THEORY TESTS FROM TIME TO TIME**
Students' work in own record	Summative Assessment- Formal Tests	
	Formative Assessment/Practical+ Class works	
Marking Guide to be presented for audit		
Students' work to be presented for audit		

Advanced Diploma in Electrical Engineering Exercises

Click HERE

UEEEL0077 Evaluate and report on the performance of LV machines

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Assessment event 1 Written Test**	**Assessment event 2 Practical & Observation**	**Assessment event 3 Assignment**
1. **Prepare to evaluate and report on the performance of LV Machines**	**1.1**	Work, health and safety (WHS) / occupational health and safety (OHS) risk control measures are identified and applied	Concurrently assessed with Synchronous and Induction machines problems		
	1.2	Machines to be evaluated, and scope of works to be undertaken are identified and confirmed	Concurrently assessed with Synchronous and Induction machines problems		
	1.3	Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety	Concurrently assessed with Synchronous and Induction machines problems		
2. Evaluate single and three phase low voltage machines	**2.1**	Correct machine is identified for a specified range of applications	Concurrently assessed with Synchronous and Induction machines problems		

	2.2	Machine performance is evaluated from measured and calculated values as they apply to single and three-phase low voltage machines and results are recorded	Concurrently assessed with Synchronous and Induction machines problems		
	2.3	Problems are diagnosed, recorded, and solutions are identified	Concurrently assessed with Synchronous and Induction machines problems		
3.Complete work and document problem solving activities.	**3.1**	Results of evaluation and recommendations are reported	Concurrently assessed with Synchronous and Induction machines problems		
	3.2	Justification for identified solutions is reported	Concurrently assessed with Synchronous and Induction machines problems		
	3.3	Work completion is documented, and an appropriate person notified	Concurrently assessed with Synchronous and Induction machines problems		

Assessment Mapping - Template

(streamlined training package)

This template to be used for "new" endorsed streamlined training packages.

Instruction for use: These instructions in RED should be deleted from the completed document. Instructions in **BLUE** should be written over with appropriate information.

- This template is to be completed by the assessment developer to ensure the assessments meet the training package requirements for the unit of competency.
- It must be used during the assessment validation process.
- Record of this document must be retained in the faculty TAS teamshare teaching section.
- Add rows and columns as required below.

This document should be viewed concurrently with E137A Assessment Mapping+Performance+Marking Guide.pdf

Click HERE

Faculty:		**College:**	
Teaching Section:	Electrical Engineering		
Qualification Number and Name:	Advanced Diploma of Engineering Technology-Electrical/ Advanced Diploma of Electrical Engineering		
Unit of Competency Number and Name:	UEECD0016 - Document and apply measures to control WHS risks associated with electrotechnology work		

Copy and paste the following table for each element as required

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Assessment event 1 Written Test**	**Assessment event 2 Practical & Observation**	**Assessment event 3 Assignment**
1.Identify and document hazards and risks.	1.1	Hazards are identified the appropriate persons involved and in accordance with compliance procedures.	Q1 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 1)		
	1.2	Risks associated with identified hazards are determined in consultation with others and documented in accordance with compliance procedures	Q2 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 1)		
			Q3+4 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 2)		
2.Assign levels of risk and develop and document control measures.	2.1	Level of risk is assigned for each identified hazard in accordance with the regulations and following compliance procedures.		Activity 1 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 4)	
	2.2	Control measures are developed for hazard, level of risk and activity to eliminate and/or mitigate the risk following compliance procedures.		Activity 2 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 4)	

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Assessment event 1 Written Test**	**Assessment event 2 Practical & Observation**	**Assessment event 3 Assignment**
	2.3	Level of risk is re-assessed to confirm the required control measures reduce the risk level to as low as reasonably practicable			
	2.4	Hazard, level of risk and control measures are agreed to and documented in consultation with all involved in accordance with compliance procedures		Activity 3 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 4)	
3. Monitor and review the control measures.	3.1	Documented control measures are made available for reference by all involved with the work.		Activity 4 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 4)	
	3.2	Control measures are modified where required in consultation with all involved with the work in accordance with compliance procedures.		Activity 5 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 4)	
	3.3	Document and apply measures to control WHS/OHS risks associated with electrotechnology work		Activity 6 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 5)	
	3.4	Changes and updates are made to relevant documentation, risk register as additional hazards are identified			
	3.5	Documentation of hazards, risks control measures and their application are filed in accordance with workplace procedures			

Add rows to the following table as required

Performance Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment

Performance Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
Identification of hazards	Q1 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 1)		
Types of hazards & risks	Q2 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 1)		
Risk assessment		Activity 1 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 4)	
Control of hazards		Activity 2 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 4)	
Risk control documentation .		Activity 3+4+5+6 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 4)	

Add rows to the following table as required

Knowledge Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
T1 Risk management and assessment of risk T7 Determine the degree of the risk		Activity 1 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 4)	
T3 Hazards associated with extra-low voltage, low-voltage and high-currents	Q1 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 1)		
T4 Hazards and risks and control measures associated with high-voltage	Q2 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 1)		
T2 Hazards and risks and control measures in working on construction sites T5 Hazards and risks and control measures in working with low voltage equipment T6 Hazards and risks and control measures associated with harmful, devices,		Activity 2 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 4)	
T8 Use control measures to eliminate or control the risk T9 Engaging in monitoring and reviewing processes to ensure control measures remain valid		Activity 3+4+5+6 of E137A Assessment Mapping+ Performance+ Marking Guide.pdf (Page 4)	

Add rows to the following table as required

Assessment Conditions	Assessment	Assessment	Assessment

	event 1 Written Test	event 2 Practical & Observation	event 3 Assignment
Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the welectrical workshop K2.11. Application of safe working practice & regarding the housekeeping rules are to be observed. Emergency procedures are to be informed. Safety equipments & first aids equipments are to be available. The students get the access to • Relevant practical equipments • Records relating to electrical engineering resources	All test	All practical	

Created by (Name)	U Kyaw Naing (Joe)	**Date created**	**16 August 2016**
Approved by (Name)		**Date approved**	
Signature		**Date modified**	

UEENEEE137A Document and apply measures to control OHS risks associated with electrotechnology work

ASSESSMENT QUESTIONS & TESTS ARE BASED ON THE FOLLOWINGS,THEY ARE MODIFIED, EXTRACTED SOME PARTS, APPLIED THE SIMILAR ONES,ALTER AND UTILIZED IN ASSESSMENT TASKS & THEORY TESTS FROM TIME TO TIME.

1. Identify and document hazards and risks.

1.1 Hazards are identified the appropriate persons involved and in accordance with compliance procedures.

Q1.How can hazards be identified?

Marking Guide+Answers 4 Marks

1. Talk with workers (including contractors) who are or will be performing any tasks to identify all potential hazards and the best ways to eliminate or reduce risk.
2. Make sure you are aware of any high risk activities, work with new machinery or new work processes before they happen.
3. Understand the hazards associated with tasks you supervise and have risk controls in place before work starts. This could mean preventing work from being done while a safety issue is being resolved.
4. Take action to resolve health and safety issues as soon as possible. This includes escalating the issue to more senior management if necessary. Once agreement is reached on how to fix a problem, implement it as soon as possible.

1.2 Risks associated with identified hazards are determined in consultation with others and documented in accordance with compliance procedures.

Q2. Correctly match the appropriate Hazards & risks.

Workplace Hazard	Example of Hazard	Example of Harm Caused

Thing	Knife	Slips, falls
Substance	Benzene	Shock, electrocution
Material	Asbestos	Cut
Source of Energy	Electricity	Leukemia
Condition	Wet floor	Mesothelioma

Marking Guide+Answers 6 Marks

Workplace Hazard	**Example of Hazard**	**Example of Harm Caused**
Thing	Knife	Cut
Substance	Benzene	Leukemia
Material	Asbestos	Mesothelioma
Source of Energy	Electricity	Shock, electrocution
Condition	Wet floor	Slips, falls
Process	Welding	Metal fume fever
Practice	Hard rock mining	Silicosis

1.3 Provision is made to accommodate changes to documentation should unforseen hazards be identified.

Q3. How do you do a risk assessment?

Marking Guide+Answers 6 Marks

To be sure that all hazards are found:

- Look at all aspects of the work.
- Include non-routine activities such as maintenance, repair, or cleaning.
- Look at accident / incident / near-miss records.
- Include people who work "off site" either at home, on other job sites, drivers, teleworkers, with clients, etc.
- Look at the way the work is organised or "done" (include experience and age of people doing the work, systems being used, etc).
- Look at foreseeable unusual conditions (for example: possible impact on hazard control procedures that may be unavailable in an emergency situation, power outage, etc.).
- Examine risks to visitors or the public.
- Include an assessment of groups that may have a different level of risk such as young or inexperienced workers, persons with disabilities, or new or expectant mothers.

Q4. If you are a driver, fill out the following risk assessment table

Risk Assessment				
Task	**Hazard**	**Risk**	**Priority**	**Control**
Delivering product to customers	Drivers work alone	May be unable to call for help if needed		
	Drivers have to occasionally work long hours	Fatigue, short rest time between shifts		
	Drivers are often in very congested traffic	Increased chance of collision		
		Longer working hours		
	Drivers have to lift boxes when delivering product	Injury to back from lifting, reaching, carrying, etc.		

Marking Guide+Answers 4 Marks

Risk Assessment				
Task	**Hazard**	**Risk**	**Priority**	**Control**
Delivering product to customers	Drivers work alone	May be unable to call for help if needed	High	Communication

	Drivers have to occasionally work long hours	Fatigue, short rest time between shifts	Low	Rostering
	Drivers are often in very congested traffic	Increased chance of collision	Medium	Adjustment of time to drive
		Longer working hours		
	Drivers have to lift boxes when delivering product	Injury to back from lifting, reaching, carrying, etc.	High	Safe lifting

2. Assign levels of risk and develop and document control measures.

2.1 Level of risk is assigned for each identified hazard in accordance with the regulations and following compliance procedures.

Activity (1)

By using the attached risk assessment chart, E137A 2.1, find out the risks that can occur in K2.11 High Power Electrical Workshop & rate the risks.

2.2 Control measures are developed for hazard, level of risk and activity to eliminate and/or mitigate the risk following compliance procedures.

Activity (2)

Based on the outcome of the risk, plan to control the hazards.

2.3 Hazard, level of risk and control measures are agreed to and documented in consultation with all involved in accordance with compliance procedures.

Activity (3)

Perform the group discussion to finalise the risk control documentation.

3. Monitor and review the control measures.

3.1 Documented control measures are made available for reference by all involved with the work.

Activity (4)

Prepare the risk control documentation & file in the locker.

3.2 Control measures are modified where required in consultation with all involved with the work in accordance with compliance procedures.

Activity (5)

The new machine will be installed in K2.11, modify your current risk control plan accordingly. Undergo the group discussion , finalize the updated document & submit it

3.3 Documentation of hazards, risk control measures and their application are filed in accordance with compliance procedures.

Activity (6)

Prepare the risk control documentation & file in the locker.

ASSESSMENT SCHEDULE

E108+E137+G106 are concurrently assessed.

Performance Criteria	Assessment 1 Practical		Assessment 2 Theory
	Continuous Observation	Written Assessment as part of Practical	Written Assessment
1.1		X	X
1.2		X	X
1.3	X		

2.1		X	X
2.2	X	X	
2.3	X		
3.1		X	
3.2		X	
3.3		X	
EKAS Assessment		X	X

ELECTRICAL TRADES REFERENCES

https://www.iqytechnicalcollege.com/electricaltrade2022.htm

Instruction for use: These instructions should be deleted from the completed assessment cover sheet.
This template is to be used by teaching sections to create an assessment Observation checklist for an assessment(s) conducted in the presence of an assessor. The completed Observation checklist must be signed by the student/s and retained by the teaching section.

Faculty:	**C.E.T.**	**Campus:**	
Teaching section:	**Electrical Engineering**		
Qualification Number and Name:	**Advanced Diploma of Engineering Technology Electrical**		
Unit of Competency Number and Name:	UEECD0036 Provide engineering solutions for problems in complex multiple path circuits		
Assessment Task:		**Duration:** (Hours and minutes)	
Assessment Date:		**Location:**	

Assessment instructions: delete or add dot points as required

- Write your name and student number in the appropriate fields below
- Do not use pencil unless otherwise specified by the assessor (e.g. for technical drawings etc)
- This assessment must be completed within the allocated duration.
- Personal electronic devices (USBs / mobile phones / IPads etc) are not permitted.
- You will be observed performing skills by your teacher and assessed accordingly

Assessment Criteria:

- The assessment criteria is listed under each performance criteria for each of the 3 element sections listed below. This assessment observation task's aims to evaluate each performance criteria to prove that the performance evidence has being assessed.

Resources to be supplied by students:

- Pen, pencil, eraser, ruler, toolkit, uniform, safety PPE, etc.

Resources permitted during assessment:

- Standard Dictionaries
- Technical Dictionaries
- Bilingual Dictionaries
- Programmable Calculators
- Non-programmable Calculators

Student Name:			
Student ID:		**Group:**	
Student signature:		**Date:**	

Performance criteria and performance evidence being observed	Y	N	Assessor comments
1. Prepare to work on D.C. electrical circuits.			
1.1 OHS procedures for a given work area are identified, obtained and understood.			
a. Has the student completed a E104 Risk Assessment form?			
b. Is the area to be used for the performance of the test free from hazards?			
c. Is the student wearing proper rubber shoes?			
d. Is the student wearing loose clothing?			
e. Is the student wearing metallic chain or bracelets			
f. What possible hazards does the student envisage in performing the practical test?			
1.2 OHS risk control work preparation measures and procedures are followed.			
a. Is the student able to understand and follow the requirements and outcomes of the practical test ?			
b. Do the required components match what is required for the test?			
1.3 The nature of the circuit problem is obtained from documentation or from work supervisor to establish the scope of work to be undertaken.			
a. Does the practical reflect any of the theory covered in the lecture?			
1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively with others.			
a. This practical test is of an individualistic nature			
1.5 Sources of materials that may be required for the work are identified and accessed in accordance with established procedures.			
a. Has the student read and understood the given information and required test prerequisites?			
1.6 Tools, equipment and testing devices needed to carry out the work are obtained and checked for correct operation and safety.			
a. Has the student checked that tools and equipment are adequate for the test?			
b. Has the student verified that the measuring equipment is fully operational for the test purpose?			
c. Is the student aware of the proper connections to be made on the equipment/			
d. Does the student have enough leads for the connections?			
2. Resolve any D.C. circuit problem found in the practical test.			
2.1 OHS risk control work measures and procedures are followed.			
a. Is the student ensuring that the power is secure off before proceeding with the test?			
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.			
a. Has student checked with teacher before turning the power on?			

2.3 Circuits are checked as being isolated where necessary in strict accordance OHS requirements and procedures.			
a. Verify by measurement that with switch off, there is absolutely no power to the circuit.			
2.4 Established methodological techniques are used to solve d.c. circuit problems from measure and calculated values as they apply to electrical circuit.			
a. With the knowledge of the theory covered in class, compare your theoretical with the practical results, and explain any discrepancies			
2.5 Unexpected situations are dealt with safely and with the approval of an authorised person.			
a. Has the student encountered any functional anomalies of the circuit in question and has she/he reported to the teacher?			
2.6 Problems are solved without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.			
a. Is the student handling of the equipment safe and sustainably acceptable/			
3. Complete work and document problem solving activities.			
3.1 OHS work completion risk control measures and procedures are followed..			
a. Is the student disconnecting the equipment power before dismantling the circuit?			
3.2 Work site is cleaned and made safe in accordance with established procedures.			
a. After finishing the test and dismantling the circuit, has the student checked that the work area is cleaned properly and left tidy with all the power switches secured off?			
3.3 Justification for solutions used to solve circuit problems is documented.			
a. Which theoretical methods did you use to calculate the answers to the practical test?			
3.4 Work completion is documented and appropriate person(s) notified in accordance with established procedures.			
a. Before leaving the test, has the student submitted proper documentation of the theoretical and practical test results, plus the conclusions.?			

Assessment Outcome:	☐ **[Satisfactory - S]** ☐ **[Not Satisfactory - NS]** ☐ **Resubmission (RS)**
Assessor's comment regarding student performance	

Assessor's comment should be specific and based on the marking criteria for the specific assessment event.
Assessor's recommendation on how to improve the performance (if there is any gap)
Assessor's comment should be specific and based on the marking criteria for the specific assessment event.

Assessor Name/ Signature:		**Date:**	

Student Feedback on Outcome(s):

☐ The results of my performance have been discussed and explained to me.

If you would like to request a review of your results or if you have any concerns about your results, contact your teacher or head teacher.

Student's signature:		**Date:**	

Instruction for use: These instructions should be deleted from the completed assessment cover sheet.

This template is to be used

Instruction for use: These instructions should be deleted from the completed assessment cover sheet.
This template is to be used by teaching sections to create an assessment Observation checklist for an assessment(s) conducted in the presence of an assessor. The completed Observation checklist must be signed by the student/s and retained by the teaching section.

Faculty:	Construction Engineering Transport	**Campus:**	
Teaching section:	**Electrical Engineering**		
Qualification Number and Name:			
Unit of Competency Number and Name:	UEEEL0043+ UEEEL0041+ UEEIC0017		
Assessment Task:		**Duration:** (Hours and minutes)	
Assessment Date:		**Location:**	

Assessment instructions: delete or add dot points as required

- Write your name and student number in the appropriate fields
- Do not use Pencil unless otherwise specified by the assessor (e.g. for technical drawings etc)
- This assessment must be completed within the allocated duration.
- Personal electronic devices (mobile phones / IPad) are not permitted.
- You will be observed performing skills by your teacher and assessed accordingly

Assessment Criteria:

- List the performance criteria and performance evidence being assessed by **this** assessment task.

Resources to be supplied by students: delete or add dot points as required

- Pen, pencil, eraser, ruler, toolkit, uniform, safety PPE, etc.

Resources permitted during assessment: delete or add dot points as required

- Standard Dictionaries
- Technical Dictionaries
- Bilingual Dictionaries
- Programmable Calculators
- Non-programmable Calculators

Student Name:			
		Group:	
Student signature:		**Date:**	

Performance criteria and performance evidence being observed	**Y**	**N**	**Assessor comments**

1. Identify & insert performance criteria / performance evidence of assessment	**Y**		
Preparation process to perform the task as described in assessment mapping			
2. Identify & insert performance criteria / performance evidence of assessment	**Y**		
Progress processes in performing the tasks as described in assessment mapping			
3. Identify & insert performance criteria / performance evidence of assessment	**Y**		
Application of theoretical knowledge as described in assessment mapping			
4. Identify & insert performance criteria / performance evidence of assessment	**Y**		
Application of practical methods as described in assessment mapping			
5. Identify & insert performance criteria / performance evidence of assessment	**Y**		
Presentation of final output & record keeping as described in assessment mapping			
6. Identify & insert performance criteria / performance evidence of assessment	**Y**		
Review/Revise/OHS as described in assessment mapping			

UEEEL0041 Develop engineering solution for synchronous machine and control problems

1. Prepare to develop engineering solution for synchronous machine problems.
2. Develop engineering solution for synchronous machine problems.
3. Test, document and implement engineering solution for synchronous machine problem.

UEEIC0017 Develop engineering solutions for d.c. machine and control problems

1. Prepare to develop engineering solution for d.c. machine problems.
2. Develop engineering solution for d.c. machine problems.
3. Test, document and implement engineering solution for d.c. machine problems.

UEEEL0043 Develop engineering solutions for induction machine and control problems

1. Prepare to develop engineering solution for induction machine problems.
2. Develop engineering solution for induction machine problems.
3. Test, document and implement engineering solution for induction machine problems.

Assessment Outcome:	☐ **[Satisfactory - S]** √ ☐ **[Not Satisfactory - NS]** ☐ **Resubmission (RS)**
Assessor's comment regarding student performance	

Assessor's comment should be specific and based on the marking criteria for the specific assessment event.
Assessor's recommendation on how to improve the performance (if there is any gap)
Assessor's comment should be specific and based on the marking criteria for the specific assessment event.

Assessor Name/ Signature:	**U Kyaw Naing**	**Date:**	

Student Feedback on Outcome(s):

☐√ The results of my performance have been discussed and explained to me.

If you would like to request a review of your results or if you have any concerns about yourresults, contact your teacher or head teacher.

Student's signature:		**Date:**	

Instruction for use: These instructions should be deleted from the completed assessment cover sheet.
This template is to be used by teaching sections to create an assessment Observation checklist for an assessment(s) conducted in the presence of an assessor. The completed Observation checklist must be signed by the student/s and retained by the teaching section.

Faculty:	Construction Engineering Transport	**Campus:**	**Ultimo**
Teaching section:	**Electrical Engineering**		
Qualification Number and Name:	**UEE62111/UEE62211**		
Unit of Competency Number and Name:	UEERE0066 **Rewnewable Energy**		
Assessment Task:		**Duration:** (Hours and minutes)	
Assessment Date:		**Location:**	

Assessment instructions: delete or add dot points as required

- Write your name and student number in the appropriate fields
- Do not use Pencil unless otherwise specified by the assessor (e.g. for technical drawings etc)
- This assessment must be completed within the allocated duration.
- Personal electronic devices (mobile phones / IPad) are not permitted.
- You will be observed performing skills by your teacher and assessed accordingly

Assessment Criteria:

- List the performance criteria and performance evidence being assessed by **this** assessment task.

Resources to be supplied by students: delete or add dot points as required

- Pen, pencil, eraser, ruler, toolkit, uniform, safety PPE, etc.

Resources permitted during assessment: delete or add dot points as required

- Standard Dictionaries
- Technical Dictionaries
- Bilingual Dictionaries
- Programmable Calculators
- Non-programmable Calculators

Student Name:			
Student ID:		**Group:**	
Student signature:		**Date:**	

Performance criteria and performance evidence being observed	Y	N	Assessor comments
1. Identify & insert performance criteria / performance evidence of assessment	Y		
Preparation process to perform the task as described in assessment mapping			
2. Identify & insert performance criteria / performance evidence of assessment	Y		
Progress processes in performing the tasks as described in assessment mapping			
3. Identify & insert performance criteria / performance evidence of assessment	Y		
Application of theoretical knowledge as described in assessment mapping			
4. Identify & insert performance criteria / performance evidence of assessment	Y		
Application of practical methods as described in assessment mapping			
5. Identify & insert performance criteria / performance evidence of assessment	Y		
Presentation of final output & record keeping as described in assessment mapping			
6. Identify & insert performance criteria / performance evidence of assessment	Y		
Review/Revise/OHS as described in assessment mapping			

UEERE0012 Develop effective engineering strategies for energy reduction in buildings

1.Prepare to develop strategies for effective energy reduction in buildings
2.Develop strategies for effective energy reduction in buildings
3.Document and report strategies for effective energy reduction in buildings

Assessment Outcome:	☐ **[Satisfactory - S]** √ ☐ **[Not Satisfactory - NS]** ☐ **Resubmission (RS)**
Assessor's comment regarding student performance	
Assessor's comment should be specific and based on the marking criteria for the specific assessment event.	
Assessor's recommendation on how to improve the performance (if there is any gap)	
Assessor's comment should be specific and based on the marking criteria for the specific assessment event.	

Assessor Name/ Signature:	**U Kyaw Naing**	**Date:**	
Student Feedback on Outcome(s): ☐√ The results of my performance have been discussed and explained to me. **If you would like to request a review of your results or if you have any concerns about yourresults, contact your teacher or head teacher.**			
Student's signature:		**Date:**	

Student Assessment Guide (Unit of Competency)
(Streamlined Training Package)

Faculty	C.E.T.	**College**	
Teaching Section	Electrical Engineering		
Qualification Number and Name	Advanced Diploma of Electrical Engineering Advanced Diploma of Engineering Technology - Electrical Advanced Diploma of Engineering Technology - Electronics		
Unit of Competency Number and Name	UEEEC0075 – Troubleshoot Single Phase Input D.C. Power Supplies		
Application	This unit covers determining correct operation of independent power supplies and power supply sections of electronic apparatus. It encompasses working safely, problem solving procedures, including the use of voltage, current and resistance measuring devices, providing solutions derived from measurements and calculations to predictable problems in d.c. power supplies with single phases input. Note: This unit applies to all aspects of Electro-technology – engineering applications only. For general competencies related to Information Technologies refer to the latest endorsed IT Training Package.		
Prerequisites	**Required Prerequisite Competencies**: Granting competency in this unit shall be made only after competency in the following unit(s) or their superseded units in UEE20 Training Package as per mapping table http://www.highlightcomputer.com/UEE11-20Mapping.pdf has/have been confirmed. UEENEEE101A - Apply Occupational Health and Safety regulations, codes and practices in the workplace UEENEEE104A - Solve problems in D.C. circuits UEENEEH102A - Repair Basic Electronic Apparatus by replacement of components UEENEEH114A - Troubleshoot resonance circuits in an electronic apparatus AND UEENEEH119A - Solve problems in multiple path extra low voltage (ELV) A.C. circuits AND UEENEEH169A - Solve problems in basic electronic circuits OR UEENEEG101A - Solve problems in electromagnetic devices AND UEENEEG102A - Solve problems in low voltage A.C. circuits **Literary and Numeracy Skills:** Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"		
Licensing,	Neither Legislative licensing nor Certification licensing requirements are needed		
Required Knowledge & Skills	You will be assessed to prove your competence in the required skills and knowledge below: **Single phase input D.C. power supplies** Evidence shall show an understanding of single phase input D.C. power supplies, applying safe working practices and relevant Standards, Codes and Regulations to an extent indicated by the following aspects: **T1 OH & S:**		

Required Knowledge & Skills	• Apply safe working practices and relevant Standards, Codes and Regulations.
	T2 Power supplies operating principles and applications:
	• Power supply function
	• Block diagram identifying each sub-system
	• Expected waveforms in a power supply
	• Constant Voltage
	• Constant Current
	T3 D.C. rectification circuits:
	• Junction diode characteristics
	• Transformer turns ratio and losses
	• Half wave and full wave rectifiers (centre-tap and bridge)
	• Dual rail supply
	T4 Filter Circuits:
	• Capacitive and inductive filters (capacitor filter, LC filter, CR filter and filter faults
	• Ripple
	• Voltage doublers
	• Series and shunt Clipper and clamping circuits
	T5 Zener diode regulators:
	• Zener shunt regulator circuit
	• Simple, series and shunt transistor regulators
	• Load and line regulation definitions
	• Operating parameters and data sheets
	• Operation of different types of regulated power supplies
	T6 Three terminal linear regulator circuits:
	• Need for regulation
	• Three terminal regulator characteristics
	• Short circuit protection
	• Line and load regulation
	• Regulated power efficiency
	• Remote voltage sensing
	• Linear regulators using integrated circuits
	T7 Electronic testing and measuring devices and techniques:
	• Test/measuring devices and their application - analogue and digital multimeters, voltage and digital testers, signal generators and oscilloscopes
	• Connection of test/measuring devices into a circuit encompassing:
	  • safety procedures
	  • circuit arrangement of test/measuring devices
	• Taking readings
	• Storage, maintenance and care of test/measuring devices
	T8 D.C. Power supply testing and fault finding:
	• Rectifier diode faults
	• Zener diode faults
	• Three terminal regulator faults
	• Purpose and benefits of different types of regulated power supplies
	• Voltage current waveforms at different points within a power supply
	• Emerging technologies

Assessment criteria	You will be assessed against the following criteria to establish your competence in the unit: **Event 1:** Practical Test 1, checks the required skill adequacy of the student to demonstrate his/her competency in working with Linear Power supplies. The student's task is to build a linear power supply and perform the required fault-finding and repairs to make the linear power supply operational. **Event 2:** Theory Exam 1, tests the required student's knowledge on linear power supplies as per the required knowledge contained in the topics delivered on the term. Exam 1 will be conducted during class time and it will contain thirty-five (35) multiple choice and five (5) calculation questions. To achieve competency in Exam 1, the student must answer correctly 50% of the test.

	You will be required to successfully assemble, fault-finding and achieve a fully working power supply and obtain 50% of the theory test to demonstrate your competence in unit H111A.
Assessment methods & schedule	Assessment of this Learning Specification will be based on the evidence that you provide using 2 or more of the following, as prescribed by your local Institute/ College teaching staff: • Observation of skills in practical exercises and • Questioning of knowledge using pen and paper tests, essays, oral tests and/or interviews You will be required to complete all assessments for this unit to demonstrate your competence in this unit. Sufficient evidence must be collected, using local assessment methods/tools identified in the Assessment Table below to demonstrate both the student's: 1. ***Successful Performance of the Competency***, by meeting the requirements in the Work Performance Specification, and an 2. ***Understanding of the required skills and knowledge (KS01-H115A)***, by meeting the requirements in the Learning Specification/s.

Assessment event no.	Assessment Name/ Method	Assessment date	Assessment duration	Assessment venue	Assessment outcome
1	Practical Test				Satisfactory/Not yet satisfactory
2	Theory Exam				Satisfactory/Not yet satisfactory

Reporting assessment outcomes	Your Transcript of Academic Record lists all of your results in your study to date. "This is an ungraded unit; therefore your academic result will be recorded and reported to you as ***Competent*** **(AC)** or ***Not Yet Competent*** **(NC)**". If you achieved competency in this unit but are unable to finish the qualification, you will receive a Transcript of Academic Record showing only the units you completed. A **Statement of Attainment** for the unit/units you have successfully completed will also be provided. Please contact the Head Teacher to initiate this process. **Recognition and credit transfers:** you can apply to have your previous study, work and/or life experiences recognised. Please see Recognition for previous learning and experience for further information.
Resources required for assessments	This unit is assessed using specific resources/tools: **Learner Resource Manual** Students don't need to purchase any Learner Resource Manual : **Principal References** It is advised that students have access to the following reference books as the main references: 1. *Understanding DC power supplies*. Author: David, Barry Publisher: Prentice Hall 2. *Exploring Electronic Devices* Author: Mark E. Hazen Publisher: Saunders College 3. *Electronic Devices* Author: Floyd, Thomas. Publisher: Merrill Publishing

	4. *Introductory Electronic Devices & Circuits* Author: Paynter, Robert Publisher: Prentice Hall You will also be provided with • Access to a simulated environment containing information similar to that which you may encounter in a workplace. • Access to computer systems for real time assessments sufficient to enable participation in the assessment process. **Other Resources** To complete this unit successfully you should bring the following equipment to class with you: • pens, pencils, notepaper, soft rubber eraser • scientific calculator Casio fx-100AU PLUS • hooking Wire single core AWG 22 (Hartland Cables P/N HC0069) • USB memory Stick
Assessment feedback, review or appeals	Your teacher will provide feedback no later than three (3) weeks after all assessment activities have been conducted. If you would like to request a review of your results or if you have any concerns about your results, contact your teacher or head teacher. You will have three weeks from the date you receive your results in which to make an appeal and request a review. You will receive a response within **ten working days** after receipt of the request.
Assessment guidelines	You must submit assessment work and attended scheduled assessments on the required dates. • **If you miss an assessment** you must discuss the issue of the missed assessment with your teacher within seven days, or at your first class attendance after the assessment, whichever occurs first. • **If you miss an exam**, or arrive late by more than 30 minutes after the commencement of the exam, due to illness or circumstances beyond your control, you should contact the teacher of this unit. • **If you are deemed unsatisfactory in an assessment event** you will be eligible to receive one (1) additional reattempt to demonstrate competence. Speak to your teacher for further information. • **If you engage in cheating** such as copying, colluding with another person, using unauthorised notes, or allowing another person to copy your work, you will be liable for disciplinary action as per Student Discipline Policy - Whatever the form of assessment, it is essential that the work you are assessed on is your own. To validate the authenticity of your submitted work it may be checked used anti plagiarism software in addition it may be stored for future plagiarism checking. We provide learners with every reasonable opportunity to have their work assessed and where possible each case of learner absence from an assessment will beconsidered on an individual basis. However, where there are no extenuating circumstances, the following penalties apply: • where the results of the unit are recorded in marks, when the assessment is up to seven days late the result achieved by the learner is reduced by 15% • when the assessment is more than seven days late, the result recorded is recorded as "not yet competent" • for non-attendance at an assessment on a negotiated date, the result is recorded as "not yet competent".

	You can view information related to assessment in *Every Student's Guide to Assessment*
Assessment: reasonable adjustments	If you are a student with a disability it is important for you to indicate this on your enrolment form and make contact with the Teacher / Consultant for Students with a Disability in your Institute for further information. If possible, this should happen beforeyou enrol. They will provide you with appropriate information about the range of units available. Teachers and teacher consultants will arrange for students with a disability tobe given reasonable adjustment in assessment on an individual needs basis. Teachers may make reasonable allowances for the learners, based on the evidence provided, in accordance with the Assessment Policy - This may relate to the timeframefor submitting/attempting the assessment task or to an alternative form of assessmentevidence to be used for assessing the learner's level of achievement.

Teacher Contact Details		

STUDENT ASSESSMENT GUIDE – UNIT OF COMPETENCY

<table>
<tr><td>Qualification</td><td>Engineering Technology – Electrical</td></tr>
<tr><td>Unit of competency</td><td>UEECD0004 Apply material science to solving electrotechnology engineering problems</td></tr>
<tr><td>Unit Descriptor</td><td>This unit covers the application of materials for a specific purpose in electrotechnology. It encompasses working safely, knowledge of materials science including classifications, characteristics and any impact a material may have on health and the environment, the processes of corrosion and degradation, how particular materials are used, solving electrotechnology problems involving of materials for a particular application and documenting justification for such solutions.</td></tr>
<tr><td>Prerequisites</td><td>UEENEEE101A/UEECD0007 Apply Occupational Health and Safety regulations, codes and practices in theworkplace</td></tr>
<tr><td>Assessment criteria</td><td>UEECD0004Materials science in electrotechnology
Evidence shall show that knowledge has been acquired of material science in electrotechnology.
Summary of topics.
Classification, nature and physical properties of materials used in electrotechnology
Dielectric strength and dielectric breakdown, examples to include applications using solids, liquids, gases and vacuum
Conductors and semiconductors
Chemical effects on materials
Material processing and manufacturing
Environment and health issues</td></tr>
<tr><td>Assessment methods</td><td>You will be required to complete all assessments for this unit to demonstrate your competence in this unit:
<table>
<tr><th>Assessment no.</th><th>Assessment method</th><th>Assessment grading</th></tr>
<tr><td>1</td><td>Research Project 1</td><td>[Satisfactory/Not Yet Satisfactory]</td></tr>
<tr><td>2</td><td>Research Project 2</td><td>[Satisfactory/Not Yet Satisfactory]</td></tr>
<tr><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Assessment schedule</td><td>You will be assessed for this unit as per the following schedule:
<table>
<tr><th>Assessment no.</th><th>Assessment date</th><th>Assessment venue</th></tr>
<tr><td>1</td><td></td><td>Industrial Control Lab</td></tr>
<tr><td>2</td><td></td><td>Industrial Control Lab</td></tr>
<tr><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Reporting assessment outcomes</td><td>Your Transcript of Academic Record lists all of your results in your study to date.

“This is an ungraded unit; therefore your result will be recorded and reported to you as Competent (AC) or Not Yet Competent (NC)”.</td></tr>
</table>

	If you have achieved competency in this unit but are unable to finish the qualification, you will receive a Transcript of Academic Record showing only the units you have completed. You will also receive a **Statement of Attainment** for the unit/units you have successfully completed. **Recognition and credit transfers**:you can apply to have your previous study, work and/or life experiences recognised. Recognition of Prior Learning will be determined according to Recognition Policy.
Resources required for assessments	This unit is assessed using specific resources/tools: You will be provided • access to a simulated environment • access to workplace documents, information and resources (such as compliance obligations, enterprise plans, work responsibilities) You are required to bring in the following for the assessments: N/A
Assessment feedback, review or appeals	Your teacher will provide feedback no later than three (3) weeks after all assessmentactivities have been conducted. If you would like to request a review of your results or if you have any concerns about your results, contact your teacher or head teacher. You will have three weeks from the date you receive your results in which to make an appeal and request a review. You will receive a response within **ten working days** after receipt of the request.
Assessment conditions	You must submit assessment work and attended scheduled assessments on the required dates. ○ **If you miss an assessment** you must discuss the issue of the missed assessment with your teacher within seven days, or at your first class attendance after the assessment, whichever occurs first. ○ **If you miss an exam**, or arrive late by more than 30 minutes after the commencement of the exam, due to illness or circumstances beyond your control, you should contact the teacher of this unit. ○ **If you engage in cheating** such as copying, colluding with another person, using unauthorised notes, or allowing another person to copy your work, you will be liable for disciplinary action as per Student Discipline Policy .Whatever the form of assessment, it is essential that the work you are assessed on is your own. We provide learners with every reasonable opportunity to have their work assessed and wherepossible each case of learner absence from an assessment will be considered on an individual basis. However, where there are no extenuating circumstances, the following penalties apply: ○ where the results of the unit are recorded in marks, when the assessment is up to seven days late the result achieved by the learner is reduced by 15% ○ when the assessment is more than seven days late, the result recorded is recorded as “not yet competent” ○ for non-attendance at an assessment on a negotiated date, the result is recorded as “not yet competent”.

Assessment: reasonable adjustments	If you are a student with a disability it is important for you to indicate this on your enrolment form and makecontact with the Teacher / Consultant for Students with a Disability in your Institute for further information. If possible, this should happen before you enrol. They will provide you with appropriate information about therange of units available. Teachers and teacher consultants will arrange for students with a disability to be givenreasonable adjustment in assessment on an individual needs basis. Teachers may make reasonable allowances for the learners, based on the evidence provided, in accordance with the Assessment Policy and guidelines.This may relate to the timeframe for submitting/attempting the assessment task or to an alternative form of assessment evidence to be used for assessing the learner's levelof achievement.

Contact Details		

Student Assessment Guide (Unit of Competency)
(Streamlined Training Package)

Faculty	C.E.T.	**College**	
Teaching Section	Electrical Engineering		
Qualification Number and Name	Advanced Diploma of Engineering Technology - Electrical Advanced Diploma of Electrical Engineering Advanced Diploma of Engineering Technology - Electronics		
Unit of Competency Number and Name	UEECD0005 -Electrotechnology Engineering Physics		
Application	This unit covers the law of physics and how they apply to solving electrotechnology related problems. It encompasses working safely, knowledge of measurements of physical phenomena, linear and angular motion, harmonic motion, wave theory, optics, acoustics and heat capacity and transfer, use of measurement techniques, solving physics related problems and documenting justification for such solutions.		
Prerequisites	**Competencies**: Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed. UEENEEE101A /CD0007Apply Occupational Health and Safety regulations, codes and practicesin the workplace **Literary and Numeracy:** Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"		
Licensing, Legislative or Certification requirements	None		
Required Skills & Knowledge	All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies. You will be assessed to prove your competence in the required skills and knowledge below: **UEECD0005 - Electrotechnology Engineering Physics** Evidence shall show an understanding of electrotechnology engineering maths to an extent indicated by the following aspects: T1 Measurement encompassing • SI units in measurement of physical phenomena • Uncertainty and toleranceT2 Linear motion T3 Angular motion T4 Simple harmonic motion and vibration T5 Wave theory • Interference • Diffraction T6 Electromagnetic waves and propagation T7 Optics • Mirrors and lenses • Optical fibre		

<table>
<tr><td>Required Skills & Knowledge</td><td>T8 Acoustics and ultrasonics
T9 Heat capacity and heat transfer
T1 Measurement encompassing
• SI units in measurement of physical phenomena
• Uncertainty and toleranceT2
Linear motion
T3 Angular motion
T4 Simple harmonic motion and vibration
T5 Wave theory
• Interference
• Diffraction
T6 Electromagnetic waves and propagation
T7 Optics
• Mirrors and lenses
• Optical fibre
T8 Acoustics and ultrasonics
T9 Heat capacity and heat transfer
• Fluid power</td></tr>
<tr><td>Assessment criteria</td><td>Sufficient evidence must be collected, using local assessment methods/tools identified in the Assessment Table below to demonstrate both the student's:
1. Successful Performance of the Competency, by meeting the requirements in the Work Performance Specification, and an
2. Understanding of the required skills and knowledge (KS01-EE082A), by meeting the requirements in the Learning Specification/s.
You will be assessed against the following criteria to establish your competence in the unit:
Event 1: Theory Test 1. Short answers and calculations based on topics T1 to T6.
Event 2: Theory Test 2. Short answers and calculations based on topics T7 to T9.</td></tr>
<tr><td>Assessment methods & schedule</td><td>
<table>
<tr><th>Assessment event no.</th><th>Assessment Name/ Method</th><th>Assessment date</th><th>Assessment duration</th><th>Assessment venue</th><th>Assessment outcome</th></tr>
<tr><td>1</td><td>Theory Test 1</td><td></td><td></td><td></td><td>S/NS</td></tr>
<tr><td>2</td><td>Theory Test 2</td><td></td><td></td><td></td><td>S/NS</td></tr>
</table>
</td></tr>
<tr><td>Reporting assessment outcomes</td><td>Your Transcript of Academic Record lists all of your results in your study to date.
"This is an ungraded unit; therefore your academic result will be recorded and reported to you as Competent (AC) or Not Yet Competent (NC)".
If you achieved competency in this unit but are unable to finish the qualification, you will receive a Transcript of Academic Record showing only the units you completed.
A Statement of Attainment for the unit/units you have successfully completed will also be provided. Please contact the Head Teacher to initiate this process.
Recognition and credit transfers: you can apply to have your previous study, work and/or life experiences recognised. Recognition of Prior Learning will be determined according to Recognition Policy.
Please see Recognition for previous learning and experience for further information.</td></tr>
<tr><td>Resources required for assessments</td><td>You are required to bring in the following for the assessments:
Calculator, Pen.</td></tr>
</table>

Assessment feedback, review or appeals	Your teacher will provide feedback no later than three (3) weeks after all assessment activities have been conducted. If you would like to request a review of your results or if you have any concerns about your results, contact your teacher or head teacher. You will have three weeks from the date you receive your results in which to make an appeal and request a review. You will receive a response within **ten working days** after receipt of the request.
Assessment guidelines	You must submit assessment work and attended scheduled assessments on the required dates. • **If you miss an assessment** you must discuss the issue of the missed assessment with your teacher within seven days, or at your first class attendance after the assessment, whichever occurs first. • **If you miss an exam**, or arrive late by more than 30 minutes after the commencement of the exam, due to illness or circumstances beyond your control, you should contact the teacher of this unit. • **If you are deemed unsatisfactory in an assessment event** you will be eligible to receive one (1) additional reattempt to demonstrate competence. Speak to your teacher for further information. • **For final examinations in Category A or B** (exams that are centrally set and timetabled) you have 10 working days. Your teacher will inform you about the revised examination date which may not be until the following year. • **If you engage in cheating** such as copying, colluding with another person, using unauthorised notes, or allowing another person to copy your work, you will be liable for disciplinary action as per Student Discipline Policy Whatever the form of assessment, it is essential that the work you are assessed on is your own. To validate the authenticity of your submitted work it may be checked used anti plagiarism software in addition it may be stored for future plagiarism checking. We provide learners with every reasonable opportunity to have their work assessed and where possible each case of learner absence from an assessment will beconsidered on an individual basis. However, where there are no extenuating circumstances, the following penalties apply: • where the results of the unit are recorded in marks, when the assessment is up to seven days late the result achieved by the learner is reduced by 15% • when the assessment is more than seven days late, the result recorded is recorded as "not yet competent" • for non-attendance at an assessment on a negotiated date, the result is recorded as "not yet competent".
Assessment: reasonable adjustments	If you are a student with a disability it is important for you to indicate this on your enrolment form and make contact with the Teacher / Consultant for Students with a Disability in your Institute for further information. If possible, this should happen before you enrol. They will provide you with appropriate information about the range of units available. Teachers and teacher consultants will arrange for students with a disability to be given reasonable adjustment in assessment on an individual needs basis. Teachers may make reasonable allowances for the learners, based on the evidence provided, in accordance with the Assessment Policy - This may relate to the timeframe for submitting/attempting the assessment task or to an alternative form of assessment evidence to be used for assessing the learner's level of achievement.

Teacher Contact Details		

Student Assessment Guide (Unit of Competency)
(Streamlined Training Package)

Faculty	C.E.T.	**College**	
Teaching Section	Electrical Engineering		
Qualification Number and Name	Advanced Diploma of Electrical Engineering Advanced Diploma of Engineering Technology - Electrical Advanced Diploma of Engineering Technology - Electronics		
Unit of Competency Number and Name	UEEEL0041 Develop engineering solution for synchronous machine		
Application	This unit covers developing engineering solutions to resolve problems with synchronous machines and their controls. It encompasses working safely, apply extensive knowledge of synchronous machine operation, construction and their application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives. . .		
Prerequisites	Granting competency in this unit shall be made only after competency in the following unit(s) or their superseded units in UEE20 Training Package as per mapping table http://www.highlightcomputer.com/UEE11-20Mapping.pdf has/have been confirmed. UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits UEENEEE125A Provide engineering solutions for problems in complex multiple path circuit UEENEEE126A Provide solutions to basic engineering computational problems AND UEENEEE129A Solve electrotechnical engineering problems OR UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace UEENEEE104A Solve problems in d.c. circuits UEENEEG101A Solve problems in electromagnetic devices and related circuits OR UEENEEH114A Troubleshoot resonance circuits in an electronic apparatus UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace AND UEENEEE104A Solve problems in d.c. circuits OR UEENEEH169A Solve problems in basic electronic circuits		
Licensing,	The skills and knowledge described in this unit require a license to practice in the workplace for work involving direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However 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 regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.		

	Note: 1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation. 2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.
Required Knowledge & Skills	You will be assessed to prove your competence in the required skills and knowledge below: **Synchronous machine diagnostics** Evidence shall show an understanding of developing engineering solutions for synchronous machine problems to an extent indicated by the following aspects: T1 a.c. generators – construction, types and cooling encompassing: □ construction of stator and rotor windings □ rotor construction (cylindrical and salient pole) □ advantages of rotating field construction □ excitation methods □ cooling methods □ prime movers T2 a.c. generators – operating principles and characteristics encompassing: □ a.c. generator equivalent circuits (synchronous reactance and resistance components) □ tests – open circuit, short circuit, stator impedance □ voltage regulation, island generator's terminal voltage load power factor □ determination of excitation voltage and load angle T3 Synchronising a.c. generators encompassing: □ conditions for synchronising (infinite bus) □ methods for synchronising (lamp methods, synchroscope) □ alternator load sharing, parallel operation T4 a.c. generators power, torque and efficiency encompassing: □ power input, input torque, speed □ power losses □ output power, load power factor, rotor angle, pu power □ efficiency □ performance chart interpretation T5 Voltage regulation (AVR) encompassing: □ need for AVR's □ features of AVR's □ effects of rotor inductance □ connections of AVRs □ operation of AVRs T6 a.c. generator operational stability encompassing: □ power output, VAR effects, rotor angle, excitation □ control of VAR (OLTC transformers) □ voltage dependant nature of stability □ critical clearance angle of a.c. generator □ stability limits
Required Knowledge & Skills	T7 a.c. generator protection encompassing: □ restricted, unrestricted primary, back up and duplicated protection □ overcurrent, short circuit, differential, reverse power, load unbalance, rotor overload, loss-of-field, rotor earth fault, station earth fault, under frequency protection □ external fault protection T8 Induction generator encompassing: □ types operating principles, characteristics □ excitation methods □ losses and efficiency □ synchronising and paralleling T9 Three phase synchronous motors encompassing: □ construction – rotor, stator, windings □ excitation methods □ operating principles (equivalent circuits, synchronous impedance) □ hunting and stability limits □ power factor correction

	□ paralleling and synchronisation techniques □ starting methods □ braking methods

Assessment criteria	Before the critical aspects of evidence are considered all prerequisites must be met.
	
	Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines - UEE07'. Evidence shall also comprise:
	
	• A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
	  • Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
	  • Apply sustainable energy principles and practices as specified in the performance criteria and range statement
	  • Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
	  • Demonstrate an appropriate level of skills enabling employment
	  • Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures.
	• Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
	  • Applying OHS practices in the workplace as described in 8) and including:
	  a. Preparing to enter the workplace including, the use of work permits and clearances and isolation permissions.Planning estimation work effectively.
	  b. Understanding and following risk control safe work methods.
	  c. Applying work procedures and instructions as they apply to risk control measures.
	  d. Dealing with accidents and emergencies within the scope of responsibility.
	  e. Participation in consultation processes, identifying hazards and implementing and monitoring control measures.
	Dealing with unplanned events

Assessment methods & schedule	Assessment of this Learning Specification will be based on the evidence that you provide using 2 or more of the following, as prescribed by your local Institute/ College teaching staff: • Observation of skills in practical exercises and • Questioning of knowledge using pen and paper tests, essays, oral tests and/or interviews You will be required to complete all assessments for this unit to demonstrate your competence in this unit. Sufficient evidence must be collected, using local assessment methods/tools identified in the Assessment Table below to demonstrate both the student's: 1. ***Successful Performance of the Competency***, by meeting the requirements in the Work Performance Specification, and an 2. ***Understanding of the required skills and knowledge ,***by meeting the requirements in the Learning Specification/s.

	Assessment event no.	Assessment Name/ Method	Assessment date	Assessment duration	Assessment venue	Assessment outcome
	1	Practical Test				Satisfactory/Not yet satisfactory
	2	Theory Exam				Satisfactory/Not yet satisfactory
Reporting assessment outcomes	Your Transcript of Academic Record lists all of your results in your study to date. "This is an ungraded unit; therefore your academic result will be recorded and reported to you as ***Competent*** **(AC)** or ***Not Yet Competent*** **(NC)**". If you achieved competency in this unit but are unable to finish the qualification, you will receive a Transcript of Academic Record showing only the units you completed. A **Statement of Attainment** for the unit/units you have successfully completed will also be provided. Please contact the Head Teacher to initiate this process. **Recognition and credit transfers:** you can apply to have your previous study, work and/or life experiences recognised. Recognition of Prior Learning will be determined according to Recognition Policy. Please see Recognition for previous learning and experience for further information.					
Resources required for assessments	This unit is assessed using specific resources/tools: **Learner Resource Manual** Students don't need to purchase any Learner Resource Manual : **Principal References** It is advised that students have access to the following reference books as the main references: *Electrical Trade Practice (Latest Edition)* *Australian Electrical Wiring (Latest Edition)* *Electrical Machines, Drives & Power Systems,* *Synchronous Machines & Drives by* AUSTIN HUGHES AND BILL DRURY You will also be provided with • Access to a simulated environment containing information similar to that which you may encounter in a workplace. • Access to computer systems for real time assessments sufficient to enable participation in the assessment process. **Other Resources** To complete this unit successfully you should bring the following equipment to class with you: • pens, pencils, notepaper, soft rubber eraser • scientific calculator Casio fx-100AU PLUS • USB memory Stick					
Assessment feedback, review or appeals	Your teacher will provide feedback no later than three (3) weeks after all assessment activities have been conducted. If you would like to request a review of your results or if you have any concerns about your results, contact your teacher or head teacher. You will have three weeks from the date you receive your results in which to make an appeal and request a review. You will receive a response within **ten working days** after receipt of the request.					

Assessment guidelines	You must submit assessment work and attended scheduled assessments on the required dates. • **If you miss an assessment** you must discuss the issue of the missed assessment with your teacher within seven days, or at your first class attendance after the assessment, whichever occurs first. • **If you miss an exam**, or arrive late by more than 30 minutes after the commencement of the exam, due to illness or circumstances beyond your control, you should contact the teacher of this unit. • **If you are deemed unsatisfactory in an assessment event** you will be eligible to receive one (1) additional reattempt to demonstrate competence. Speak to your teacher for further information. • **If you engage in cheating** such as copying, colluding with another person, using unauthorised notes, or allowing another person to copy your work, you will be liable for disciplinary action as per Student Discipline Policy - Whatever the form of assessment, it is essential that the work you are assessed on is your own. To validate the authenticity of your submitted work it may be checked used anti plagiarism software in addition it may be stored for future plagiarism checking. We provide learners with every reasonable opportunity to have their work assessed and where possible each case of learner absence from an assessment will beconsidered on an individual basis. However, where there are no extenuating circumstances, the following penalties apply: • where the results of the unit are recorded in marks, when the assessment is up to seven days late the result achieved by the learner is reduced by 15% • when the assessment is more than seven days late, the result recorded is recorded as "not yet competent" • for non-attendance at an assessment on a negotiated date, the result is recorded as "not yet competent".
Assessment: reasonable adjustments	If you are a student with a disability it is important for you to indicate this on your enrolment form and make contact with the Teacher / Consultant for Students with a Disability in your Institute for further information. If possible, this should happen before you enrol. They will provide you with appropriate information about the range of units available. Teachers and teacher consultants will arrange for students with a disability to be given reasonable adjustment in assessment on an individual needs basis. Teachers may make reasonable allowances for the learners, based on the evidence provided, in accordance with the Assessment Policy This may relate to the timeframe for submitting/attempting the assessment task or to an alternative form of assessment evidence to be used for assessing the learner's level of achievement.

Teacher Contact Details		

Student Assessment Guide (Unit of Competency)
(Streamlined Training Package)

Faculty	C.E.T.	**College**	
Teaching Section	Electrical Engineering		
Qualification Number and Name	Advanced Diploma of Electrical Engineering Advanced Diploma of Engineering Technology - Electrical Advanced Diploma of Engineering Technology - Electronics		
Unit of Competency Number and Name	UEEEL0043 Develop engineering solutions for induction machine		
Application	This unit covers developing engineering solutions to resolve problems with induction machines and their controls. It encompasses working safely; apply extensive knowledge of induction machine operation and construction and their application, gathering and analysing data, applying problem solving techniques, developing and documenting solutions and alternatives . .		
Prerequisites	Granting competency in this unit shall be made only after competency in the following unit(s) or their superseded units in UEE20 Training Package as per mapping table http://www.highlightcomputer.com/UEE11-20Mapping.pdf has/have been confirmed. UEENEEG149A Provide engineering solutions to problems in complex polyphase power circuits UEENEEE125A Provide engineering solutions for problems in complex multiple path circuit UEENEEE126A Provide solutions to basic engineering computational problems AND UEENEEE129A Solve electrotechnical engineering problems OR UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace UEENEEE104A Solve problems in d.c. circuits UEENEEG101A Solve problems in electromagnetic devices and related circuits OR UEENEEH114A Troubleshoot resonance circuits in an electronic apparatus UEENEEE101A Apply Occupational Health and Safety regulations, codes and practices in the workplace AND UEENEEE104A Solve problems in d.c. circuits OR UEENEEH169A Solve problems in basic electronic circuits		
Licensing,	The skills and knowledge described in this unit require a license to practice in the workplace for work involving direct access to plant and equipment connected to installation wiring at voltage above 50 V a.c. or 120 V d.c. However 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 regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships.		

	Note: 1. Compliance with permits may be required in various jurisdictions and typically relates to the operation of plant, machinery and equipment such as elevating work platforms, powder operated fixing tools, power operated tools, vehicles, road signage and traffic control and lifting equipment. Permits may also be required for some work environments such as confined spaces, working aloft, near live electrical apparatus and site rehabilitation. 2. Compliance may be required in various jurisdictions relating to currency in First Aid, confined space, lifting and risk safety measures.
Required Knowledge & Skills	You will be assessed to prove your competence in the required skills and knowledge below: □ excitation methods **Induction machines diagnostics** Evidence shall show an understanding of developing engineering solutions for induction motor problems to an extent indicated by the following aspects: T1 Operating principles of polyphase induction motors encompassing: □ rotating magnetic field torque slip □ MMF relationships □ Leakage fluxes T2 Construction of polyphase induction motors encompassing: □ squirrel cage motors □ slip-ring motors □ construction considerations in minimisation of tooth locking T3 Speed-torque relationships in induction motors encompassing: □ maximum torque □ torque – slip relationships □ squirrel cage rotor types □ power flow in the motors □ power distribution □ torque units □ slip ring rotors T4 Induction motor performance testing encompassing: □ no-load tests locked rotor tests □ development of motor equivalent circuit from test results □ analysis of motor performance using circle diagrams T5 Induction motor starters encompassing: □ starting requirements □ type of starters □ starting torque □ starting dynamics □ static friction □ mechanical loads □ starting duration T6 Reduced voltage starting encompassing: □ starting dynamics □ change over conditions □ starting duration □ acceleration curves
Required Knowledge & Skills	T7 Speed control of induction motors encompassing: □ constant torque, constant power concepts □ torque-flux-voltage relationships □ rotor resistance control □ stator impedance control □ variable frequency control T8 Braking of induction motors encompassing: □ electrical braking systems (plugging, d.c. dynamic, regenerative, capacitor-magnetic) □ mechanical braking systems (mechanical drum, demag, eddy current) T9 Motor protection encompassing: □ overload □ earth fault □ phase failure

	T10 Motor selection criteria and RMS rating T11 Induction motor maintenance/repair encompassing: □ routine maintenance schedules □ type of repairs (mechanical, electrical) T12 Single phase induction motors encompassing: □ operating principles (especially RMF) □ construction types speed-torque relationships □ testing

Assessment criteria	Before the critical aspects of evidence are considered all prerequisites must be met.
	
	Evidence for competence in this unit shall be considered holistically. Each Element and associated performance criteria shall be demonstrated on at least two occasions in accordance with the 'Assessment Guidelines − UEE20 Evidence shall also comprise:
	
	• A representative body of work performance demonstrated within the timeframes typically expected of the discipline, work function and industrial environment. In particular this shall incorporate evidence that shows a candidate is able to:
	  • Implement Occupational Health and Safety workplace procedures and practices, including the use of risk control measures as specified in the performance criteria and range statement
	  • Apply sustainable energy principles and practices as specified in the performance criteria and range statement
	  • Demonstrate an understanding of the essential knowledge and associated skills as described in this unit. It may be required by some jurisdictions that RTOs provide a percentile graded result for the purpose of regulatory or licensing requirements.
	  • Demonstrate an appropriate level of skills enabling employment
	  • Conduct work observing the relevant Anti Discrimination legislation, regulations, polices and workplace procedures.
	• Demonstrated consistent performance across a representative range of contexts from the prescribed items below:
	  • Applying OHS practices in the workplace as described in 8) and including:
	  a. Preparing to enter the workplace including, the use of work permits and clearances and isolation permissions.Planning estimation work effectively.
	  b. Understanding and following risk control safe work methods.
	  c. Applying work procedures and instructions as they apply to risk control measures.
	  d. Dealing with accidents and emergencies within the scope of responsibility.
	  e. Participation in consultation processes, identifying hazards and implementing and monitoring control measures.
	Dealing with unplanned events

Assessment methods & schedule	Assessment of this Learning Specification will be based on the evidence that you provide using 2 or more of the following, as prescribed by your local Institute/ College teaching staff: • Observation of skills in practical exercises and • Questioning of knowledge using pen and paper tests, essays, oral tests and/or interviews You will be required to complete all assessments for this unit to demonstrate your competence in this unit. Sufficient evidence must be collected, using local assessment methods/tools identified in the Assessment Table below to demonstrate both the student's: 1. ***Successful Performance of the Competency***, by meeting the requirements in the Work Performance Specification, and an

2. ***Understanding of the required skills and knowledge*** by meeting the requirements in the Learning Specification/s.

Assessment event no.	Assessment Name/ Method	Assessment date	Assessment duration	Assessment venue	Assessment outcome
1	Practical Test				Satisfactory/Not yet satisfactory
2	Theory Exam				Satisfactory/Not yet satisfactory

Reporting assessment outcomes

Your Transcript of Academic Record lists all of your results in your study to date.

"This is an ungraded unit; therefore your academic result will be recorded and reported to you as ***Competent*** **(AC)** or ***Not Yet Competent*** **(NC)**".

If you achieved competency in this unit but are unable to finish the qualification, you will receive a Transcript of Academic Record showing only the units you completed. A **Statement of Attainment** for the unit/units you have successfully completed will also be provided. Please contact the Head Teacher to initiate this process.

Recognition and credit transfers: you can apply to have your previous study, work and/or life experiences recognised.

Please see Recognition for previous learning and experience for further information.

Resources required for assessments

This unit is assessed using specific resources/tools:

Learner Resource Manual

Students don't need to purchase any Learner Resource Manual :

Principal References

It is advised that students have access to the following reference books as the main references:

Electrical Trade Practice (Latest Edition)
Australian Electrical Wiring (Latest Edition)
Electrical Machines, Drives & Power Systems,
Induction Machines & Drives by AUSTIN HUGHES AND BILL DRURY
Electrical Machines Diagnosis by Jean-Claude Trigeassou

You will also be provided with

- Access to a simulated environment containing information similar to that which you may encounter in a workplace.
- Access to computer systems for real time assessments sufficient to enable participation in the assessment process.

Other Resources

To complete this unit successfully you should bring the following equipment to class with you:

- pens, pencils, notepaper, soft rubber eraser
- scientific calculator Casio fx-100AU PLUS
- USB memory Stick

Assessment feedback,

Your teacher will provide feedback no later than three (3) weeks after all assessment activities have been conducted.

review or appeals	If you would like to request a review of your results or if you have any concerns about your results, contact your teacher or head teacher. You will have three weeks from the date you receive your results in which to make an appeal and request a review. You will receive a response within **ten working days** after receipt of the request.
Assessment guidelines	You must submit assessment work and attended scheduled assessments on the required dates. • **If you miss an assessment** you must discuss the issue of the missed assessment with your teacher within seven days, or at your first class attendance after the assessment, whichever occurs first. • **If you miss an exam**, or arrive late by more than 30 minutes after the commencement of the exam, due to illness or circumstances beyond your control, you should contact the teacher of this unit. • **If you are deemed unsatisfactory in an assessment event** you will be eligible to receive one (1) additional reattempt to demonstrate competence. Speak to your teacher for further information. • . • **If you engage in cheating** such as copying, colluding with another person, using unauthorised notes, or allowing another person to copy your work, you will be liable for disciplinary action as per Student Discipline Policy - Whatever the form of assessment, it is essential that the work you are assessed on is your own. To validate the authenticity of your submitted work it may be checked used anti plagiarism software in addition it may be stored for future plagiarism checking. We provide learners with every reasonable opportunity to have their work assessed and where possible each case of learner absence from an assessment will beconsidered on an individual basis. However, where there are no extenuating circumstances, the following penalties apply: • where the results of the unit are recorded in marks, when the assessment is up to seven days late the result achieved by the learner is reduced by 15% • when the assessment is more than seven days late, the result recorded is recorded as "not yet competent" • for non-attendance at an assessment on a negotiated date, the result is recorded as "not yet competent".
Assessment: reasonable adjustments	If you are a student with a disability it is important for you to indicate this on your enrolment form and make contact with the Teacher / Consultant for Students with a Disability in your Institute for further information. If possible, this should happen before you enrol. They will provide you with appropriate information about the range of units available. Teachers and teacher consultants will arrange for students with a disability to be given reasonable adjustment in assessment on an individual needs basis. Teachers may make reasonable allowances for the learners, based on the evidence provided, in accordance with the Assessment Policy This may relate to the timeframe for submitting/attempting the assessment task or to an alternative form of assessment evidence to be used for assessing the learner's level of achievement.

Teacher Contact Details		

Student Assessment Guide (Unit of Competency)
(Streamlined Training Package)

Faculty		**College**	
Teaching Section	Electrical Engineering		
Qualification Number and Name	Advanced Diploma of Engineering – Electrical Advanced Diploma of Engineering Technology - Electrical		
Unit of Competency Number and Name	UEEEL0062 A Provide engineering solutions to problems in complex polyphase power circuits		
Application	This unit covers determining correct operation of complex polyphase power circuits and providing solutions as they apply to electrical power engineering work functions. It encompasses working safely, problem solving procedures, including using electrical measuring devices, applying appropriate circuit theorems and providing solutions derived from measurements and calculations and justification for such solutions. Note: This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.		
Prerequisites	**Essential Competencies:** Granting competency in this unit shall be made only after competency in the following unit(s) or their superseded units in UEE20 Training Package as per mapping table http://www.highlightcomputer.com/UEE11-20Mapping.pdf has/have been confirmed. UEENEEE125A Provide engineering solutions for problems in complex multiple path circuits and UEENEEG102A Solve problems in low voltage a.c. circuits		
Licensing,	The skills and knowledge described in this unit require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However 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 regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships		
	REQUIRED SKILLS AND KNOWLEDGE **7)** This describes the essential skills and knowledge and their level, required for this unit.		

Required Knowledge & Skills	Evidence shall show that knowledge has been acquired of safe working practices and providing solutions for problems in complex polyphase power circuits. All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies. **Polyphase power circuit analysis** Evidence shall show an understanding of polyphase power circuit analysis to an extent indicated by the following aspects: T1 Polyphase supply system encompassing: advantage of three phase system compared to single phase systems double subscript notation phase sequence 120 degree operator given circuit component parameters, solve practically based problems using: equivalent circuits of transformers, lines and loads. component values using rectangular and polar notation. current divider and potential divider rules using complex impedances. The "per unit" values of voltage, current, VA and impedance to a common VA base. T2 Types of three phase system connections encompassing: supply to balanced star, 3 and 4 wire loads supply to delta connected loads effects of phase reversal representation of currents and voltages as complex phasors for 3 phase and 3 phase and neutral quantities. calculation the values of and draw labeled phasor diagrams, not to scale, to represent complex values of current and voltage for balanced and unbalanced loads for star and delta systems. calculation of values of P, Q and S for balanced and unbalanced systems. draw and label single phase diagrams to represent 1 phase of a complex 3 phase system. represent unbalanced voltages or currents as symmetrical components. Phase to phase currents Phase to neutral/earth currents. T3 Balanced three phase loads encompassing: calculations of balanced loads connected in star calculations of balanced loads connected in delta calculation of steady state values of fault current for various configurations. evaluation of the symmetrical component impedances for the various distribution system components. Transformers (earthed neutral case). Generators (high impedance earth) calculation of fault currents using the per unit approach. calculation using the "worst case" values based on transformer impedance only (ie., a short circuit fault) estimation of peak values using accepted multipliers. effects of the d.c. component on the instantaneous magnitudes of fault currents in transformers and generators. T4 Unbalanced three phase loads encompassing: Star – 4 wire systems Delta systems Star – 3 wire systems Star 4 wire with neutral impedance T5 Power in three-phase circuits encompassing: summation of phase powers and power in balanced loads measurement of power in balanced loads – 2 Wattmeter methods
Required Knowledge & Skills	

T6 Reactive three phase power encompassing:

power triangle calculation
measurement of VAR
power factor correction

T7 Fault currents encompassing:

symmetrical components
positive, negative and zero sequence impedance
fault current breaking and let-through energy capacities of circuit breakers, fuses
importance of fault/arc impedance
calculation of fault currents - phase-to-earth faults
calculation of fault currents - phase-to-phase faults
analysis of asymmetrical faults currents.

T8 Harmonics in three phase systems encompassing:

presence of triple in harmonics in 3 phase systems
effects of 3 phase harmonics for different star and delta connections.
methods for reducing harmonics in three phase systems.

Assessment criteria

You will be assessed against the following criteria to establish your competence in the unit:

Event 1 (Theory test 1) You will be assessed based on the theory test which mainly consist of problem solving however there may be some multiple choice questions. Theory test will cover solving DC circuits using all the circuit analysis techniques and network theorems. It will also contain test of mathematical ability required. Test will be of 50% marks.

Event 2 (Theory test 2) You will be assessed based on the theory test 2 which mainly consist of problem solving and covers all the methods of analysis, network theorems studied under DC circuits but in this the circuits will be AC. Test will be worth 50%

Assessment methods & schedule

Assessment event no.	Assessment Name/ Method	Assessment date	Assessment duration	Assessment venue	Assessment outcome
1	Theory Test 1				Satisfactory/Not yet satisfactory
2	Theory Test 2				Satisfactory/Not yet satisfactory

Reporting assessment outcomes

Your Transcript of Academic Record lists all of your results in your study to date.

"This is an ungraded unit; therefore your academic result will be recorded and reported to you as ***Competent*** **(AC)** or ***Not Yet Competent*** **(NC)**".

If you achieved competency in this unit but are unable to finish the qualification, you will receive a Transcript of Academic Record showing only the units you completed. A **Statement of Attainment** for the unit/units you have successfully completed will also be provided. Please contact the Head Teacher to initiate this process.

Recognition and credit transfers: you can apply to have your previous study, work and/or life experiences recognised. Recognition of Prior Learning will be determined according to Recognition Policy.

Please see Recognition for previous learning and experience - for further information.

Resources required for assessments	**Learner Resource Manual** Students don't need to purchase any Learner Resource Manual : **Principal References** 1) Handouts given by the teacher 2) Class notes 3) Fundamentals of Electrical circuits by D A Bell (In library)
Assessment feedback, review or appeals	Your teacher will provide feedback no later than three (3) weeks after all assessment activities have been conducted. If you would like to request a review of your results or if you have any concerns about your results, contact your teacher or head teacher. You will have three weeks from the date you receive your results in which to make an appeal and request a review. You will receive a response within **ten working days** after receipt of the request.
Assessment guidelines	You must submit assessment work and attended scheduled assessments on the required dates. • **If you miss an assessment** you must discuss the issue of the missed assessment with your teacher within seven days, or at your first class attendance after the assessment, whichever occurs first. • **If you miss an exam**, or arrive late by more than 30 minutes after the commencement of the exam, due to illness or circumstances beyond your control, you should contact the teacher of this unit. • **If you are deemed unsatisfactory in an assessment event** you will be eligible to receive one (1) additional reattempt to demonstrate competence. Speak to your teacher for further information. • **If you engage in cheating** such as copying, colluding with another person, using unauthorised notes, or allowing another person to copy your work, you will be liable for disciplinary action as per Student Discipline Policy - Whatever the form of assessment, it is essential that the work you are assessed on is your own. To validate the authenticity of your submitted work it may be checked used anti plagiarism software in addition it may be stored for future plagiarism checking. We provide learners with every reasonable opportunity to have their work assessed and where possible each case of learner absence from an assessment will beconsidered on an individual basis. However, where there are no extenuating circumstances, the following penalties apply: • where the results of the unit are recorded in marks, when the assessment is up to seven days late the result achieved by the learner is reduced by 15% • when the assessment is more than seven days late, the result recorded is recorded as "not yet competent" • for non-attendance at an assessment on a negotiated date, the result is recorded as "not yet competent".
Assessment: reasonable adjustments	If you are a student with a disability it is important for you to indicate this on your enrolment form and make contact with the Teacher / Consultant for Students with a Disability in your Institute for further information. If possible, this should happen before you enrol. They will provide you with appropriate information about the range of units available. Teachers and teacher consultants will arrange for students with a disability to be given reasonable adjustment in assessment on an individual needs basis.

	Teachers may make reasonable allowances for the learners, based on the evidence provided, in accordance with the Assessment Policy This may relate to the timeframe for submitting/attempting the assessment task or to an alternative form of assessmentevidence to be used for assessing the learner's level of achievement.

Teacher Contact Details		

Student Assessment Guide (Unit of Competency)
(Streamlined Training Package)

Faculty		**College**	
Teaching Section	Electrical Engineering		
Qualification Number and Name	Advanced Diploma of Engineering - Electrical		
Unit of Competency Number and Name	UEECD0036- Providing engineering solutions for problems in complex multiple path circuits.		
Application	This unit covers determining correct operation of complex multiple path circuits and providing engineering solutions as they apply to various branches of electrotechnology work functions. It encompasses working safely, problem solving procedures, including using electrical measuring devices, applying appropriate circuit theorems and providing solutions derived from measurements and calculations and justification for such solutions. Note: This unit is intended to augment formally acquired competencies. It is suitable for employment-based programs under an approved contract of training.		
Prerequisites	**Essential Competencies**: Granting of competency in this unit shall be made only after competency in the following unit(s) has/have been confirmed. UEECD0039 Provide solutions to basic engineering computational problems **Literary and Numeracy Skills:** Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"		
Licensing,	The skills and knowledge described in this unit require a license to practice in the workplace where plant and equipment operate at voltage above 50 V a.c. or 120 V d.c. However 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 regulations directly related to occupational health and safety and where applicable contracts of training such as apprenticeships		
Required Knowledge & Skills	You will be assessed to prove your competence in the required skills and knowledge below:		

Required Knowledge & Skills	Evidence shall show that knowledge has been acquired of safe working practices and provide engineering solutions for solving problems in complex multiple path circuits. All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies. **Circuit analysis** Evidence shall show an understanding of circuit analysis to an extent indicated by the following aspects: T1 Voltage/Current Sources and Kirchhoff's Law for d.c. Linear Circuits encompassing: • calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources • calculating current and voltage in any d.c. network of up to two loops and three sources. • Kirchhoff's Law using a circuit simulation program. • function and operation of an electronics circuit simulation program. • using electronics circuit simulation program. T2 Superposition Principles for d.c. Linear Circuits encompassing: • d.c. networks (two loops, three sources) • using simulation programs • calculating current and voltage in any d.c. network of up to two loops and three sources. • Superposition theorem using a circuit simulation program. T3 Mesh and Nodal Analysis for d.c. Linear Circuits encompassing: • writing mesh equations for d.c. networks containing up to three loops. • writing Nodal equations for d.c. networks containing up to three nodes. • using mesh analysis to find currents in d.c. networks of up to two loops. • using nodal analysis to find node voltage and branch currents in d.c. networks of up to two nodes • using a circuit simulation program to confirm the results of Mesh analysis or Nodal analysis of d.c. networks. T4 Thévenin's principles for d.c. Linear Circuits encompassing: • calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources. • calculating the Thévenin equivalent voltage and resistance for d.c. networks and determining the load current, voltage and power. • converting the Thévenin equivalent circuit to a Norton equivalent circuit and vice versa. • verifying the equivalence of Thévenin equivalent circuits by measurement. T5 Norton's principles for d.c. linear circuits encompassing: • calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources. • calculating the Norton equivalent current and resistance for d.c. networks and determining the load current, voltage and power. • converting the Thévenin equivalent circuit to a Norton equivalent circuit and vice versa. • verifying the equivalence of Norton equivalent circuits by measurement. T6 Phasors encompassing: • time domain and frequency domain • frequency, angular frequency and units of measurement

- defining rms and convert between time domain and rms phasor values for a sine wave.
- converting between angular frequency and frequency.
- using a calculator to convert between polar and rectangular forms of phasor.
- representing a.c. voltages on a phasor diagram.

T7 Complex Impedance encompassing:

- defining impedance, resistance and reactance.
- defining admittance, conductance and susceptance.
- converting between conductance to resistance.
- converting between susceptance and reactance.
- converting between impedance and admittance.
- sketching impedance and admittance diagrams.
- calculating two-component series equivalent circuits and two-component parallel equivalent circuits and convert between these forms.

T8 Series and parallel a.c. linear circuits encompassing:

- Kirchhoff's Laws
- series equivalent impedance
- parallel equivalent impedance
- voltage divider and current divider rules
- calculating and measuring voltage and currents in a series a.c .circuit and draw the phasor diagram.
- calculating and measuring currents in a parallel a.c. circuit and draw the phasor diagram.
- calculating and measuring voltage and currents in a series/parallel a.c. circuit and draw the phasor diagram.

T9 Superposition principles and Kirchoff's Laws applied to a.c. linear circuits encompassing:

- calculating current and voltage in any a.c. network of up to two loops and two sources.
- using circuit simulation programs to demonstrate the superposition theorem.
- function and operation of an electronics circuit simulation program.
- entering given circuit specifications into an electronic circuit program.
- setting the circuit simulation program operation parameters including input and output values, ranges and graduation.
- producing hardcopies of the circuit and analyse results.

T10 Mesh and Nodal analysis for a.c. linear circuits encompassing:

- Mesh analysis
- Node voltages and nodal analysis
- matrix representation
- method of determinants
- writing mesh equations for a.c. networks containing up to three loops.
- writing nodal equations for a.c. networks containing up to three nodes.
- using mesh analysis to find currents in a.c. networks of up to two loops.
- using nodal analysis to find node voltage and branch currents in a.c. networks of up to two nodes.
- using a circuit simulation program to confirm the results of mesh analysis or nodal analysis of a.c. networks.

T11 Thévenin and Norton theorems applied to a.c. linear circuits encompassing:

- calculating the effect of the internal resistance on terminal voltage and current delivered for practical voltage sources and current sources.

	• calculating the Thévenin equivalent voltage and impedance for a.c. networks and determining the load current, voltage and power. • calculating the Norton equivalent current and impedance for a.c. networks and determining the load current, voltage and power. • converting the Thévenin equivalent circuit to a Norton equivalent circuit and vice versa. • verifying the equivalence of Thévenin and Norton equivalent circuits by measurement. T12 Star-delta conversions encompassing: • Star connections • Star-delta transformation formula equations • selection of appropriate conversion • calculating the delta connected equivalent of a star connected balanced a.c. or d.c. load and vice versa. • converting a complex non-series/parallel network to a series/parallel network by means of star-delta or delta-star conversions. • verifying star-delta and delta-star network conversions by measurements. T13 Complex a.c. power and maximum power transfer theorem encompassing: • true power, reactive power and apparent power • maximum power transfer • calculating real, reactive and apparent power for series/parallel a.c. circuits and state the appropriate units of measurement. • calculating the power factor of a.c. series/parallel circuits. • drawing power triangle for a given circuit. • calculating the load value which would consume maximum power and calculate this power for d.c. networks. • calculating the load value which would consume maximum power in an a.c. network when the load is a pure resistance and calculate the power. • calculating the load value which would consume maximum power in an a.c. network when the load is an impedance of variable resistance and reactance and calculate the power. • verifying load selection by measurement. T14 Transients encompassing: • transients in R-C and R-L circuits • growth and decay • calculating voltage and currents in R-C series circuits using exponential equations. • calculating voltage and currents in R-L series circuits using exponential equations
Assessment criteria	You will be assessed against the following criteria to establish your competence in the unit: **Event 1 (Theory test 1)** You will be assessed based on the theory test which mainly consist of problem solving however there may be some multiple choice questions. Theory test will cover solving DC circuits (T1 to T5) using all the circuit analysis techniques and network theorems. It will also contain test of mathematical ability required. Test will be of 50% marks. **Event 2 (Theory test 2)** You will be assessed based on the theory test 2 which mainly consist of problem solving and covers all the methods of analysis, network theorems studied under DC circuits but in this the circuits will be AC (T6 to T14).

Assessment methods & schedule

Assessment event no.	Assessment Name/ Method	Assessment date	Assessment duration	Assessment venue	Assessment outcome
1	Theory Test 1				Satisfactory/Not yet satisfactory
2	Theory Exam 2				Satisfactory/Not yet satisfactory

Reporting assessment outcomes

Your Transcript of Academic Record lists all of your results in your study to date.

"This is an ungraded unit; therefore your academic result will be recorded and reported to you as ***Competent*** **(AC)** or ***Not Yet Competent*** **(NC)**".

If you achieved competency in this unit but are unable to finish the qualification, you will receive a Transcript of Academic Record showing only the units you completed. A **Statement of Attainment** for the unit/units you have successfully completed will also be provided. Please contact the Head Teacher to initiate this process.

Recognition and credit transfers: you can apply to have your previous study, work and/or life experiences recognised. Recognition of Prior Learning will be determined according to Recognition Policy.

Please see Recognition for previous learning and experience for further information.

Resources required for assessments

Learner Resource Manual

Students don't need to purchase any Learner Resource Manual :

Principal References

1) Handouts given by the teacher
2) Class notes
3) Fundamentals of Electrical circuits by D A Bell (In library)

Assessment feedback, review or appeals

Your teacher will provide feedback no later than three (3) weeks after all assessment activities have been conducted.

If you would like to request a review of your results or if you have any concerns about your results, contact your teacher or head teacher.

You will have three weeks from the date you receive your results in which to make an appeal and request a review.

You will receive a response within **ten working days** after receipt of the request.

Assessment guidelines

You must submit assessment work and attended scheduled assessments on the required dates.

- **If you miss an assessment** you must discuss the issue of the missed assessment with your teacher within seven days, or at your first class attendance after the assessment, whichever occurs first.
- **If you miss an exam**, or arrive late by more than 30 minutes after the commencement of the exam, due to illness or circumstances beyond your control, you should contact the teacher of this unit.
- **If you are deemed unsatisfactory in an assessment event** you will be eligible to receive one (1) additional reattempt to demonstrate competence. Speak to your teacher for further information.

	• **If you engage in cheating** such as copying, colluding with another person, using unauthorised notes, or allowing another person to copy your work, you will be liablefor disciplinary action as per Student Discipline Policy Whatever the form of assessment, it is essential that the work you are assessed on is your own. To validate the authenticity of your submitted work it may be checked used anti plagiarism software in addition it may be stored for future plagiarism checking. We provide learners with every reasonable opportunity to have their work assessed and where possible each case of learner absence from an assessment will beconsidered on an individual basis. However, where there are no extenuating circumstances, the following penalties apply: • where the results of the unit are recorded in marks, when the assessment is up toseven days late the result achieved by the learner is reduced by 15% • when the assessment is more than seven days late, the result recorded is recorded as "not yet competent" • for non-attendance at an assessment on a negotiated date, the result is recorded as "not yet competent".
Assessment: reasonable adjustments	If you are a student with a disability it is important for you to indicate this on your enrolment form and make contact with the Teacher / Consultant for Students with a Disability in your Institute for further information. If possible, this should happen beforeyou enrol. They will provide you with appropriate information about the range of units available. Teachers and teacher consultants will arrange for students with a disability tobe given reasonable adjustment in assessment on an individual needs basis. Teachers may make reasonable allowances for the learners, based on the evidence provided, in accordance with the Assessment Policy - This may relate to the timeframefor submitting/attempting the assessment task or to an alternative form of assessmentevidence to be used for assessing the learner's level of achievement.

Teacher Contact Details		

STUDENT ASSESSMENT GUIDE – UNIT OF COMPETENCY

<table>
<tr><td>Qualification</td><td>Engineering Technology – Electrical</td></tr>
<tr><td>Unit of competency</td><td>UEEIC0013 Develop, enter and verify discrete control programs for programmable controllers
MEM30027A Prepare basic programs for programmable logic controllers</td></tr>
<tr><td>Unit Descriptor</td><td>This unit covers development, installation and testing of programs for programmable controllers (PLC) for a system requiring discrete control functions. It encompasses working safely, applying knowledge of control systems, control system development methods, using ladder diagrams/statement list/function block diagram instruction sets, following written instructions and documenting program development and testing activities.</td></tr>
<tr><td>Prerequisites</td><td>UEENEEE101A /UEECD0007Apply Occupational Health Safety regulations, codes and practices in the workplace</td></tr>
<tr><td>Assessment criteria</td><td>Programmable controllers
Key Areas of Assessment
Software – enter/test /transfer/simulate
Hardware-wiring/safety/Emergency Stops/failsafe
Basic Programming- Examine on/off
Basic Programming Stop/Start
Develop a program from a description
Use Flags / Internals , create Assignment List/symbolic table
Basic Programming – Use Timers
Basic Programming – Use Counter and Comparators
Use Jumps / Blocks / Structured Programming
OH&S – Safety / PLC Safety</td></tr>
<tr><td>Assessment methods</td><td>You will be required to complete all assessments for this unit to demonstrate your competence in this unit:
<table>
<tr><th>Assessment no.</th><th>Assessment method</th><th>Assessment grading</th></tr>
<tr><td>1</td><td>Workplace Simulations
(1-4)</td><td>[Satisfactory/Not Yet Satisfactory]</td></tr>
<tr><td>2</td><td>Practical Test</td><td>[Satisfactory/Not Yet Satisfactory]</td></tr>
<tr><td>3</td><td>Theory Test</td><td>[Satisfactory/Not Yet Satisfactory]</td></tr>
</table></td></tr>
<tr><td>Assessment schedule</td><td>You will be assessed for this unit as per the following schedule:
<table>
<tr><th>Assessment no.</th><th>Assessment date</th><th>Assessment venue</th></tr>
<tr><td>1</td><td></td><td>PLC Lab</td></tr>
<tr><td>2</td><td></td><td>PLC Lab</td></tr>
<tr><td>3</td><td></td><td>PLC Lab</td></tr>
</table></td></tr>
</table>

Reporting assessment outcomes	Your Transcript of Academic Record lists all of your results in your study to date. "This is an ungraded unit; therefore your result will be recorded and reported to you as **Competent** (AC) or **Not Yet Competent** (NC)". If you have achieved competency in this unit but are unable to finish the qualification, you will receive a Transcript of Academic Record showing only the units you have completed. You will also receive a **Statement of Attainment** for the unit/units you have successfully completed. **Recognition and credit transfers**:you can apply to have your previous study, work and/or life experiences recognised. Recognition of Prior Learning will be determined according to TAFE NSW Recognition Policy.
Resources required for assessments	This unit is assessed using specific resources/tools: You will be provided • access to a simulated environment • access to workplace documents, information and resources (such as compliance obligations, enterprise plans, work responsibilities) You are required to bring in the following for the assessments: N/A
Assessment feedback, review or appeals	Your teacher will provide feedback no later than three (3) weeks after all assessmentactivities have been conducted. If you would like to request a review of your results or if you have any concerns about your results, contact your teacher or head teacher. You will have three weeks from the date you receive your results in which to make an appeal and request a review. You will receive a response within **ten working days** after receipt of the request.
Assessment conditions	You must submit assessment work and attended scheduled assessments on the required dates. o **If you miss an assessment** you must discuss the issue of the missed assessment with your teacher within seven days, or at your first class attendance after the assessment, whichever occurs first. o **If you miss an exam**, or arrive late by more than 30 minutes after the commencement of the exam, due to illness or circumstances beyond your control, you should contact the teacher of this unit. o **For final examinations in Category A or B** (exams that are centrally set and timetabled) you have 10 working days. Your teacher will inform you about the revised examination date which may not be until the following year. o **If you engage in cheating**such as copying, colluding with another person, using unauthorised notes, or allowing another personto copy your work, you will be liable for disciplinary action as

	per Student Discipline Policy .Whatever the form of assessment, it is essential that the work youare assessed on is your own. We provide learners with every reasonable opportunity to have their work assessed and where possible each case of learner absence from an assessment will be considered on an individual basis. However, where there are no extenuating circumstances, the following penaltiesapply: ○ where the results of the unit are recorded in marks, when the assessment is up to seven dayslate the result achieved by the learner is reduced by 15% ○ when the assessment is more than seven days late, the result recorded is recorded as “not yetcompetent” ○ for non-attendance at an assessment on a negotiated date, the result is recorded as “not yetcompetent”. .
Assessment: reasonable adjustments	If you are a student with a disability it is important for you to indicate this on your enrolment form and make contact with the Teacher / Consultant for Students with a Disability in your Institute for further information. If possible, this should happen before you enrol. They will provide you with appropriate information about the range of units available. Teachers and teacher consultants will arrange for students with a disability to be given reasonable adjustment in assessment on an individual needs basis. Teachers may make reasonable allowances for the learners, based on the evidence provided, in accordance with the Assessment Policy and guidelines.This may relate to the timeframe forsubmitting/attempting the assessment task or to an alternative form of assessment evidence to beused for assessing the learner’s level of achievement.

Contact Details		

Student Assessment Guide (Unit of Competency)
(Streamlined Training Package)

Faculty	C.E.T.	**College**	
Teaching Section	Electrical Engineering		
Qualification Number and Name	Advanced Diploma of Engineering Technology - Electrical Advanced Diploma of Electrical Engineering Advanced Diploma of Engineering Technology - Electronics		
Unit of Competency Number and Name	UEERE0013 Sustainability in the Energy Sector		
Application	This unit covers developing strategies to address environmental and sustainability issues in the energy sector. It encompasses working safely, apply extensive knowledge of sustainable energy systems and components and their operating parameters, gathering and analysing data, applying problem solving techniques, developing and documenting alternatives solutions.		
Prerequisites	None **Literary and Numeracy:** Participants are best equipped to achieve this unit if they have reading, writing and numeracy skills indicated by the following scales. Description of each scale is given in Volume 2, Part 3 "Literacy and Numeracy"		
Licensing, Legislative or Certification requirements	None		
Required Skills & Knowledge	All knowledge and skills detailed in this unit should be contextualised to current industry practices and technologies. You will be assessed to prove your competence in the required skills and knowledge below: **Sustainability in the Energy Sector** Evidence shall show an understanding of greenhouse reduction strategies to an extent indicated by the following aspects: T1 Principles of sustainability encompassing: • ways in which ecosystems moderate climate. • ways in which ecosystems purify and store water. • ways in which ecosystems recycle waste. T2 Problems in a sustainable world encompassing: • changes to Australian forest cover since white settlement, and the resulting loss of ecosystem and human benefits. • changes to Australia's soils since white settlement, and the resulting loss of ecosystem and human benefits. • changes to Australia's waterways since white settlement, and the resulting loss of ecosystem and human benefits. • place of environmental accounting in quantifying Australia's environmental losses. • limits to Australia's population carrying capacity. T3 Sustainability principles encompassing: • principles within sustainability including: environmental accounting and economies; full cost pricing; triple bottom line ethic; ecologically sustainable development; greenhouse		

Required Skills & Knowledge	gas abatement; energy efficiency; resource and water use efficiency; life cycle costing; renewable energy substitution, cleaner production; waste minimisation, reuse and recycling ecological footprint. T4 Addressing the problem of global warming encompassing: • greenhouse gases and their sources and quantities that contribute to global warmin • global warming impacts for Australia for 2030 and 2070 predicted by CSIRO modelling. • requirements to achieve stable atmospheric concentrations of greenhouse gases. • ecologically and economically sustainable methods for achieving these stable concentrations. T5 Greenhouse gas emissions profile encompassing: • goals and principles of the National Greenhouse Strategy • what a greenhouse gas inventory is, why it is required, and the sectors to which it applies • uses to which the National Greenhouse Gas Inventory can be applied. T6 Understanding and communicating climate change and its impacts encompassing: • the possible impact of climate change in Australia. • techniques for improving the understanding of climate change • techniques for communicating to and educating the general public on greenhouse gas induced climate change. T7 Partnerships for greenhouse action encompassing: • actions achievable by each level of government to implement the NGS. • methods by which the community activity can be engaged in the reduction of greenhouse gas emissions. • initiatives that can be undertaken by the private sector to reduce greenhouse gas emissions. • advantages of international partnerships. • emissions trading system. T8 Efficient and sustainable energy use and supply encompassing: • techniques for reducing the greenhouse intensity of energy supply. • types of renewable energy sources suitable for use in Australia. • methods and technique for improving end-use efficiency. T9 Efficient transport and sustainable urban planning encompassing: • how integrating land use and transport planning can assist the greenhouse problem. • how each of the following can be used to mitigate greenhouse gas; travel demand and traffic management strategies; encouraging greater use of public transport, walking and cycling; freight and logistics systems; improving vehicle fuel efficiency and fuel technologies T10 Greenhouse sinks and sustainable land management encompassing: • how enhancing greenhouse sinks and encouraging sustainable forestry and vegetation management can complement the AGS. • how greenhouse gas emissions are obtained from agricultural production and describe techniques to mitigate the emissions. T11 Models of greenhouse best practice in industrial processes and waste management encompassing: • types and methods of reducing greenhouse gas emissions from industry. • methods of reducing methane emissions from waste treatment and disposal. T12 Adaptation to climate change encompassing: • salient points in each of the key sectors that require analysis and the strategies required in the need for adaptation to climate change
Assessment criteria	Sufficient evidence must be collected, using local assessment methods/tools identified in the Assessment Table below to demonstrate both the student's: 1. ***Successful Performance of the Competency***, by meeting the requirements in the Work Performance Specification, and an 2. ***Understanding of the required skills and knowledge*** *(**KS01-EE082A**)*, by meeting the requirements in the Learning Specification/s. You will be assessed against the following criteria to establish your competence in the unit: **Event 1:** Assignment 1. A full report based on topics T1 to T7, T10 to T12..

<table>
<tr><td></td><td colspan="6">Event 2: Assignment 2. A full report based on topics T8 and T9.</td></tr>
<tr><td>Assessment methods & schedule</td><td>Assessment event no.</td><td>Assessment Name/ Method</td><td>Assessment date</td><td>Assessment duration</td><td>Assessment venue</td><td>Assessment outcome</td></tr>
<tr><td></td><td>1</td><td>Assignment 1</td><td></td><td></td><td></td><td>S/NS</td></tr>
<tr><td></td><td>2</td><td>Assignment 2</td><td></td><td></td><td></td><td>S/NS</td></tr>
<tr><td>Reporting assessment outcomes</td><td colspan="6">Your Transcript of Academic Record lists all of your results in your study to date.

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Please see Recognition for previous learning and experience - for further information.</td></tr>
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</table>

	the authenticity of your submitted work it may be checked used anti plagiarismsoftware in addition it may be stored for future plagiarism checking. We provide learners with every reasonable opportunity to have their work assessedand where possible each case of learner absence from an assessment will be considered on an individual basis. However, where there are no extenuating circumstances, the following penalties apply: • where the results of the unit are recorded in marks, when the assessment is up toseven days late the result achieved by the learner is reduced by 15% • when the assessment is more than seven days late, the result recorded is recorded as "not yet competent" • for non-attendance at an assessment on a negotiated date, the result is recorded as "not yet competent". .
Assessment: reasonable adjustments	If you are a student with a disability it is important for you to indicate this on your enrolment form and make contact with the Teacher / Consultant for Students with a Disability in your Institute for further information. If possible, this should happen beforeyou enrol. They will provide you with appropriate information about the range of units available. Teachers and teacher consultants will arrange for students with a disability tobe given reasonable adjustment in assessment on an individual needs basis. Teachers may make reasonable allowances for the learners, based on the evidence provided, in accordance with the Assessment Policy - This may relate to the timeframefor submitting/attempting the assessment task or to an alternative form of assessmentevidence to be used for assessing the learner's level of achievement.

Teacher Contact Details		

Assessment Mapping - Template

(streamlined training package)

This template to be used for "new" endorsed streamlined training packages.

Instruction for use: These instructions in RED should be deleted from the completed document. Instructions in **BLUE** should be written over with appropriate information.

- This template is to be completed by the assessment developer to ensure the assessments meet the training package requirements for the unit of competency.
- It must be used during the assessment validation process.
- Record of this document must be retained in the faculty TAS teamshare teaching section.
- Add rows and columns as required below.

Faculty:		**College:**	
Teaching Section:	Electrical Engineering		
Qualification Number and Name:	UEE62122 Advanced Diploma of Engineering Technology-Electrical/ UEE62220 Advanced Diploma of Electrical Engineering		
Unit of Competency Number and Name:	**UEECD0010 Compile and produce an energy sector detailed report**		

This unit is to be concurrently assessed with UEENEEE117A

Copy and paste the following table for each element as required

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment Questions & Answers**	**Project Assignment/Report**
1 Prepare to develop a energy sector report. .	1.1	OHS processes and procedures for a given work area are identified, obtained and understood.			Project safety audit report
	1.2	Established techniques for report writing are reviewed are adopted in accordance with organisation policies.		Page 57 to 59 Activities of E124 Report Course book	
	1.3	The scope of the report is evaluated and report parameters established using a formal evaluation/survey processes		Activity 1,2,3 Page 39 to 42 of E124 Report Course book	
	1.4	Criteria from other related works impacting on the report are determined from other sources.		Tasks on page 46 to 49 of E124 Report Course book	
	1.5	Identify source and availability of information		Tasks on page 49 of E124 Report Course book	
2 Develop energy sector report	2.1	Report is developed to include scenarios/requirements established in consultation with appropriate person(s), and regulatory requirements.		Tasks on page 60 to 64 of E124 Report Course book	
	2.2	Report is developed in collaboration with all relevant personnel			Group activity & Role playing activities to produce the project report (Assessed concurrently with G169+G170
	2.3	Competent persons are identified to assist in the compilation of the report			Group activity & Role playing activities to produce the project report (Assessed

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment Questions & Answers**	**Project Assignment/Report**
					concurrently with G169+G170
	2.4	Report is reviewed against all inputs and adjusted to rectify any anomalies			Group activity & Role playing activities to produce the project report (Assessed concurrently with G169+G170
	2.5	Compile report in accordance with organisation policies and procedures.		Page 57 to 59 Activities of E124 Report Course book	
	2.6	Compile and analyse research report information		Tasks on page 44 to 649 of E124 Report Course book	
3 Obtain approval for final energy sector report.	3.1	Report is presented and discussed with person(s) of higher authority.			Report presentation class activity/ Use of projector & power point
	3.2	Alterations to the report resulting from the presentation/discussion are negotiated with person(s) of higher authority within the constraints of organisation policy.			Group assessment tasks, answering the questions
	3.3	Final report is presented and approval obtained from appropriate person(s).			Finalised report presentation

Performance Evidence	Test	Assignment Questions & Answer	Project Assignment / Report
Collecting information		Assignment tasks	

Performance Evidence	Test	Assignment Questions & Answer	Project Assignment / Report
Analyzing data		Assignment tasks	
Research & evaluation			Project work & Presentation
Use of software, graphs, power point, audio visual aids			Project work & Presentation
Discussion & presentation skills			Project work & Presentation
Group work & communication			Project work & Presentation

Knowledge Evidence	Test	Assignment Report	Project Assignment / Report
T1 Communicating with personnel			Project work & Presentation
T2 Communicating with suppliers		Assignment tasks	
T3 Communicating with customers		Assignment tasks	
T4 Purpose and extent of maintaining work activities records		Page 57 to 59 Activities of E124 Report Course book	
T5 Techniques of analysis		Tasks on page 46 to 49 of E124 Report Course book	
T6 Summary of statistics		Page 6 to 38 Activity 1 to 9 of E124 Report Course book	
T7 Correlation and regression		Page 6 to 38 Activity 1 to 9 of E124 Report Course book	
T8 Investigation and reporting			Project work & Presentation

Add rows to the following table as required

Assessment Conditions	Insert	Insert	Insert

	Assessment event 1	Assessment event 2	Assessment event 3
. Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances must be typical of those experienced in the administration – general administration field of work and include access to:			

Created by (Name)		**Date created**	
Approved by (Name)		**Date approved**	
Signature		**Date modified**	

Assessment Mapping - Template

(streamlined training package)

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Teaching Section:	Electrical Engineering		
Qualification Number and Name:	UEE62122 Advanced Diploma of Engineering Technology-Electrical/ UEE62220 Advanced Diploma of Electrical Engineering		
Unit of Competency Number and Name:	**UEECD0024 Implement and monitor energy sector OHS policies and procedures**		

This unit is to be concurrently assessed with UEECD0026

Copy and paste the following table for each element as required

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment Questions & Answers**	**Project Assignment/Report**
1 Provide OHS information to the work group .	**1.1**	Relevant WHS/OHS legislation and codes of practice are explained to work group		Q 1 to 13 of Advanced Diploma Electrical Engineering Exercises Page 72	
	1.2	Relevant WHS/OHS workplace policies, procedures and programs are available in a readily accessible manner and explained to work group		Q2,4,7,8,9 of Advanced Diploma Electrical Engineering Exercises Page 65	
	1.3	Identified hazards, risk assessments and risk control measures are identified, supplied and explained to the work group	Test 1 Q1+2 Concurrently with E011C/UEECD0026		
2. Implement and monitor participative arrangements for the management of OHS.	**2.1**	Workplace procedures for consultation of WHS/OHS issues are implemented, monitored and communicated to work group	Test 1 Q7+8 Concurrently with E011C/UEECD0026		
	2.2	Issues raised through consultation are dealt with and resolved promptly or referred to relevant person/s for resolution in accordance with workplace procedures			Risk Assessment Project Report
	2.3	Outcomes of WHS/OHS consultation issues are communicated to the work group			Risk Assessment Project Report
3.Implement and monitor the procedures for identifying hazards, assessing risk and controlling risks.	**3.1**	Hazards are identified, risks are assessed and control measures are implemented		Q17+18 Page 2 of Advanced Diploma in Electrical Engineering Exercise	

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment Questions & Answers**	**Project Assignment/Report**
	3.2	Risks control measures are implemented and adherence by work group is monitored in accordance with workplace procedures		Q19+20 Page 2 of Advanced Diploma in Electrical Engineering Exercise	
	3.3	Inadequacies in existing risk control measures are identified in accordance with hierarchy of risk control and reported to relevant person/s	Test 1 Q 2 to 5 Concurrently with E011C/UEECD0026		
	3.4	Inadequacies in resource allocation for implementation of risk control measures are identified and reported to relevant person/s			Risk Assessment Project Report
4 Implement the procedures for dealing with hazardous events.	**4.1**	Workplace procedures for responding to hazardous events are implemented to ensure prompt control action is taken			Risk Assessment Project Report
	4.2	Hazardous events are investigated to identify their cause in accordance with workplace procedures		Q17+18 Page 2 of Advanced Diploma in Electrical Engineering Exercise	
	4.3	Control measures to minimise risks of hazardous events based on the hierarchy of risk control are implemented or referred to relevant person/s	Test 1 Q 2 to 5 Concurrently with E011C/UEECD0026		
5.Implement and monitor the procedures for OHS training.	**5.1**	WHS/OHS training needs analysis of work group is performed to identify competency gaps	Concurrently assessed with E101/UEECD0007 Test		
	5.2	Identified WHS/OHS training gaps are fulfilled by training programs in consultation with relevant person/s	Concurrently assessed with E101/UEECD0007 Test		

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment Questions & Answers**	**Project Assignment/Report**
6.Implement and monitor the procedures for maintaining OHS records	**6.1**	WHS/OHS records for work area are completed in accordance with workplace procedures and relevant legislative requirements			OHS Assessment Report
	6.2	Aggregate information from work area WHS/OHS records are used to identify hazards and monitor risk control procedures in accordance with workplace procedures			OHS Assessment Report

Performance Evidence	Test	Assignment Questions & Answer	Project Assignment / Report
LV Safety (Concurrently assessed with E011C)		Q 13 to 16 Page 2 of Advanced Diploma in Electrical Engineering Exercise	
Electrical Installation Safety (Concurrently assessed with E011C)		Q 19/20 Page 2 of Advanced Diploma in Electrical Engineering Exercise	
Safety in Substation (Concurrently assessed with E011C)		Q 17/18 Page 2 of Advanced Diploma in Electrical Engineering Exercise	

Knowledge Evidence	Test	Assignment Report	Project Assignment / Report
T1 Provisions of relevant occupational health and safety legislation		Q8 to 12 Page 2 of Advanced Diploma in Electrical Engineering Exercise	

Knowledge Evidence	Test	Assignment Report	Project Assignment / Report
T2 Principles and practice of effective occupational health and safety management		Q8 to 12 Page 2 of Advanced Diploma in Electrical Engineering Exercise	
T3 Workplace hazards, range and selection of control measures			Risk Assessment Project Report
T4 Organisational health and safety management systems and policies and procedures needed for legislative compliance	Test 1 Q 1+2		
T5 Impact of characteristics and composition of the workforce on occupational health and safety management			Risk Assessment Project Report
T6Relevance of occupational health and safety management to other organisational management policies, procedures and systems.	Concurrently assessed with E101 Test		
T7 Analysis of entire work environment and judge occupational health and safety interventions			Risk Assessment Project Report
T8 Analysis of relevant workplace data			Risk Assessment Project Report
T9 Ability to assess resources needed for risk control			Risk Assessment Project Report

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Teaching Section:	Electrical Engineering		
Qualification Number and Name:	UEE62122 Advanced Diploma of Engineering Technology-Electrical/ UEE62220 Advanced Diploma of Electrical Engineering		
Unit of Competency Number and Name:	**UEECD0026 Manage risk in electrotechnology activities**		

This unit is to be concurrently assessed with UEECD0024 Implement and monitor energy sector WHS policies and procedures

+UEECD0010 - Compile and produce an energy sector detailed report

Copy and paste the following table for each element as required

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment Questions & Answers**	**Project Assignment/Report**
1 Identify risks and develop management strategies. .	**1.1**	Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for a given work area are identified, obtained and applied			Project safety audit report
	1.2	Scope of program or project is identified from design brief specifications and/or relevant documentation and in consultation with relevant person/s		Q2,4,7,8,9 of Advanced Diploma Electrical Engineering Exercises Page 65	
	1.3	Potential, perceived and actual risk events are identified, documented and analysed in consultation with risk professionals and/or relevant person/s in accordance with workplace procedures	Test 1 Q1+2		
	1.4	Risk management methods, tools and techniques are used in the analysis, reporting and documenting of identified risk events	Test 1 Q7+8		
	1.5	Risk management techniques are used to analyse risk events, assess options and recommend risk approaches to relevant person/s for approval			Risk Assessment Project Report
	1.6	Risk management processes and workplace procedures are developed for agreement by stakeholders and communicated for ongoing management of risk factors			
	1.7	WHS/OHS risk control measure are incorporated in risk management strategies in accordance with workplace procedures and		Q17+18 Page 2 of Advanced Diploma in Electrical Engineering	

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment Questions & Answers**	**Project Assignment/Report**
		relevant industry standards		Exercise	
	1.8	Condition monitoring of plant, equipment, criteria for repair and/or replacement are incorporated in risk management strategies		Q19+20 Page 2 of Advanced Diploma in Electrical Engineering Exercise	
2.Implement and monitor risk management strategies.	**2.1**	Risk management processes and workplace procedures are incorporated into work and project plans to ensure outcomes are achieved	Test 1 Q 2 to 5		
	2.2	Programs and project plan/s activities are monitored to identify and respond to variations in accordance with risk management processes and workplace procedures			Risk Assessment Project Report
	2.3	Agreed risk responses are implemented and plans modified to reflect changing project objectives in accordance with risk management processes and workplace procedures			Risk Assessment Project Report
3 Evaluate risk management strategies.	**3.1**	Project outcomes are reviewed with relevant person/s to determine effectiveness of risk management processes in accordance with workplace procedures			Risk Assessment Project Report
	3.2	Risk issues and recommended improvements are identified, documented and submitted to relevant person/s for approval to be incorporated into ongoing and/or future program or project plans			

Performance Evidence	Test	Assignment Questions & Answer	Project Assignment / Report
LV Safety		Q 13 to 16 Page 2 of Advanced Diploma in Electrical Engineering Exercise	
Electrical Installation Safety		Q 19/20 Page 2 of Advanced Diploma in Electrical Engineering Exercise	
Safety in Substation		Q 17/18 Page 2 of Advanced Diploma in Electrical Engineering Exercise	

Knowledge Evidence	Test	Assignment Report	Project Assignment / Report
T1 The need for risk management within the broad project management framework		Q8 to 12 Page 2 of Advanced Diploma in Electrical Engineering Exercise	
T2 Risk management methodologies, their capabilities, limitations, applicability and outcomes		Q8 to 12 Page 2 of Advanced Diploma in Electrical Engineering Exercise	
T3 Uncertainty and the means of measurement			Risk Assessment Project Report
T4 The application of risk management tools and techniques	Test 1 Q 1+2		
T5 Risk management in the context of the project life cycle and other project management functions			Risk Assessment Project Report
T6 Implementing risk management			Risk Assessment Project Report

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This document is to be viewed concurrently with C007 Attached
Click HERE

Faculty:		**College:**	
Teaching Section:	Electrical Engineering		
Qualification Number and Name:	UEE62122 Advanced Diploma of Engineering Technology-Electrical/ UEE62220 Advanced Diploma of Electrical Engineering		
Unit of Competency Number and Name:	**UEECD0039 Provide solutions to basic engineering computational problems**		

Copy and paste the following table for each element as required

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment Report**	**Practical**
1.Provide computational solutions to engineering problems.	**1.1**	Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied	Concurrently assessed with UEENEEE101A /UEECD0007		
	1.2	Scope of problem/s is obtained from documentation and/or from work instructions to determine work	Test 3 Q 1/2/3		
	1.3	Problems are documented and/or diagrammatic form and appropriate methods identified to resolve them	Test 1B Q7		
	1.4	Constants and variables to the problem are obtained from measured values and/or problem documentation	Test 1B Q 1/2		
	1.5	Alternative methods for resolving the problem are considered and, as required, discussed with relevant person/s		Q37 Advanced Diploma in Electrical Engineering Exercises Page 37 Method1- Simultaneous equation method Method 2-Matrice Solution	
	1.6	Problems are resolved using mathematical processes in accordance with workplace procedures		Q117 to 120 Advanced Diploma in Electrical Engineering Exercises Page 39	

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment Report**	**Practical**
2.Complete work and document problem solving activities	**2.1**	Justification for solutions used to solve engineering problems is documented in work records in accordance with workplace procedures and relevant industry standards	Test 3 Q 1/2/3 Test 2B Q7 Test 2 Q6		
	2.2	Work completion is documented and relevant person/s notified in accordance with workplace procedures		All assignments submission	

Performance Evidence	Test	Assignment Report	Practical
Applying mathematics in electrical problems solving			Test 3 Q 1/2/3
Applying mathematics in mechanical problems solving	Test 2B Q7		
Applying mathematics in financial problems solving	Test 1B Q7		
Applying mathematics in electronic problems solving			Test 2 Q6

Knowledge Evidence	Test	Assignment Report	Practical
T1 Rational, irrational numbers and basic algebra	Test1B Q1/2		
T2 Algebraic manipulation	Test1B Q1/2		
T3 Laws of indices	Test 1B Q3		
T4 Estimations, errors and approximations		Q117 to 120 Advanced Diploma in Electrical Engineering Exercises Page 39	
T5 Plane figures – triangles and basic trigonometry	Test 2B Q2,5,6		

Knowledge Evidence	Test	Assignment Report	Practical
T6 Plane figures - quadrilaterals and circles		Q55 to 63 Advanced Diploma in Electrical Engineering Exercises Page 39	
T7 Graphs of Trigonometric functions	Test 2B Q8		
T8 Graphs of linear functions	Test 2B Q4,6		
T9 Simultaneous equations		Q37 Advanced Diploma in Electrical Engineering Exercises Page 37	
T10 Matrices	Test 3 Q6		
T11 Quadratic functions	Test 1B Q 1/2		
T12 Exponential and logarithmic functions	Test 1 Q 2		
T13 Vectors and Phasors	Test 3 Q6		
T14 Complex numbers	Test 3 Q1		

Add rows to the following table as required

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. Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances must be typical of those experienced in the administration – general administration field of work and include access to: • Electrical equipment and resources records relating to business resources			

Created by (Name)		**Date created**	
Approved by (Name)		**Date approved**	

Signature		**Date modified**	

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Teaching Section:	Electrical Engineering		
Qualification Number and Name:	UEE62111 Advanced Diploma of Engineering Technology-Electrical/ UEE62211 Advanced Diploma of Electrical Engineering		
Unit of Competency Number and Name:	**UEECD0059 Write specifications for electrical engineering projects**		

Copy and paste the following table for each element as required

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment Questions & Answers**	**Project Assignment/Report**
1 Prepare specification requirements. .	**1.1**	Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied			Project safety audit report
	1.2	Techniques for specification writing are reviewed and applied in accordance with workplace procedures		Q2,4,7,8,9 of Advanced Diploma Electrical Engineering Exercises Page 65	
	1.3	Relevant person/s is consulted and/or site visits conducted to identify other works impacting on specification			Q14, 23 of Advanced Diploma Electrical Engineering Exercises Page 65 Q30 to 33 of Advanced Diploma Electrical Engineering Exercises Page 65
2 Write specification.	**2.1**	Specification is developed to include scenarios/requirements in consultation with relevant person/s and in accordance with relevant industry standards			Q37,38,41 of Advanced Diploma Electrical Engineering Exercises Page 65
	2.2	Specification is developed in collaboration with relevant design professional/s and/or contractor/s involved in the project			Q51, 54 of Advanced Diploma Electrical Engineering Exercises Page 65
	2.3	Relevant person/s required for the project is identified and their role/s specified in the specification			Q49 to 60 +69 of Advanced Diploma Electrical Engineering Exercises Page 65
	2.4	Specification is reviewed against all inputs and adjusted to rectify any anomalies			Practical Assignment
	2.5	Specification is developed in accordance with workplace procedures		Q2,4,7,8,9 of Advanced Diploma Electrical Engineering	

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment Questions & Answers**	**Project Assignment/Report**
				Exercises Page 65	
3. Approval of specification is obtained.	**3.1**	Specification is presented and discussed with relevant person/s		Q2,4,7,8,9 of Advanced Diploma Electrical Engineering Exercises Page 65	
	3.2	Alterations to the specification resulting from the discussion are negotiated with relevant person/s in accordance with workplace procedures			Practical Assignment
	3.3	Specification is finalised and approval obtained from relevant person/s			Practical Assignment

Performance Evidence	Test	Assignment Questions & Answer	Project Assignment / Report
Power Project Specification task -Project brief, project plan, project outline & relevant specifications			Project
Power Project Specification task-Risk assessment, project procedure & relevant specifications			Project
Project Specification Assessment- Project variation, project report & relevant specifications			Project

Knowledge Evidence	Test	Assignment Report	Project Assignment / Report

Knowledge Evidence	Test	Assignment Report	Project Assignment / Report
T1 Electrical engineering specifications		Q37,38,41 of Advanced Diploma Electrical Engineering Exercises Page 65	
T2 Dealing with suppliers and manufacturer's		Q15,16,36 of Advanced Diploma Electrical Engineering Exercises Page 65	
T3 Using basic computers functions			Project
T4 Research skills			Project

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Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1 Identify terms of variations	**1.1** Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and applied
	1.2 WHS/OHS risk control measures and workplace procedures are followed
	1.3 Original scope of work and contract price is obtained from specifications, plans, diagrams and relevant tender

		submission/acceptance documents
	1.4	Costing and claiming variations are obtained from relevant tender submission/acceptance and contract documents
2 Manage contract variations	**2.1**	Contract variations are determined and documentation issued by the customer representative or relevant person
	2.2	Variations are priced in accordance with workplace procedures
	2.3	Variation approvals are negotiated with relevant person/s and in accordance with workplace procedures
	2.4	Unplanned events are identified and resolution techniques are applied in accordance with workplace procedures
	2.5	Approved variations are submitted for payment in accordance with workplace procedures
	2.6	Variations documents are forwarded to relevant person/s in accordance with workplace procedures

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Qualification Number and Name:	UEE62122Advanced Diploma of Engineering Technology-Electrical/ UEE62220 Advanced Diploma of Electrical Engineering		
Unit of Competency Number and Name:	**UEEEL0058 Plan large electrical projects**		

This unit is concurrently assessed with UEEEL0015 Manage large electrical projects.+ UEECD0014 - Develop design briefs for electrotechnology projects +UEECO0001 - Estimate electrotechnology projects +

UEECO0002 Maintain documentation

UEECO0015 Provide quotations for installation or service jobs

UEECO0017 Source and purchase material/parts for installation or service jobs

Copy and paste the following table for each element as required

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment Questions & Answers**	**Project Assignment/Report**
1 Prepare to plan project .	**1.1**	Work health and safety (WHS)/occupational health and safety (OHS) processes and workplace procedures for a given work area are identified, obtained and applied			Project safety audit report
	1.2	Project planning techniques are reviewed and adopted in accordance with workplace procedures		Q37 of Page 210 Advanced Diploma Electrical Engg Exercise	
	1.3	Scope of the project is identified from design brief specification and/or relevant documentation and from discussions with relevant person/s	Test 1 Question 8 Test 1 Question 4,7		Role Playing **Task** Activity -Change of technical requirement variation-Technical
2. Develop project plan proposal.	**2.1**	Estimated plant, material, labour and related costs are sought from relevant person/s in accordance with workplace procedures	Test 1 Question 5 Test 1 Question 9		
	2.4	Sources and availability of materials and resources needed for the project are identified in accordance with workplace procedures	Test 2 Question 7		
	2.3	Critical path analysis is applied to develop workflow strategies	Test 1 Question 10/11		
	2.5	Risk management strategies are sought and obtained for incorporating in the project plan	Test 1 Question 9		

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment Questions & Answers**	**Project Assignment/Report**
	2.6	Project plan is reviewed against all inputs and adjusted to rectify any anomalies			Project Report
	2.7	Project plan proposal is documented in accordance with workplace procedures			Project Report
		Procurement processes and procedures are monitored to ensure on time supply of plant and materials and in accordance with organisation's policy.			
	2.2	Project budget is established from estimated plant, material, labour and related costs in accordance with workplace procedures	Test 2 Question 1+2		
3. Obtain approval for project plan. .	**3.2**	Alterations to the project plan resulting from the presentation/discussion are negotiated with relevant person/s in accordance with workplace procedures	Test 2 Question 3		
	3.1	Project plan is presented and discussed with relevant person/s			Project Report
	3.3	Final project plan is documented and approval obtained from relevant person/s			Project Report

Performance Evidence	Test	Assignment Questions & Answer	Project Assignment / Report
Power Project task -Project brief, project plan, project outline,			Project
Power Project task-Risk assessment, project procedure			Project
Project Assessment- Project variation, project report			Project

Knowledge Evidence	Test	Assignment Report	Project Assignment / Report
T1-Project planning			Project Report
T2-Purpose of project planning		Q37 of Page 210 Advanced Diploma Electrical Engg Exercise	
T5-Financial management encompassing:		Financial Management Assignment Report	
T4-Time management			Project Report
T6-Quality management	Test 2 Q1		
T7-Human Resource management		Q61,62,63,64,65,66, 67 of Page 209 Advanced Diploma Electrical Engg Exercise (13) Management leadership	
T8-Communication management concepts and practices within a project			Role playing regarding communication actions
T9-Risk management and contingencies encompassing:		Q5 of Page 2 Advanced Diploma Electrical Engg Exercise	
T10-Procurement management concepts and practices		Q43 of Page 209 Advanced Diploma Electrical Engg Exercise (9) Software development project	

Knowledge Evidence	Test	Assignment Report	Project Assignment / Report
T11- Physical Resources Management		Q22 to 27 of Page 207 Advanced Diploma Electrical Engg Exercise	
T3-Defining project parameters	Test 1 Q5		
T12-Contracts		Q2 of Page 65 Advanced Diploma Electrical Engg Exercise	
T13-Performance assessment and continuous improvement		Q68 to 71 of Page 212 Advanced Diploma Electrical Engg Exercise	
T14-Engineering ethics principles		Q69 of Page 71 Advanced Diploma Electrical Engg Exercise	
T15-Customer/Client relations		Q13,14,15 of Page 208 Advanced Diploma Electrical Engg Exercise	
T17- Critical path and project analysis	Test 1 Question 10/11		
T16+T18-Electrical industry sector customs and practice		Q3.15.16 of Page 66Advanced Diploma Electrical Engg Exercise	

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Approved by (Name)		**Date approved**	
Signature		**Date modified**	

Source and purchase material/parts for installation or service jobs

	UEECO0017		Source and purchase material/parts for installation or service jobs	
1	**Determine relevant materials/parts to purchase**	**1.1**	Work health and safety (WHS)/occupational health and safety (OHS) procedures for a given work area are identified, obtained and applied in accordance with workplace procedures	Purchasing activities to be assessed
		1.2	WHS/OHS risk control measures and workplace procedures are followed	
		1.3	Scope of installation or service work is determined from job specification drawings and/or results of service calls	
		1.4	Materials/parts required for work are determined from job specifications or service calls	
		1.5	Materials/parts required are documented in accordance with workplace procedures	
2	**Procure materials/parts**	**2.1**	Source of materials/parts are determined based on availability and price in accordance with workplace procurement procedures	
		2.2	Approval to purchase alternative materials/parts is sought from supervisor in accordance with workplace procurement procedures	
		2.3	Prices for the supply of materials/parts, particularly non-standard high-cost items, is sought in accordance with workplace procurement procedures	
		2.4	Approval to purchase materials/parts is obtained in writing from the customer or relevant person/s in accordance with workplace procurement procedures	
		2.5	Purchases are initiated based on price and availability of materials/parts within the required timeframe and in accordance with workplace procurement procedures	

		2.6	Appropriate information technology is used to source and purchase materials/parts	
3	**Document materials/parts purchases**	**3.1**	Materials/parts purchased are allocated against the appropriate jobs	
		3.2	Materials/parts purchases are documented in accordance with workplace procurement procedures	

			UEECO0002 Maintain documentation	
1	**Prepare to maintain documentation**	**1.1**	Documentation requirements and record management methods are identified, obtained and applied in accordance with workplace procedures	Document maintaining and filing activities to be assessed
		1.2	Advice is sought from supervisor, as required, to ensure work activity is correctly documented and coordinated with other person/s	
		1.3	Forms required to document work activity are obtained in accordance with workplace procedures	
		1.4	Work health and safety (WHS)/occupational health and safety (OHS), risk assessment and control measures are documented in accordance with workplace procedures	
2	**Maintain documents**	**2.1**	Work activities are documented, at the appropriate time and in accordance with workplace procedures	
		2.2	Documents are checked for accuracy, clarity and anomalies corrected	
		2.3	Appropriate information technology is used to maintain workplace documentation	
		2.4	Signatures are obtained by relevant person/s, as required	
		2.5	Copies of required documents are forwarded to appropriate person/s in accordance with workplace procedures	
		2.6	Unplanned events are referred to supervisor for direction in accordance with workplace procedures.	

		UEECO0015		Provide quotations for installation or service jobs
Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.		
1	**Determine extent of installation or service work**	**1.1**	Scope of electrotechnology installation or service project work is determined from job specifications and discussions with customer and/or relevant person/s	Providing quotation activities to be assessed
		1.2	Work health and safety (WHS)/occupational health and safety (OHS) requirements and workplace procedures for the project work area are identified and applied	
		1.3	WHS/OHS and regulatory requirements are assessed and incorporated in the work specification on which the quotation is based	
		1.4	Scope of installation or service work for quotation is documented as a job specification and agreement sought with customer and/or relevant person/s	
		1.5	Requests for alterations to job specification are negotiated with customer and/or relevant person/s in accordance with workplace procedures and regulatory requirements	
2	**Develop installation or service work quotation**	**2.1**	List of materials are determined accurately and checked against job specification	
		2.2	Materials, labour and other relevant service and margin costs are determined in accordance with workplace costing parameters and material supplier costs	
		2.3	Quotation is quantified and costed against job specification and list of materials for costing	

			accuracy in accordance with workplace procedures	
		2.4	Unplanned customer situations are responded to in accordance with workplace procedures in a manner that minimises risk to service project	
		2.5	Installation or service work quotation is reviewed and approved by delegated person in accordance with workplace procedures	
3	**Document and submit installation or service quotation**	**3.1**	Quotation is documented in accordance with workplace policies and procedures	
		3.2	Quotation is submitted to customer within specified timeframes	

UETTDRIS68A Solve problems in energy supply protection equipment

UETTDRIS74A Develop engineering solutions for energy supply system protection problems

ONLINE RESOURCES ARE SUPPORTED THE STUDENTS TO ACQUIRE THE COMPETENCIES

ASSESSMENT QUESTIONS & TESTS ARE BASED ON THE FOLLOWINGS,THEY ARE MODIFIED, EXTRACTED SOME PARTS, APPLIED THE SIMILAR ONES,ALTER AND UTILIZED IN ASSESSMENT TASKS & THEORY TESTS FROM TIME TO TIME.

1 Prepare to solve problems in energy supply network equipment

1.1 Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be done are reviewed and determined

Ref-Advanced Diploma in Electrical Engineering Exercises Page 3 -Q15+16

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http://www.mongroupsydney1.com/Advanced_Diploma_in_Electrical_Engineering_Exercises_EE011.pdf

Relevant Instruction Lessons

Study Option (1)

Guided study (Online)Resources+Online exercises+Online Practicals

Click HERE

&

Youtube Videos for Electrical Engineering Lessons

http://www.mongroupsydney1.com/youtubevideos.htm

Q1.Describe the risks and dangers in power station and outline the recommended safety

Q2.equipments and emergency procedures.

Q3.Outline the process of maintenance work in substation.

1.1 Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be done are reviewed and determined

Ref-Advanced Diploma in Electrical Engineering Exercises Page 3 -Q17+18 Page 4 Q21+22

Q4. Write down the check list to perform the tasks in substation.

Q5. Write down the safety procedures and methods to assess the risk and to reduce the

risk.

Q6..Write down the code of practice for working near exposed main and apparatus.

Q7.Which precautions are to be emphasized when working in substation?

1.2 Work plan is obtained, confirmed and communicated with relevant personnel in accordance with workplace requirements

Q8. Write down the risk reduction procedures in maintenance work to discuss with work manager. (Ref-Advanced Diploma in Electrical Engineering Exercises Page 2 Q12)

Answer the following questions to seek the advice from work supervisor in the following aspects.

Q9. What are the risks?

Q10.How are the risks classified?

Q12.How can the risk be evaluated?

Q12.How will you manage the risk? Ref-Advanced Diploma in Electrical Engineering Exercises Page 2 Q8 to 11)

1.3 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements

Submit the following assignment questions (IS68)

1.4 Hazards are identified, risks assessed, and control measures identified and applied. (IS74)

1.5 Work permits are determined in accordance with workplace requirements
Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order

Effective strategies are formed to ensure solution development and implementation is carried out efficiently. (IS74)

Ref-Advanced Diploma in Electrical Engineering Exercises Page 208)

(3) Strategy objective

Slide 1+2
Q11.What are the developing of strategies in project?
Q12.How will you examine the effectiveness of activities in project management?

Ref-Advanced Diploma in Electrical Engineering Exercises Page 123)

The practice questions are organized to find out the protection system equipments and materials together with relevant theory

15) Over current and earth fault protection

Slide 1+2

Q1.Sketch three phase over current protection.

Q2.Sketch three phase earth fault relay protection.

Slide 3+4+5

Q3.Explain the operation of directional element with sketch.

Slide 6

Q4.Locate the position of reverse power relay in power line.

Slide 7

Q5.Sketch the connection of combined protection scheme that contains two over current relays &

one earth fault relay to provide phase to phase and earth protection.

Q6.How does directional element of relay perform?

Slide 8

Q7.Locate directional and non directional element in a ring circuit.

Ref-Advanced Diploma in Electrical Engineering Exercises Page 128)

.Testing of protection current & potential transformer and relevant questions are arranged to provide this competency component.

Slide 5

Q52.Explain (a) AC ratio check (b) DC polarity check (c)Three phase polarity test for three phase CT

Slide 6

Q53.How will you interpose & sum CT & PT?

Location of Evidences (Table 1)

Performnce Criteria	Above	Location of Evidences
Marking Guide/ Assessment Cover/ Feedback own record		

Students' work in own record	Summative Assessment- Formal Tests	
	Formative Assessment/Practical+ Class works	

2 Solve problems in network protection

2.1 Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored

2.2 Lifting, working at heights, working in confined spaces and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements

2.3 Work permits are received and signed in accordance with workplace requirements

As per 1.1 to 1.3

The need to test or measure live is determined in strict accordance with OHS requirements and when necessary conducted within established safetyprocedures.

Ref-Advanced Diploma in Electrical Engineering Exercises Page 126)

Live testing of protective relay system and depermination of characteristics and relevant questions are arrrranged to provide this competency component.

2.5 Hazard control measures are monitored in accordance with workplace requirements

Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures As per 1.3

Safety hazards resulting from the reports and risk control measures devised and implemented in consultation with appropriate personnel.

As per 1.3

2.4 Problems in network protection are solved in accordance with workplace requirements

Problem solving is approached methodically drawing on knowledge of energy supply network protection equipment and systems

using measured and calculated values of circuit/apparatus parameters. (IS68)

Problem solving activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainableenergy

practices.(IS68)

Knowledge of supply system protection arrangements, operation, device characteristics and applications are applied to developingsolutions to supply system

protection problems. (IS74)

Parameters, specifications and performance requirements in relation to each protection problem are obtained in accordance with

established procedures. (IS74)

Approaches to resolving supply system protection problems are analysed to provide (IS74)

Appropriately competent and qualified person(s) required to implement solutions to supply system protection

problems are coordinated in accordance with regulatory requirements and enterprise policy. (IS74)

Justification for solutions used to solve supply system protection problems is documented for inclusion in work/project development records in

accordance with professional standards. (IS74)

(25) Distance protection scheme

Slide 1

Q30.Explain the distance protection scheme with sketch.

Slide 2

Q31.Explain the operation and construction of distance relay with sketch.

Slide 3

Q32.Explain the characteristics of distance relay.

Slide 4

Q33.Describe the directional distance relay with sketch.

Slide 5

Q34.What is the relation between maximum reach & relay characteristics.

Slide 6+7

Q35.Explain the zones for distance protection scheme.

Slide 8

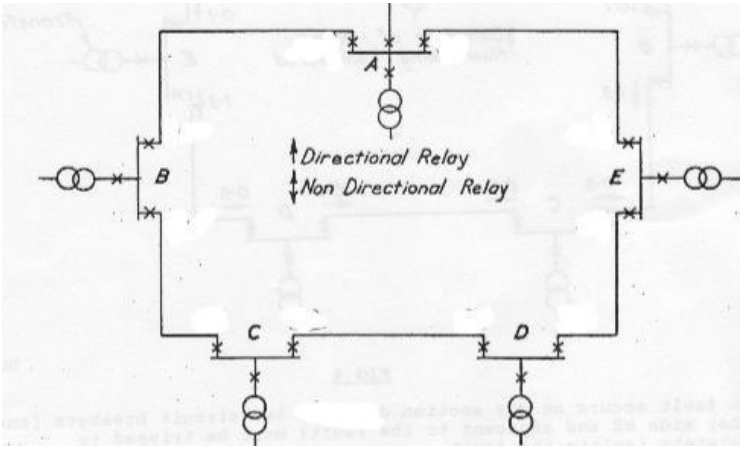
Q36.Explain the operation of three phase distance relay.

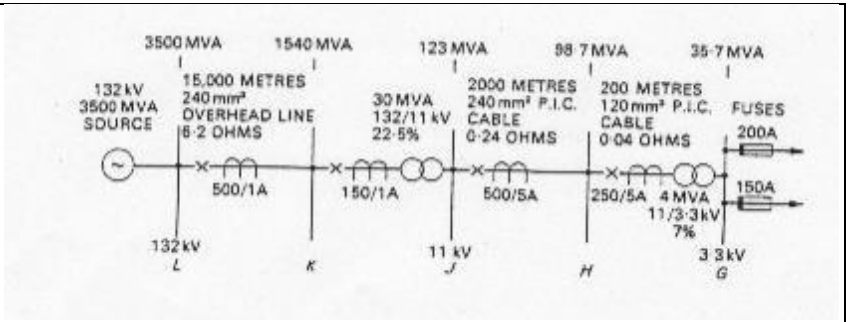
Slide 9

Q37.Explain maximum reach and maximum reach angle.

EKAS COMPONENT	Question No	Questions
	1	What is power system protection scheme?

KS01-TIS68A Electrical power system protection Evidence shall show an understanding of protection methods and devices for electrical power systems to an extent indicated by the following aspects: T1 Protection fundamentals encompassing: - purpose of protection - features of a protection scheme T2 Instrument transformers for protection encompassing: - Operating principles - Applications of current transformers - Applications of voltage transformers T3 Feeder protection encompassing: - fuse protection - overcurrent & earth fault - sensitive earth fault - unit schemes - distance protection - trip/close sequences for feeders	2 3 4 5	(5 marks) What equipments are included in power system protection scheme? (5 marks) Explain the functions of the following devices included in a power system protection Scheme. CT, PT, Fault Detector, Tripping Circuit (10 marks) Sketch the construction of • Balanced Beam Relay Connection Diagram of Relay Tripping Circuit (10 marks) Sketch the connection diagram of combination protection scheme that contains two Over current relays and one earth fault relay to provide phase to phase and phase to earth protection.. (10 marks)

recloser/sectionaliser systems T4 Transformer protection encompassing: overheating protection overcurrent protection restricted earth fault protection differential protection oil and gas devices T5 Busbar protection encompassing: types of fault requirements of busbar protection system protection frame-earth protection T6 Surge protection encompassing: voltage surges surge diverters arcing horns	6	 Locate relay protection scheme for given system when fault occurs at point F. (20 marks) Sketch curve for discrimination by both time and current of the following power system..

KS01-TIS74A Electrical power system protection diagnostic Evidence shall show an understanding of diagnosing faults in electrical power system protection to an extent indicated by the following aspects: T1 Protection scheme requirements encompassing: □ Requirements of a protection scheme - relationship to primary system design, purpose of protection, safety of persons, protection of plant, system instability, system break up, loss of customers, loss of revenue, protection zones, restricted schemes, unrestricted schemes, duplicate protection, local backup protection, remote backup protection, selectivity, discrimination, stability, sensitivity, reliability □ Components of a protection scheme - current transformers, potential transformers, summation current transformers, interposing transformers, multi-tapped transformers, all-or-nothing relays, induction relays, balanced beam	7 Total 70 marks 8	 (20 marks) How will you adjust Definite Minimum Time point on relay curve? (5 marks) What is “Pick Up” of relay? (5 marks Sketch the vector diagram for primary, secondary main windings of Star Delta Power Transformer . (10 marks) Ref-Advanced Diploma in Electrical Engineering Exercises Page 127 to 128)

relays, directional relays, biased relays, solid state relays, microprocessor based relays, gas relays, thermal sensors, hardwired communication, powerline carriers systems, microwave systems, fibre optic systems, need for isolation, need for interfacing □ Protection applied to buses - overload, differential, earth leakage, structure leakage, combined schemes, protection overlap □ Protection applied to transformers - biased differential, gas, winding temperature, oil temperature □ Protection applied to single/radial lines - overcurrent, earth leakage, slow earth leakage, distance, auto reclose, sectionalising, over voltage □ Protection applied to interconnected lines - overcurrent, pilot wire, directional, directional overcurrent, current differential, phase comparison, current	9 10 Total 100 marks	(21) Definite minimum time point, interpreting relay specification Slide 1+2 Q20.How will you adjust the definite minimum time point on relay curve? Q21.Explain the operating characteristics of following relay 10 amp 150/40/200 ---------- (22) Capacitor bank protection Slide 1 Q22.Sketch the diagram for capacitor bank and earth fault protection. ---------- (23) Transmission line protection Slide 1 Q23.Sketch transmission line differential protection Slide 2+3 Q24.Sketch the modification diagram for transmission line protection with differential relay. ---------- (24) Distance relay, pilot wire with differential three phase line protection Slide 1 Q25.Explain the operation of distance relay Slide 2 126 Q26.Explain the operation of distance relay with sketch Slide 3+4 Q27.Sketch the characteristics curve of distance relay

comparison, distance, impedance, admittance, offset T2 Discrete protection systems encompassing: □ Earth fault protection - master earth leakage schemes, sensitive earth fault relays and schemes, residual earth fault scheme, core balance earth fault scheme, frame/structure earth leakage scheme, time graded discrimination, backup protection □ Overcurrent protection - feeder overcurrent protection, instantaneous overcurrent schemes, inverse timed overcurrent schemes, types and location of components of an overcurrent scheme, CT summation, time graded discrimination, backup protection Alarms and controls - auxiliary relays, voltage regulating relays, line drop compensation, gas relay types, gas relay scheme operation and setting, over temperature schemes		Slide 5+6 Q28.Explain the zone protection of distance relay. Slide 7+8 Q29.Sketch the protection diagram of distance relay with operating & restraining voltage and current. 29) Digital relay+ Telecommunication for protection Slide 1 Q54.What is digital relay? Slide 2+4 Q55.Sketch the flow diagram of digital relay operation. Slide 3+4 Q56.Sketch DAC system Slide 5 Q57.Explain busbar protection with sketch Slide 6 Q58.Write line & busbar protection with sketch. Slide 7 Q59.Sketch the operation of digital relay. Slide 8+9 Q60.Sketch the flow chart for the software of digital protective relay.

T3 Interdependent protection systems encompassing: □ Overcurrent and earth leakage intertripping, interlocking and blocking - logic mapping, master control, electromechanical, electronic, shading coils □ Pilot wire, phase comparison - opposed voltage schemes, circulating current schemes, location of components of a scheme, pilot supervisory techniques, □ Load shedding, voltage control, parallel operation, load rejection □ CB failure protection □ Reclose systems - applications, single shot, multishot, blocking schemes, synchronisation checking T4 Complex protection systems encompassing: □ Distance - characteristics, electromechanical, electronic, impedance, mho, offset mho, switched schemes, non-switched schemes, blocking schemes, bus zone □ Differential, transformer differential, bus overcurrent - principles, feeder		

protection, transformer protection, bias systems, harmonic restraint, CT connections, bus protection, low impedance schemes, high impedance schemes, bus overcurrent schemes, generator protection, CT connections, special considerations, digital systems - Types of revenue metering - Applications of SCADA - Complex protection systems for communications - Harmonic control - Point on wave switching3399999		

2.5 Circuit/apparatus components are dismantled where necessary and parts stored to protect them against loss or damage (IS68)

Ref-Advanced Diploma in Electrical Engineering Exercises Page 128)

To convert the analog relaying system to digital relay system, the dismantling of origin components and assembly of new system components are to be done. The following questions and activities provide this competency component.

(29) Digital relay+ Telecommunication for protection

Slide 1

Q54.What is digital relay?

Slide 2+4

Q55.Sketch the flow diagram of digital relay operation.

Slide 3+4

Q56.Sketch DAC system

Slide 5

Q57.Explain busbar protection with sketch

Slide 6

Q58.Write line & busbar protection with sketch.

Slide 7

Q59.Sketch the operation of digital relay.

Circuits/components are rechecked and their operational status is confirmed.

Quality of work is monitored against personal performance agreement and/or established organizational or professional standards. (IS74)

Ref-Advanced Diploma in Electrical Engineering Exercises Page 211)

Q53.Sketch the procedure for preparing quality manual.

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Ref-Advanced Diploma in Electrical Engineering Exercises Page 129)

To determine the quality of the operational status of protection system, it needs to ensure relay operation sequence, the sequential relay protection system and characteristics are to be investigated. The following activities and questions provide this competency.

(32)Over current & earth fault protection , Directional protection, operating characteristics

Slide 1

Q64.Sketch the diagram of over current protection

Slide 2

Q65.Sketch earth fault relay protection diagram.

Slide 3

Q66.Sketch the combined over current and earth fault protection and explain it’s operation.

Slide 4

Q67.Explain the operation of directional relay with diagram.

Slide 5+6+7+8

Q68.Locate directional & non directional elements in ring system.

Slide 9+10

Q69.Sketch the connection diagram of combinational protection scheme that contains two over

current relays and one earth fault relay to provide phase to phase and phase to earth protection.

Slide 11

Q70.How will you adjust definite minimum time point on relay curve?

Materials/replacement parts required to solve problems are sourced and obtained in accordance with established procedures.(IS68)

Effectiveness of the repair is tested in accordance with established procedures.(IS68)

Apparatus is reassembled, finally tested and prepared for return to service. (IS68)

Ref-Advanced Diploma in Electrical Engineering Exercises Page 126)

When more power loads are connected to transmission line, the current protection system needs to be modified. The following questions and activities provide this competency component.

(23) Transmission line protection

Slide 1

Q23.Sketch transmission line differential protection

Slide 2+3

Q24.Sketch the modification diagram for transmission line protection with differential relay.

---

(24) Distance relay, pilot wire with differential three phase line protection

Slide 1

Q25.Explain the operation of distance relay

Slide 2

126

Q26.Explain the operation of distance relay with sketch

Slide 3+4

Q27.Sketch the characteristics curve of distance relay

Slide 5+6

Q28.Explain the zone protection of distance relay.

Slide 7+8

Q29.Sketch the protection diagram of distance relay with operating & restraining voltage and

current.

Unexpected situations are dealt with safely and with the approval of an authorised person. As

per 1.3

Problem solving activities are carried out without damage to apparatus, circuits, the surrounding environment or services and using sustainable energy practices.

As per 2.5

Location of Evidences (Table 1)

3. Completion and report for problem solving in energy supply network equipment (IS68)

3.1 Completed work is checked for compliance against the work plan and

workplace requirements

As per 1.3

3.2 Incidents or unplanned events are reported in accordance with workplace

requirements

Prepare incidence report

Reusable, faulty or worn components are tagged and dispatched for repair to maintain adequate spares.(IS68)

Maintenance work activities are documented in accordance with established procedures. (IS68)

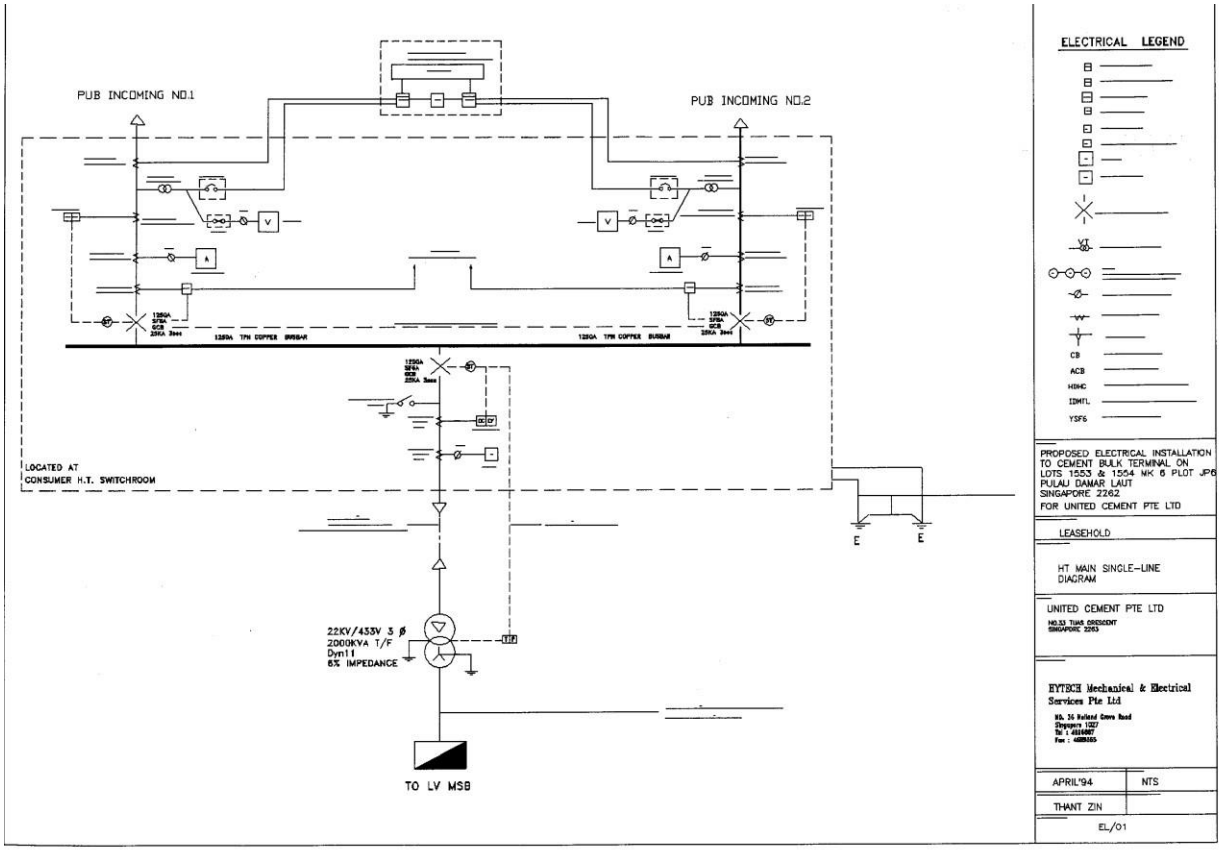
Test, document and implement engineering solution for energy supply system protection problems (IS74)

3.3 Plant, tools and equipment are cleaned, checked and returned to storage, and surplus resources and materials are managed in accordance with workplace requirements

Prepare equipment record, cleaning record of power control and protection equipment

3.4 Work permits are signed off in accordance with workplace requirements
Work records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements
Prepare the following project and sign off the completion

POWER SYSTEM PROTECTION COMMISSIONING PROJECT



The above diagram is Incoming HV supply system for a Cement Factory. It contains Star –Delta Transformer, Interchange switches for switching 2 supply, sketch of protective relay system with trip circuit and outline for measuring instruments.

(1) Develop Detail installation diagram that contain appropriate protection instruments and measurement instruments

(2) Recommend appropriate specifications for protection and measuring instruments for power supply requiring 500Kw for the factory.

By answering the following questions, the concepts for the above project can be highlighted

Ref-Advanced Diploma in Electrical Engineering Exercises Page 125)

(19) Three phase differential relay

Slide 1

Q17.Sketch three phase star/ delta transformer protection with differential relay.

125

Slide 2

Q18.Explain the setting of differential relay.

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(20) Connection of main transformer, CT , directional relay

Slide 1+2+3

Q19.Sketch the combined earth fault and differential protection for three phase star/ delta

transformer.

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Refer Power System Practicals

Part 1: Operational Study

Lab No	Name of Practical	Equipments	Assessment
	Group 1 Power & Line		
EP1	Receiving end voltage comparison between short/ medium and long transmission lines	distribution system types	Circuit interpretation, connection, data collection, calculation, graph sketch, report presentation, conclusion
EP2	Long transmission line PI equivalent circuit	overhead systems	As above
EP3	Long transmission line T equivalent circuit	distribution system	As above

		types	
EP4	Transmission line efficiency/ Transformer effect on line efficiency	energy metering • demand meters	As above
EP5	Reactive power and power factor improvement	energy metering • demand meters	As above
EP6	PF effect on line current	energy metering • demand meters	As above
EP7	Corona Video	• surge protection	Report presentation, conclusion
EP8	Phase sequence measurement		Competency assessment
	GROUP 2- Protection equipments		
EP9	Connection of relay protection scheme & protective equipments by using one line diagram (Circuit interpreting & connection competency development without electrical supply)	protection equipment and systems	Competency assessment
EP10	Current transformer & potential transformer connection & ratio test	current transformers • potential	Circuit interpretation, connection, data collection, calculation, graph sketch, report presentation, conclusion

		transformers	
EP11	Over current relay characteristics	protection equipment and systems • over-current protection	Circuit interpretation, connection, data collection, calculation, graph sketch, report presentation, conclusion
EP12	Electronic relay test	conventional relays • electronic relays	As above
EP13	Study of various protective relays used in industry through trade references	• earth fault protection • differential protection busbar protection • surge protection • conventional relays	Research, report presentation
	Group 3- Supply System		
EP19	Underground cable capacitance test	underground systems	Circuit interpretation, connection, data collection, calculation, graph sketch, report presentation, conclusion
EP20	High tension line design	• overhead systems	Design project

EP21	Line insulator test & capacitance grading	• overhead systems	Circuit interpretation, connection, data collection, calculation, graph sketch, report presentation, conclusion
EP22	Voltage profile chart of distribution system	• voltage regulation equipment • on load tap changers	As above
EP23	Load centre-Power loss comparison	• distributor equipment	As above
EP30	Transformer polarity test	• distributor equipment	As above
EP42	Maximum power transfer theorem with power circuit	• load control	As above
EP43	Load flow study	• load control	As above

EP45	Trade reference study, switch board, busbar, insulator, circuit breakers	reclosers / sectionalisers.	As above

2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.

2.11 Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to system and the surrounding environment or services and using sustainable energy practices.

General faults including: open-circuit; short-circuit; incorrect connections; insulation failure; unsafe condition; apparatus/component failure; related mechanical failure for the equipments in the range

(2)**Explore some of the faults in power system/ energy supply that can be rectified only by utilizing para-professional knowledge background and how the arranged simulated practical can provide the hand on experience and work performance for the students and how it is different from the performance only based on trade level activities.**

In range of performance, it outlines the real equipments used in the industry. There will be the arguments that the setting of practical in lab room only includes rheostat, resistor, varic, capacitor etc. How it meets the outlined competencies?

To exactly find out and rectify the faults in energy supply system , the tasks and complexity level more than the trade level- (check the continuity, check the connection, visual inspection, testing and measurement)will be included.

The following is the various power system faults which I draw out from my power engineer work records that the technical knowledge higher than trade level is required to successfully rectify the fault and determine the appropriate solutions. In the table, I summarize how the fault is , caused, background theory, how the person who knows the theory will do, how the person who does not know the theory will do and how my simulated practical / and practical related background theory will assist to develop the fault finding skill.

Typical fault	**Cause**	**Related Theory**	**How the person who does not know the theory will do**	**How the person who knows theory will do**	**Name of simulated practical**	**How to develop the skill**
(1)In reticulation system, there is abnormally different in voltages	Abnormal resistance. Wrong cable selection. Abnormal circuit configuration	Voltage profile chart.	May give he other idea to change the load	Measure voltage, sketch the voltage profile chart. Then identify the portion of the circuit.	EP 23 Voltage profile chart	Develop the analytical skills to identify the fault point
(2)Line conductor slips from the pin insulator	Line deviation is too high, combination of wind, conductor tension will take away the conductor	Line deviation angle calculation	Will reinstall the line. After some period, he same thing will happen	Will examine line deviation angle. Tension, wind force. Will rearrange the line or provide	Theory instruction. Line deviation	Develop the problem solving skill on line construction.

	from pin insulator		again	shackle insulator		
(3)Conductor sag too low. Hit by traffic and then broken	Sag calculation. Wrong tension, safety factor, weight	Sag/ line design	Pull up the cable. After some time, it will fall again	Will examine the related parameters and find the way	EP 20 High Tension Line Design	Develop the skill on line design and to know the technical factors for sag.
(4)Discharge current flows out from underground insulator and cause the injury	UG cable capacitance. Charging current	UG Cable capacitance test	Will think about current flow, leakage etc.	Will examine the UG cable capacitance and produce the procedure for discharging	EP 19 Underground cable capacitance test	Develop the skill in UG cable testing focus on capacitance and estimate the amount of charging current
(5)Line pole broken without natural disaster	In appropriate pole strength	Pole mechanical design	Will erect the pole. Some time after, broken gain	Will examine he tension, wind force, conductor weight, then will calculate the pole strength and select appropriate diameter of pole and appropriate pole material	Pole mechanical design lesson + EP 20 High tension line design	Develop the skill on line design and to know the technical factors for pole.

Complete and report fault diagnosis and rectification activities.

OHS work completion risk control measures and procedures are followed.

Work site is made safe in accordance with established safety procedures.

As per 1.3

Rectification of faults is documented in accordance with established procedures.

Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified.

Fault	**Reason**	**Related theory**	**The person who does not know the theory will do**	**The person who knows the theory will do**	**Related Practical**	**Development of skill**
(6)There are too much power loss. Line efficiency is poor	If all connected loads are all right, wrong location of power station/ load centre	Load centre study	Will not take account on load centre	Will take account on load centre	EP23 Load centre power loss comparison	How the location of supply source affect line losses/ efficiency and % voltage regulation
(7)Problem with UG cable joint	Wrong method in UG cable joining	UG cable joining methods. Theory study			UG cable joining method in my prepared 7762 AA Electrical Distribution textbook	UG cable joining methods. Theory PLUS photographs
(8)Generator got motor action. Reverse	Out of synchronism. Up to 180 degree out	Synchronizing	Will neglect synchronism. Just run	Will focus on synchronizing process. Avoid	Synchronizing	Synchronism, generator parallel operation requirement

power relay cuts off	of phase		and switch on	reverse power relay operation		practical knowledge development.
(9)Generator vibration/ hunting	Stability concept	System stability	Do not care on machine hunting. Will continue to run . As consequence, face the short life of bearing/ shaft	Will take care on transient and steady state system stability and prevent the hunting	Moment of inertia/ machine stability	Moment of inertia/ machine stability practical knowledge development.
(10)Relay operates on fault. But the system loss the synchronism	System stability/ critical fault clearing angle aspect.	System stability/ critical fault clearing angle	Do not care on the relay setting to provide both fault protection and maintain the system stability. Re-synchronize the generators when ever the relay operates	Will set the proper relay setting to maintain the stability	Critical fault clearing angle. Equal area criteria	Critical fault clearing angle. Equal area criteria practical knowledge development.
(11) Line reactive power too much. The equipment capacity is unnecessarily increased	Problem related to load flow	Load flow study	Will not take account on load flow concept.	Take account on load flow and optimize the loading	EP 42 Maximum power transfer theorem EP43 Load flow study	Develop the load flow concept and practical optimizing skill
(12)There is nothing wrong with the line but the transformer placed near the switch heat up and cooked	Switching surge	Switching voltage surge	Just replace the transformer. After some time, the same problem will be faced	Take account on switching voltage surge and plan tom install the surge diverter.	Switching voltage surge	Switching voltage surge practical knowledge development.

(13)Light radiated from the power line. Too much power loss and high interference to telecom line	Corona	Corona study	Will consider the ACT OF GOD	Will find the way to reduce corona such as application of hollow conductor to increase diameter of conductor to raise the critical voltage level	EP 7 Corona video	How corona occurs and find the way to prevent .
(14) Control telecommunication for power line down, no relay operates	Application of telecommunication system in power system operation	Application of telecommunication system in power system operation 7762AG Power System Operation	Will not be aware of the role of telecommunication system	Will check the function of telecom equipment for power system control and protection and perform the preventive maintenance	Application of telecommunication system in power system operation	Web based control/ IP based control and telecomm: concepts practical knowledge development.
(15)Too much flickering of lamps	Harmonics	Harmonics in power system	Will not know what happens	Will check the harmonics source/ increase the size of neutral wire to allow the harmonics current flows	Harmonic source scope observation	Development of identifying the harmonics
(16)Lightning strike	Lightning arrester	Lightning arrester	Will reinstall LA. But not sure it will be safe or not.	Will check the coverage provided by lightning arrester	Lightning arrester study	Lightning arrester practical knowledge development.
(17)Earth fault/ earth leakage can not be protected	Grounding in power system	Grounding in power system 7762AE Power System Protection	--	Will measure the ground resistance, will implement the additional ground connections	Power system grounding study	Power system grounding practical knowledge development.
(18)Occurance of over current	Over current protection	Over current relay 7762AE Power System Protection	Will not exactly know how to set/ adjust the over current relay	Will set/ adjust the over current relay	EP11 Over current relay characteristics	Practical skill development in over current relay

(19)Earth leakage fault	Earth leakage protection	Earth leakage protection 7762AE Power System Protection	Will not exactly know how to set/ adjust the earth leakage relay	Will set/ adjust the earth leakage relay/ CT arrangement	CT arrangement for earth leakage fault & fault in protected zone	Practical skill development in earth leakage fault protection
(20)Transformer protection	Differential relay	Differential relay	Will not exactly know how to set/ adjust the differential relay	Will set/ adjust the differential relay	CT arrangement for fault in protected zone	Practical skill development in differential protection
(21)Line is protected by differential/ over current relay. But it is not effective when the load are fed from some part of the line	Distance relay	Distance relay	Will not exactly determine the reason why and how to change the protection system	Will change the protection system and will calculate earth fault impedance	Earth fault calculation	Problem solving skill development in earth fault calculation
(22)Fault happens but the relay can not provide the effective protection	CT/ PT ratio for relay	Relay protection scheme	Will not exactly determine the reason why and how to change the protection system	Will adjust CT PT ratio at the simulated fault situation and will adjust the relay setting appropriately	EP9 Connection of relay protection scheme & protective equipments by using one line diagram (Circuit interpreting & connection competency development without electrical supply) EP10 Current transformer & potential	Practical skill development in CT PT ratio adjustment

					transformer connection & ratio test	
(23) I accidently open the CT secondary and it got explosion	Current transformer	Current transformer		Will make sure not to open circuit the CT secondary	EP10 Current transformer & potential transformer connection & ratio test	Develop the skill on CT/ PT connection & applications.
(24) we use old type gravity relay, it does not provide the effective protection	Restrainting system of relay	Relay types & characteristics		Will make sure to correctly arrange the relay position	EP13 Study of various protective relays used in industry through trade references	Knowledge development on various protective relays used in industry through trade references
(25) Relay operates at wrong current	Operation/ setting of relay	Relay types & characteristics	Trial error approach will be used	Will make sure to correctly arrange the relay setting	EP11 Over current relay characteristics	Practical skill development in over current relay
(26)In power transformer protection. Transformer is Star/Delta connection. All relay settings are correct. But relay wrongly operates. I	Transformer Star Delta & relay star/delta matching	Star delta vector diagram. Transformer star side –Relay delta & transformer delta—Relay star	Will not know what happens and how to rectify the fault	Will check the connection and will consider the vector difference causes the wrong operation	EP10-CT & PT connection/ ratio check	Practical skill development in CT/PT Connection

checked all continuity. Every thing all right						
(27)Regulator is set to meet the system voltage condition. But later time, it is blown out	Voltage ratio/ regulator setting	Voltage regulator	Will emphasize in solving the problem for a short moment. Will not consider the long term impact	Will consider whether the setting to upgrade the voltage will impact on future system voltage change	EP22 Voltage profile chart of distribution system	The skill training to develop the judgment of voltage level and future impact
(28)Fault spread from one busbar to another busbar	Busbar arrangement/ sectionalization	Busbar arrangement	Will assemble he busbar to install the equipment, will not consider how the arrangement can contribute the spread of fault	Will consider the way to insert section circuit breakers	Busbar layout/ arrangement study	Busbar arrangement sketch/ plan practice development
(29)Equipment suffers over voltage and blown out after the capacitor value is changed for PF improvement	Inappropriate capacitor setting. Cause of overvoltage. Vector diagram	PF improvement/ Capacitive reactance effect on load	Will only see the way to improvement the PF. Will not know the consequences	Will posses the knowledge of capacitor impact on load voltage and will take account on optimal setting of capacitor value	EP5-capactance effect on line EP6-PF Improvement	PF improvement method is judgment with capacitor effect causes over voltage. This skill is trained.
(30)Directional relay does not work to protect the reverse power flow	Directional relay operation	Study on directional relay.		Wrong connection to direction coil will be identified	EP 13 Protective relays used in industry	Guide to acquire the relevant technical knowledge
(31)Voltage flashing over capacitor string	Capacitor string	Study on capacitor string	Will change the capacitor string	Will provide the preventive protection such as arcing horns OR take account on line capacitor grading	EP21 Line insulator capacitance test	Develop the skill to measure line capacitor value . Capacitance grading.

(32)Circuit Breaker itself is blown out	Circuit Breaker capacity	Study on capacity of circuit breaker	Will change CB. After sometime, it will blow up again.	Will consider the CB capacity & possible over current developed in line fault	EP13 Relay & CB used in system Fault current	Develop the skill in fault current estimate and choosing CB capacity
(33)CB too hot and meltdown	CB capacity/ Arc development	Study on capacity of circuit breaker/electric arc	Will change CB. After sometime, it will blow up again.	Will consider the CB capacity & possible over current developed in line fault Will consider the arc extinguishing methods	EP13 Rely & CB used in system Fault current	Develop the skill in fault current estimate and choosing CB capacity
(34)Need to expand the line in emergency. I am only in-charge	Line design	Line design project	Will not know how to design a line	Will utilize references/ methods to design and construct the line	7762AA Project-Over head line design	Line electrical & mechanical design practice development
(35)HV current flows into LV line	Separation between HV & LV line	Rules & regulations related to line	Will not know the regulation	Will apply the regulation in real wok	7762AA Line pole/ cross arm design and conductor arrangement	Line electrical & mechanical design practice development
(36) Line wire fracture	Sag calculation	Sag calculation/ minimum cable size	Reinstall the line wire. Like part to like part replacement is applied, will use the same size of cable. After sometime, line will break gain	Will consider allowable tension/ minimum conductor size	7762AA Project-Over head line design	Line electrical & mechanical design practice development
(37)Electronics equipment used for line protection is	Voltage surge	Signal condition sub system. Surge filter	Will replace the electronic board. But the same fault	Will consider the cause of surge. Surge filter / absorber/	7762AE Line surge/ application of electronic control	Develop the skill in line surge/ electronic

blown up			happens again	diverter will be installed	system	control.
(38) Receiving end voltage is greater than the sending end	Capacitance effect on long line	Long line 7762AG Power System Operation	Will think that the equipments are designed to operate at the sending end voltage level, it will be enough	Will consider the line configuration and will provide the appropriate arrangement for over voltage caused by capacitance effect on long line.	EP2/EP3 Long Line PI & TEE equivalent circuits	Develop the practical skill in determination of possible voltage rise in simulated line model.
(39)Can not run the generators in parallel	Synchronism problem	Synchronizing	Will not properly know the synchronism	Will consider the synchronism	Alternator parallel operation- Procedure	Develop he knowledge in synchronizing
(40) Over current relay is provided to protect the system but it does not work when the ground fault occurs	Characteristics of relays	Relay types and characteristics	Will think that one relay will protect everything	Will select the appropriate relay for appropriate place and protection task	EP13 Study of various protective relays used in industry through trade references	Knowledge development on various protective relays used in industry through trade references

Method of delivery	**Method of collection of evidence**
7-Face to face 6-Electronic Key for delivery mode 1-On the job 2-Simulated 3-Blended 4- Self paced 5-Distance 6-Electronic 7-Face to face 8-Other	A,B,D,E,F,G,L Key for Methods for Collecting Evidence: A-Assignment B-Written Task C-Role play D-Exam E-Oral questioning F-Simulation G-Observation H-Work based I-Portfolio J-Self assessment K-Case study L-Practical demonstration M-Project N-Training Record O-Other

Detailed explanation	*Detailed explanation*
Face to face class teaching + Online supplement multimedia notes **Evidence** **Part 1- Evidence of teaching & learning** **Plan for concurrently delivery** www.powerlearning1.zoomshare.com Both digitised notes + multimedia notes including audio files Notes in USB (Available on request)	A+B-Test 1, 2, 3, 4 E-Oral question in practical class F-Simulated practical for line & power system comprising mathematical equations & functions G-Observe the student's performance in practical class L-Student practical performance result + report preparation *Evidence Attached* **Part (1)- Test questions**

Part 2- Evidence of lesson planning (1) Delivery & assessment matrix excel form (2) Semester plan (3) Students study progress plan (Available on request)	2 tests **Part (2)-Evidence of students participation** (1) Signed attendance sheet (2) Signed Test attendance sheet (3) Sample answer paper & practical report Either hard or scanned copy (Will be available on request within 6 months of the assessment event (4) EBS attendance & grade record

1 On the job	**2** Simulated	**3** Blended	**4** Self-paced (facilitated)
5 Distance	**6** Electronic	**7** Face to Face	**8** Other (Please specify)

Key for Methods for Collecting Evidence:			
A Assignment	**B** Written task	**C** Role play	**D** Exam
E Oral questioning	**F** Simulation	**G** Observation	**H** Work based
I Portfolio	**J** Self assessment	**K** Case study	**L** Practical demonstration

M Project	**N** Training Record Book	**O** Other (Please specify)

Location of Evidences (Table 1)

ASSESSMENT SCHEDULE

Performance Criteria	Assessment 1 Practical		Assessment 2 Theory
	Continuous Observation	Written Assessment as part of Practical	Written Assessment
1.1		X	
1.2		X	
1.3		X	X
1.4		X	X
1.5		X	X
1.6		X	X
2.1		X	
2.2		X	X

2.3		X	X
2.4		X	X
2.5		X	X
2.6		X	X
2.7		X	X
2.8		X	X
2.9		X	X
2.10		X	X
2.11		X	X
2.12		X	X
3.1	X	X	
3.2	X		
3.3	X		
EKAS Assessment		X	X

POWER SYSTEM Youtube video Lessons to provide the sufficient EKAS

G015/ IS67+68+ IS74

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Power System (1)

G015(AA)Lesson 1-Distribution system.zip

http://youtu.be/VuzjXkRx4UI

G015(AA)Lesson 2-Demand factor.zip

http://youtu.be/cUGbxhBT-Dc

http://youtu.be/DCCl4cO3Vu8

G015(AA)Lesson 3-Sag.zip

http://youtu.be/1s496h-Iuu8

G015(AA)Lesson 4-OH Line mechanical design.zip

http://youtu.be/T0BnyqV9T6E

http://youtu.be/hu1TrUv2_OY

G015(AA)Lesson 5-UG Cable.zip

http://youtu.be/hHCLzMnVmT0

http://youtu.be/A5AieaBBZHo

G015(AA)Lesson 6-Voltage control.zip

http://youtu.be/y1vTM5fvfyU

http://youtu.be/Z9HBGsVgymA

G015(AE)Lesson 1-Power system protection scheme.zip

http://youtu.be/ihpd3cDAhBU

http://youtu.be/EGXkLRM2L9M

http://youtu.be/zOIUYQ7OJfs

G015(AE)Lesson 2-Differential relay.zip

http://youtu.be/2iW0oEScMsw

G015(AE)Lesson_3-Over_current_&_earth_fault_protection.zip

http://youtu.be/hvGjdO9jEhk

G015(AE)Lesson 4-Three phase differential relay.zip

http://youtu.be/2iW0oEScMsw

http://youtu.be/VuzjXkRx4UI

http://youtu.be/2iW0oEScMsw

G015(AE)Lesson 5-Current time grading.zip

http://youtu.be/r0qkLrmkKsM

G015AE Lesson 6

http://youtu.be/InsTLh7_N5k

G015(AE)Lesson_7-CT_PT.zip

http://youtu.be/ZF_y65xsM_M

G015(AE)Lesson 8-Distance relay.zip

http://youtu.be/NKzMVquFLu8

http://www.filefactory.com/file/c386a2e/n/G015_AE_Lesson_8-Distance_relay.zip

G015(AE)Lesson 9-Telecom in power protection.zip

http://youtu.be/9C6oggZAKRg

http://youtu.be/XRpffA6hU_U

http://youtu.be/X-kz3cyL9fU

G015(AG)Lesson 1-Stability.zip

http://youtu.be/fUyNqcXtBXg

G015(AG)Lesson 2-Generator load sharing.zip

http://youtu.be/A-t7XH4rK4M

http://youtu.be/OTsis_KIRuk

http://youtu.be/8j1nD9nY2hU

G015(AG)Lesson 3-Power Flow.zip

http://youtu.be/0OzT4Pol-Jc

http://youtu.be/fK0wcaTY_rw

G015(AG)Lesson 4-IP based system.zip

http://youtu.be/ve5O8K9fL7k

G015(AG)Lesson 5-Surge in power system.zip

http://youtu.be/6WkezTcOzX4

G015(AG)Lesson 6-CTPT Harmonic filter.zip

http://youtu.be/Uy7q9SsaOYs

G015(AG)Lesson 7-Short circuit in alternator.zip

http://youtu.be/b-46Kvn8kJI

G015(AG)Lesson 8-Corona.zip

http://youtu.be/XYGRAWOqzsc

G015(AG)Lesson 9-Power surge.zip

http://youtu.be/uzFS-otIn-g

http://youtu.be/IsZ_ccy630w

G015(AG)Lesson_10-Static_Var_Compensation.zip

http://youtu.be/y-of5oLojCU

G015(AG)Lesson 11-PF Control+Fuel cell.zip

http://youtu.be/AXbCcoQeLns

G015(AG)Lesson_12-Exercises.zip

http://youtu.be/nRGScOH9aSM

G037+G038+G039 Part 1/2/3+IS69

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Power System (2)

G037+G038+G039 Lesson 1-Power Flow.zip

http://youtu.be/mzwGGXRTtvw

G037+G038+G039 Lesson 2-Site Earthing.zip

http://youtu.be/PATkXVBF9kc

http://youtu.be/H4Dj1K238BE

G037+G038+G039 Lesson 3-Power System Control Equipments.zip

http://youtu.be/JJczbYVWOoI

G037+G038+G039 Lesson 4-Auxiliary System+Harmonic.zip

http://youtu.be/5mDNHGFLA0c

G037+G038+G039 Lesson 5-Harmonic.zip

http://youtu.be/n41q4Rmz2p0

http://youtu.be/8CelGV5AElk

G037+G038+G039 Lesson 6-Harmonic Calculation.zip

http://youtu.be/NHSzu6HkOgI

http://youtu.be/fSLrPIC6Mho

G037+G038+G039 Lesson 7-Synchronous Generator Loading.zip

:http://youtu.be/jv1q7Mtg7Gs

http://www.filefactory.com/file/c39be2f/n/G037_G038_G039_Lesson_7-Synchronous_Generator_Loading.zip

G037+G038+G039 Lesson 8-Turbine Control+Power Line Earthing.zip

http://youtu.be/0CvgkmDE3Kw

G037+G038+G039 Lesson 9-Insulator.zip

http://youtu.be/l4jqs8MLBFA

http://youtu.be/TiQezIA9Z-c

G037+G038+G039 Lesson 10-Reliability of Power System.zip

http://youtu.be/tIUk3nc1IxE

G037+G038+G039 Lesson 11-Harmonic Reduction.zip

http://youtu.be/8dYX-11kRcc

http://youtu.be/A684Agej8-w

G037+G038+G039 Lesson 12-Grounding + Power Quality.zip

http://youtu.be/QQPUj3WXJnA

G037+G038+G039 Lesson 13-Power Quality.zip

http://youtu.be/feI7SCb_QTY

http://youtu.be/mcK2YhDsnr0

G037+G038+G039 Lesson 14-Harmonic Model.zip

http://youtu.be/dwWBOq-BsLY

G037+G038+G039 Lesson 15-Harmonic Losses in Transformer.zip

http://youtu.be/mwEJgEEgPVc

http://youtu.be/1A6FY5f5ijM

http://youtu.be/yLiOKy7uJj0

G037+G038+G039 Lesson 16-Reliability Improvement.zip

http://youtu.be/cn-CfDWnUN8

G037+G038+G039 Lesson 17-Preparation for emergency.zip

http://youtu.be/La7Xip8GI2I

G037+G038+G039 Lesson 18-Harmonic problems.zip

http://youtu.be/0Urnkee_

http://youtu.be/zM_Xcwckicw

G037+G038+G039 Lesson 19-Synchronous machine problems.zip

http://youtu.be/Lx2S-NATr20

G037+G038+G039 Lesson 20-Power Generation + Generator Control.zip

http://youtu.be/56Ks8sArQxc

G037+G038+G039 Lesson 21-Turbine Control+ Digital Excitation.zip

http://youtu.be/uCsvv18qKwQ

http://youtu.be/I4vCDI2CZS0

G037+G038+G039 Lesson 22-Power System Protection.zip

http://youtu.be/c6iXRwfCYBU

G037+G038+G039 Lesson 23-Switch Gear.zip

http://youtu.be/DDpbzgNYTiM

http://youtu.be/2cl-nOdBNro

G040 + IS73

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Power transformer

G040 Lesson 1 Power transformer rating 1.zip

http://youtu.be/qjWJVQAh_jA

G040 Lesson 1 Power transformer rating 2.zip

http://youtu.be/JonzO8JD-k4

G040 Lesson 2 Open circuit short circuit test.zip

http://youtu.be/Ru-KlKv40OY

G040 Lesson 3 Transformer regulation.zip

http://youtu.be/t6IZMwMj-B4

G040 Lesson 4 Power transformer connection.zip

http://youtu.be/iig8PISDN1I

G040 Lesson 5 Maximum efficiency.zip

http://youtu.be/Qa7I0eHTWTU

G040 Lesson 6 Transformer parallel operation.zip

http://youtu.be/dkRxoaozrOk

http://youtu.be/Sz5QY727w-8

G040 Lesson 7 Harmonic in transformer.zip

http://youtu.be/_YOlWb3e574

G040 Lesson 8 Transformer problem + auto transformer.zip

http://youtu.be/0KCscbCIUjk

G040_Lesson_9_Transformer_rating_cooling_connection_tap_changing.zip

http://youtu.be/d3XHm-wguzQ

http://youtu.be/XwiIkZnKFqQ

http://youtu.be/uOHBk840Bhw

G040 Lesson 10 Phase shift transformer.zip

http://youtu.be/7aWhg9DIoWI

G042+IS71

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Transmission Line

G042 Lesson 1-Transmission line introduction.zip

http://youtu.be/DrOOgcKeaL4

G042 Lesson 2-DC Line+Line reflection.zip

http://youtu.be/jvVdecp-clk

G042 Lesson 3-Power line calculation.zip

http://youtu.be/3TgVt67DhvY

http://youtu.be/QT6aqsaM7a0

http://youtu.be/WxjQIkdJjQ8

G042 Lesson 4-Line model+Economic aspect.zip

http://youtu.be/1HRdGZXp_-w

G042 Lesson 5-Time value of money+Line reflection.zip

http://youtu.be/n9mupLQWANY

http://youtu.be/YdfiX2gL-3c

G042 Lesson 6-Line matching+Wave guide.zip

http://youtu.be/1WyP5_Cek40

G042 Lesson 7-Wave guide.zip

http://youtu.be/BuGtjZ3QBXk

http://youtu.be/pftevsnbl0w

G042 Lesson 8-Microstrip line.zip

http://youtu.be/eINq1kKuiec

G042 Lesson 9-Per unit value of line.zip

http://youtu.be/66Y-Lm3EntI

G042 Lesson 10-Line constants.zip

http://youtu.be/2XYnZZ-zXI

G042 Lesson 11-Smith chart.zip

http://youtu.be/dv-NQh4vlrg

http://youtu.be/KfM8XZd9Wqc

http://youtu.be/3NYVQvW8-Nk

http://youtu.be/5qBwLsbtfTA

http://youtu.be/ViamcvqAy_I

http://youtu.be/j_nx9n7mGec

http://youtu.be/d53B3-zV2ec

G042 Lesson 12-Four terminals network.zip

http://youtu.be/HCO4P1qrPbA

G042 Lesson 13-Exercises.zip

http://youtu.be/LeyJf1PhpCY

Assessment Mapping - Template

(streamlined training package)

This template to be used for "new" endorsed streamlined training packages.

Instruction for use: These instructions in RED should be deleted from the completed document. Instructions in **BLUE** should be written over with appropriate information.

- This template is to be completed by the assessment developer to ensure the assessments meet the training package requirements for the unit of competency.
- It must be used during the assessment validation process.
- Record of this document must be retained in the faculty TAS teamshare teaching section.
- Add rows and columns as required below.

Faculty:		**College:**	
Teaching Section:	**Electrical Engineering**		
Qualification Number and Name:	**UEE62220 Advanced Diploma of Electrical Engineering**		
Unit of Competency Number and Name:	**UEECS0033 Use engineering applications software on personal computers**		

Copy and paste the following table for each element as required

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment**	**Project**
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	Assessed concurrently with UEECD0007		
	1.2	WHS/OHS risk control measures and procedures in relation to computer and keyboard use are followed in accordance with workplace procedures	Assessed concurrently with UEECD0007		
	1.3	Application software and information/instructions required for use are obtained			Practical observation
	1.4	On-screen instructions in relation to any anomaly are followed in accordance with workplace procedures			Practical observation
	1.5	Help menu is used to resolve any common start-up, access issues or anomalies			Practical observation
2 Use engineering application software	2.1	Established OHS risk control measures and procedures for carrying out the work are followed.	Assessed concurrently with E101A		
	2.2	Techniques specific to software packages are used to produce relevant files and engineering information		Assignments 1,2,3,4,5	
	2.3	Checks are made to ensure accuracy of information produced		Assignments 1,2,3,4,5	
3 Output information from an application.	3.1	Completed files are stored appropriately in accordance with workplace policies and procedures		Assignments 1,2,3,4,5	
	3.2	Files are printed and stored electronically as formal records and/or forwarded to relevant personnel			Practical observation
4 Shut down computer.	4.1	Files are named, arranged, saved and backed up in accordance with workplace policies and procedures		Practical observation	

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Test**	**Assignment**	**Project**
	4.2	Computer shutdown procedures are followed in accordance with workplace procedures and computer powered			Practical observation

Add rows to the following table as required

Performance Evidence	Test	Assignment	Project
Computer software applications		Assignments 1,2,3,4,5	
Working with operating system			Practical observation
CAD Portfolio			CAD Portfolio
Internet Research			Online Internet Research Project Report
Documents preparation		Assignments 1,2,3,4,5	

Add rows to the following table as required

Knowledge Evidence	Test	Assignment	Project
T1 Computer Systems Overview		ASSIGNMENT (5) Of http://www.highlightcomputer.com/InstructionITPart1Mod.pdf	
T2 Operating System Overview		ASSIGNMENT (4) Of http://www.highlightcomputer.com/InstructionITPart1Mod.pdf	
T3 Windows Operating System		ASSIGNMENT (4) Of http://www.highlightcomputer.com/InstructionITPart1Mod.pdf	

Knowledge Evidence	Test	Assignment	Project
T4 Word Processors		ASSIGNMENT (3) Of http://www.highlightcomputer.com/InstructionITPart1Mod.pdf	
T5 Spreadsheets		ASSIGNMENT (3) Of http://www.highlightcomputer.com/InstructionITPart1Mod.pdf	
T6 Databases		ASSIGNMENT (3) Of http://www.highlightcomputer.com/InstructionITPart1Mod.pdf	
T7 Transferring Data Between Windows Applications		ASSIGNMENT (3) Of http://www.highlightcomputer.com/InstructionITPart1Mod.pdf	
T8 Drawing and Computer Assisted Design (CAD) programs			CAD Portfolio
T9 E-mail and Internet Browsers			Online Internet Research Project Report

Add rows to the following table as required

Lessons-- www.iqytechnicalcollege.com/ICTCertDip.zip

www.highlightcomputer.com/Mgt107.zip

www.highlightcomputer.com/Mgt108.zip

Assessment Conditions	Test	Assignment	Project
Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances must be typical of those experienced in the administration – general administration field of work	√	√	√

Created by (Name)		**Date created**	
Approved by (Name)		**Date approved**	
Signature		**Date modified**	

UEEIC0042 Solve problems in single phase electronic power control circuits

Competency		EKAS No. H025/H026	Test No	Question /Activity Number	Mode of assessment
1. Identify problems in single phase electronic power control system	1.1 WHS/OHS requirements and workplace procedures are identified and applied	2.18.1			Completion of UEECD0007
	1.2 Hazards are identified, risks are assessed and control measures implemented	2.18.1			Concurrently assessed with UEECD0026
	1.3 Extent of single phase electronic power control problems are determined from performance specifications, situation reports and consultations with relevant person/s	2.9.7.1 (a, b) 2.9.7.1 (c, d)	Test 2 / 3 Practical	All	Written test Test question paper & students' answer sheets are the final evidence of the written tests Laboratory Lab report is an evidence
	1.4 Activities are planned to meet scheduled timelines in consultation with relevant person/s	2.9.7.1 (a, b,c,d)	Test Practical	All	Testing for phase control, firing angle, output voltage and waveform by using power scope are to be assessed. Laboratory Lab report is an evidence

	1.5 Tools, equipment and testing devices needed for the work are obtained in accordance with workplace procedures and checked for correct operation and safety	2.9.7.1 (a, b,c,d)	Practical	All	Use of SCR, power scope, firing circuit, single phase rectifier, interface with load, frequency control drive are to be assessed.
2 Provide solutions to single phase electronic power control problems.	2.1 WHS/OHS risk control measures and workplace procedures for carrying out the work are followed				Concurrently assessed with UEECD0026
	2.2 Single phase electronic power control devices, circuit operation characteristics and applications are used to develop solutions for control problems	2.9.7.1 (a, b,c,d)	Test (2/3)	All	Written test Test question paper & students' answer sheets are the final evidence of the written tests

	2.3 Parameters, specifications and performance requirements in relation to each single phase electronic power control problem are obtained in accordance with workplace procedures	2.9.7.1 (a, b,c,d)	Test (2/3)	All	Written test Selection of parameters, specifications and applications are to be assessed. Test question paper & students' answer sheets are the final evidence of the written tests
	2.4 Approaches to resolving single phase electronic power control problems are evaluated to provide most effective solutions	2.9.7.1 (a, b,c,d)	Test (2/3)	All	Written test Problem solutions are to be assessed. Test question paper & students' answer sheets are the final evidence of the written tests
	2.5 Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment	2.9.7.1	Practical	All	Unexpected error such as firing rate change affecting the firing angle and output thermal effect adjustment are to be assessed. Laboratory Lab report is an evidence
	2.6 Problems are solved efficiently using sustainable energy practices without waste of materials, damaging apparatus, the surrounding environment or services in accordance with workplace procedures	2.9.7.1	Test	All	Application of SCR in photovoltaic system is to be assessed. Written test Test question paper & students' answer sheets are the final evidence of the written tests

3 Test and document solutions to single phase electronic power control.	3.1 WHS/OHS risk control measures and workplace procedures for carrying out the work are followed	2.9.7.2	Practical	All	Student's ability to systematically trace the power control electronic circuit & use of appropriate equipments are to be assessed. Laboratory Lab report is an evidence
	3.2 Solutions to single phase electronic power control problems are tested to determine effectiveness and modified as necessary	2.9.7.1	Test (4/5)	All	Written test Test question paper & students' answer sheets are the final evidence of the written tests
	3.3 Adopted solutions are documented, including instructions for implementation, incorporating risk control measures	2.9.7.1	Test (4/5)	All	Written test Test question paper & students' answer sheets are the final evidence of the written tests
	3.4 Justification for solutions used to solve single phase electronic power control problems are	2.9.7.1	Test	All	Students' answer sheets are to be collected.

	documented in accordance with workplace procedures				

2.9.7 1 Single phase power control
2.18.1 Occupational Health and Safety principles

Attached

(1) Question papers for 2.2, 2.3, 2.4

(2) Competency sheet for 1.3, 1.4, 1.5, 2.5, 2.6, 3.2, 3.3 and 3.4

(3) OHS record for 1.1, 1.2 and 2.1

UEEIC0040 Solve problems in single phase electronic power control circuits

Competency		EKAS No.	Test No	Question /Activity Number	Mode of assessment
1. Identify problems in poly phase electronic power control system	1.1 WHS/OHS requirements and workplace procedures are identified and applied				Completion of UEENEEE001B
	1.2 Hazards are identified, risks are assessed and control measures implemented				Concurrently assessed with UEENEEE011B

	1.3 Extent of poly phase electronic power control problems are determined from performance specifications, situation reports and consultations with relevant person/s	2.9.7.2 (a, b) 2.9.7.2 (c,d)	Test 4/ 5 Practical	All	Written test Test question paper & students' answer sheets are the final evidence of the written tests Laboratory Lab report is an evidence
	1.4 Activities are planned to meet scheduled timelines in consultation with relevant person/s	2.9.7.2 (a, b,c,d)	Test Practical	All	Testing for phase control, firing angle, output voltage and waveform by using power scope are to be assessed. Laboratory Lab report is an evidence
	1.5 Tools, equipment and testing devices needed for the work are obtained in accordance with workplace procedures and checked for correct operation and safety	2.9.7.2 (a, b,c,d)	Practical	All	Use of SCR, power scope, firing circuit, single phase rectifier, interface with load, frequency control drive are to be assessed.
2 Provide solutions to poly phase electronic power control problems.	2.1 WHS/OHS risk control measures and workplace procedures for carrying out the work are followed				Concurrently assessed with UEENEEE011B

	2.2 Poly phase electronic power control devices, circuit operation characteristics and applications are used to develop solutions for control problems	2.9.7.2 (a, b,c,d)	Test (2/3)	All	Written test Test question paper & students' answer sheets are the final evidence of the written tests
	2.3 Parameters, specifications and performance requirements in relation to each single phase electronic power control problem are obtained in accordance with workplace procedures	2.9.7.2 (a, b,c,d)	Test (2/3)	All	Written test Selection of parameters, specifications and applications are to be assessed. Test question paper & students' answer sheets are the final evidence of the written tests
	2.4 Approaches to resolving single phase electronic power control problems are evaluated to provide most effective solutions	2.9.7.2 (a, b,c,d)	Test (2/3)	All	Written test Problem solutions are to be assessed. Test question paper & students' answer sheets are the final evidence of the written tests

	2.5 Unplanned situations are responded to in accordance with workplace procedures in a manner that minimises risk to personnel and equipment	2.9.7.2	Practical	All	Unexpected error such as firing rate change affecting the firing angle and output thermal effect adjustment are to be assessed. Laboratory Lab report is an evidence
	2.6 Problems are solved efficiently using sustainable energy practices without waste of materials, damaging apparatus, the surrounding environment or services in accordance with workplace procedures	2.9.7.2	Test	All	Application of SCR in photovoltaic system is to be assessed. Written test Test question paper & students' answer sheets are the final evidence of the written tests
3 Test and document solutions to poly phase electronic power control.	3.1 WHS/OHS risk control measures and workplace procedures for carrying out the work are followed	2.9.7.2	Practical	All	Student's ability to systematically trace the power control electronic circuit & use of appropriate equipments are to be assessed. Laboratory Lab report is an evidence
	3.2 Solutions to poly phase electronic power control problems are tested to	2.9.7.2	Test (4/5)	All	Written test Test question paper & students' answer sheets are the final evidence of the written tests

	determine effectiveness and modified as necessary				
	3.3 Adopted solutions are documented, including instructions for implementation, incorporating risk control measures	2.9.7.2	Test (4/5)	All	Written test Test question paper & students' answer sheets are the final evidence of the written tests
	3.4 Justification for solutions used to solve poly phase electronic power control problems are documented in accordance with workplace procedures	2.9.7.2	Test	All	Students' answer sheets are to be collected.

2.9.7.2 Poly phase power control
2.18.1 Occupational Health and Safety principles

Attached

(1) Question papers for 2.2, 2.3, 2.4

(2) Competency sheet for 1.3, 1.4, 1.5, 2.5, 2.6, 3.2, 3.3 and 3.4

(3) OHS record for 1.1, 1.2 and 2.1

Assessment Mapping - Template

(streamlined training package)

This template to be used for "new" endorsed streamlined training packages.

Instruction for use: These instructions in RED should be deleted from the completed document. Instructions in **BLUE** should be written over with appropriate information.

- This template is to be completed by the assessment developer to ensure the assessments meet the training package requirements for the unit of competency.
- It must be used during the assessment validation process.
- Record of this document must be retained in the faculty TAS teamshare teaching section.
- Add rows and columns as required below.

This document should be viewed concurrently with IS71 Assessment Mapping.pdf

Faculty:		**College:**	
Teaching Section:	Electrical Engineering		
Qualification Number and Name:	UEE62220 Advanced Diploma of Electrical Engineering		
Unit of Competency Number and Name:	**UETDRIS027 Diagnose and rectify faults in electrical energy supply transmission systems**		

Copy and paste the following table for each element as required

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Assessment event 1 Written Test**	**Assessment event 2 Practical & Observation**	**Assessment event 3 Assignment**
1. **Prepare to diagnose and resolve faults in transmission systems**	1.1	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be done are reviewed and determined	Advanced Diploma in Electrical Engineering Exercises Page 3 - Q15+16		
	1.4	Hazards are identified, risks assessed, and control measures identified and applied	Advanced Diploma in Electrical Engineering Exercises Page 3 - Q17+18 Page 4 Q21+22		
	1.2	Work plan is developed and confirmed, permissions obtained, and these are communicated with relevant personnel in accordance with workplace requirements	Advanced Diploma in Electrical Engineering Exercises Page 2 Q12)		
	1.3	Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements	Advanced Diploma in Electrical Engineering Exercises Page 203)		

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Assessment event 1 Written Test**	**Assessment event 2 Practical & Observation**	**Assessment event 3 Assignment**
			Q21 to 23		
	1.5	Work permits are determined in accordance with workplace requirements			Advanced Diploma in Electrical Engineering Exercises Page 150) Q 23 to 25
	1.6	Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order		**EP1,EP2,EP3 EP4**	Advanced Diploma in Electrical Engineering Exercises Page 153) Q 41 to 47
2. **Diagnose and resolve faults in transmission systems**	2.1 2.5	Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored Hazard control measures are monitored in accordance with workplace requirements	As per 1.3		
	2.2	Lifting, working at heights, working in confined spaces and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements			Advanced Diploma in Electrical Engineering Exercises Page 149) Q 13 to 20
	2.3	Work permits are received and signed in accordance with workplace requirements	Advanced Diploma in Electrical Engineering Exercises Page 147) Q 1 to 10		

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Assessment event 1 Written Test**	**Assessment event 2 Practical & Observation**	**Assessment event 3 Assignment**
	2.4	Faults in transmission systems are diagnosed and resolved in accordance with workplace requirements Suspected fault scenarios are tested as being the source of system problems. Source of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is outside the scope of the control system Faults in the system components are rectified to raise electrical energy transmission system to its operation standard. System is tested to verify that it operates as intended and to specified requirements. Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements		**Fault finding activities**	Advanced Diploma in Electrical Engineering Exercises Page 129) Q 64 to 70 As above As above Advanced Diploma in Electrical Engineering Exercises Page 211) Q 50 to 54 As above As above
	2.6	Incidents or unplanned events are responded to in accordance with workplace requirements		Fault finding activities Page 13 of IS71 Assessment Mapping.pdf	

Elements & Performance Criteria			Assessment event(s)		
Element(s)	**PC No**	**Performance Criteria (PC)**	**Assessment event 1 Written Test**	**Assessment event 2 Practical & Observation**	**Assessment event 3 Assignment**
3 Complete work and documentation	3.1	Completed work is checked for compliance against the work plan and workplace requirements	**Complete work and documentation**	**Complete work and documentation**	**Complete work and documentation**
	3.2 3.3	Incidents or unplanned events are reported in accordance with workplace requirements Plant, tools and equipment are cleaned, checked and returned to storage, and surplus resources and materials are managed in accordance with workplace requirements	As per 1.3		
	3.4	Work permits are signed off in accordance with workplace requirements		Fault finding activities Page 14 to 20 of IS71 Assessment Mapping.pdf	
	3.5	Work records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements		Fault finding activities Page 14 to 20 of IS71 Assessment Mapping.pdf	

Add rows to the following table as required

Performance Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
Receiving end voltage comparison between short/ medium and long transmission lines		EP1	
Long transmission line PI equivalent circuit Investigation		EP2	

Performance Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
Long transmission line T equivalent circuit Investigation		EP3	
Finding Transmission line efficiency/ Transformer effect on line efficiency		EP4	
Reactive power and power factor improvement		EP5	

Add rows to the following table as required

Knowledge Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
<Insert knowledge evidence >	**Insert question number or task skill number** from assessment tool that address the specific, knowledge evidence.	**Insert question number or task skill number** from assessment tool that address the specific, knowledge evidence.	**Insert question number or task skill number** from assessment tool that address the specific, knowledge evidence.
T1 Overview of the transmission system	Advanced Diploma in Electrical Engineering Exercises Page 153) Q 41 to 47		
T2 The principles involved in high voltage a.c. transmission			Advanced Diploma in Electrical Engineering Exercises Page 149) Q 16 to 18
T3 The principles involved in d.c. transmission	Advanced Diploma in Electrical Engineering Exercises Page 147) Q 5 to 7		
T4 The principles of operation, voltage and current range, breaking capacity and field of use			Advanced Diploma in Electrical Engineering Exercises Page 147) Q 10 to 12

Knowledge Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
T5 The types of isolators in use			Advanced Diploma in Electrical Engineering Exercises Page 147) Q4
T6 Circuit breaker auxiliary systems			Advanced Diploma in Electrical Engineering Exercises Page 123) Q 1 to 4
T7 The characteristics of lines and cables			Advanced Diploma in Electrical Engineering Exercises Page 117) Q 1 to 5 Q 24 to 30
T8 Control of voltage. Conditions leading to voltage collapse			Advanced Diploma in Electrical Engineering Exercises Page 117) Q 40 to 43
T9 Range of devices covered by SVCs	Advanced Diploma in Electrical Engineering Exercises Page 132) Q 19 to 21		
T10 Importance of the location in the system of voltage control devices			Advanced Diploma in Electrical Engineering Exercises Page 122) Q 23 to 44
T11 Use of graphical methods to calculate the size of VAr regulating plant			Advanced Diploma in Electrical Engineering Exercises Page 131) Q 19 to 21
T12 Types of communication systems including telephone, power line carrier,			Advanced Diploma in Electrical Engineering Exercises Page 132) Q 23 to 37

Knowledge Evidence	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
T13 Transient over-voltages in power systems	Advanced Diploma in Electrical Engineering Exercises Page 131) Q 14 to 18		
T14 Factors leading to the generation of corona.			Advanced Diploma in Electrical Engineering Exercises Page 130) Q 5 to 12

Add rows to the following table as required

Assessment Conditions	Assessment event 1 Written Test	Assessment event 2 Practical & Observation	Assessment event 3 Assignment
Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the welectrical workshop K2.11. Application of safe working practice & regarding the housekeeping rules are to be observed. Emergency procedures are to be informed. Safety equipments & first aids equipments are to be available. The students get the access to • Relevant practical equipments Records relating to electrical engineering resources	Test 1 + 2	Practical EP1 to 5	All assignments

Created by (Name)	U Kyaw Naing (Joe)	**Date created**	
Approved by (Name)		**Date approved**	
Signature		**Date modified**	

Concurrently assessed with

UETDRIS026 Diagnose and resolve faults in electrical apparatus

ELEMENTS PERFORMANCE CRITERIA

Elements describe the essential outcomes.

1 Prepare to diagnose and resolve faults in electrical apparatus

2 Diagnose and resolve faults in electrical apparatus

Performance criteria describe the performance needed to demonstrate achievement of the element.

1.1 Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be done are reviewed and determined

1.2 Work plan is obtained, confirmed and communicated with relevant personnel in accordance with workplace requirements

1.3 Work is prioritised and sequenced for completion in accordance with work plan and workplace requirements

1.4 Hazards are identified, risks assessed, and control measures identified and applied

1.5 Work permits are determined in accordance with workplace requirements

1.6 Plant, tools, equipment and personal protective equipment (PPE) required for work are determined, obtained and confirmed in working order

2.1 Legislation, regulations, standards, codes of practice and organisational workplace requirements for the work to be performed are applied and monitored

2.2 Lifting, working at heights, working in confined spaces and the use of plant, tools, equipment and PPE are carried out in accordance with workplace requirements

2.3 Work permits are received and signed in accordance with workplace requirements

2.4 Faults in electrical apparatus are diagnosed and resolved in accordance with workplace requirements

2.5 Hazard control measures are monitored in accordance with workplace requirements

3 Complete work and documentation

2.6 Incidents or unplanned events are responded to in accordance with workplace requirements
2.7 Quality checks of work are undertaken in accordance with work plan and workplace requirements
3.1 Completed work is checked for compliance against the work plan and workplace requirements

3.2 Incidents or unplanned events are reported in accordance with workplace requirements

3.3 Plant, tools and equipment are cleaned, checked and returned to storage, and surplus resources and materials are managed in accordance with workplace requirements
3.4 Work permits are signed off in accordance with workplace requirements
3.5 Work records, reports and documentation are completed, and appropriate personnel notified in accordance with workplace requirements

UETTDRIS71A Diagnose and rectify faults in electrical energy supply transmission systems

ASSESSMENT QUESTIONS & TESTS ARE BASED ON THE FOLLOWINGS,THEY ARE MODIFIED, EXTRACTED SOME PARTS, APPLIED THE SIMILAR ONES,ALTER AND UTILIZED IN ASSESSMENT TASKS & THEORY TESTS FROM TIME TO TIME.

(1) Delivery & collection of evidence

1 Prepare to diagnose and rectify faults. Work performance

1.1 OHS procedures for a given work area are identified, obtained and understood

Ref-Advanced Diploma in Electrical Engineering Exercises Page 3 -Q15+16

www.electricaldiploma2013.webs.com Then access Click **HERE** to download the Exercises

http://www.mongroupsydney1.com/Advanced_Diploma_in_Electrical_Engineering_Exercises_EE011.pdf

Relevant Instruction Lessons

Study Option (1)

Guided study (Online)Resources+Online exercises+Online Practicals

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Youtube Videos for Electrical Engineering Lessons

http://www.mongroupsydney1.com/youtubevideos.htm

Q1.Describe the risks and dangers in power station and outline the recommended safety
Q2.equipments and emergency procedures.
Q3.Outline the process of maintenance work in substation.

1.2 OHS risk control measures and procedures in preparation for the work are followed

Ref-Advanced Diploma in Electrical Engineering Exercises Page 3 -Q17+18 Page 4 Q21+22
Q4. Write down the check list to perform the tasks in substation.
Q5. Write down the safety procedures and methods to assess the risk and to reduce the risk.
Q6..Write down the code of practice for working near exposed main and apparatus.
Q7.Which precautions are to be emphasized when working in substation?

1.3 The likely extent of work to be undertaken is envisaged from reports and/or discussions with appropriate person(s)

Q8. Write down the risk reduction procedures in maintenance work to discuss with work manager. (Ref-Advanced Diploma in Electrical Engineering Exercises Page 2 Q12)

1.4 Advice is sought from the work supervisor to ensure the work is coordinated effectively withothers.

Answer the following questions to seek the advice from work supervisor in the following aspects.
Q9. What are the risks?
Q10.How are the risks classified?
Q12.How can the risk be evaluated?
Q12.How will you manage the risk? Ref-Advanced Diploma in Electrical Engineering Exercises Page 2 Q8 to 11)

1.4 The extent of faults is determined from reports and other documentation and from discussion with appropriate personnel.

Ref-Advanced Diploma in Electrical Engineering Exercises Page 203)
(11) Positive, negative and zero sequence
Slide 1+2+3+4
Q21.Z1= 20% Z2= 15% 200MVA base A to B fault at 33KV Find fault currents.
Slide 5
Q22.Z1 = 5% Z2 = 10% Zo = 20%, 200MVA 132 KV line to ground fault. Find fault current.
Slide 6+7+8

Q23. Z1 = 70% Z2= 70% Zo = 30 % Base MVA = 200 MVA E = 66KV 2 Line to ground fault.
Calculate fault current.

1.5 Appropriate personnel are consulted to ensure the work is coordinated effectively with others involved on the work site.

1.6 Tools, equipment and testing devices needed to diagnose faults are obtained in accordance with established procedures and checked for correct operation and safety

Ref-Advanced Diploma in Electrical Engineering Exercises Page 150)

Slide 15+16+17
Q23.A three phase 66KV line is supplying 500 KW at 0.85 PF lagging. Line resistance, inductive reactance and capacitive reactance are 1Ω, 4Ω and 3000Ω respectively. Calculate the sending end voltage by using equivalent Pi circuit.
Slide 18+19
Q24. What factors are to be considered for power system planning.
Slide 20+21
Q25.A sum of $2000 is invested at 5% for 15 years at compound interest.
(a) Calculate the sum at the end of 15 years
(b) If instead of lump sum at the end of 15 years, the loan of $2000 is to be paid by the fixed around each year, calculate the annual amount.

Ref-Advanced Diploma in Electrical Engineering Exercises Page 153)

Slide 1+2+3
Q41.What is transmission line . Explain the components of it.
Slide 4_6
Q42.Explain maximum transfer of electrical energy.
Slide 5+7+8
Q43.Explain surge impedance loading.
Slide 9

Q44.Describe long and short transmission lines.
Slide 10+11+12+13
Q45.Explain (a)Propagation constant (b) Line model & SIL
Slide 14+15
Q46.Write the equations to calculate complex power.
Slide 16
Q47.What are the difference between balanced line & unbalance line.

Location of Evidences (Table 1)

Performnce Criteria	Above	Location of Evidences
Marking Guide/ Assessment Cover/ Feedback own record		
Students' work in own record	Summative Assessment- Formal Tests	
	Formative Assessment/Practical+ Class works	

2 Diagnose and rectify faults.
2.1 OHS risk control measures and procedures for carrying out the work are followed.
As per 1.3

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.
Ref-Advanced Diploma in Electrical Engineering Exercises Page 149)

4) Power factor connection

Slide 1+2+3+4+5+6+7
Q13.What is power factor. What are the effects of poor power factor
Q14.Four three phase 415V 50HZ loads are connected together in an industrial installation. Determine (a) Total load (b) Total power factor (c) The value of capacitor required PF to 0.98
Slide 8+9
Q15.A load with a PF 0.7 lagging dissipates 1500W from 240V , 50HZ supply. It is required to correct the PF to 0.95 lagging. Find (a) The original and final currents (b) The value of the component to be added in parallel with the original load to achieve the required PF correction.

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(5) Overhead transmission line
Slide 1+2
Q16.Sketch Tee and Pi equivalent circuits of transmission line and vector diagram.
Slide 3+4
Q17.Sketch two ports network equivalent circuit and write the equation.
Slide 5
Q18.By doing open circuit test and short circuit test for parallel line model, the following values are obtained.
OCT—Vs= 12V , Vr=12.5V Is = 0.1 amp
SCT---Vs = 13V, Ir = 0.4A Is = 0.48 amp
Find the generalized equation
Slide 6
Q19.Sketch power transformer protection circuit.
Slide 7
Q20.Sketch recloser

2.3Circuits/machines/plant are checked as being isolated where necessary in strict accordance OHS requirements and procedures.

Ref-Advanced Diploma in Electrical Engineering Exercises Page 147)

Slide 1+2+3
Q1.Compare the copper weight of 3 phase 3 wires system & simple dc system
Slide 4+5
Q2.Explain voltage variations in power system
Slide 6

Q3.Sketch induction motor & synchronous motor
Slide 7
Q4.Explain the components of circuit breaker

Ref-Advanced Diploma in Electrical Engineering Exercises Page 148)

(3) Reflection in transmission line
Slide 1+2+3+4+5
Q8.A 60Ω transmission line connected to load impedance 100+j70 Ω. The forward RMS valresiue on line is 30V. Line impedance is 30Ω
Calculate (a) Power delivered to resistance part of load impedance
(b) RMS current in impedance, reflected wave voltage
(c) Peak voltage forward & backward wave
(d) Voltage standing wave ratio (VSWR)
(e) Return loss in decibel
Slide 6
Q9.Explain the impact of switching in power line
Slide 7+8+9+10
Q10.A coil of 20H inductance and 10Ω resistance is connected in parallel with a 30Ω resistor across a 150V dc supply which is suddenly disconnected.
Find
(a) Initial rate change of current after switching
(b) The voltage across 30Ω resistor initially after 0.4 sec
(c) The voltage across the switch contacts at the instance of separation
(d) The rate at which the coil is losing stored energy 0.3 sec after switching

2.4 Logical diagnostic methods are applied to diagnose electrical energy transmission system faults employing measurements and estimation of system operating parameters referenced to system operational requirements.

2.5 Suspected fault scenarios are tested as being the source of system problems.

2.6 Source of the fault is identified and appropriately competent persons are engaged to rectify the fault where it is outside the scope of the control system.
Ref-Advanced Diploma in Electrical Engineering Exercises Page 129)

To determine the quality of the operational status of protection system, it needs to ensure relay operation sequence, the sequential relay protection system and characteristics are to be investigated. The following activities and questions provide this competency.

(32)Over current & earth fault protection , Directional protection, operating characteristics

Slide 1

Q64.Sketch the diagram of over current protection

Slide 2

Q65.Sketch earth fault relay protection diagram.

Slide 3

Q66.Sketch the combined over current and earth fault protection and explain it's operation.

Slide 4

Q67.Explain the operation of directional relay with diagram.

Slide 5+6+7+8

Q68.Locate directional & non directional elements in ring system.

Slide 9+10

Q69.Sketch the connection diagram of combinational protection scheme that contains two over current relays and one earth fault relay to provide phase to phase and phase to earth protection.

Slide 11

Q70.How will you adjust definite minimum time point on relay curve?

2.7 Faults in the system components are rectified to raise electrical energy transmission system to its operation standard.

2.8 System is tested to verify that it operates as intended and to specified requirements.

2.9 Decisions for dealing with unexpected situations are made from discussions with appropriate persons and job specifications and requirements.

Ref-Advanced Diploma in Electrical Engineering Exercises Page 211)

(11) Change control

Slide 1

Q50.Describe the overview of change control system.

Slide 2

Q51.Explain the establishment of contracts

Slide 3
Q52.Outline the project control system responding the disturbances.
Slide 4
Q53.Sketch the procedure for preparing quality manual.
Slide 5+6
Q54.Explain management leadership.

Work performance + Practical Instruction Back up

Click HERE to download practicals

http://www.filefactory.com/file/cf88135/n/Practical.zip

Refer Power System Practicals

Part 1: Operational Study

Lab No	Name of Practical	Equipments	Assessment
	Group 1 Power & Line		
EP1	Receiving end voltage comparison between short/ medium and long transmission lines	distribution system types	Circuit interpretation, connection, data collection, calculation, graph sketch, report presentation, conclusion
EP2	Long transmission line PI equivalent circuit	overhead systems	As above
EP3	Long transmission line T equivalent circuit	distribution system types	As above

EP4	Transmission line efficiency/ Transformer effect on line efficiency	energy metering • demand meters	As above
EP5	Reactive power and power factor improvement	energy metering • demand meters	As above
EP6	PF effect on line current	energy metering • demand meters	As above
EP7	Corona Video	• surge protection	Report presentation, conclusion
EP8	Phase sequence measurement		Competency assessment
	GROUP 2- Protection equipments		
EP9	Connection of relay protection scheme & protective equipments by using one line diagram (Circuit interpreting & connection competency development without electrical supply)	protection equipment and systems	Competency assessment
EP10	Current transformer & potential transformer connection & ratio test	current transformers • potential transformers	Circuit interpretation, connection, data collection, calculation, graph sketch, report presentation, conclusion
EP11	Over current relay characteristics	protection equipment and systems • over-current protection	Circuit interpretation, connection, data collection, calculation, graph sketch, report presentation, conclusion
EP12	Electronic relay test	conventional relays • electronic relays	As above
EP13	Study of various protective relays used in industry through trade references	• earth fault protection • differential protection	Research, report presentation

		busbar protection • surge protection • conventional relays	
	Group 3- Supply System		
EP19	Underground cable capacitance test	underground systems	Circuit interpretation, connection, data collection, calculation, graph sketch, report presentation, conclusion
EP20	High tension line design	• overhead systems	Design project
EP21	Line insulator test & capacitance grading	• overhead systems	Circuit interpretation, connection, data collection, calculation, graph sketch, report presentation, conclusion
EP22	Voltage profile chart of distribution system	• voltage regulation equipment • on load tap changers	As above
EP23	Load centre-Power loss comparison	• distributor equipment	As above
EP30	Transformer polarity test	• distributor equipment	As above
EP42	Maximum power transfer theorem with power circuit	• load control	As above
EP43	Load flow study	• load control	As above
EP45	Trade reference study, switch board, busbar, insulator, circuit breakers	reclosers / sectionalisers.	As above

2.10 Methods for dealing with unexpected situations are selected on the basis of safety and specified work outcomes.

2.11 Diagnosis and rectification activities are carried out efficiently without unnecessary waste of materials or damage to system and the surrounding environment or services and using sustainable energy practices.

General faults including: open-circuit; short-circuit; incorrect connections; insulation failure; unsafe condition; apparatus/component failure; related mechanical failure for the equipments in the range

(2)**Explore some of the faults in power system/ energy supply that can be rectified only by utilizing para-professional knowledge background and how the arranged simulated practical can provide the hand on experience and work performance for the students and how it is different from the performance only based on trade level activities.**

In range of performance, it outlines the real equipments used in the industry. There will be the arguments that the setting of practical in lab room only includes rheostat, resistor, varic, capacitor etc. How it meets the outlined competencies?
To exactly find out and rectify the faults in energy supply system , the tasks and complexity level more than the trade level- (check the continuity, check the connection, visual inspection, testing and measurement)will be included.
The following is the various power system faults which I draw out from my power engineer work records that the technical knowledge higher than trade level is required to successfully rectify the fault and determine the appropriate solutions. In the table, I summarize how the fault is , caused, background theory, how the person who knows the theory will do, how the person who does not know the theory will do and how my simulated practical / and practical related background theory will assist to develop the fault finding skill.

Typical fault	Cause	Related Theory	How the person who does not know the theory will do	How the person who knows theory will do	Name of simulated practical	How to develop the skill
(1)In reticulation system, there is abnormally different in voltages	Abnormal resistance. Wrong cable selection. Abnormal circuit configuration	Voltage profile chart.	May give he other idea to change the load	Measure voltage, sketch the voltage profile chart. Then identify the portion of the circuit.	EP 23 Voltage profile chart	Develop the analytical skills to identify the fault point
(2)Line conductor slips from the pin insulator	Line deviation is too high, combination of wind, conductor tension will take away the conductor from pin insulator	Line deviation angle calculation	Will reinstall the line. After some period, he same thing will happen again	Will examine line deviation angle. Tension, wind force. Will rearrange the line or provide shackle insulator	Theory instruction. Line deviation	Develop the problem solving skill on line construction.

(3)Conductor sag too low. Hit by traffic and then broken	Sag calculation. Wrong tension, safety factor, weight	Sag/ line design	Pull up the cable. After some time, it will fall again	Will examine the related parameters and find the way	EP 20 High Tension Line Design	Develop the skill on line design and to know the technical factors for sag.
(4)Discharge current flows out from underground insulator and cause the injury	UG cable capacitance. Charging current	UG Cable capacitance test	Will think about current flow, leakage etc.	Will examine the UG cable capacitance and produce the procedure for discharging	EP 19 Underground cable capacitance test	Develop the skill in UG cable testing focus on capacitance and estimate the amount of charging current
(5)Line pole broken without natural disaster	In appropriate pole strength	Pole mechanical design	Will erect the pole. Some time after, broken gain	Will examine he tension, wind force, conductor weight, then will calculate the pole strength and select appropriate diameter of pole and appropriate pole material	Pole mechanical design lesson + EP 20 High tension line design	Develop the skill on line design and to know the technical factors for pole.

Location of Evidences (Table 1)

3 Complete and report fault diagnosis and rectification activities.

3.1 OHS work completion risk control measures and procedures are followed.

3.2 Work site is made safe in accordance with established safety procedures.

As per 1.3

3.3 Rectification of faults is documented in accordance with established procedures.

3.4 Appropriate person or persons notified, in accordance with established procedures, that the system faults have been rectified.

Fault	**Reason**	**Related theory**	**The person who does not know the theory will do**	**The person who knows the theory will do**	**Related Practical**	**Development of skill**

(6)There are too much power loss. Line efficiency is poor	If all connected loads are all right, wrong location of power station/ load centre	Load centre study	Will not take account on load centre	Will take account on load centre	EP23 Load centre power loss comparison	How the location of supply source affect line losses/ efficiency and % voltage regulation
(7)Problem with UG cable joint	Wrong method in UG cable joining	UG cable joining methods. Theory study			UG cable joining method in my prepared 7762 AA Electrical Distribution textbook	UG cable joining methods. Theory PLUS photographs
(8)Generator got motor action. Reverse power relay cuts off	Out of synchronism. Up to 180 degree out of phase	Synchronizing	Will neglect synchronism. Just run and switch on	Will focus on synchronizing process. Avoid reverse power relay operation	Synchronizing	Synchronism, generator parallel operation requirement practical knowledge development.
(9)Generator vibration/ hunting	Stability concept	System stability	Do not care on machine hunting. Will continue to run . As consequence, face the short life of bearing/ shaft	Will take care on transient and steady state system stability and prevent the hunting	Moment of inertia/ machine stability	Moment of inertia/ machine stability practical knowledge development.
(10)Relay operates on fault. But the system loss the synchronism	System stability/ critical fault clearing angle aspect.	System stability/ critical fault clearing angle	Do not care on the relay setting to provide both fault protection and maintain the system stability. Re-synchronize the generators when ever the relay operates	Will set the proper relay setting to maintain the stability	Critical fault clearing angle. Equal area criteria	Critical fault clearing angle. Equal area criteria practical knowledge development.
(11) Line reactive power too much. The equipment capacity is unnecessarily increased	Problem related to load flow	Load flow study	Will not take account on load flow concept.	Take account on load flow and optimize the loading	EP 42 Maximum power transfer theorem EP43 Load flow study	Develop the load flow concept and practical optimizing skill
(12)There is nothing wrong with the line but the transformer placed near the switch heat up and cooked	Switching surge	Switching voltage surge	Just replace the transformer. After some time, the same problem will be faced	Take account on switching voltage surge and plan tom install the surge diverter.	Switching voltage surge	Switching voltage surge practical knowledge development.
(13)Light radiated from the power line. Too much power loss	Corona	Corona study	Will consider the ACT OF GOD	Will find the way to reduce corona such as application of	EP 7 Corona video	How corona occurs and find the way to prevent .

and high interference to telecom line				hollow conductor to increase diameter of conductor to raise the critical voltage level		
(14) Control telecommunication for power line down, no relay operates	Application of telecommunication system in power system operation	Application of telecommunication system in power system operation 7762AG Power System Operation	Will not be aware of the role of telecommunication system	Will check the function of telecom equipment for power system control and protection and perform the preventive maintenance	Application of telecommunication system in power system operation	Web based control/ IP based control and telecomm: concepts practical knowledge development.
(15)Too much flickering of lamps	Harmonics	Harmonics in power system	Will not know what happens	Will check the harmonics source/ increase the size of neutral wire to allow the harmonics current flows	Harmonic source scope observation	Development of identifying the harmonics
(16)Lightning strike	Lightning arrester	Lightning arrester	Will reinstall LA. But not sure it will be safe or not.	Will check the coverage provided by lightning arrester	Lightning arrester study	Lightning arrester practical knowledge development.
(17)Earth fault/ earth leakage can not be protected	Grounding in power system	Grounding in power system 7762AE Power System Protection	--	Will measure the ground resistance, will implement the additional ground connections	Power system grounding study	Power system grounding practical knowledge development.
(18)Occurance of over current	Over current protection	Over current relay 7762AE Power System Protection	Will not exactly know how to set/ adjust the over current relay	Will set/ adjust the over current relay	EP11 Over current relay characteristics	Practical skill development in over current relay
(19)Earth leakage fault	Earth leakage protection	Earth leakage protection 7762AE Power System Protection	Will not exactly know how to set/ adjust the earth leakage relay	Will set/ adjust the earth leakage relay/ CT arrangement	CT arrangement for earth leakage fault & fault in protected zone	Practical skill development in earth leakage fault protection
(20)Transformer protection	Differential relay	Differential relay	Will not exactly know how to set/ adjust the differential relay	Will set/ adjust the differential relay	CT arrangement for fault in protected zone	Practical skill development in differential protection
(21)Line is protected by differential/ over current relay. But it is not effective when the load are fed from some part of the line	Distance relay	Distance relay	Will not exactly determine the reason why and how to change the protection system	Will change the protection system and will calculate earth fault impedance	Earth fault calculation	Problem solving skill development in earth fault calculation
(22)Fault happens but the relay can not	CT/ PT ratio for relay	Relay protection scheme	Will not exactly determine the reason why and how to	Will adjust CT PT ratio at the simulated fault situation and will	EP9 Connection of relay protection	Practical skill development in CT PT ratio adjustment

provide the effective protection			change the protection system	adjust the relay setting appropriately	scheme & protective equipments by using one line diagram (Circuit interpreting & connection competency development without electrical supply) EP10 Current transformer & potential transformer connection & ratio test	
(23) I accidently open the CT secondary and it got explosion	Current transformer	Current transformer		Will make sure not to open circuit the CT secondary	EP10 Current transformer & potential transformer connection & ratio test	Develop the skill on CT/ PT connection & applications.
(24) we use old type gravity relay, it does not provide the effective protection	Restrainting system of relay	Relay types & characteristics		Will make sure to correctly arrange the relay position	EP13 Study of various protective relays used in industry through trade references	Knowledge development on various protective relays used in industry through trade references
(25) Relay operates at wrong current	Operation/ setting of relay	Relay types & characteristics	Trial error approach will be used	Will make sure to correctly arrange the relay setting	EP11 Over current relay characteristics	Practical skill development in over current relay
(26)In power transformer protection. Transformer is Star/Delta connection. All relay settings are	Transformer Star Delta & relay star/delta matching	Star delta vector diagram. Transformer star side –Relay delta & transformer delta—Relay star	Will not know what happens and how to rectify the fault	Will check the connection and will consider the vector difference causes the wrong operation	EP10-CT & PT connection/ ratio check	Practical skill development in CT/PT Connection

correct. But relay wrongly operates. I checked all continuity. Every thing all right						
(27)Regulator is set to meet the system voltage condition. But later time, it is blown out	Voltage ratio/ regulator setting	Voltage regulator	Will emphasize in solving the problem for a short moment. Will not consider the long term impact	Will consider whether the setting to upgrade the voltage will impact on future system voltage change	EP22 Voltage profile chart of distribution system	The skill training to develop the judgment of voltage level and future impact
(28)Fault spread from one busbar to another busbar	Busbar arrangement/ sectionalization	Busbar arrangement	Will assemble he busbar to install the equipment, will not consider how the arrangement can contribute the spread of fault	Will consider the way to insert section circuit breakers	Busbar layout/ arrangement study	Busbar arrangement sketch/ plan practice development
(29)Equipment suffers over voltage and blown out after the capacitor value is changed for PF improvement	Inappropriate capacitor setting. Cause of overvoltage. Vector diagram	PF improvement/ Capacitive reactance effect on load	Will only see the way to improvement the PF. Will not know the consequences	Will posses the knowledge of capacitor impact on load voltage and will take account on optimal setting of capacitor value	EP5-capactance effect on line EP6-PF Improvement	PF improvement method is judgment with capacitor effect causes over voltage. This skill is trained.
(30)Directional relay does not work to protect the reverse power flow	Directional relay operation	Study on directional relay.		Wrong connection to direction coil will be identified	EP 13 Protective relays used in industry	Guide to acquire the relevant technical knowledge
(31)Voltage flashing over capacitor string	Capacitor string	Study on capacitor string	Will change the capacitor string	Will provide the preventive protection such as arcing horns OR take account on line capacitor grading	EP21 Line insulator capacitance test	Develop the skill to measure line capacitor value . Capacitance grading.
(32)Circuit Breaker itself is blown out	Circuit Breaker capacity	Study on capacity of circuit breaker	Will change CB. After sometime, it will blow up again.	Will consider the CB capacity & possible over current developed in line fault	EP13 Relay & CB used in system Fault current	Develop the skill in fault current estimate and choosing CB capacity
(33)CB too hot and meltdown	CB capacity/ Arc development	Study on capacity of circuit breaker/electric arc	Will change CB. After sometime, it will blow up again.	Will consider the CB capacity & possible over current developed in line fault	EP13 Rely & CB used in system Fault current	Develop the skill in fault current estimate and choosing CB capacity

				Will consider the arc extinguishing methods		
(34)Need to expand the line in emergency. I am only in-charge	Line design	Line design project	Will not know how to design a line	Will utilize references/ methods to design and construct the line	7762AA Project-Over head line design	Line electrical & mechanical design practice development
(35)HV current flows into LV line	Separation between HV & LV line	Rules & regulations related to line	Will not know the regulation	Will apply the regulation in real wok	7762AA Line pole/ cross arm design and conductor arrangement	Line electrical & mechanical design practice development
(36) Line wire fracture	Sag calculation	Sag calculation/ minimum cable size	Reinstall the line wire. Like part to like part replacement is applied, will use the same size of cable. After sometime, line will break gain	Will consider allowable tension/ minimum conductor size	7762AA Project-Over head line design	Line electrical & mechanical design practice development
(37)Electronics equipment used for line protection is blown up	Voltage surge	Signal condition sub system. Surge filter	Will replace the electronic board. But the same fault happens again	Will consider the cause of surge. Surge filter / absorber/ diverter will be installed	7762AE Line surge/ application of electronic control system	Develop the skill in line surge/ electronic control.
(38) Receiving end voltage is greater than the sending end	Capacitance effect on long line	Long line 7762AG Power System Operation	Will think that the equipments are designed to operate at the sending end voltage level, it will be enough	Will consider the line configuration and will provide the appropriate arrangement for over voltage caused by capacitance effect on long line.	EP2/EP3 Long Line PI & TEE equivalent circuits	Develop the practical skill in determination of possible voltage rise in simulated line model.
(39)Can not run the generators in parallel	Synchronism problem	Synchronizing	Will not properly know the synchronism	Will consider the synchronism	Alternator parallel operation- Procedure	Develop he knowledge in synchronizing
(40) Over current relay is provided to protect the system but it does not work when the ground fault occurs	Characteristics of relays	Relay types and characteristics	Will think that one relay will protect everything	Will select the appropriate relay for appropriate place and protection task	EP13 Study of various protective relays used in industry through trade references	Knowledge development on various protective relays used in industry through trade references

Method of delivery	**Method of collection of evidence**
7-Face to face 6-Electronic Key for delivery mode 1-On the job 2-Simulated 3-Blended 4-Self paced 5-Distance 6-Electronic 7-Face to face 8-Other Detailed explanation Face to face class teaching + Online supplement multimedia notes **Evidence**	A,B,D,E,F,G,L Key for Methods for Collecting Evidence: A-Assignment B-Written Task C-Role play D-Exam E-Oral questioning F-Simulation G-Observation H-Work based I-Portfolio J-Self assessment K-Case study L-Practical demonstration M-Project N-Training Record O-Other Detailed explanation A+B-Test 1, 2, 3, 4 E-Oral question in practical class F-Simulated practical for line & power system comprising mathematical equations & functions G-Observe the student's performance in practical class L-Student practical performance result + report preparation

Part 1- Evidence of teaching & learning **Plan for concurrently delivery** www.powerlearning1.zoomshare.com Both digitised notes + multimedia notes including audio files Notes in USB (Available on request) **Part 2- Evidence of lesson planning** (1) Delivery & assessment matrix excel form (2) Semester plan (3) Students study progress plan (Available on request)	**Evidence Attached** Part (1)- Test questions 2 tests Part (2)-Evidence of students participation (1) Signed attendance sheet (2) Signed Test attendance sheet (3) Sample answer paper & practical report Either hard or scanned copy (Will be available on request within 6 months of the assessment event (4) EBS attendance & grade record

1 On the job	**2** Simulated	**3** Blended	**4** Self-paced (facilitated)
5 Distance	**6** Electronic	**7** Face to Face	**8** Other (Please specify)

Key for Methods for Collecting Evidence:			
A Assignment	**B** Written task	**C** Role play	**D** Exam
E Oral questioning	**F** Simulation	**G** Observation	**H** Work based
I Portfolio	**J** Self assessment	**K** Case study	**L** Practical demonstration
M Project	**N** Training Record Book	**O** Other (Please specify)	

Location of Evidences (Table 1)

ASSESSMENT SCHEDULE

Performance Criteria	Assessment 1 Practical		Assessment 2 Theory
	Continuous Observation	Written Assessment as part of Practical	Written Assessment
1.1		X	
1.2		X	
1.3		X	X
1.4		X	X
1.5		X	X
1.6		X	X
2.1		X	
2.2		X	X
2.3		X	X
2.4		X	X
2.5		X	X
2.6		X	X
2.7		X	X
2.8		X	X
2.9		X	X
2.10		X	X
2.11		X	X
2.12		X	X
3.1	X	X	
3.2	X		
3.3	X		
3.4	X		
EKAS Assessment		X	X

POWER SYSTEM Youtube video Lessons to provide the sufficient EKAS

G015/ IS67+68+ IS74

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Power System (1)

G015(AA)Lesson 1-Distribution system.zip

http://youtu.be/VuzjXkRx4UI

G015(AA)Lesson 2-Demand factor.zip

http://youtu.be/cUGbxhBT-Dc

http://youtu.be/DCCl4cO3Vu8

G015(AA)Lesson 3-Sag.zip

http://youtu.be/1s496h-Iuu8

G015(AA)Lesson 4-OH Line mechanical design.zip

http://youtu.be/T0BnyqV9T6E

http://youtu.be/hu1TrUv2_OY

G015(AA)Lesson 5-UG Cable.zip

http://youtu.be/hHCLzMnVmT0

http://youtu.be/A5AieaBBZHo

G015(AA)Lesson 6-Voltage control.zip

http://youtu.be/y1vTM5fvfyU

http://youtu.be/Z9HBGsVgymA

G015(AE)Lesson 1-Power system protection scheme.zip

http://youtu.be/ihpd3cDAhBU

http://youtu.be/EGXkLRM2L9M

http://youtu.be/zOIUYQ7OJfs

G015(AE)Lesson 2-Differential relay.zip

http://youtu.be/2iW0oEScMsw

G015(AE)Lesson_3-Over_current_&_earth_fault_protection.zip

http://youtu.be/hvGjdO9jEhk

G015(AE)Lesson 4-Three phase differential relay.zip

http://youtu.be/2iW0oEScMsw

http://youtu.be/VuzjXkRx4UI

http://youtu.be/2iW0oEScMsw

G015(AE)Lesson 5-Current time grading.zip

http://youtu.be/r0qkLrmkKsM

G015AE Lesson 6

http://youtu.be/InsTLh7_N5k

G015(AE)Lesson_7-CT_PT.zip

http://youtu.be/ZF_y65xsM_M

G015(AE)Lesson 8-Distance relay.zip

http://youtu.be/NKzMVquFLu8

http://www.filefactory.com/file/c386a2e/n/G015_AE_Lesson_8-Distance_relay.zip

G015(AE)Lesson 9-Telecom in power protection.zip

http://youtu.be/9C6oggZAKRg

http://youtu.be/XRpffA6hU_U

http://youtu.be/X-kz3cyL9fU

G015(AG)Lesson 1-Stability.zip

http://youtu.be/fUyNqcXtBXg

G015(AG)Lesson 2-Generator load sharing.zip

http://youtu.be/A-t7XH4rK4M

http://youtu.be/OTsis_KIRuk

http://youtu.be/8j1nD9nY2hU

G015(AG)Lesson 3-Power Flow.zip

http://youtu.be/0OzT4Pol-Jc

http://youtu.be/fK0wcaTY_rw

G015(AG)Lesson 4-IP based system.zip

http://youtu.be/ve5O8K9fL7k

G015(AG)Lesson 5-Surge in power system.zip

http://youtu.be/6WkezTcOzX4

G015(AG)Lesson 6-CTPT Harmonic filter.zip

http://youtu.be/Uy7q9SsaOYs

G015(AG)Lesson 7-Short circuit in alternator.zip

http://youtu.be/b-46Kvn8kJI

G015(AG)Lesson 8-Corona.zip

http://youtu.be/XYGRAWOqzsc

G015(AG)Lesson 9-Power surge.zip

http://youtu.be/uzFS-otIn-g

http://youtu.be/IsZ_ccy630w

G015(AG)Lesson_10-Static_Var_Compensation.zip

http://youtu.be/y-of5oLojCU

G015(AG)Lesson 11-PF Control+Fuel cell.zip

http://youtu.be/AXbCcoQeLns

G015(AG)Lesson_12-Exercises.zip

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G037+G038+G039 Part 1/2/3+IS69
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Power System (2)

G037+G038+G039 Lesson 1-Power Flow.zip

http://youtu.be/mzwGGXRTtvw

G037+G038+G039 Lesson 2-Site Earthing.zip

http://youtu.be/PATkXVBF9kc

http://youtu.be/H4Dj1K238BE

G037+G038+G039 Lesson 3-Power System Control Equipments.zip

http://youtu.be/JJczbYVWOoI

G037+G038+G039 Lesson 4-Auxiliary System+Harmonic.zip

http://youtu.be/5mDNHGFLA0c

G037+G038+G039 Lesson 5-Harmonic.zip

http://youtu.be/n41q4Rmz2p0

http://youtu.be/8CelGV5AElk

G037+G038+G039 Lesson 6-Harmonic Calculation.zip

http://youtu.be/NHSzu6HkOgI

http://youtu.be/fSLrPIC6Mho

G037+G038+G039 Lesson 7-Synchronous Generator Loading.zip

:http://youtu.be/jv1q7Mtg7Gs

http://www.filefactory.com/file/c39be2f/n/G037_G038_G039_Lesson_7-Synchronous_Generator_Loading.zip

G037+G038+G039 Lesson 8-Turbine Control+Power Line Earthing.zip

http://youtu.be/0CvgkmDE3Kw

G037+G038+G039 Lesson 9-Insulator.zip

http://youtu.be/l4jqs8MLBFA

http://youtu.be/TiQezIA9Z-c

G037+G038+G039 Lesson 10-Reliability of Power System.zip

http://youtu.be/tIUk3nc1IxE

G037+G038+G039 Lesson 11-Harmonic Reduction.zip

http://youtu.be/8dYX-11kRcc

http://youtu.be/A684Agej8-w

G037+G038+G039 Lesson 12-Grounding + Power Quality.zip

http://youtu.be/QQPUj3WXJnA

G037+G038+G039 Lesson 13-Power Quality.zip

http://youtu.be/feI7SCb_QTY

http://youtu.be/mcK2YhDsnr0

G037+G038+G039 Lesson 14-Harmonic Model.zip

http://youtu.be/dwWBOq-BsLY

G037+G038+G039 Lesson 15-Harmonic Losses in Transformer.zip

http://youtu.be/mwEJgEEgPVc

http://youtu.be/1A6FY5f5ijM

http://youtu.be/yLiOKy7uJj0

G037+G038+G039 Lesson 16-Reliability Improvement.zip

http://youtu.be/cn-CfDWnUN8

G037+G038+G039 Lesson 17-Preparation for emergency.zip

http://youtu.be/La7Xip8GI2I

G037+G038+G039 Lesson 18-Harmonic problems.zip

http://youtu.be/0Urnkee_

http://youtu.be/zM_Xcwckicw

G037+G038+G039 Lesson 19-Synchronous machine problems.zip

http://youtu.be/Lx2S-NATr20

G037+G038+G039 Lesson 20-Power Generation + Generator Control.zip

http://youtu.be/56Ks8sArQxc

G037+G038+G039 Lesson 21-Turbine Control+ Digital Excitation.zip

http://youtu.be/uCsvv18qKwQ

http://youtu.be/I4vCDI2CZS0

G037+G038+G039 Lesson 22-Power System Protection.zip

http://youtu.be/c6iXRwfCYBU

G037+G038+G039 Lesson 23-Switch Gear.zip

http://youtu.be/DDpbzgNYTiM

http://youtu.be/2cl-nOdBNro

G040 + IS73

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Power transformer

G040 Lesson 1 Power transformer rating 1.zip

http://youtu.be/qjWJVQAh_jA

G040 Lesson 1 Power transformer rating 2.zip

http://youtu.be/JonzO8JD-k4

G040 Lesson 2 Open circuit short circuit test.zip

http://youtu.be/Ru-KlKv40OY

G040 Lesson 3 Transformer regulation.zip

http://youtu.be/t6IZMwMj-B4

G040 Lesson 4 Power transformer connection.zip

http://youtu.be/iig8PISDN1I

G040 Lesson 5 Maximum efficiency.zip

http://youtu.be/Qa7l0eHTWTU

G040 Lesson 6 Transformer parallel operation.zip

http://youtu.be/dkRxoaozrOk

http://youtu.be/Sz5QY727w-8

G040 Lesson 7 Harmonic in transformer.zip

http://youtu.be/_YOlWb3e574

G040 Lesson 8 Transformer problem + auto transformer.zip

http://youtu.be/0KCscbCIUjk

G040_Lesson_9_Transformer_rating_cooling_connection_tap_changing.zip

http://youtu.be/d3XHm-wguzQ

http://youtu.be/XwiIkZnKFqQ

http://youtu.be/uOHBk840Bhw

G040 Lesson 10 Phase shift transformer.zip

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G042+IS71

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Transmission Line

G042 Lesson 1-Transmission line introduction.zip

http://youtu.be/DrOOgcKeaL4

G042 Lesson 2-DC Line+Line reflection.zip

http://youtu.be/jvVdecp-clk

G042 Lesson 3-Power line calculation.zip

http://youtu.be/3TgVt67DhvY

http://youtu.be/QT6aqsaM7a0

http://youtu.be/WxjQIkdJjQ8

G042 Lesson 4-Line model+Economic aspect.zip

http://youtu.be/1HRdGZXp_-w

G042 Lesson 5-Time value of money+Line reflection.zip

http://youtu.be/n9mupLQWANY

http://youtu.be/YdfiX2gL-3c

G042 Lesson 6-Line matching+Wave guide.zip

http://youtu.be/1WyP5_Cek40

G042 Lesson 7-Wave guide.zip

http://youtu.be/BuGtjZ3QBXk

http://youtu.be/pftevsnbl0w

G042 Lesson 8-Microstrip line.zip

http://youtu.be/eINq1kKuiec

G042 Lesson 9-Per unit value of line.zip

http://youtu.be/66Y-Lm3EntI

G042 Lesson 10-Line constants.zip

http://youtu.be/2XYnZZ-zXII

G042 Lesson 11-Smith chart.zip

http://youtu.be/dv-NQh4vlrg

http://youtu.be/KfM8XZd9Wqc

http://youtu.be/3NYVQvW8-Nk

http://youtu.be/5qBwLsbtfTA

http://youtu.be/ViamcvqAy_I

http://youtu.be/j_nx9n7mGec

http://youtu.be/d53B3-zV2ec

G042 Lesson 12-Four terminals network.zip

http://youtu.be/HCO4P1qrPbA

G042 Lesson 13-Exercises.zip

http://youtu.be/LeyJf1PhpCY

Power References

http://electricaldiploma2013.zoomshare.com/files/powerreference.htm

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