This Subject will no longer be offered for Certification after 2025

L-Università ta' Malta

MATSEC
Examinations Board

SEAC 03 Syllabus

Engineering Technology

2025

Updated February 2024

SEAC03 Engineering Technology

Syllabus Addendum

Updates for the 2025 MATSEC Examinations Session

Changes in Subject Content	Content of Unit 3 **K5, C2** and **A2** may not be covered.
Changes in Coursework	All criteria in Unit 3 (including those highlighted for the Controlled assessment), except for **K5, C2** and **A2**, will be assessed in Assignment 1 and Assignment 2.
Changes in Exam Paper(s)	The Unit 3 Controlled assessment (Assignment 3) will not be carried out. **K5, C2** and **A2** will not be assessed and these will be prorated at the end of the unit based on the combined performance in knowledge and comprehension criteria, and application criteria respectively, within the same unit.

MATSEC Examinations Board

September 2022

Table of Contents

Introduction

The aim of this learning and assessment programme is to assist secondary schools to manage applied vocational programmes, specifically in the planning and implementation of the programme delivery.

This learning and assessment programme is structured in two parts, namely:

Part A: General Policies

Part B: Unit Specifications

In Part A, the Learning Outcomes of the programme are explained. Important terms used in the Learning and Assessment Programme (LAP) are defined.

In Part B, the content to be covered in each unit is provided. The learning outcomes together with a brief description are also specified. The assessment criteria together with the scheme of assessment are presented in this part of the document.

In order to ensure effective implementation of the programme, adequate standards, quality assurance processes and procedures have to be adopted. Additionally, policies, guidelines and strategies related to assessment practices are documented in the SEAC Vocational Subjects Policy Document. Standard templates will also be provided and will be structured as follows:

List of Templates
Teacher's Timeframe
Assignment Brief Front Sheet
Record of Internal Verification – Assignment Brief
Record of Internal Verification – Assessment Decision
External Verification Report Template
Unit Tracking Sheet Template

Part A: General Policies

Introduction

The aim of the vocational programme in Engineering Technology is to provide candidates with the underpinning knowledge related to the world of engineering technology. By the end of the programme, candidates are expected to have gained sufficient skills and knowledge and be able to apply them.

Programme Learning Outcomes

At the end of the programme, I can:

- Work safely in an engineering environment.
- Carry out basic risk assessments.
- Respond effectively to help persons when an incident occurs.
- Interpret different types of documentation.
- Use tools and machinery in the appropriate manner.
- Carry out simple tests on different materials.
- Manufacture electrical and electronic circuits using different methods.
- Construct an electro-mechanical project using tools and machinery.
- Conduct basic tests on different circuits to identify faults.

Unit Learning Outcomes

Unit 1: Manufacturing Processes

At the end of the unit, I can:

LO 1. Demonstrate an understanding of Health and Safety practices while working in an engineering context.

LO 2. Make use of measuring and marking out tools on materials with specific properties.

LO 3. Make appropriate use of tools and equipment used for cutting materials.

LO 4. Make use of permanent and non-permanent joining processes.

LO 5. Finish a product according to set requirements.

Unit 2: Mechanical Systems

At the end of the unit, I can:

LO 1. Manufacture different threads according to given specifications.

LO 2. Assemble pulleys and structure systems.

LO 3. Use gears and ratchets according to given specifications.

LO 4. Assemble cams and cranks according to given specifications.

LO 5. Use different sub-mechanical systems to construct a mechanical system.

Unit 3: Electrical and Electronic Systems

At the end of the unit, I can:

LO 1. Demonstrate an understanding of Health and Safety practices in relation to electronics and electricity.

LO 2. Build basic electrical and electronic circuits.

LO 3. Use tools and testing equipment to perform an electrical task.

LO 4. Interpret drawings and install a wiring system.

Programme Descriptors

Programme descriptors are understood as outcome statements of what a candidate is expected to have achieved by the end of the programme. These are an adaptation of MQF level descriptors for the specific programme.

Overview

MQF Level 1	MQF Level 2	MQF Level 3
Basic general **knowledge.** 1. Acquires basic general knowledge related to the engineering world and expressed through a variety of simple tools and context as an entry point to lifelong learning; 2. Knows and understands the steps needed to complete simple tasks and activities in an engineering workshop environment; 3. Is aware and understands basic tasks and instructions; 4. Understands basic textbooks.	Basic factual **knowledge** of a field of work or study. 1. Possess good knowledge of engineering technology; 2. Is aware and interprets type of information and ideas; 3. Understands facts and procedures in the application of basic engineering tasks and instructions; 4. Selects and uses relevant knowledge to accomplish specific actions for self and others.	**Knowledge** of facts, principles, processes and general concepts in engineering technology. 1. Understands the relevancy of theoretical knowledge and information related to engineering related topics; 2. Assesses, evaluates and interprets facts, establishing basic principles and concepts in engineering technology; 3. Understands facts and procedures in the application of more complex tasks and instructions; 4. Selects and uses relevant knowledge acquired on one's own initiative to accomplish specific actions for self and others.

MQF Level 1	MQF Level 2	MQF Level 3
Basic **skills** required to carry out simple tasks. 1. Has the ability to apply basic knowledge and carry out a limited range of simple tasks related to engineering; 2. Has basic repetitive communication skills to complete well defined routine engineering tasks and identifies whether actions have been accomplished; 3. Follows instructions and be aware of consequences of basic actions for self and others.	Basic cognitive and practical **skills** required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools. 1. Has the ability to demonstrate a range of skills by carrying out a range of complex tasks within engineering environment; 2. Communicates basic information; 3. Ensures engineering tasks are carried out effectively.	A range of cognitive and practical **skills** required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information. 1. Demonstrates a range of developed skills to carry out more than one complex task effectively and in unfamiliar and unpredictable engineering contexts; 2. Communicates more complex information; 3. Solves basic problems by applying basic methods, tools, materials and information given in a restricted learning engineering environment.
Work out or study under direct supervision in a structured context. 1. Applies basic knowledge and skills to do simple, repetitive and familiar tasks in an engineering context; 2. Participates in and takes basic responsibility for the action of simple tasks related to engineering; 3. Activities are carried out under guidance and within simple defined timeframes; 4. Acquires and applies basic key engineering competences at this level.	Work or study under supervision with some autonomy. 1. Applies factual knowledge and practical skills to do some structured tasks related to engineering; 2. Ensures one acts pro-actively; 3. Carries out engineering activities under limited supervision and with limited responsibility in a quality controlled context; 4. Acquires and applies basic key competences in engineering technology at this level.	Take responsibility for completion of tasks in work or study and adapt own behaviour to circumstances in solving problems. 1. Applies knowledge and skills to carry out engineering tasks systematically; 2. Adapts own behaviour to circumstances in solving problems by participating pro-actively in structured learning environments related to engineering technology; 3. Uses own initiative with established responsibility and autonomy, but is supervised in quality controlled learning environments related to engineering technology; 4. Acquires key competences at this level as a basis for lifelong learning.

Definitions/Terminology

Term	Definition
Assessment Criteria	A description of what a candidate is expected to do in order to demonstrate that a learning outcome has been achieved.
Assessor	The person responsible to grade the candidate's work, issue a mark and determine the candidate's final grade.
Competences	Each competence is defined as a combination of knowledge and skills and is associated with the level of autonomy and responsibility that the person is expected to have at that level.
Controlled Assessment	An assessment set by MATSEC which may include written and/or practical tasks as specified in the syllabus. This may be a take-home assessment or carried out under controlled conditions.
Coursework	A number of assignments set by teachers and given to the candidate during the course as specified in the syllabus.
Knowledge	Knowledge refers to the understanding of basic, factual and theoretical information, which is traditionally associated with formal learning but can also be acquired from informal and non-formal learning.
Learning Outcome	Learning Outcomes are statements which describe what a qualification represents in terms of knowledge, skills and competences. The Malta Qualifications Framework (MQF) defines a learning outcome as what the candidate understands and is capable of doing at the end of the learning process.
Malta Qualification Framework	The Malta Qualifications Framework (MQF) provides an indication of the level of difficulty as a benchmark for a qualification, which needs to be assigned a level and mapped to the framework. The MQF has level descriptors from Level 1 to 8. The level descriptors are useful for education and training providers as they describe the Knowledge, Skills and Competences and a set of Learning Outcomes, which indicate to the candidate the end of a learning process.
Quality Assurance	A continuous process to assure the standards and quality of the learning assessment programme.
Sample of Work	A sample of work is a percentage of the candidate's work gathered as a representative sample for the internal or external verifier.
Skills	Skills imply the application of acquired knowledge and understanding in different contexts. A skill may be the result of formal learning or of repetitive work in an informal setting.
Synoptic Assessment	An assessment in the form of a written examination and conducted under controlled conditions covering all learning outcomes and the majority of Knowledge and Comprehension assessment criteria in a given unit.
Unit Content	The unit content is the content required to be communicated and given to the candidate per learning outcome. Each learning outcome must have content related to it, which content must be delivered to provide the candidate with the tools necessary to achieve that outcome.

Assessment Scope

Assessment is an important element in any learning process. This should inform candidates about their achievements and at the same time it should meet important conditions of reliability, validity and fairness. Thus, important rules and procedures must be adhered-to. In particular, the assessment regulations and procedures that are explained in this section will ensure that assessments are:

- Of the required standard, quality and level;
- Fair for all candidates;
- Valid and reliable.

Each unit will be assessed through three assignments. The assessment mode/type, criteria to be assessed and the distribution of marks are explained in Part B of the programme as part of the unit specifications.

Quality Assurance

An important aspect of this programme is the quality assurance process that must be conducted throughout the implementation of the programme. Three main processes are to be conducted as stipulated in the table below.

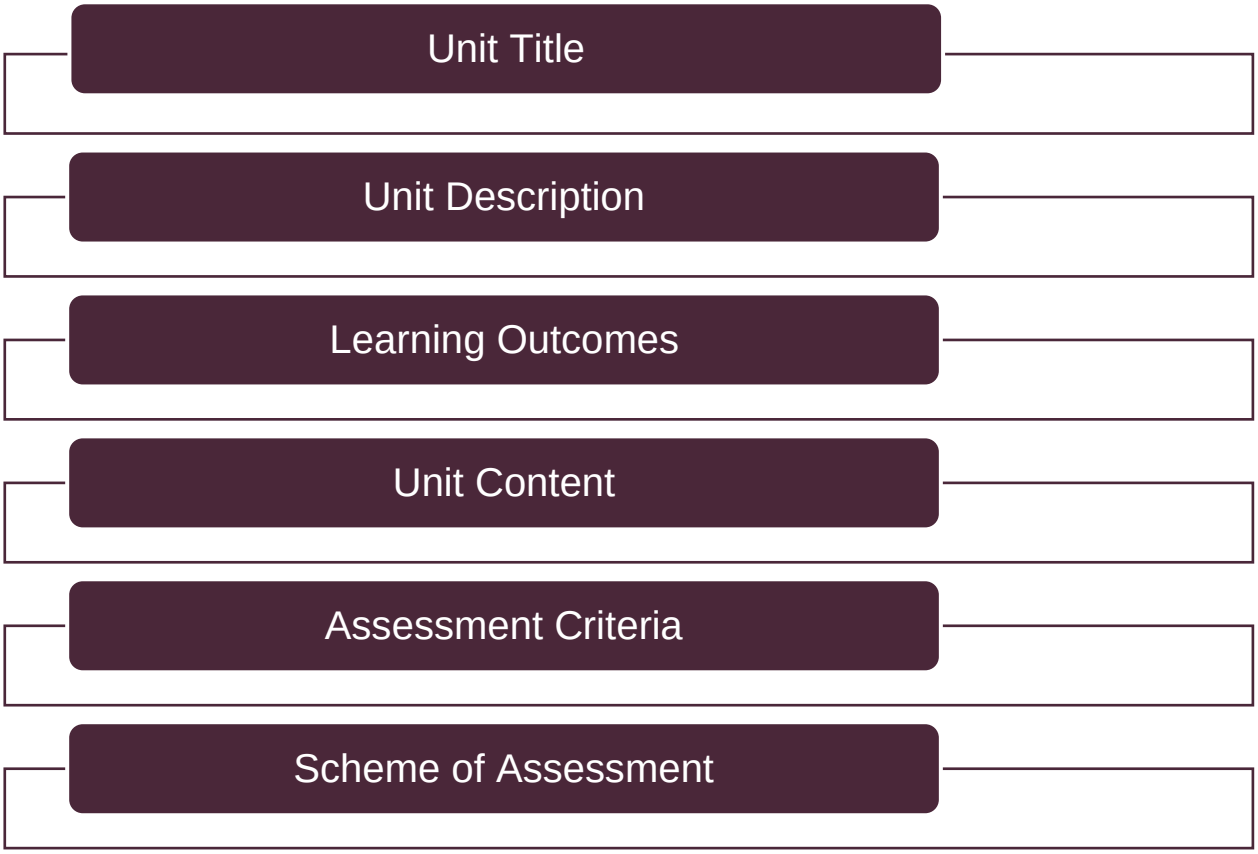
Internal Verification of Assessment Briefs	All assessment briefs are to be internally verified before being issued to the candidates. Within this process, important checks relating to learning outcomes, criteria to be assessed, validity and reliability are to be performed.
Internal Verification of Assessment Decisions	Once candidates complete their work, and their assessments have been corrected, a representative sample of candidates' work is to be internally verified.
External Verification	The process of external verification will ensure that programme quality and standards are met.

Part B: Unit Specifications

Introduction

This part of the programme guide provides detailed specification for each of the 3 units that are to be implemented for the successful completion of the programme. The curriculum design adopted for the development of the units of study is based on the learning outcomes approach. The latter can be defined as "written statements of what a candidate should be able to do/know/apply by the end of the learning process."[1]

The structure of the unit specifications is presented below:



Interpreting the Unit Specifications

The syllabus is written in a way whereby the knowledge criteria at MQF level 3 build upon the knowledge criteria at MQF level 2 and in the same manner the knowledge criteria at MQF level 2 build upon the knowledge criteria at MQF level 1. The same applies for the comprehension and application criteria. The comprehension criteria also build upon the knowledge criteria and the application criteria build upon the knowledge and the comprehension criteria.

[1] http://www.cedefop.europa.eu/files/4156_en.pdf

The document is an assessment syllabus; therefore any other examples or information apart from those written in the unit content should be taught so that candidates will enjoy the learning process and get a general overview of the subject. Under each grading criterion, only the **minimum** content that has to be covered is listed. The material covered in class must at least reflect **both** the unit content and grading criteria.

Examples (e.g.), commas, semi-colons, bullets, or, and N.B. are used in the Learning and Assessment Programme. When semi-colons are used the candidates should be assessed on all the content prescribed. However, when the list is headed with example (e.g.), all the content is to be covered but candidates are to be assessed on more than 50% of the content prescribed for that grading criterion. Where bullets are present, marks allocated for the criterion should be equally distributed. Where 'or' is present, only one of the listed items should be assessed. Where an 'N.B.' is present, important information regarding the assessment is given.

Where the plural is used in grading criteria (e.g. types, aspects, etc.), at least two answers are expected. Unless indicated otherwise in the unit content, when assignments are written, the criteria assessed should build on each other.

In each grading criterion there is a command verb which determines the type of answers expected by the student, such as list, identify, outline, describe, explain, etc… These verbs are defined in the glossary of verbs available on the MATSEC website. It is of vital importance that the command verbs specified in the grading criteria remain unchanged in the assignment brief.

Unit 1: Manufacturing Processes

Unit 1	Manufacturing Processes
Unit Description	Candidates will be exposed to basic concepts of health and safety, properties of materials, tools, equipment and machinery, which can then be applied in diverse engineering situations. In this unit, candidates will have the opportunity to engage in hands-on engineering related activities where they can learn the above concepts through practical work. Candidates will get the knowledge and understanding of how to read drawings and other technical information as well as how to apply this information. They will work with different materials and hence come to recognise and use them based on their different properties. Candidates will also learn to use measuring, marking out, cutting, joining and finishing tools safely and appropriately.

Learning Outcomes

At the end of the unit, I can:

LO 1. Demonstrate an understanding of Health and Safety practices while working in an engineering context.

LO 2. Make use of measuring and marking out tools on materials with specific properties.

LO 3. Make appropriate use of tools and equipment used for cutting materials.

LO 4. Make use of permanent and non-permanent joining processes.

LO 5. Finish a product according to set requirements.

Unit Content

Subject Focus	Health and Safety
LO 1.	Demonstrate an understanding of Health and Safety practices while working in an engineering context.
K-1.	Personal and Protective Equipment (PPE): e.g. overalls, protective foot wear, eye protection, mask/respirators, harnesses, hard hats, hand protection, ear protection.
K-2.	Purpose of safety sign colours: • Red signs: prohibition **or** danger **or** firefighting equipment; • Yellow signs: warning; • Blue signs: mandatory; • Green signs: no danger **or** emergency escape **or** first aid.
	Safety signs: e.g. no smoking, not drinkable, no access for pedestrians, no access for unauthorised persons, fire extinguisher, do not extinguish with water, flammable material, toxic material, overhead load, industrial vehicles, danger of electrocution, general danger, safety overalls must be worn, safety helmet must be worn, eye protection must be worn, face protection must be worn, emergency exit, first aid, eyewash. ***N.B.*** *It is highly recommended that during delivery reference should be made to Subsidiary Legislation 424.16.*
	N.B. *For assessment purposes, students should identify* ***FOUR*** *suitable safety signs.*
C-1.	Benefits of using the correct PPE: safeguard oneself; decrease risk of injury; reputation; conforming to law.
	Design and material of PPE: functional design; material.
	N.B. *For assessment purposes, students should justify* ***TWO*** *PPE.*

Subject Focus	Measuring and marking out on different materials
LO 2.	Make use of measuring and marking out tools on materials with specific properties.
K-3.	Different classes of material: e.g. ferrous, non-ferrous, alloys, hardwoods, softwoods, man-made woods, thermosetting, thermoplastics.
	Properties of different materials: e.g. • Non-ferrous metals: e.g. do not contain iron, are not magnetic, more resistant to corrosion, • Ferrous metals: e.g. contain iron, magnetic, corrode easily, • Alloys: e.g. a mixture of two or more metals, magnetic/non-magnetic, can be customised according to industrial needs, • Hardwoods: e.g. are produced from deciduous trees, come from cold or cool climate countries, slow growing hence tend to be expensive, • Softwoods: e.g. are produced from coniferous trees, tend to be softer than hardwoods, sometimes harder to work than hardwoods, • Manmade woods: e.g. are made from a composition of materials (plywood, chipboard, Medium-Density Fibreboard [MDF], Block-board), tend to be cheap in cost, can be made out of recycled material, • Thermoplastics: can be reheated and remoulded; can be recycled easily, • Thermosetting: cannot be reheated and remoulded; difficult to recycle.
	Forms of supply: e.g. • Metal: bar **and/or** sheet **and/or** pipe **and/or** rod **and/or** wire **and/or** castings **and/or** forgings **and/or** mouldings **and/or** extrusions, • Wood: planks **and/or** sheets **and/or** dowels **and/or** mouldings **and/or** beams, • Polymers: film/sheet **and/or** pallets/powder **and/or** extrusions **and/or** castings **and/or** pipe/rod **and/or** liquid.
K-4.	Measuring and marking out tools: • Measuring tools: e.g. steel ruler, measuring tape, protractor, height gauge, Vernier calliper, micrometre, engineering/try square, sliding bevel, combination square; • Marking out tools: e.g. scriber/marking knife, centre punch, chalk line, dividers/ callipers, surface plate, blueing or paint, scribing block, mortise gauge, centre square.
C-2.	Tests that can be carried out on materials: hardness; tensile; compression; shear; temperature; torque; impact; environment degradation.
A-1.	Measuring and marking out tools and PPE: choice of measuring tools; choice of marking out tool.
	Risk assessment: filling in correct fields; filling in with correct information; level of detail. ***N.B.*** *For assessment purposes, refer to the Risk Assessment Sheet attached in Appendix 2.*
	Using measuring and marking out tools and PPE: accuracy and precision (tolerance should be up to the resolution of measuring tool used e.g. if using a meter ruler tolerance should be up to 1mm); clear markings; correct PPE; correct use of tools.

Subject Focus	Cutting materials
LO 3.	Make appropriate use of tools and equipment used for cutting materials.
K-5.	Cutting tools: e.g. saws/hack saw, milling machine, lathe, angle grinder, band saw/engineers, circular saw, jigsaw / scroll saw, taps and dies, craft knife.
	Preventive measures when using cutting tools: e.g. wear appropriate PPE, use suitable tool for the proper job, visual inspection of the tool, work to laid down procedures, do not remove or disable guards, do not remove or disable safety devices on machinery, remove loose clothing, tie back long hair and remove jewellery.
A-2.	Cutting tools: choice of cutting tool; choice of bit/blade; choice of holding devices.
	Risk assessment: filling in correct fields; filling in with correct information; level of detail. ***N.B.*** *For assessment purposes, refer to the Risk Assessment Sheet attached in Appendix 2.*
	Cutting task: correct tool handling; use tool safely; use the right tool; accuracy and precision; correct PPE.

Subject Focus	Joining materials
LO 4.	Make use of permanent and non-permanent joining processes.
K-6.	Tools and equipment for making non-permanent joints: e.g. hammers, rivet guns, screwdrivers, spanners/sockets, filling knife/blade, Allen/torque keys.
K-7.	Tools and equipment for making permanent joints: e.g. adhesives, chisels, router, welding sets, brazing torch, plastic welding.
C-3.	***N.B.*** *It is important that when setting assessment, the task presented to candidates should have only* ***ONE*** *clear ideal joining method.*
A-3.	Preparation for non-permanent joining: tools and equipment; material for joining with; preparation of material where non-permanent joint is going to take place.
	Risk assessment: filling in correct fields; filling in with correct information; level of detail. ***N.B.*** *For assessment purposes, refer to the Risk Assessment Sheet attached in Appendix 2.*
	Non–permanent joining process: PPE; correct use of tools; correct process; accuracy/neatness.
A-4.	Preparation for permanent joining: tools and equipment; material for joining with; preparation of material where permanent joint is going to take place.
	Risk assessment: filling in correct fields; filling in with correct information; level of detail. ***N.B.*** *For assessment purposes, refer to the Risk Assessment Sheet attached in Appendix 2.*
	Permanent joining process: PPE; correct use of tools; correct process; accuracy/neatness.

Subject Focus	Finishing off
LO 5.	Finish a product according to set requirements.
K-8.	Finishing tools: spray gun/paint brush; sander; buffer; file; emery cloth & sanding block.
	Preventive measures when using finish tools and equipment: e.g. wear appropriate PPE, use suitable tools for the proper job, visual inspection of the tool, work to laid down procedures, remove loose clothing, tie back long hair and remove jewellery.
A-5.	Preparation for finishing: tools and equipment; consumables according to the given finishing process; preparation of environment and object before the finishing task.
	Risk assessment: filling in correct fields; filling in with correct information; level of detail. ***N.B.*** *For assessment purposes, refer to the Risk Assessment Sheet attached in Appendix 2.*
	Finishing task: PPE; use the right tool/equipment; use tool safely; use tool correctly; correct process.

Learning Outcomes and Assessment Criteria

Subject Focus:	**Health and Safety**
Learning Outcome 1:	Demonstrate an understanding of Health and Safety practices while working in an engineering context.

Knowledge Criteria			**Comprehension Criteria**			**Application Criteria**		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-1. Name different personal and protective equipment (PPE).	K-1. Identify specific personal and protective equipment (PPE) required for a given task.	K-1. Describe the function of personal and protective equipment (PPE) required for a given task.	C-1. Outline the benefits of using the correct PPE for a specific activity.	C-1. Discuss the different functional design and material of specific PPE for a given scenario.	C-1. Justify the use of PPE according to a given scenario.			
K-2. Match safety sign colours with their purpose.	K-2. Name the given safety signs.	K-2. Identify suitable safety signs for a given scenario.						

Subject Focus:	**Measuring and marking out on different materials**
Learning Outcome 2:	Make use of measuring and marking out tools on materials with specific properties.

Knowledge Criteria			**Comprehension Criteria**			**Application Criteria**		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-3. List the different classes of material.	K-3. Outline the properties of different materials.	K-3. Describe the form of supply of different materials used for a given scenario.	C-2. Outline the different tests that can be carried out on materials.	C-2. Explain the test needed to examine a particular property of a given material.	C-2. Justify a test to be carried out to select a particular material for a given scenario.	A-1. Choose appropriate measuring and marking out tools for a given task.	A-1. Conduct a basic risk assessment before the measuring and marking out task.	A-1. Use measuring and marking out tools and PPE to carry out a given task.
K-4. Identify different measuring and marking out tools.	K-4. Outline the function of different measuring and marking out tools.	K-4. Describe the appropriate measuring and marking out tools for a specific task.						

Subject Focus:	**Cutting materials**
Learning Outcome 3:	Make appropriate use of tools and equipment used for cutting materials.

Knowledge Criteria			**Comprehension Criteria**			**Application Criteria**		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-5. Label different tools and equipment used for cutting materials.	K-5. Outline the function of different tools and equipment used for cutting materials.	K-5. Describe preventive measures when using tools and equipment used for a given cutting task.				A-2. Choose appropriate tools and/or equipment to use in a given cutting task.	A-2. Conduct a basic risk assessment before a given cutting process.	A-2. Make appropriate use of cutting tools and/or equipment in a given cutting task.

Subject Focus:	**Joining materials**
Learning Outcome 4:	Make use of permanent and non-permanent joining processes.

Knowledge Criteria			**Comprehension Criteria**			**Application Criteria**		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-6. Identify different tools and equipment used for making non-permanent joints.	K-6. Outline the function of different tools and equipment used for making non- permanent joints.	K-6. Describe a preventive measure for each tool when making a non-permanent joint.	***C-3. Identify the ideal joining method for a given task.***	***C-3. Describe the method of joining materials together for a given task.***	***C-3. Justify the choice of the joining method for a given task.***	A-3. Choose appropriate, tools and equipment and material for a given non-permanent joining process.	A-3. Conduct a basic risk assessment before carrying out a non-permanent joining process.	A-3. Use non-permanent joining tools and equipment to carry out a specific task.
K-7. Identify different tools and equipment used for making permanent joints.	***K-7. Outline the function of different tools and equipment used for making permanent joints.***	***K-7. Describe a preventive measure for each tool when making permanent joints.***				***A-4. Choose appropriate tools and equipment for a given permanent joining process.***	***A-4. Conduct a basic risk assessment before carrying out a permanent joining process.***	***A-4. Use permanent joining tools and equipment to carry out a specific task.***

Subject Focus:	**Finishing off**
Learning Outcome 5:	Finish a product according to set requirements.

Knowledge Criteria			**Comprehension Criteria**			**Application Criteria**		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-8. Identify finishing tools.	***K-8. Match finishing tools to a specific task.***	***K-8. Describe preventive measures when using finishing tools and equipment.***				***A-5. Choose appropriate tools and equipment for a given finishing process.***	***A-5. Conduct a basic risk assessment before a given finishing process.***	***A-5. Use finishing tools and/or equipment to carry out a specific task.***

Assessment Criteria

Assessment criteria provide guidance on how the candidates will be assessed in order to ensure that the learning outcomes have been achieved.

To achieve each outcome a candidate must satisfy the assessment criteria listed in the previous table. The assessment criteria which will be assessed in the controlled assessment have been highlighted.

Scheme of Assessment

Every assignment should include at least **ONE** knowledge criterion and **ONE** application criterion.

Assignment Number	Assignment Type	Percentage distribution
1	Coursework	24 – 42%
2	Coursework	24 – 42%
3	Controlled	24 – 42%

Distribution of Marks

Criteria	MQF Level 1 Marks	MQF Level 2 Marks	MQF Level 3 Marks	Totals
Knowledge	1	1	2	4
Comprehension	2	2	2	6
Application	3	3	4	10

Unit 2: Mechanical Systems

Unit 2	Mechanical Systems
Unit Description	This unit will introduce candidates to mechanical systems. Threads, pulleys, levers, gears, ratchets, cams and cranks are the fundamentals of this unit. Candidates will be exposed to different mechanical systems through the making of the above-mentioned subsystems. Knowledge obtained from Unit 1 will be applied to manufacture subsystems based on given information. Moreover, candidates will be exposed to sub-mechanical systems focusing on a section from a whole system. Candidates will be trained to assemble and construct different sub-mechanical systems to construct a complete mechanical system.

Learning Outcomes

At the end of the unit, I can:

LO 1. Manufacture different threads according to given specifications.

LO 2. Assemble pulleys and structure systems.

LO 3. Use gears and ratchets according to given specifications.

LO 4. Assemble cams and cranks according to given specifications.

LO 5. Use different sub-mechanical systems to construct a mechanical system.

Unit Content

Subject Focus	Threads
LO 1.	Manufacture different threads according to given specifications.
K-1.	Measuring systems used in thread charts: imperial; metric.
	Terms: pitch; diameter; taps; dies; coarse and fine threads.
	N.B. *For assessment purposes, candidates should be assessed on the metric thread chart, based on the ISO 724 and/or DIN 13 standard.* ***N.B.*** *For assessment purposes, candidates should be given a thread size and they should be asked to select the correct tap or die from the appropriate metric thread chart.*
A-1.	Preparation to manufacture inside and outside threads: • Tools/Equipment: metric thread chart; vice or material holding mechanism; taps/dies and drill bit (inside thread); • PPE: working gloves; safety glasses; overall.
	Marking out: • Inside thread: using proper tools; precision and accuracy. • Outside thread: using proper tools; precision and accuracy.
	Manufacturing: • Inside thread: using proper tools; precision and accuracy. • Outside thread: using proper tools; precision and accuracy.

Subject Focus	Pulleys
LO 2.	Assemble pulleys and structure systems.
K-2.	Different types of pulleys: single pulley; double pulley; v-pulley; multi groove pulley.
	Parts of a pulley and belt system: e.g. driver/driven, effort and load, v-belt, round belt, flat belt, toothed belt.
	Outcome for a given compound pulley system: load; effort. ***N.B.*** *For assessment purposes,* ***TWO*** *pulleys working in a system with belts should be presented to students.*
K-3.	Types of structures: e.g. frame (made of separate members), shell (enclosed or contains its contents), solid (made almost entirely of matter).
	Different parts of a structure: strut; tie; beam; joints.
C-1.	Forces on structures: compression; tension; shearing; torsion; bending.
	Pulley setups: e.g. single fixed pulley, single movable pulley, double movable pulleys.
	Calculation of effort force or load on pulley setup: working; correct answer and units.

A-2.	Preparation to assemble pulley systems: proper tools/equipment; proper PPE prepared.
	Assembly task according to given specifications: proper handling and use of tools/equipment; following of instructions from drawings; stability; functionality; PPE. ***N.B.*** *For assessment purposes, the structure should include struts, ties and beams.*
	Combining structure and pulley ratio for pulley assemblies: proper handling and use of tools/equipment; functionality; PPE; meets requirements.

Subject Focus	**Gears and ratchets**
LO 3.	Use gears and ratchets according to given specifications.
K-4.	Different gear systems: spur; compound; rack and pinion; bevel.
	Parts of a gear system: e.g. driver, idler, driven.
K-5.	Mechanical systems where ratchet are used: hoist; clock; jack; socket ratchet.
	Parts of ratchet system: gear wheel; pawl.
	Ratchet system use: one direction movement; locking system.
C-2.	Calculation of ratio in a gear system: working; correct answer.
	Symbols used in a gear system: diameter; tooth height; centre; pitch. ***N.B.*** *For assessment purposes, it is expected that the candidate describes the gear system from a diagram which uses the appropriate symbols.*
	N.B. *For assessment purposes, the gear system should include at least* ***THREE*** *gears.*
A-3.	Preparation to produce gear and ratchet assemblies: PPE; tools/equipment. ***N.B.*** *For assessment purposes, the system should include* ***ONE*** *gear system and* ***ONE*** *ratchet component.*
	Manufacturing gear and ratchet components: accuracy; proper use of tools. ***N.B.*** *For assessment purposes, gears can be manufactured by hand or by CNC.*
	Constructing gear and ratchet assemblies according to ratio: proper handling and use of tools/equipment; functionality; PPE; meets requirements.

Subject Focus	Cams and cranks
LO 4.	Assemble cams and cranks according to given specifications.
K-6.	Cam and follower system: cam; follower; guide; shaft.
	Cams and followers: • Cams: pear; eccentric; heart; drop; • Followers: knife; roller; plate; spherical.
K-7.	Crank assembly and parts: • Crank assembly: crank; connecting rod; slider; guide; crank handle; • Crank parts: journal; crack-pin; webs; counterweights.
A-4.	Preparation to assemble cams and crank systems: proper use of tools/equipment; proper PPE prepared.
	Construction of housing for cam and crank systems: accuracy; precision; proper use of tools/equipment. ***N.B.*** *For assessment purposes, assemblies should accommodate cam and crank systems to be constructed at MQF 3.*
	Construction of cam and crank assemblies: proper handling and use of tools/equipment; functionality; PPE; meets requirements.

Subject Focus	Levers and mechanical systems
LO 5.	Use different sub-mechanical systems to construct a mechanical system.
K-8.	Types of levers: e.g. 1st class, 2nd class, 3rd class.
	Types of linkages in levers: reversing; push-pull; parallel motion; bell crank.
	Output for linkage systems: reciprocating/linear; rotary.
C-3.	Parameters: input and output; process.
	N.B. *This criterion should be assessed after A-5, using the same mechanical system constructed in A-5.*
A-5.	Preparation to construct a mechanical system: proper tools/equipment; proper PPE; material.
	Construction of housing for different mechanical sub-systems: accuracy; precision; proper use of tools/equipment.
	Construction of assemblies composed of different sub-systems: proper handling and use of tools/equipment; functionality; PPE; meets requirements. ***N.B.*** *For assessment purposes,* ***TWO*** *different mechanical subsystems are to be included in this application. The other application criteria outcomes can be used for this application.*

Learning Outcomes and Assessment Criteria

Subject Focus:	**Threads**
Learning Outcome 1:	Manufacture different threads according to given specifications.

Knowledge Criteria			**Comprehension Criteria**			**Application Criteria**		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-1. List different measuring systems used in thread charts.	K-1. Outline the terms used when dealing with threads.	K-1. Interpret the information presented in a given metric thread chart for a given task.				A-1. Prepare tools/equipment and the necessary PPE to manufacture inside and outside threads.	A-1. Mark out a specific material to manufacture inside and outside threads.	A-1. Manufacture inside and outside threads according to given specifications.

Subject Focus:	**Pulleys**
Learning Outcome 2:	Assemble pulleys and structure systems.

Knowledge Criteria			**Comprehension Criteria**			**Application Criteria**		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-2. Identify different types of pulleys.	K-2. Label different parts in a pulley and belt system.	K-2. Describe the outcome for a given compound pulley system.	C-1. Outline different forces on structures which will accommodate pulleys.	C-1. Explain different forces on different pulley setups.	C-1. Determine effort force or load on a given pulley setup.	A-2. Prepare tools/equipment and the necessary PPEs to assemble pulley systems in a structure.	A-2. Assemble a given structure for a pulley system.	A-2. Construct appropriate pulley assemblies according to a given ratio in a structure.
K-3. Identify different types of structures.	K-3. Label the parts of a structure.	K-3. Describe the function of parts in a structure for a given scenario.						

Subject Focus:	**Gears and ratchets**
Learning Outcome 3:	Use gears and ratchets according to given specifications.

Knowledge Criteria			**Comprehension Criteria**			**Application Criteria**		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-4. Name different types of gears.	K-4. Outline the function of the different parts in a gear system.	K-4. Describe the outcome of a gear system.	C-2. Determine the ratio of a gear system.	C-2. Describe a given gear system.	C-2. Justify the appropriate design of a gear system from given information.	A-3. Prepare the necessary PPE and tools/ equipment to produce gear and ratchet assemblies for a given task.	A-3. Manufacture gear and ratchet components.	A-3. Construct appropriate gear and ratchet assemblies according to a given ratio.
K-5. List different mechanical systems where ratchets are used.	K-5. Outline the function of the parts of a ratchet system.	K-5. Describe the use of ratchet systems in different mechanical systems.						

Subject Focus:	**Cams and cranks**
Learning Outcome 4:	Assemble cams and cranks according to given specifications.

Knowledge Criteria			**Comprehension Criteria**			**Application Criteria**		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-6. Name the different parts of a cam and follower system.	K-6. Identify the different cams and followers in different systems.	K-6. Describe the motions in a cam and follower system.				***A-4. Prepare tools/ equipment and the necessary PPEs to assemble cams and cranks systems.***	***A-4. Construct housing for cams and crank systems to given specifications.***	***A-4. Construct appropriate cams and crank assemblies according to given specifications.***
K-7. Label the crank assemblies and their parts.	K-7. Determine reciprocating distance of a given crank assembly.	K-7. Describe the change in motion of a given crank assembly.						

Subject Focus:	**Levers and mechanical systems**
Learning Outcome 5:	Use different sub-mechanical systems to construct a mechanical system.

Knowledge Criteria			**Comprehension Criteria**			**Application Criteria**		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-8. Label the different lever classes.	***K-8. Identify the different linkages in lever systems.***	***K-8. Describe the output for each linkage system.***	***C-3. Classify a mechanical system into input and output.***	***C-3. Describe the parameters of your own mechanical system.***	***C-3. Explain the parameters of your own mechanical system.***	***A-5. Prepare the necessary PPE and tools/ equipment to construct a mechanical system from a given drawing.***	***A-5. Construct housing for a mechanical system.***	***A-5. Construct a mechanical system composed of different mechanical sub-systems.***

Assessment Criteria

Assessment criteria provide guidance on how the candidates will be assessed in order to ensure that the learning outcomes have been achieved.

To achieve each outcome a candidate must satisfy the assessment criteria listed in the previous table. The assessment criteria which will be assessed in the controlled assessment have been highlighted.

Scheme of Assessment

Every assignment should include at least **ONE** knowledge criterion and **ONE** application criterion.

Assignment Number	Assignment Type	Percentage distribution
1	Coursework	24 – 42%
2	Coursework	24 – 42%
3	Controlled	24 – 42%

Distribution of Marks

Criteria	MQF Level 1 Marks	MQF Level 2 Marks	MQF Level 3 Marks	Totals
Knowledge	1	1	2	4
Comprehension	2	2	2	6
Application	3	3	4	10

Unit 3: Electrical and Electronic Systems

Unit 3	Unit Name
Unit Description	This unit equips candidates with a skill set of theoretical and practical knowledge related to the domains of electrical and electronic circuits. Candidates will learn to read and interpret drawings and circuit diagrams. They will become aware of how different components function so that the circuit achieves the desired outcome. Candidates will assemble series and parallel circuits, lighting circuits and power circuits on prototype boards.

Learning Outcomes

At the end of the unit, I can:

LO 1. Demonstrate an understanding of Health and Safety practices in relation to electronics and electricity.

LO 2. Build basic electrical and electronic circuits.

LO 3. Use tools and testing equipment to perform an electrical task.

LO 4. Interpret drawings and install a wiring system.

Unit Content

Subject Focus	Health and Safety
LO 1.	Demonstrate an understanding of Health and Safety practices in relation to electronics and electricity.
K-1.	Different types of tools used in electrical and electronic installations: pliers; multi-meter; screwdrivers; soldering equipment; PVC related tools.
	Different tools used in electrical and electronic installations: • Pliers: side cutter **and/or** long nose **and/or** combination pliers **and/or** snips **and/or** tweezers **AND/OR** • Screw drivers: Pozi/Philips **and/or** flat head **and/or** mains tester **AND/OR** • Soldering equipment: e.g. soldering iron **and/or** soldering stand **and/or** de-soldering pump **AND/OR** • PVC related tools: PVC pipe cutter **and/or** bending spring **and/or** mitre block. ***N.B.*** *For assessment purposes, the situation given to candidates must include* ***TWO*** *types of different tools.*
	Preventative measures before and while using tools: visual inspection of tool; read instructions; place tools in their respective stands if applicable; good housekeeping.
K-2.	Health and Safety practices: use appropriate PPE; avoid overloading sockets or outlets; use proper tool for the proper job; disconnect supply before starting work.
	Electrical injuries: death; electric shock; burns; falls.
	Actions: turn off source of electricity or isolate victim from electrical source; call 112; begin CPR if the person is not breathing or call for help; prevent the injured person from becoming chilled; apply a bandage if needed.
K-3.	Wire types: single-stranded; multi-stranded.
	Wire colour coding: • Alternating Current (single phase): brown (live conductor); blue (neutral conductor); green and yellow (earth conductor); other colour (return); • Direct Current: red (positive); black (negative).
C-1.	S.I. units and their conversion: • Interpretation of magnitude in SI units related to voltage, current, resistance and power: Milli; Micro; Kilo; Mega; • SI units: Volts (V); Amperes (A); Ohms (Ω); Wattage (W).
	Missing values: • correct subject of the formula; • correct answer: correct value; S.I. Unit.

Subject Focus	Electric and electronic circuits
LO 2.	Build basic electrical and electronic circuits.
K-4.	***N.B.*** *For assessment purposes at MQF 3, the circuit should contain* ***ONE*** *parallel and* ***ONE*** *series sub-circuits.* ***N.B.*** *During delivery it is highly recommended that teachers should give examples of series and parallel circuits which contain switches, batteries, bulbs, resistors.*
K-5.	Electronic boards and their parts: • Electronic boards: e.g. breadboard, strip board, printed circuit board (PCB); • Parts: bus lines **and/or** terminal strips **and/or** copper tracks **and/or** insulation layer **and/or** photoresist layer.
	Electronic components: • Passive: e.g. resistors, capacitors, inductors; • Active: diodes; transistor.
K-6.	Tools and materials for soldering: soldering iron; de-soldering pump; soldering iron's stand; solder; flux.
	Parts of a soldering iron/gun: handle; soldering tip; flexible cord; soldering iron stand.
	Soldering process: cleaning of soldering iron tip and board; preparation of surfaces to be soldered by tinning; applying solder; finish.
C-2.	Calculating the total resistance: working; correct answer.
A-1.	Preparation of a stripboard to be used for a circuit: cut the board to size; file edges; clean copper tracks (rubber and steel wool); drill holes for mounting.
	Population of stripboard with components: cutting tracks; enlarging holes (for potentiometers); placing components; holding components with masking tape.
	Soldering task: cleaning of soldering iron tip and board; preparation of surfaces to be soldered by tinning; applying solder; cutting extra components leads.

Subject Focus	Testing equipment
LO 3.	Use tools and testing equipment to perform an electrical task.
K-7.	Parts of the multi-meter: probes; dial; LCD display; multi-meter sockets.
	Functions of the multi-meter: voltmeter; ammeter; ohmmeter; continuity test.
	Tests can be but not limited to: test continuity; voltage; current; resistance. ***N.B.*** *It is highly suggested that other types of tests are included during delivery.*
A-2.	Checking the continuity in circuits using the multi-meter: correct multi-meter setting; correct connection.
	Testing resistance of components as standalone resistor and resistors in a circuit: correct multi-meter setting; correct connection; accuracy.
	Voltage and current tests: correct multi-meter setting; correct connection.
A-3.	Visual inspection of a plug: inspection of casing; correct wiring order; correct insulation stripping; wires secured properly; no missing components.
	Wiring a 13 A plug: correct identification of wires; correct stripping technique; correct length of insulation and outer jacket; correct assembling of plug.
	Fuse: calculation of correct fuse; installation of fuse and testing of fuse.

Subject Focus	Wiring and distribution of electricity
LO 4.	Interpret drawings and install a wiring system.
K-8.	Different types of electrical power generation plants: e.g. fossil-fuel, nuclear, geothermal, hydroelectric, wind, solar.
	Electricity generation, transmission and distribution: power plant; step-up transformer; transmission lines; step-down transformer; consumer unit.
C-3.	Wall switches and electrical accessories: • Wall Switches: e.g. single pole switch, two way switch, switch combination (1 gang, 2 gang, etc.), surface ceiling cord switch, 13 A switched socket-outlets, water heater 13 A fused double pole switch, 20 A double pole switch; • Electrical accessories: lamp holders; ceiling rose.
	Wall switches, electrical accessories and electrical conduit fittings: • Wall switches and electrical accessories: e.g. single pole switch, two-way switch, switch combination (1 gang, 2 gang, etc.), surface ceiling cord switch, 13 A switched socket-outlets, water heater 13 A fused double pole switch, 20 A double pole switch, lamp holders, ceiling rose; • Electrical conduit fittings: e.g. junction boxes, rigid conduit bends, couplers, plastic 3x3 boxes, plastic 6x3 boxes, terminal boxes, through boxes, looping boxes, tangent T-box.
A-4.*	Cutting of PVC conduits and trunking: correct length; correct use of tools; PPE.
	Bending of PVC conduits: correct use of tools; correct angle; correct length; PPE.
	Complete an electrical installation: adequate installation of conduit/trucking; correct wiring; correct use of tools; PPE; proper termination.
A-5.*	Preparation to wire an electrical circuit: • Materials needed to wire an electrical circuit: bulb holder; switches; MCBs; tripper main switches; • PPE: eye protection; rubber soled shoes; • Tools/equipment: screw drivers; testers; side cutters; pliers; hammer.
	Wiring a power circuit: correct length of wire; correct termination; correct use of tools. ***N.B.*** *For assessment purposes, the wiring system should include, but not be limited to: socket outlets, MCB, tripper main switch.* ***N.B.*** *It is highly suggested that during delivery candidates should be made aware of the difference between radial circuit and ring circuit.*
	Wiring of lighting circuit: correct length of wire; correct termination; correct use of tools. ***N.B.*** *For assessment purposes, the wiring system should include, but not be limited to: Bulb holder, switch, MCB, tripper main switch.* ***N.B.*** *For assessment purposes students should be assessed on a 2-way switch system.*

**N.B.* *For assessment purposes of A-4 and A-5, candidates are expected to work in a simulated environment with safe voltages and currents, not on 240 Volts mains.*

Learning Outcomes and Assessment Criteria

Subject Focus:	**Health and Safety**
Learning Outcome 1:	Demonstrate an understanding of Health and Safety practices in relation to electronics and electricity.

Knowledge Criteria			**Comprehension Criteria**			**Application Criteria**		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-1. List different types of tools used in electrical and electronic installations.	K-1. Match the correct tool to the proper situation.	K-1. Describe preventive Health and Safety measures to be taken before and while using tools.	C-1. Interpret the metric prefixes of SI units and their conversion.	C-1. Outline the relationship of resistance and power in terms of voltage and current.	C-1. Calculate a missing value using Ohm's law.			
K-2. Name Health and Safety practices in electrical and electronic installations.	***K-2. Outline injuries caused by electrical incidents.***	***K-2. Describe actions to be taken to help someone suffering from an electrical shock.***						
K-3. Mention the difference between insulators and conductors.	K-3. Outline the differences between different wire types.	K-3. Interpret different wire colour coding according to international standards.						

Subject Focus:	**Electric and electronic circuits**
Learning Outcome 2:	Build basic electrical and electronic circuits.

Knowledge Criteria			**Comprehension Criteria**			**Application Criteria**		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-4. Differentiate between open and closed circuits.	K-4. Label series and parallel circuits.	K-4. Identify series and parallel sub-circuits in a given circuit.	C-2. Determine the total resistance in a series circuit.	C-2. Determine the total resistance in a parallel circuit.	C-2. Determine the total resistance of a circuit containing series and parallel sub-circuits.	A-1. Prepare a stripboard to be used for a circuit.	A-1. Carry out the population of the stripboard with components.	A-1. Carry out a soldering task to create an electronic circuit on a stripboard.
K-5. Label different types of electronic boards and their parts.	K-5. Identify different electronic components.	K-5. Describe the function of different electronic components.						
K-6. List material and tools related to soldering.	K-6. Label different parts of the soldering iron/soldering gun.	K-6. Describe how to use a soldering iron to create a permanent joint.						

Subject Focus:	**Testing equipment**
Learning Outcome 3:	Use tools and testing equipment to perform an electrical task.

Knowledge Criteria			**Comprehension Criteria**			**Application Criteria**		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-7. Label different parts of the multi-meter.	K-7. Outline different functions of the multi-meter.	K-7. Describe how to use a multi-meter for particular tests.				A-2. Use a multi-meter to check continuity in a circuit.	A-2 Use a multi-meter to test resistance of components in a circuit.	A-2. Use a multi-meter to carry out tests to measure voltage and current in a circuit.
						A-3. Carry out a visual inspection of a 13 A plug to identify any wrong doings.	A-3. Wire a 13 A plug using the correct procedure.	A-3. Choose the correct fuse to be used for a given scenario.

Subject Focus:	**Wiring and distribution of electricity**
Learning Outcome 4:	Interpret drawings and install a wiring system.

Knowledge Criteria			**Comprehension Criteria**			**Application Criteria**		
Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)	Assessment Criteria (MQF 1)	Assessment Criteria (MQF 2)	Assessment Criteria (MQF 3)
K-8. Name the different types of electrical power generation plants.	***K-8. Define generation and distribution of electrical power.***	***K-8. Describe how electrical power reaches the consumer from a generation plant.***	***C-3. Interpret standard symbols of wall switches and electrical accessories.***	***C-3. Identify wall switches, electrical accessories and electrical conduit fittings for a given scenario.***	***C-3. Illustrate through a schematic diagrams a power circuit and lighting circuit for a given scenario.***	***A-4. Use tools to cut PVC conduits and trunking.***	***A-4. Bend PVC conduits using the appropriate tools.***	***A-4. Complete an electrical installation using proper PVC conduits, trunking and wiring.***
						A-5. Prepare the materials, PPE and tools/ equipment needed to wire an electrical circuit.	***A-5. Carry out the wiring of a power circuit.***	***A-5. Carry out the wiring of a lighting circuit.***

Assessment Criteria

Assessment criteria provide guidance on how the candidates will be assessed in order to ensure that the learning outcomes have been achieved.

To achieve each outcome a candidate must satisfy the assessment criteria listed in the previous table. The assessment criteria which will be assessed in the controlled assessment have been highlighted.

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Comprehension	2	2	2	6
Application	3	3	4	10

Appendix 1 – Minimum required resources

This list is not intended to be exhaustive. It is highly recommended that tools listed hereunder should be educational. These resources should be available for at least 16 candidates.

Per workshop

- Marking out tools: chalk line; surface plate; trammel; blueing or paint; scribing block; mortise gauge;
- Measuring tools: micrometre; gauges;
- Power tools and machinery:
    - Machinery: lathe, sanding machines; band saw; pillar drill; strip wire heater; vacuum former; angle grinder; circular saw; scroll saw;
    - Electronics: UV box; etching tank;
- Test bench equipment: oscilloscope; signal generator.

Per candidate

- Measuring tools: ruler;
- Hand tools (Electronics): soldering iron; wire stripper; side cutter; long nose pliers; third hand.

Per group of 2 candidates

- Benches: wood working benches; metal working benches.

Per group of 2-4 candidates

- Marking out tools: scriber; centre punch; dividers/callipers;
- Measuring tools: measuring tape; protractor; veneer calliper; engineer square; sliding bevel; combination sets;
- Hand tools:
    - Materials: hammers/mallets; pincers; pliers; saws; screwdrivers; files; spanners; sockets; chisels; planer; taps; dies;
    - Electronics: de-soldering pump track cutter;
- Power tools and machinery: drills; hot air blowers; jigsaw;
- Electrical/Electronic Test Equipment: multi-meter; isolation transformer.

Appendix 2 – Risk Assessment Sheet

RISK ASSESSMENT SHEET								
Assessment by:		**Assessment for:**		**Date:**				
Activity	**Hazard**	**Risk**	**Persons in Danger**	**Existing Control Measures in Place**	**Risk rating**			**Control Measures required**
					S	**L**	**R**	

S = Severity, L = Likelihood, R = Result