L-Università ta' Malta

MATSEC
Examinations Board

Marking Scheme

SEC Engineering Technology Unit 3

Main Session 2025
4th April 2025

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In the case of marking schemes that include model solutions or answers, it should be noted that these are not intended to be exhaustive. Variations and alternatives may also be acceptable. Examiners must consider all answers on their merits, and will have consulted with the MATSEC Examinations Board when in doubt.

Criteria Reference	The candidate should be able to:	Question Number	Maximum marks that can be achieved	Allocation of marks NOT to be subdivided any further than indicated below	Example of Expected Answer Other valid answers are to be accepted unless stated otherwise
		Q1	**4**		
K-1	MQF 1: Name the different types of electrical power generation plants.	1a	1	0.25 marks for each correct answer.	Candidates are expected to name any **FOUR** power generating plants from the following, apart from fossil-fuel: Hydroelectric, geothermal, nuclear, wind, solar.
	MQF 2: Define generation and distribution of electrical power.	1b	1	0.5 marks for each correct definition.	Candidates are expected to define electrical power generation and electrical power distribution: Example of a correct definition: Distribution: It is the process of delivering electrical power from a generating plant through transmission and distribution systems to households and industries.
	MQF 3: Describe how electrical power reaches the consumer from a generation plant.	1c	2	0.4 marks for each correct description.	Candidates are expected to describe the **FIVE** main stages required for electrical power to reach consumers: Electrical power generating plant, step-up transformer, transmission lines, step-down transformer, consumer unit. Example of a correct description: Consumer unit: Receives low voltage AC power from step-down transformers and supplies this electrical energy to households and/or industry.

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		Q2	**4**		
K-2	MQF 1: List applications of electromagnetic devices.	2a	1	0.25 marks for each correct answer.	Candidates are expected to list **FOUR** applications of electromagnetic devices. • Microphone: To record sound • Loudspeaker: To amplify sound. • Relay: To isolate and control high power with a low power circuit. • Transformer: To step-down or step-up voltage. Accept any other suitable answer, including examples where the given electromagnetic devices can be used e.g. Loudspeakers: concerts, online meetings.
	MQF 2: Outline the working principle of an electromagnet.	2b	1	1 mark for a correct outline.	Candidates are expected to outline the working principle of an electromagnet: When an electrical current passes through a coil, it produces a magnetic field similar to that of a bar magnet, which can exert either an attractive or repulsive force on nearby ferromagnetic materials.
	MQF 3: Describe how a relay achieves its function through its individual parts.	2c	2	2 marks for a correct description which includes all parts.	Candidates are expected to describe how a relay works: When the coil is energized, the electromagnet generates a magnetic field, pulling the hinged armature from the normally open contacts to the normally closed contacts, controlling the flow of electricity in a separate circuit. De-energizing the relay resets the armature via a spring. Accept any other suitable description as long as it includes the parts underlined.

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		Q3	**6**		
C-1	MQF 1: Outline the importance of selecting a fuse with the appropriate current rating.	3a	2	1 mark for each correct outline.	Candidates are expected to outline the **TWO** given reasons. Example of a good outline: Function: The fuse internal wire is expected to melt once the current passing through the fuse is larger than the fuse current rating.
	MQF 2: Calculate the appropriate rating of a fuse.	3b	2	1 mark for correct current calculation. 1 mark for selecting appropriate rating.	Current = Power / Voltage Current = 1800 / 230 Current = 7.83 A Rating of fuse 10 A
	MQF 3: Discuss the main differences between an MCB and a fuse.	3c	2	1 mark for each correct discussion.	Candidates are expected to discuss **TWO** other differences between an MCB and a fuse apart from sacrificial vs. reset and ease to resume supply: Example of a correct discussion: Cost: An MCB costs multiple times more than a fuse. This is because a fuse is easier to manufacture and requires less resources as compared to an MCB. The MCB contains a mechanical spring-loaded mechanism which may combine both thermal and magnetic elements to detect an overload or short circuit.

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		Q4	**4**		
K-6	MQF 1: List different types of bearings.	4a	1	0.25 marks for each correct answer.	Candidates are expected to list any **FOUR** different types of bearings apart from ball bearing: • roller bearing; • thrust bearing; • magnetic bearing; • tapered roller bearing • fluid bearing.
	MQF 2: Identify different factors that causes premature bearing failure.	4b	1	0.5 marks for each correct answer.	Candidates are expected to identify the following **TWO** factors: • shaft misalignment; • inadequate lubrication. Other answers should not be accepted.
	MQF 3: Outline how different bearings can be replaced.	4c	2	1 mark for each correct outline.	Candidates are expected to outline **TWO** methods that can be used to replace a bearing, apart from using a press. Example of a good outline: Using a bearing puller: Position the puller's arms around the bearing, ensuring a firm grip. Align the centre bolt with the shaft, then slowly tighten it to apply pressure. Continue turning until the bearing is fully extracted, taking care to apply even force to avoid damage.

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		Q5	**4**		
K-9	MQF 1: List the main classes of fire.	5a	1	0.2 marks for each correct answer.	Candidates are expected to list the **FIVE** main classes of fire. Class E – Fires involving electrical equipment Class C – Fires involving gases Class A – Fires with trash, wood, paper, or other combustible materials as the fuel source Class B – Fires with flammable or combustible liquids as the fuel source Class F – Fires involving cooking oils Other answers should not be accepted.
	MQF 2: Identify the proper fire extinguisher for different classes of fire.	5b	1	0.25 marks for each correct answer.	Candidates are expected to identify the correct extinguisher i. CO2 or Powder. ii. Fire Blanket, Foam, Powder or Wet chemical. iii. Wet Chemical or Fire Blanket. iv. Powder. Other answers should not be accepted.

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	MQF 3: Describe important practices to adopt when a fire emergency occurs.	5c	2	0.5 marks for each correct answer.	Candidates are expected to describe the following **FOUR** practices: • sound the fire alarm; • if you are trained and the fire is still contained, try to put it out using the correct fire extinguisher; • do not take out with you heavy personal belongings; • evacuate the building via the escape route to the assembly area avoiding lifts. Example of a good description: Evacuate the building via the escape route to the assembly area avoiding lifts: Every individual in the building shall use the assigned assembly route to avoid overcrowding and to reach the assembly area in the minimum time possible. Lifts can become non-operational at any point in time during a fire event and therefore these shall be avoided.