



L-Università
ta' Malta

MATSEC
Examinations Board



Marking Scheme

SEC Engineering Technology Unit 3

Main Session 2024

24th April 2024

Marking schemes published by the MATSEC Examination Board are not intended to be standalone documents. They are an essential resource for markers who are subsequently monitored through a verification process to ensure consistent and accurate application of the marking scheme.

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.

Marking Scheme (Main Session 2024): SEC Engineering Technology Unit 3

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	Examples of expected answer
		Q1	4		
K-1	MQF 1: Name the different types of electrical power generation plants.	1a	1	0.25 marks for each correct answer.	<p>Candidates are expected to choose any FOUR power generating plants of the following:</p> <ul style="list-style-type: none"> • fossil-fuel, • hydroelectric, • geothermal, • wind, • solar. <p>Accept any other suitable answer.</p>
	MQF 2: Define generation and distribution of electrical power.	1b	1	0.5 marks for a correct definition.	<p>Candidates are expected to define electrical power generation and electrical power distribution:</p> <p>Generation: Is the process of generating electrical power from a primary energy source.</p> <p>Distribution: Is the process of transferring electrical power from a generating plant through transmission and distribution systems to households and industry.</p> <p>Accept any other suitable answer.</p>
	MQF 3: Describe how electrical power reaches the consumer from a generation plant.	1c	2	0.4 marks for each correct description.	<p>Candidates are expected to describe FIVE main stages required for electrical power to reach consumers:</p> <ul style="list-style-type: none"> - Electrical power generating plant: Converts energy from a primary source to AC electrical energy. - Step-up transformer: Increases the AC voltage and decreases the AC current to decrease losses during transmission. - Transmission lines: Are used to transmit high voltage AC power from the generating stations to distribution centres.

Marking Scheme (Main Session 2024): SEC Engineering Technology Unit 3

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	Examples of expected answer
					<ul style="list-style-type: none"> - Step-down transformer: Decreases the AC voltage and increases the AC current to distribute low voltage AC power to consumers. - Consumer unit: Receives low voltage AC power from step-down transformers to supply electrical energy to households and/or industry. <p>Accept any other suitable descriptions.</p>
		Q2	4		
K-2	MQF 1: List applications of electromagnetic devices.	2a	1	0.25 marks for each correct answer.	<p>Candidates are expected to list FOUR applications of electromagnetic devices.</p> <ul style="list-style-type: none"> • Loudspeaker: To amplify sound • Transformers: To step up or step down voltage. • Solenoid: To electrical energy into mechanical linear movement. • Motors and Generators: To convert electrical energy into rotational movement and vice versa. <p>Accept any other suitable answer, including examples where the given electromagnetic devices can be used e.g. Loudspeakers: halls, ferry and aircraft</p>
	MQF 2: Outline the working principle of an electromagnet.	2b	1	1 mark for a correct outline.	<p>Candidates are expected to outline the working principle of an electromagnet:</p> <p>An electrical current flowing through a coil generates a magnetic field similar to that of a bar magnet, capable of creating either an attractive or a repulsive force with any nearby ferromagnetic material.</p> <p>Accept any other suitable answer.</p>

Marking Scheme (Main Session 2024): SEC Engineering Technology Unit 3

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	Examples of expected answer
	MQF 3: Describe how a relay achieves its function through its individual parts.	2c	2	2 marks for a correct description including all four parts.	<p>Candidates are expected to describe how a relay work:</p> <p>Passing an electric current through the <u>electromagnet</u> generates an electromagnetic field. This field attracts the hinged armature from the <u>normally open contacts to the normally closed contacts</u>. Once the electromagnet is de-energized, the <u>spring</u> assists in restoring the hinged <u>armature</u> to its initial normally open position. It's important for the spring's strength to be weaker than the attractive force of the electromagnet, yet still robust enough to effectively retract the armature to its original stance.</p> <p>Accept any other suitable description as long as it includes the four parts underlined.</p>
		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.	<p>Candidates are expected to outline TWO reasons.</p> <p>Example of a good outline: Potential Hazards: In the event of an overcurrent fault in an appliance with an oversized fuse, the fuse will not protect both the wiring and the appliance. This situation could lead to an electrical and fire hazard.</p> <p>Accept any other suitable answer.</p>
	MQF 2: Calculate the appropriate rating of a fuse.	3b	2	<p>1 mark for correct current calculation.</p> <p>1 mark for selecting appropriate rating.</p>	<p>Current = Power / Voltage Current = 2200 / 230 Current = 9.57 A</p> <p>Rating of fuse 10 A</p>

Marking Scheme (Main Session 2024): SEC Engineering Technology Unit 3

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	Examples of expected answer
	MQF 3: Discuss the main differences between an MCB and a fuse.	3c	2	1 mark for each correct answer.	<p>Candidates are expected to discuss the main differences between an MCB and a fuse apart from cost and sensitivity to current overload:</p> <p>Example of a correct discussion: Ease to resume supply: In case of an overcurrent or short circuit current fault, an MCB can be switched on again by simply switching it on once the fault issue triggering the fault is addressed. In contrast a blown fuse flows requires removal and replacement which is more time consuming.</p> <p>Accept any other suitable answer.</p>
		Q4	4		
K-6	MQF 1: List different types of bearings.	4a	1	0.25 marks for each correct answer.	<p>Candidates are expected to list any FOUR different types of bearings apart from fluid bearing:</p> <ul style="list-style-type: none"> • ball bearing; • roller bearing; • thrust bearing; • magnetic bearing; • tapered roller bearing; <p>Accept any other suitable answer.</p>
	MQF 2: Identify different factors that causes premature bearing failure.	4b	1	0.5 marks for each correct answer.	<p>Candidates are expected to identify the following TWO factors:</p> <ul style="list-style-type: none"> • incorrect fit; • ineffective bearing sealing.

Marking Scheme (Main Session 2024): SEC Engineering Technology Unit 3

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	Examples of expected answer
	MQF 3: Outline how different bearings can be replaced.	4c	2	1 mark for each correct answer.	<p>Candidates are expected to outline TWO methods that can be used to replace a bearing, apart from using wax.</p> <p>Example of a good outline: Using a press: Secure the bearing under the press and align the press attachments with the bearing inner and outer race. Apply pressure gradually and monitor to prevent damage as the bearing starts moving out of its seat.</p> <p>Accept any other suitable answer.</p>
		Q5	4		
K-9	MQF 1: List the main classes of fire.	5a	1	0.2 marks for each correct answer.	<p>Candidates are expected to list the FIVE main classes of fire.</p> <p>Class B – Fires with flammable or combustible liquids as the fuel source Class F – Fires involving cooking oils Class E – Fires involving electrical equipment Class A – Fires with trash, wood, paper, or other combustible materials as the fuel source Class C – Fires involving gases</p>
	MQF 2: Identify the proper fire extinguisher for different classes of fire.	5b	1	0.25 marks for each correct answer.	<p>Candidates are expected to identify the correct extinguisher</p> <ol style="list-style-type: none"> i. Dry powder or foam or water. ii. Dry powder. iii. CO₂ or foam or Dry Powder. iv. Wet chemical.

Marking Scheme (Main Session 2024): SEC Engineering Technology Unit 3

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	Examples of expected answer
	MQF 3: Describe important practices to adopt when a fire emergency occurs.	5c	2	0.5 marks for each correct answer.	<p>Candidates are expected to describe the following FOUR practices or any other valid one:</p> <ul style="list-style-type: none"> • 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. <p>Example of a good description: Do not take out with you heavy personal belongings: It is important that you leave heavy personal items where they are as these may increase your time to reach your assigned assembly point, increasing your risks of getting hurt.</p> <p>Accept any other suitable answer.</p>