L-Università ta' Malta

MATSEC
Examinations Board

Marking Scheme

SEC Engineering Technology Unit 3

Main Session 2022
27th April 2022

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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	Examples of expected answer.
K-1	MQF 1: Name the different types of electrical power generation plants.	1(a)	1 mark	0.25 marks for each correct answer	Candidates are expected to choose any **FOUR** of the following answers: • fossil-fuel, • nuclear, • geothermal, • hydroelectric, • wind, • solar.
	MQF 2: Define generation and distribution of electrical power.	1(b)	1 mark	0.5 marks for a correct definition	Candidates are expected to define generation and distribution of electrical power: Generation: Is the process of generating electrical power from a source of primary energy (e.g. sun, wind, fossil fuel). Distribution of electrical power: Is the carrying of electricity from the transmission systems to the households. Accept any other suitable answer.
	MQF 3: Describe how electrical power reaches the consumer from a generation plant.	1(c)	2 marks	0.4 marks for each correct description	Candidates are expected to describe how electrical power reaches the consumer from: - Power plant: Changing from the primary source of energy to electrical energy - Step-up transformer: Increase the voltage of the AC signal and decreases the current - Transmission lines: Is used to transport the AC signal to the distribution centres - Step-down transformer: Decrease the voltage of the AC signal and increases the current - Consumer unit: AC is received in the household ready to be used Accept any other suitable answer.

K-2	MQF 1: List applications of electromagnetic devices.	2(a)	1 mark	0.25 marks for each correct answer	Candidates are expected to list **FOUR** electromagnetic devices. • Solenoid: To turn electrical energy into movement • Microphone: To be used to project/ record sounds • Loudspeaker: To hear sounds • Motors and/or Generators: To electrical energy into rotational movement and vice-versa Accept any correct application.
	MQF 2: Outline the working principle of an electromagnet.	2(b)	1 mark	1 mark for a correct outline	Candidates are expected to outline the working principle of an electromagnet: Electrical current passing through a coil generates a magnetic field which can cause movement or vice-versa. Accept any other suitable answer.
	MQF 3: Describe how a relay achieves its function through its individual parts.	2(c)	2 marks	2 marks for a correct description	Candidates are expected to describe how a relay work: Electrical current from the control signal passes through the electromagnet which in turn causes an electromagnetic field which pushes the movable armature from the normally open to normally closed pins. When the signal is removed the spring returns the movable armature to the original position. Accept any other suitable answer.
C-1	MQF 1: Outline the importance of selecting a fuse with the appropriate current rating.	3(a)	2 marks	1 mark for each correct outline	Candidates are expected to outline the following points: Hazards when selecting inappropriate fuse: If a fault in an appliance causes too much current to flow, the fuse will break the circuit. This protects the wiring and the appliance from fire and electrical hazards. Function: The fuse internal wire melts when its current rating is exceeded. Therefore, the fuse should be rated slightly higher than the maximum operating current of the device being used, so the fuse won't blow when the equipment is used. Accept any other suitable answer.

	MQF 2: Calculate the appropriate rating of a fuse.	3(b)	2 marks	1 mark for correct current calculation 1 mark for selecting appropriate rating	Current = Power / Voltage Current = 2000 / 230 Current = 8.7A Rating of the fuse = 13A
	MQF 3: Discuss the main differences between an MCB and a fuse.	3(c)	2 marks	0.5 marks for each correct answer	Candidates are expected to discuss the main differences between an MCB and a fuse in terms of the following characteristics: Cost, Sensitivity to current overload, Sacrificial vs. reset, Ease to resume supply. Example of a good discussion: Sacrificial vs. reset: An MCB detects an abnormality in the current flow and switches off the electrical circuit by tripping to an 'OFF' position. In order to resume supply, you just need to switch push the knob back to the 'ON' position (no need to replace the MCB). On the other hand, a fuse needs to replaced when it is goes faulty. Accept any other suitable answer.
K-6	MQF 1: List different types of bearings.	4(a)	1 mark	0.25 marks for each correct answer	Candidates are expected to list any **FOUR** different types of bearings: • ball bearing • roller bearing • tapered roller bearing • thrust bearing • magnetic bearing • fluid bearing Accept any other suitable answer.
	MQF 2: Identify different factors that causes premature bearing failure	4(b)	1 mark	0.5 marks for each correct answer	Candidates are expected to identify the following **TWO** factors: • inadequate lubrication • ineffective bearing sealing

	MQF 3: Outline how different bearings can be replaced.	4(c)	2 marks	1 mark for each correct answer	Candidates are expected to outline any **TWO** of the following: • using a bearing puller • using a press • heating inside diameter of bearing • using wax or grease to force out a thrust bearing. Example of a good outline: Using a press: Bearings can be replaced by pressing them in or out of their housing using a press. The press can be a hydraulic type or a screw type. Accept any other suitable answer.
K-9	MQF 1: List the main classes of fire.	5(a)	1 mark	0.2 marks for each correct answer	Candidates are expected to list the **FIVE** main classes of fire. 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 C – Fires involving gases Class E – Fires involving electrical equipment Class F – Fires involving cooking oils
	MQF 2: Identify the proper fire extinguisher for different classes of fire.	5(b)	1 mark	0.25 marks for each correct answer	Candidates are expected to identify the correct extinguisher i. Fire blanket ii. Powder or CO2 iii. Water or foam or powder iv. Powder
	MQF 3: Describe important practices to adopt when a fire emergency occurs.	5(c)	2 marks	0.5 marks for each correct answer	Candidates are expected to describe the following **FOUR** practices or any other valid one: • 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: Sound the fire alarm: Fire alarm is to be sounded when a fire occurs. This is important as to inform everyone in the nearby that there is an emergency going on.