L-Università ta' Malta

MATSEC
Examinations Board

Marking Scheme

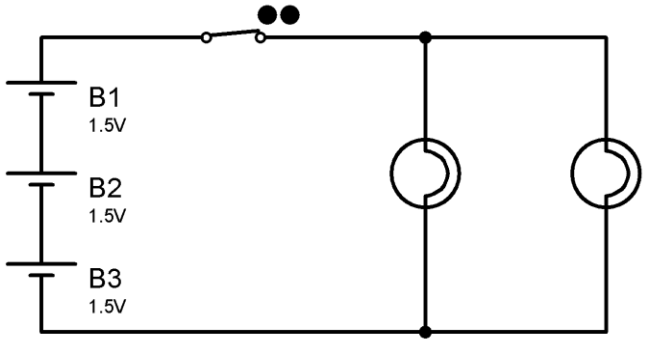
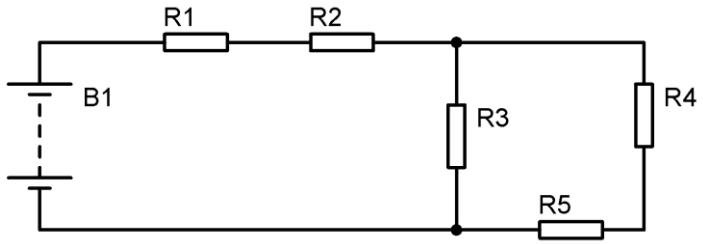
SEC Engineering Technology Unit 2

Main Session 2022
20th May 2021

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.

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: Categorise different materials as insulators, conductors.	1(a)	1 mark	0.25 marks for each correct answer.	i) Copper – Conductor ii) Wood – Insulator iii) Ceramic – Insulator iv) Iron – Conductor
	MQF 2: Define the term semiconductor.	1(b)	1 mark	1 mark for a correct answer.	Example of a correct answer: Semiconductors are materials which have a conductivity between conductors (generally metals) and nonconductors or insulators (such as most ceramics). Semiconductors can be pure elements, such as silicon or germanium, or compounds such as gallium arsenide or cadmium selenide. In a process called doping, small amounts of impurities are added to pure semiconductors causing large changes in the conductivity of the material. Any other suitable answer is to be accepted.
	MQF 3: State the parameters affecting resistance of a material.	1(c)	2 marks	1 mark for naming each correct parameter.	Candidates are expected to state **TWO** parameters affecting resistance. Examples of correct answers: - Resistivity of a material. The higher the resistivity of the material used, the greater the resistance. - Length. Longer wires have greater resistance. - Cross-sectional area. Wires with smaller diameters have greater resistance. Any other suitable answer is to be accepted.

K-3	MQF 1: Differentiate between open and closed circuit.	2(a)	1 mark	1 mark for the correct answer.	Open circuit – a circuit that is not complete / connected Closed circuit – a circuit that has a complete path between positive and negative terminals of its power source
	MQF 2: Draw series and parallel circuits.	2(b)	1 mark	0.5 marks for right battery set up. 0.5 marks for right bulb set up.	Examples of correct answers:  Any other suitable answer is to be accepted.
	MQF 3: Identify parallel and series subcircuits in a given circuit	2(c)	2 marks	0.5 marks for each identified series sub-circuit. 1 mark for identifying parallel sub-circuit.	 Examples of correct answers: R4 and R5 are connected in series (R4 + R5). These are then connected in parallel with R3 (R3 || (R4+R5)). These are then connected in series with R1 and R2 [R1 + R2 + (R3 || (R4+R5))]. Any other suitable answer is to be accepted.

C-2	MQF 1: Find the total resistance in a series circuit.	3(a)	2 marks	1 mark for working 1 mark for correct answer	R1 = 10,000Ω R2 = 2,200Ω R3 = 5,600Ω R4 = 330Ω RT = R1 + R2 + R3 + R4 RT = 10000 + 2200 + 5600 + 330 RT = 18130Ω = 18.13KΩ
	MQF 2: Find the total resistance in a parallel circuit.	3(b)	2 marks	1 mark for working 1 mark for correct answer	R1 = 1200Ω R2 = 450Ω R3 = 3600Ω RT = 1 / (1/R1 + 1/R2 + 1/R3) RT = 1 / (1/1200 + 1/450 + 1/3600) RT = 1 / 0.00333333 RT = 300Ω
	MQF 3: Find the total resistance of a circuit containing series and parallel subcircuits.	3(c)	2 marks	1 mark for working 1 mark for correct answer	R1 = 8600Ω R4 = 1200Ω i) R2 + R3 = 270 + 330 = 600Ω ii) R4 || (R2 + R3) = 1200 || 600 = 400Ω iii) R1 + (R4 || (R2 + R3)) = 8600 + 400 = 9000Ω = 9kΩ
K-9	MQF 1: Identify electronic symbols.	4(a)	1 mark	0.2 marks for each correct answer.	i) LDR ii) Operational Amplifier (Op-amp) iii) Diode iv) Capacitor v) Transistor

	MQF 2: Match SI units to their respective parameters.	4(b)	1 mark	0.2 marks for each correct answer.	i) Volts - Voltage ii) Amps - Current iii) Farads - Capacitance iv) Ohms - Resistance v) Watts – Power
	MQF 3: Identify different packaging of the same electronic components.	4(c)	2 marks	0.5 marks for each correct answer.	i) Capacitor Packaging 1 – Axial Packaging 2 – Radial ii) Resistor Packaging 1 – Through hole Packaging 2 – Surface mount
K-10	MQF 1: Label different tools used in electronic circuit construction.	5(a)	1 mark	0.25 marks for each correct answer.	i) Side cutter ii) Third Hand iii) Soldering iron iv) Wire stripper
	MQF 2: Identify correct steps to use a soldering iron effectively.	5(b)	1 mark	0.2 marks for each correct step mentioned.	Examples of correct answers: i) Clean soldering iron tip ii) Free board from oxidization iii) Apply the required heat to component pin and copper track iv) Apply the correct amount of solder v) Allow the solder joint to solidify appropriately. Any other suitable answer is to be accepted. Steps should be listed in the order as mentioned above.

	MQF 3: Outline the functions of different tools for circuit construction.	5(c)	2 marks	1 mark for each correct answer.	Examples of correct answers: i) Desoldering Pump: The desoldering pump is used together with a soldering iron to remove soldered components from a PCB. It is a manually-operated device which sucks up the molten solder from a joint where the component is mounted. ii) PCB driller: A PCB driller is used to drill holes through the whole PCB. These holes can be used for internal electrical connection or used as a positioning hole to assemble components. Any other suitable answer is to be accepted.