Engineering Technology

Applied Vocational Certificate (AVC)

Unit 3: Electrical and Electronic Systems

2025-2026

Important Notice

The content of this unit has been reduced due to year 11 being shorter than the year 9 and year 10. However, a new component that involves self-reflection has been introduced. All the content within the syllabus and self-reflection has to be completed by the end of the scholastic year.

Criteria K5, C2, and A2 have been excluded from the formal assessment but will still be addressed during class instruction. All remaining criteria will be assessed through Assignment 1 and Assignment 2.

Assessment type	Percentage distribution
Assignment 1	28 – 42 %
Assignment 2	28 – 42 %
Total marks	**80 marks**

To achieve a global mark of 100, a self-reflective task has been introduced. This will carry 20 marks, and templates can be found at the end of this document. Each student should fill in all four parts of the self-reflection task.

Applied Vocational Certificate Programme

The Applied Vocational Certificate (AVC) programme is designed to emphasize the practical application of vocational subjects, providing students with hands-on experience directly related to the workplace. This programme is aligned with the Malta Qualifications Framework (MQF) and offers a final certification at MQF Level 3, with exit points at MQF Levels 1 and 2. To earn the final certificate, candidates must complete all three units over the secondary cycle and meet the requirements for coursework and controlled assessments as outlined in the specific subject syllabi.

The AVC programme focuses on equipping candidates with both theoretical knowledge and practical skills relevant to specific industries, preparing them for future employability or education. This skills-based approach ensures that students develop the competencies necessary for the workforce while also providing a clear pathway for academic progression. The programme supports continuous learning, with opportunities to advance to post-secondary institutions that offer courses at MQF Levels 1-3, and potentially even higher, such as MQF Level 4. Recognized and accredited by various educational institutions, the AVC programme represents a vital step in the lifelong learning journey, aligning with both industry needs and educational standards.

Spanning over three scholastic years (Years 9, 10 and 11) and comprising 10 credits, the AVC programme fosters the development of technical and vocational skills in specific industries. This structure supports the holistic growth of candidates, preparing them not only for future employment but also for future academic pursuits in line with this policy's objectives and the relevant subject syllabi.

Subject Programme

The aim of this Applied 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.

Assessment

The assessment of the applied vocational certificate in Engineering Technology along the three years is based on coursework and controlled assessment leading to the global mark.

Year 9	Year 10	Year 11
Coursework (assignment 1)	Coursework (assignment 1)	Coursework (assignment 1)
Coursework (assignment 2)	Coursework (assignment 2)	Coursework (assignment 2)
Controlled assessment	Controlled assessment	Self-Reflection

The Ks, Cs and As of each unit, making up the coursework and controlled assessment, are of varying percentages.

The mark obtained by the candidates are to be inputted on MySchool platform each scholastic year.

Coursework

The coursework refers to assignments 1 and 2 which are made up of a written and practical component. The assignment briefs will be prepared by the teacher and internally verified. Assignments together with evidence of practical work and artefacts are considered as the portfolio for each year.

Controlled Assessment

The controlled assessment will be issued by the Education Assessment Unit (EAU) between April and May. Assessment decisions will be internally verified.

Programme Certification

Upon completion of the three-year programme, candidates will receive a certificate and a certificate supplement indicating the MQF Level achieved. Each applied vocational subject within the AVC programme is structured to be qualified at MQF Level 3, with possible exit points at MQF Level 2 or MQF Level 1. The final qualification level depends on the total marks obtained by the candidate over the three years (with a maximum of 300 marks) as indicated in the table.

Candidates who are absent for an entire year of the programme can qualify up to a maximum of MQF Level 2, while those absent for two full years can qualify up to a maximum of MQF Level 1.

Award	Marks throughout the Subject	Grade
MQF Level 3	270 – 300	1
	240 – 269	2
	210 – 239	3
	180 – 209	4
	150 – 179	5
MQF Level 2	120 – 149	6
	90 – 119	7
MQF Level 1	60 – 89	8
	0 – 59	Fail

Quality Assurance

Assessment is a fundamental component of the learning process. It provides candidates with feedback on their progress and achievements while adhering to key standards of reliability, validity, and fairness. To maintain these standards, it is crucial to follow established rules and procedures. The assessment guidelines ensure that all evaluations are:

- Aligned with the appropriate standards, quality, and level.
- Fair and equitable to all students.
- Valid and reliable.

In order to ensure quality, assignment briefs and assessment decisions undergo internal verification by the designated internal verifier. This process ensures that assessments align with the intended learning outcomes and comply with established policy procedures. Furthermore, moderation will be conducted each academic year by moderators that will evaluate candidates work based on a specified rubric and moderation criteria ensuring that work has been fairly, accurately and consistently graded. During both internal verification and moderation, candidates' marks are subject to change.

Unit 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** desoldering 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.
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: file edges; clean copper tracks (rubber and steel wool); drill holes for mounting.
	Population of stripboard with components: cutting tracks; ; 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/trunking; 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.*

Engineering Technology

Unit 3: Electrical and Electronic Systems

Rubric

Learning Outcome	Criterion	MQF Level 1			MQF Level 2			MQF Level 3			Total Mark per grading criterion
LO1	K1	K-1. List **FOUR** types of tools used in electrical and electronic installations.	0.25 marks per part.	1	K-1. Match **FOUR** correct tools to the proper situation.	0.25 marks per part.	1	K-1. Describe **TWO** preventive Health and Safety measures to be taken before and while using tools.	1 mark per part.	2	4
	K2	K-2. Name **FOUR** Health and Safety practices in electrical and electronic installations.	0.25 marks per part.	1	K-2. Relate **TWO** injuries caused by electrical incidents.	0.5 marks per part.	1	K-2. Outline **FOUR** actions to be taken to help someone suffering from electrical shock.	0.5 marks per part.	2	4

	K3	K-3. Mention the difference between insulators and conductors.	1 marks per part.	1	K-3. Outline **TWO** differences between different wire types.	0.5 marks per part.	1	K-3. Interpret **TWO** wire colour coding according to international standards.	1 mark per part.	2	4
	C1	C-1. Interpret the **FOUR** metric prefixes of SI units and their conversion.	0.5 marks per part	2	C-1. Outline the relationship of resistance in terms of voltage and current.	2 marks for correct answer	2	C-1. Calculate a missing value using Ohm's law.	1 mark for formula 1 mark for working and correct answer	2	6

LO2	**K4**	K-4. Outline differences between open and closed circuits.	0.5 marks per part.	1	K-4. Label series and parallel circuits.	0.5 marks per part.	1	K-4. Determine **ONE** series and **ONE** parallel subcircuits in a given circuit.	1 mark per part.	2	4
	K5	K-5. Label **FOUR** types of electronic boards and their parts.	0.5 marks per part.	1	K-5. Identify different electronic components.	1 mark for each correct answer.	1	K-5. Describe the function of different electronic components.	2 marks for the correct answer.	2	4
	K6	K-6. List **FOUR** material and tools related to soldering.	0.25 marks per part.	1	K-6. Label **FOUR** parts of the soldering iron/soldering gun.	0.25 marks per part.	1	K-6. Describe **FOUR** steps how to use a soldering iron to create a permanent joint.	0.5 marks per part.	2	4
	C2	C-2. Determine the total resistance in a series circuit.	1 mark for correct working 1 mark for correct answer	2	C-2. Determine the total resistance in a parallel circuit.	1 mark for correct working. 1 mark for correct answer.	2	C-2. Determine the total resistance of a circuit containing series and parallel sub-circuits.	1 mark for correct working 1 mark for correct answer	2	6
	A1	A-1. Prepare a stripboard to be used for a circuit.	1 mark for proper edge preparation 1 mark for cleaning copper track	3	A-1. Carry out the population of the stripboard with components.	1 mark for cutting tracks. 1 mark for placing the correct component in the correct place.	3	A-1. Carry out a soldering task to create an electronic circuit on a stripboard.	1 mark for preparing the soldering iron and its tip. 1 mark for preparing the	4	10

			1 mark for drilling mounting hole / enlarging of hole in the correct place.			1 mark for holding components in their place with the use of masking tape.			surface to be soldered by tinning 1 mark for applying the correct amount of solder at the correct place and temperature 1 mark for cutting extra lengths of component leads		

LO3	**K7**	K-7. Label **FOUR** parts of the multi-meter.	0.25 marks per part.	1	K-7. Outline **FOUR** functions of the multi-meter.	0.25 marks per part.	1	K-7. Describe how to use a multi-meter for **TWO** particular tests.	1 marks per part.	2	4
	A2	A-2. Use a multi-meter to check continuity in a circuit.	2 marks for the correct multi-meter setting 1 mark for the correct connection	3	A-2 Use a multi-meter to test resistance of components in a circuit.	1 mark for the correct multi-meter setting 1 mark for the correct connection 1 mark for accuracy	3	A-2. Use a multi-meter to carry out tests to measure voltage and current in a circuit.	1 mark for the correct multi-meter setting to measure voltage 1 mark for the correct connection to measure voltage 1 mark for the correct multi-meter setting to measure current 1 mark for the correct connection to measure current	4	10

	A3	A-3. Carry out a visual inspection of a 13 A plug to identify any wrong doings.	1 mark for correct assembly of casing and no missing components 1 mark correct wiring order 1 mark for correct wire stripping and wires secured properly	3	A-3. Wire a 13 A plug using the correct procedure.	1 mark for correct identification of wires 1 mark for correct stripping techniques, length of insulation and outer jacket 1 mark for correct assembly of plug	3	A-3. Choose the correct fuse to be used for a given scenario.	2 marks for calculation of fuse 1 mark for installation of fuse 1 mark for testing of fuse	4	10

LO4	**K8**	K-8. Name **FOUR** different types of electrical power generation plants.	0.25 marks per part	1	K-8. Define **TWO** aspects of generation and distribution of electrical power.	0.5 marks per part	1	K-8. Describe how electrical power reaches the consumer from a generation plant.	2 marks for correct answer	2	4
	C3	C-3. Interpret **TWO** standard symbols of wall switches and electrical accessories.	1 mark per part	2	C-3. Identify **FOUR** wall switches and electrical accessories and **FOUR** electrical conduit fittings for a given scenario.	0.25 marks per part	2	C-3. Illustrate through a schematic diagrams a power circuit and lighting circuit for a given scenario.	2 marks for correct answer	2	6
	A4	A-4. Use tools to cut PVC conduits and trunking.	1 mark for correct length. 1 mark for the use of correct tools. 1 mark for using the correct PPE.	3	A-4. Bend PVC conduits using the appropriate tools.	1 mark for correct use of tools; 1 mark for correct angle and correct length. 1 mark for using the correct PPE.	3	A-4. Complete an electrical installation using proper PVC conduits, trunking and wiring.	1 mark for adequate installation of conduit/trucking; 1 mark for correct wiring. 1 mark for correct use of tools and PPE 1 mark for proper termination.	4	10
	A5	A-5. Prepare the materials, PPE and tools/ equipment needed to	1 mark for correct materials needed to wire an electrical	3	A-5. Carry out the wiring of a power circuit.	1 mark for correct length of wire 1 mark for correct termination 1 mark for correct use of tools.	3	A-5. Carry out the wiring of a lighting circuit.	1 mark for correct length of wire 2 marks for correct termination 1 mark for correct use of tools.	4	10

		wire an electrical circuit.	circuit preparation. 1 mark for correct PPE preparation. 1 mark for correct Tools/equipment preparation.								

***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.*

Assessment Distribution

	Assignment 1 & 2 Criteria	Self-Reflection
LO1	K1	Part 1 – 5 marks Part 2 – 5 marks Part 3 – 4 marks Part 4 – 6 marks
	K2	
	K3	
	C1	
LO2	K4	
	K6	
	A1	
LO3	K7	
	A3	
LO4	K8	
	C3	
	A4	
	A5	
Marks	**80 marks**	**20 marks**

End-of-course

SELF REFLECTION

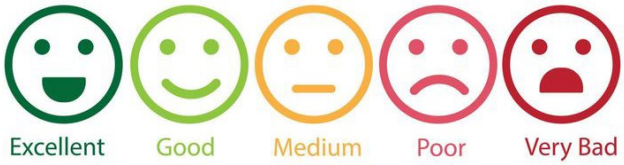
Name	***Surname***	***Class***	***Date***

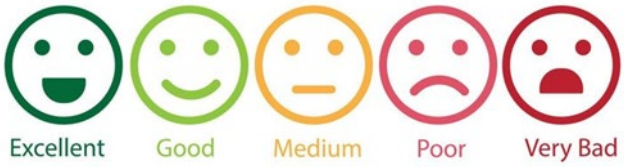
For parts 1, 2 and 3:

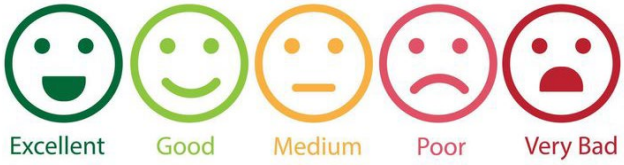
1. **Read** each sentence and **circle** the face that shows how you feel.
2. Then, **write** a short reason matching the face that you have selected.

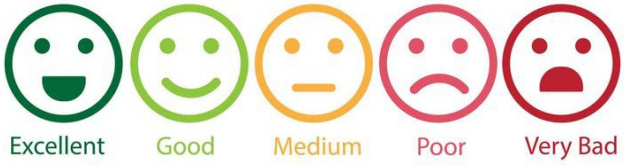
For part 4, **answer** the questions to the best of your ability.

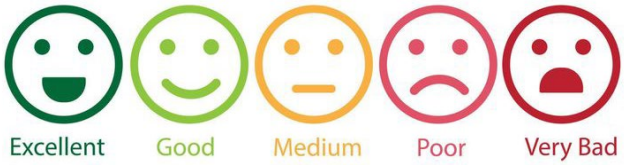
Part 1	**Marks**		
	Each	Allocated	Awarded
	1	5	

1	I know how to stay safe and follow safety rules when working with tools and machines
	
	Reason:

2	I can use tools to measure and mark materials, depending on what the material I am using.
	
	Reason:

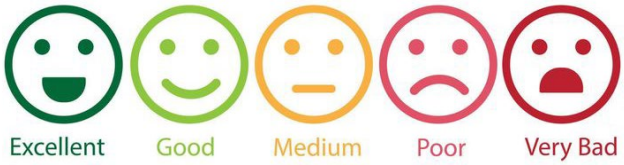
3	I can use the right tools and machines to cut materials safely and properly.
	
	Reason:

4	I can use different ways to join materials together — some that are permanently joined, and others that can be taken apart.
	
	Reason:

5	I can finish my project the way it's supposed to be done.
	
	Reason:

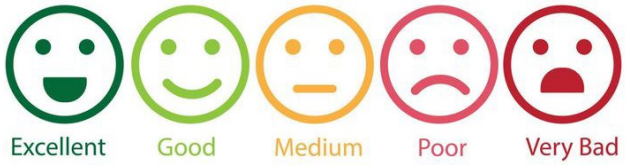
Part 2	**Marks**		
	Each	Allocated	Awarded
	1	5	

6	I can make different types of threads by following the instructions.
	
	Reason:

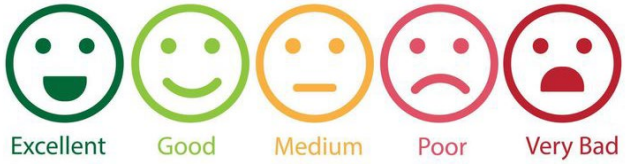
7	I can put together pulleys and build simple structures.
	
	Reason:

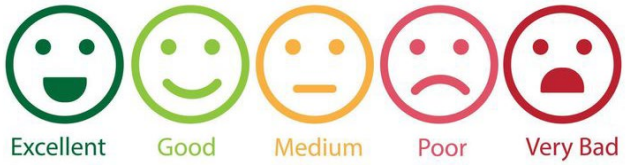
8	I can use gears and ratchets the right way by following the instructions.
	
	Reason:

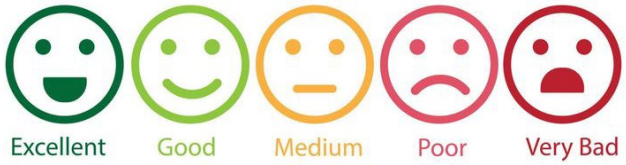
9	I can put together cams and cranks by following the steps given.
	
	Reason:

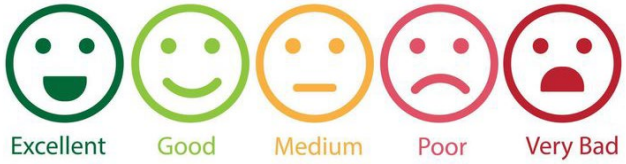
10	I can use sub-mechanical systems to build a working mechanical system.
	
	Reason:

Part 3	**Marks**		
	Each	Allocated	Awarded
	1	4	

11	I can stay safe when working with electricity and electronics.
	
	Reason:

12	I can build circuits using wires, batteries, and electronic components.
	
	Reason:

13	I can use tools and testing devices to do a simple electrical task.
	
	Reason:

14	I can read drawings and set up a wiring system by following the steps.
	
	Reason:

Part 4	Marks		
	Each	Allocated	Awarded
	1	6	

15	What were your favourite topics while learning engineering, and why did you enjoy learning about them?

16	What were your least favourite topics while learning engineering? Why?

17	What skills do you think you've learned from this subject?

18	Do you intend to further your studies in the engineering field and intend to get a job within the same area of study?

19	Which hands-on (practical) activity did you enjoy most, and what made it interesting?	

20	Was there a practical task you found challenging or did not enjoy? What made it difficult or less enjoyable?	