ELEC2217 – Mark Scheme 2023

1 Indicative Mark Scheme

This is an indicative mark scheme. It should be treated as a general guideline of what is expected and is likely to change during the exercise at the discretion of the examiners.

40% of the mark is Individual work

60% of the mark is from Group work

The group mark may be modified at the examiner discretion for anyone significantly underperforming in the group.

1.1 First Review (20 marks)

Individual Contribution (10 marks)

7+	Extremely detailed and comprehensive record of technical work and interactions with other team members. Evidence of outstanding engagement and ownership of an aspect of the project
6-7	Very detailed and comprehensive record of technical work and interactions with other team members. Evidence of very good engagement and ownership of an aspect of the project.
5-6	Detailed record of technical work and interactions with other team members. Evidence of engagement and contributions to an aspect of the project.
3-5	Fair record of technical work and interactions with other team members. Some evidence of engagement and contributions to an aspect of the project.
0-2	Little to no evidence of contribution.

Group mark: Smart meter design (10 marks)

7+	Excellent design fits well within specification and novel design. Additional features planned beyond target specification.
6-7	Very good design with good consideration of the specification. Design exceeds target specification.
5-6	Good functional design. Design meets target specification.
3-5	Basic design. Design partially meets target specification.
0-3	Insufficient progress. Design fails to meet target specification.

1.2 Second Review (25 marks)

Individual Contribution (10 marks)

7+	Extremely detailed and comprehensive record of technical work and interactions with other team members. Evidence of outstanding engagement and ownership of an aspect of the project
6-7	Very detailed and comprehensive record of technical work and interactions with other team members. Evidence of very good engagement and ownership of an aspect of the project.
5-6	Detailed record of technical work and interactions with other team members. Evidence of engagement and contributions to an aspect of the project.
3-5	Fair record of technical work and interactions with other team members. Some evidence of engagement and contributions to an aspect of the project.
0-3	Little to no evidence of contribution.

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Group Mark: Power Supply (7 marks)

7	Lowest power PSU in the cohort bonus mark with full load.
6	Power supply safety tested, delivers stable DC output with load. Draws 1.2W or below.
5	Power supply safety tested, delivers stable DC output with load. Draws 1.4W or below.
4	Power supply safety tested, delivers stable DC output with load. Draws 1.6W or below.
3	Power supply safety tested, delivers stable DC output with load. Draws 1.8W or below.
2	Power supply safety tested, delivers stable DC output with load. Draws 2W or below.
1	Power supply safety tested, delivers stable DC output with load. Draws 2W or more.
0	Power supply not functional, unstable output or not safety tested.

Load = TFT displaying Team letter + il matto and green LED.

Group Mark: Box design assessment (8 marks)

Bonus+1	Easy for one person to open for full evaluation of water ingress in less than 60 seconds.
7	No water ingress, screen stays on.*
6	< 1ml water ingress, screen stays on.*
5	< 1.5ml water ingress, screen stays on.*
4	< 2ml water ingress, screen stays on.*
3	< 2.5ml water ingress, screen stays on.
2	< 5ml water ingress, screen stays on.
1	< 10ml water ingress, screen stays on.
0	>15ml or screen stops working

Capped at 3 marks if only using the watering can.

***** Examiners cannot be held responsible for any gentle mocking of any team opting for the watering can.***

1.3 Final Review (15 Marks)

Overall Product Compliance with Specification (5 marks)

5	Meter exceeds defined specifications. Fully integrated inside box, box sealed, meter works without user intervention. Attractive and fully functional user interface.
4	Meter meets defined specifications. Fully integrated inside box, meter works without user intervention. Well-designed user interface.
3	Meter meets majority of specifications. Mostly integrated inside box, meter works but may require restart to work correctly. User interface shows basic operation of meter.
2	Meter meets some specifications. May not be integrated inside box. Meter functional but may not work as intended. Some issues with user interface.
1	Meter does not meet specifications. May not be integrated inside box. Meter functional but may not work as intended. Some issues with user interface.
0	Meter fails to operate.

Smart Meter Functionality (10 marks)

Numerically generated by cost function set in final test specification and ranked in comparison with other groups.

Output	**% of marks**
Survival Rate	30%
Mains Usage minimised	30%
Renewables Usage maximised	20%
Busbar voltage stability	20%

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1.4 Final Report (20 marks)

Group Report Mark (15 marks)

12+	Excellent progress in all areas of the project (circuits, software) and project/budget management. Excellent test plan and results showing testing of all modules, refinement of design, and thorough testing of complete system. Extremely well structured and logical report. High-quality figures. Very clear and concise description of technical aspects.
10-12	Very good progress in all areas of the project (circuits, software) and project/budget management. Very good test plan and results showing testing of all modules, refinement of design, and thorough testing of complete system. Very well structured report. Good-quality figures. Clear and concise description of technical aspects.
7-10	Good progress in majority of areas of the project (circuits, software) and project/budget management. Good test plan and results showing testing of all modules, and good testing of complete system. Well structured report. Clear description of technical aspects.
3-7	Fair progress in most areas of the project (circuits, software) and project or budget management. Test plan and results showing some testing of all modules, some testing of complete system. Fair structure. Adequate description of technical aspects.
0-3	Insufficient progress in the project (circuits, software). Test plan only covers some modules or complete system. Some significant flaws with testing. Report lacks coherency or detail.

Specification Sheet/User guide (5 marks)

5	Excellent, accessible and attractively-designed user guide demonstrating all main and additional features.
4	Very good, accessible and well-designed user guide demonstrating all main features.
3	Good, well-designed user guide demonstrating main features.
2	Adequately-designed user guide demonstrating most main features.
0-1	Poorly-designed user guide partially demonstrates some features.

1.5 Individual Reflective Account/Final Logbook (20 marks)

Individual Contribution: (20 marks)

12+	Extremely detailed and comprehensive record of technical work and interactions with other team members. Evidence of outstanding engagement and ownership of an aspect of the project. Excellent reflection on group dynamics.
10-12	Very detailed and comprehensive record of technical work and interactions with other team members. Evidence of very good engagement and ownership of an aspect of the project. Very good reflection on group dynamics.
7-10	Detailed record of technical work and interactions with other team members. Evidence of engagement and contributions to an aspect of the project. Good reflection on group dynamics.
2-7	Fair record of technical work and interactions with other team members. Some evidence of engagement and contributions to an aspect of the project. Some reflection on group dynamics.
0-2	Little to no evidence of contribution. Little to no reflection on group dynamics.

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Final Specification List:

Requirement	**Pass/Fail?**
Design based around a microcontroller board.	
No external communication is allowed with the meter once it is connected to the test bench to run the test profile, but you may wish to demonstrate other features separately.	
Power consumption (as specified in IEC Standard 62053-22) should not exceed 2 W when operational with full load.	
The meter must include a sealed power supply, enabling it to be powered from the test bed mains output.	
Meter suitable for outside installation with maximum dimensions 110 x 110 x 110mm, and a mounting lug.	
Housing consists of at least 3 separate sections and accessed using up to 4 bolts/screws.	
No blutak, glue or any other liquid as a sealant, or lining/film/tape to prevent water ingress.	
A green continuous LED will clearly indicate when the meter is operational.	
The meter will be expected to display data including the amount of consumed energy on a TFT/LCD screen.	
Electronics neatly	
Group Letter clearly identified on the box.	
Team:	
Signed by Staff member:	
Date:	