Commentary on candidate evidence

Candidate 1

The evidence for this candidate has achieved the following marks for each question of this course assessment component.

Question	Mark	Given mark	Comments
1a	1	1	Correct response.
1b	1	1	Correct engineer stated.
2	3	3	1 mark awarded for LDR, 1 mark awarded for fixed resistor and 1 mark awarded for wiring.
3	2	2	1 mark awarded for all forces and directions and 1 mark awarded for all dimensions.
4a	1	0	Candidate gave an incorrect response.
4b	3	2	1 mark awarded for the control comparison and a further mark awarded for photo. There is no mention of speed sensor measuring the vehicle actual speed.
5	1	0	Final symbol response considered which is incorrect.
6	2	2	Candidate gave the correct response.
7	1	1	The candidate gave the correct response.
8	2	1	1 mark awarded for the incorrect line type (dashed).
9	3	3	Candidate gave the correct response as per the MIs.
10a	10	9	Correct apart from a missing arrow on continuous loop.
10b	3	3	Candidate gave the correct response as per the MIs expressed to 3 significant figures (s.f.), which is acceptable.
11a	1	1	Candidate gave the correct response.
11bi	2	1	1 mark awarded for substitution. 0 marks awarded for the final answer due to the use of 6 s.f..
11bii	3	3	Candidate gave the correct response.
11ci	1	0	Incorrect condition given by candidate.
11cii	1	0	Incorrect value out with tolerance provided by candidate.
11d	2	2	Correct material selected, and reason given in terms of load and durability
12ai	2	2	Candidate gave the correct response..
12aii	3	3	Candidate gave the correct response.
12bi	1	0	Generic advantages were offered here, but not related to the given context. No marks awarded.
12bii	2	2	Reprogrammed (used multiple times) and saving of materials.
13ai	3	2	0 marks awarded for substitution. 1 mark was awarded for transposition allowing a follow through error and 1 mark was awarded for the final answer with unit.

13aii	2	2	Correct response using the candidate's value calculated in 13(a) (i). (FTE).
13b	2	1	1 mark awarded for 'designing hull with materials that can withstand force of waves'. Repeated activity, design, for mast so no mark awarded here.
14a	4	4	All four points were described correctly..
14b	4	4	Candidate gave the correct response.
14c	1	1	Candidate gave the correct answer given as a description.
14d	1	1	Correct response provided with unit.
14e	3	3	Correct response provided with unit expressed to 3 s.f.
15ai	4	4	Correct final response with unit provided..
15aii	2	2	Candidate gave the correct final response..
15b	1	1	Correct response 'removing teeth' is given.
15c	3	3	1 mark awarded for actuation of valve 2 causing outstroking. 1 mark awarded for time delay and 1 mark awarded for valve 2 changing state causing cylinder instroking. The statement about air bleed was ignored.
15d	2	0	No mention of damage to pastry or hygiene. 0 marks awarded.
15e	2	2	Candidate provided the correct final value and unit.
16ai	1	1	Response "No air pollution produced in use" awarded 1 mark.
16aii	1	1	Reduced demand so less business just enough to suggest economic impact.
16b	3	3	Candidate provided the correct final response with unit here (3 s.f. acceptable).
16ci	2	2	Correct final response with unit provided here..
16cii	4	4	Candidate provided the correct final response with unit.
16d	2	1	No clear cause provided, however 1 mark awarded for possible effect(s).
17a	3	3	1 mark awarded per energy type and value to a total of 3 marks.
17b	2	2	Candidate provided the correct final response with unit (%).
17ci	1	1	Correct response.
17cii	3	2	1 mark awarded for feedback sensor and a further mark awarded for output. No mark awarded for feedback loop as this should started at given node.
17di	2	1	1 mark awarded for symbol. No mark awarded for orientation
17dii	1	1	Candidate provided the correct response.

Candidate 2

The evidence for this candidate has achieved the following marks for each question of this course assessment component.

Question	Mark	Given mark	Comments
1a	1	1	Correct response.
1b	1	1	Candidate gave the correct engineering branch.
2	3	2	1 mark per correct component symbol (2 marks). No mark awarded for wiring.
3	2	1	1 mark awarded for dimensions, however no mark is awarded for forces as R_1 and R_2 are not labelled.
4a	1	0	No mark awarded as the candidate gave an incorrect response.
4b	3	2	1 mark awarded for the car speed sensed implied. Photograph taken, therefore a further mark is awarded.
5	1	1	Mark awarded as the candidate gave the correct response.
6	2	1	1 mark is awarded for B in tension.
7	1	1	Correct response provided.
8	2	0	The candidate gave incorrect response for both errors therefore no marks are awarded.
9	3	3	Correct response provided. Note that AND gate is sketch beside printed node rather than NAND gate symbol.
10a	10	5	The use of “red”, “green” without pin numbers receives no marks for control of outputs. All three delays with unit – 1 mark. Fixed loop decision – and loop back – 2 marks. Continuous loop – 1 mark. All symbols correct – 1 mark.
10b	3	3	Candidate has given the correct final response with unit expressed to appropriate significant figures (s.f.). Full 3 marks awarded.
11a	1	0	Candidate gave an incorrect response therefore no marks are awarded here.
11bi	2	1	The correct final response with unit is given, but not expressed to appropriate s.f. (6 s.f.) therefore, 1 mark is awarded for substitution only.
11bii	3	3	The correct final response with unit expressed to appropriate s.f. is given and so full marks are awarded.
11ci	1	1	Candidate provided the correct response..
11cii	1	1	The correct value within tolerance is given and so a mark is awarded.
11d	2	0	Candidate gave the incorrect material choice (D) therefore no marks can be awarded.
12ai	2	2	Candidate gave the correct Boolean statement therefore the full 2 marks are awarded.
12aii	3	3	Truth Table columns are correct. Full 2 marks awarded.

12bi	1	0	No functional advantage linked to given context therefore no marks are awarded here.
12bii	2	2	Environmental cause (fewer parts) and effect (less harmful fumes) given. Full 2 marks awarded here.
13ai	3	1	Transposition (2nd last line of calculation) – 1 incorrect answer from working so no further follow through error could be awarded.
13aii	2	0	No marks awarded for response.
13b	2	1	"Design the frame" whilst not labelled in the photograph was accepted as a structural aspect of the catamaran. Testing the catamaran was not a specific structural element. One mark awarded here.
14a	4	1	Increase in resistance not linked to any component so no mark could be awarded. 1 mark is awarded for switch motor on.
14b	4	4	Correct final response with unit expressed to appropriate s.f. Full marks awarded.
14c	1	1	Candidate provided the correct statement.
14d	1	0	Incorrect value read therefore, no marks are awarded.
14e	3	3	Candidate gave the correct final response with unit expressed to appropriate s.f. (4) as per MIs.
15ai	4	4	Correct final response provided with unit expressed to appropriate s.f..
15aii	2	2	Correct final response given as per the MIs.
15b	1	1	Candidate provided the correct response so a mark is awarded here.
15c	3	1	Incorrect description of input condition to outstroke piston – 0 marks awarded. No description of instroking condition – 0 mark awarded. 1 mark is awarded for time delay.
15d	2	NR	No response.
15e	2	2	Correct final response with unit and expressed to appropriate s.f. Full marks awarded.
16ai	1	1	Candidate provided the correct descriptive response..
16aii	1	0	"jobs" is an insufficient response without a link to economy..
16b	3	2	1 mark awarded for substitution, no mark is awarded for R_p. 1 mark is awarded for the final response with unit after applying follow through error.
16ci	2	2	Candidate provided the correct final answer with unit and expressed to appropriate s.f. Full marks awarded.
16cii	4	2	The candidate made no attempt at finding $V_{5.6K}$ therefore cannot be awarded first or second mark. Follow through error applied for transposition and final response from working.
16d	2	NR	No response.
17a	3	2	Candidate stated "electricity" rather than electrical energy. 1 mark for each output energy type and value – 2 marks awarded.

17b	2	2	Correct final response provided.. Full marks awarded.
17ci	1	1	Candidate gave the correct statement..
17cii	3	1	1 mark awarded for heater. No mark awarded for thermometer.
17di	2	2	1 mark awarded for symbol and a further mark awarded for orientation.
17dii	1	1	Correct response provided..

Candidate 3

The evidence for this candidate has achieved the following marks for each question of this course assessment component.

Question	Mark	Given mark	Comment
1a	1	1	Correct statement provided.
1b	1	0	Candidate stated electronic rather than electrical engineer. No mark awarded.
2	3	2	1 mark awarded for LDR symbol and a further mark awarded for fixed resistor symbol. No mark awarded for wiring.
3	2	1	1 mark awarded for dimensions however, no marks awarded for forces as R_1 and R_2 direction missing.
4a	1	1	Correct statement provided..
4b	3	3	Comparison by control unit inferred. 1 mark awarded for speed measured and a further mark awarded for photograph taken.
5	1	0	Candidate gave an incorrect symbol. No mark awarded.
6	2	0	Both statements provided by the candidate are incorrect therefore, no marks are awarded.
7	1	NR	No response.
8	2	1	1 mark awarded for line type.
9	3	3	Correct logic diagram provided.
10a	10	9	No decision checking input pin 0 was omitted so no mark awarded. Continuous loop entering the side of the start symbol was awarded the mark. All symbols, pin numbers and delay unit correct.
10b	3	3	Correct final response provided with unit and expressed to appropriate significant figures (s.f.). Full marks awarded.
11a	1	0	Incorrect motion type given therefore, no mark awarded here.
11bi	2	1	Candidate provided the correct final response with unit, however not expressed to 1 to 4 s.f. therefore, 1 mark is awarded.
11bii	3	1	1 mark awarded for follow through error of final answer with unit.
11ci	1	0	Incorrect statement provided by candidate.
11cii	1	0	The size of force provided by the candidate is incorrect.
11d	2	2	Correct material selected and justified. Full marks awarded.
12ai	2	2	Candidate provided the correct Boolean statement..
12aii	3	3	Correct outputs provided therefore, full marks awarded.
12bi	1	0	Candidate did not provide a functional advantage linked to context therefore, no mark is awarded.
12bii	2	2	Less material – 1 mark awarded. Less fuel used in factory – 1 mark awarded.

13ai	3	2	1 mark awarded for follow through error for transposition. And a further mark is awarded for final response with unit.
13aii	2	NR	No response.
13b	2	0	No role described therefore, no marks are awarded.
14a	4	1	1 mark is awarded for motor turns however, no marks are awarded for 'thermistor reduces the resistance in the circuit'. No description of V_{in}.
14b	4	3	3 marks are awarded for establishing V_1=1.5V, substitution and transposition. Final value from candidate's working (16/3) expressed to 3 s.f. should be 5.33 rather than the stated 5.34.
14c	1	0	Incorrect description provided therefore, no marks are awarded.
14d	1	1	Correct value with unit.
14e	3	2	Correct final response provided however, with incorrect unit. 2 marks are awarded for substitution and transposition.
15ai	4	1	1 mark awarded for gear given on diagram, but no follow through error on final answer due to incorrect units used.
15aii	2	2	Follow through error with candidate's response from (a) (i) used. Correct ratio expressed therefore, 2 marks are awarded.
15b	1	1	Candidate provided the correct description.
15c	3	2	1 mark awarded for outstroke condition and a further mark is awarded for instroke condition. No mark awarded for time delay.
15d	2	NR	No response.
15e	2	2	Correct final response with unit and expressed in appropriate s.f.
16ai	1	0	Candidate's response is not related to environmental impact.
16aii	1	0	Candidate's response is not related to economic issues.
16b	3	0	No follow through error for response from working as this simplifies the calculation and units are incorrect for the formula. No marks are awarded here.
16ci	2	1	1 mark is awarded for response from given working, with unit.
16cii	4	NR	No response.
16d	2	1	1 mark awarded for effect.
17a	3	3	Candidate provided the correct energy with value at all points therefore, 3 marks are awarded.
17b	2	2	Candidate provided the correct answer expressed using appropriate s.f. Full marks awarded.
17ci	1	1	Candidate provided the correct statement. 1 mark awarded.
17cii	3	0	Feedback loop does not start from node on diagram – No marks awarded.
17di	2	2	Correct symbol and orientation provided therefore, 2 marks awarded.

17dii	1	0	Incorrect alteration suggested therefore, no marks are awarded.

Candidate 4

The evidence for this candidate has achieved the following marks for each question of this course assessment component.

Question	Mark	Given mark	Comments
1a	1	1	Correct branch stated as per marking instructions (MIs).
1b	1	0	Candidate provided the incorrect engineering branch therefore, no mark is awarded.
2	3	3	Candidate provided the correct symbol, variable resistor changed to fixed resistor. Wiring to form specification is correct. Full marks awarded.
3	2	0	No dimension included. Missing magnitude and direction of the forces.
4a	1	1	Candidate provided the correct type as per the MIs.
4b	3	1	1 mark awarded for 'send a signal to the camera, inferring photograph taken, when over speed limit'.
5	1	1	1 mark awarded for correct buzzer symbol provided.
6	2	2	1 mark awarded for each correct nature of force provided.
7	1	0	Solenoid actuator not drawn on valve – No marks awarded here.
8	2	1	1 mark awarded for error 2. The line type should be solid.
9	3	0	Incorrect logic diagram as per MIs therefore, no marks awarded.
10a	10	3	All delays with units, pin 5 on/off, Pin 4 on/off – each 1 mark. No mark awarded for loops as arrows missing, no mark awarded for symbols because of x 10 decision box type and no mark awarded for pin 6 because of placement of off box.
10b	3	3	Correct final answer provided with units expressed to appropriate significant figures (s.f.). Full marks awarded.
11a	1	1	Correct motion type stated.
11bi	2	1	1 mark awarded for substitution. Final answer expressed to 6 s.f. but data given to 2 s.f. therefore, 1 to 4 s.f. acceptable range.
11bii	3	0	No mark awarded for formula even if it were correct.
11ci	1	0	Incorrect statement provided therefore, no mark awarded.
11cii	1	1	Candidate provided the correct value given as per the MIs.
11d	2	2	Correct material identified therefore, 1 mark is awarded. Durability and ability to support load given is also awarded a further mark.
12ai	2	0	Two responses with one not scored out – first answer marked but no NOT B and only a single ANDing so no marks awarded.
12aii	3	0	Column D incorrect. Column E does not AND candidates D with A hence no marks awarded. Column L does not

			AND candidates D with E therefore, no marks are awarded.
12bi	1	0	The candidate has provided generic statements which are not related to the function of the given context. Therefore, no marks are awarded.
12bii	2	0	The statement provided 'less use of unneeded waste material' is insufficient for one mark related to environment cause or effect.
13ai	3	0	No marks awarded for moment expression.
13aii	2	NR	No Response.
13b	2	0	Both statements provided are generic and not linked to specific aspects of the catamaran therefore, no marks are awarded.
14a	4	0	Resistance decreases in the circuit is not related to specific component thermistor therefore, no marks are awarded.
14b	4	3	1 mark is awarded for thermistor voltage and a further mark is awarded for substitution. A final mark is awarded for transformation. The final answer provided is incorrect from working and is therefore not awarded a mark.
14c	1	0	Candidate provided an incorrect alteration.
14d	1	0	An incorrect value was provided therefore, no mark is awarded.
14e	3	3	Correct final answer with unit expressed to an appropriate s.f. therefore, full marks are awarded.
15ai	4	1	1 mark awarded for follow through error of answer from given working with unit.
15aii	2	2	Follow through error with 15(a)(i) value used correctly in substitution and final answer.
15b	1	1	Reduction in gear size is acceptable as per the MIs.
15c	3	3	1 mark awarded for each condition that will actuate valve 2 and in/outstroke piston. Time delay inferred in statement 'once passed …' is awarded 1 mark.
15d	2	0	No mention of hygiene or non-damage of pastry with actuator therefore, no marks are awarded.
15e	2	0	Candidate provided an incorrect formula and the final answer units are incorrect therefore, no marks are awarded.
16ai	1	0	Candidate provided an incorrect response with fuel emission rather than CO2 or pollution.
16aii	1	0	Negative issue not linked to economic therefore, no mark is awarded.
16b	3	2	2 marks awarded for calculating R_p (3818.8Ω not final answer so s.f. ignored), but this was not added to 15k.
16ci	2	2	Correct value with units provided as per the MIs.
16cii	4	2	1 mark awarded for Transposition. Correct final answer to given working with units is awarded a further mark.
16d	2	0	No named emerging technology or impact is explained therefore, no marks are awarded.

17a	3	3	Energy form and value correctly given at all three points therefore, 3 marks are awarded.
17b	2	1	No mark awarded for substitution however, the final answer is correct for given working and is therefore awarded 1 mark.
17ci	1	1	Candidate provided the correct statement as per the MIs.
17cii	3	0	Incorrect sub-systems are identified and feedback without arrows and in the incorrect start position is given therefore, no marks awarded.
17di	2	0	The incorrect symbol and orientation provided cannot be awarded with this response.
17dii	1	0	Incorrect alteration offered by candidate therefore, no mark is awarded.

Candidate 5

The evidence for this candidate has achieved the following marks for each question of this course assessment component.

Question	Mark	Given mark	Comments
1a	1	1	Correct engineer stated as per marking instructions (MIs).
1b	1	0	No mark is awarded for Electrical must be Electronic as per the MIs.
2	3	3	1 mark is awarded for each correct symbol (2). A further mark is awarded for wiring.
3	2	2	1 mark is awarded for force values and labels with direction and a further mark is awarded for positions.
4a	1	1	Correct control type stated as per the MIs.
4b	3	2	1 mark awarded for speeding car sensed with a further mark awarded for photo taken. No description of control unit comparing set and actual speed therefore, no mark is awarded.
5	1	1	Correct symbol sketched by candidate.
6	2	2	Correct nature stated for each beam loading.
7	1	1	Solenoid actuator sketch correctly in position.
8	2	2	Two errors identified therefore, 1 mark is awarded for each.
9	3	3	Logic diagram completed correctly.
10a	10	8	Correct apart from the omission of Pin 0 decision and continuous loop to start of flowchart. 8 marks awarded.
10b	3	3	Correct final answer with unit expressed to appropriate significant figures (s.f.). Full marks awarded.
11a	1	0	Candidate stated the incorrect motion type therefore, no mark is awarded.
11bi	2	1	1 mark awarded for substitution however, the final answer is not expressed to appropriate s.f. (1 to 4 s.f.).
11bii	3	2	The correct final answer is provided, but no units so marks are awarded for substitution and transposition only.
11ci	1	NR	No response.
11cii	1	1	Correct value given.
11d	2	2	Correct material is awarded 1 mark with strength and durability reasons given also being awarded 1 mark.
12ai	2	2	Boolean equation correctly expressed and is therefore awarded full marks.
12aii	3	3	Candidate has completed the Truth table correctly and is therefore awarded 3 marks.
12bi	1	0	Candidate response is not related to context/functional advantage therefore, no mark is awarded.
12bii	2	2	Less material on its own would not gain a mark however, because this is linked to reduction in fumes in the air it is a valid explanation and 2 marks are awarded.

13ai	3	3	Correct final answer provided with unit and expressed in appropriate s.f.
13aii	2	2	Candidate provided correct final answer with units and is awarded 2 marks.
13b	2	0	Candidate responses are not linked to specific activity around catamaran structure and so no marks are awarded.
14a	4	2	1 mark is awarded for 'resistance of thermistor decreases' and a further mark is awarded for 'motor will switch on'.
14b	4	4	Correct answer with unit provided and is and expressed using appropriate s.f. 4 marks awarded as per the MIs.
14c	1	1	Adding a variable resistor as per MIs - 1 mark.
14d	1	0	Incorrect value given.
14e	3	2	Correct working, however the final answer is not expressed as appropriate s.f. (1 to 4 s.f. allowed) therefore, 2 marks are awarded.
15ai	4	2	2 marks awarded for calculating the speed for B calculated as per the MIs, but the question asks for speed at D.
15aii	2	2	2 marks awarded due to allowance of follow through error using candidates answer for (a) (i) in working.
15b	1	1	Reduction in gear size is correct as per the MIs.
15c	3	3	Both factors resulting in valve 2 in/out stroking piston described therefore, 2 marks are awarded. Time delay is also awarded 1 mark.
15d	2	0	Incorrect response.
15e	2	1	No unit is provided in the final answer so only 1 mark is awarded for substitution.
16ai	1	1	'No fuel gasses released' is correct as per the MIs therefore, 1 mark is awarded.
16aii	1	0	Insufficient economic description given by the candidate therefore no mark is awarded as per the MIs.
16b	3	3	Correct final answer with unit expressed to appropriate s.f. therefore, full marks awarded.
16ci	2	1	No unit is provided in the final answer therefore only 1 mark is awarded for substitution.
16cii	4	2	No attempt is made to calculate the voltage across parallel branch however, 1 mark is awarded for transposition of V/R and further mark is awarded for the candidate's correct answer from their given working.
16d	2	1	1 mark is awarded for increased yield but detail on the reasons for this is not given. Therefore only 1 mark is awarded.
17a	3	1	1 mark awarded for output energy type and value however, input and losses energy types are incorrect and therefore do not achieve a mark.
17b	2	NR	No response.
17ci	1	0	Incorrect statement provided by candidate and therefore no mark is awarded.

17cii	3	2	1 mark awarded each for thermostat and heating element. No award for feedback loop as it does not return to control unit correctly.
17di	2	2	Candidate provided the correct symbol and orientation.
17dii	1	1	Two responses are given but only the first is marked and is correct as per the MIs therefore achieving 1 mark.

Candidate 6

The evidence for this candidate has achieved the following marks for each question of this course assessment component.

Question	Mark	Given mark	Comments
1a	1	1	Correct engineer as per marking instructions (MIs).
1b	1	1	1 mark awarded for identifying the correct engineer.
2	3	3	1 mark awarded for each correct symbol (2) and a further mark is awarded for wiring.
3	2	NR	No response.
4a	1	1	Correct type of control stated and therefore 1 mark is awarded.
4b	3	3	1 mark awarded for sensing car speed, function of control sub-system and photo taken therefore 3 marks are awarded.
5	1	1	Candidate sketched the correct buzzer symbol and is therefore awarded 1 mark.
6	2	2	The correct nature on both beams is given and therefore awarded 2 marks.
7	1	0	Plunger rather than solenoid actuator is sketched and therefore no mark is awarded.
8	2	1	1 mark is awarded for line type response.
9	3	3	NOT, OR and AND logic gates are all correctly wired and therefore awarded 3 marks.
10a	10	8	All responses are correct apart from the omission of Pin 0 decision and pin 7 not switched off. Therefore, 8 marks are awarded here.
10b	3	3	The correct final answer is provided with unit expressed to appropriate significant figures (s.f.). Therefore, full marks are awarded.
11a	1	0	Candidate identified an incorrect motion type and therefore, no mark is awarded.
11bi	2	1	Candidate identified the correct substitution, but the final answer is expressed to 6 s.f. rather than 1 to 4 allowed therefore, only 1 mark is awarded.
11bii	3	3	The correct final answer is provided with unit expressed to appropriate s.f. Full marks are awarded here.
11ci	1	0	Candidate has provided an incorrect condition and no marks are therefore awarded.
11cii	1	1	Correct value measured being awarded 1 mark.
11d	2	2	The correct material is selected and is therefore awarded 1 mark. ‘can handle both support loads’ is acceptable along with high durability as a justification and a further mark is therefore awarded.
12ai	2	2	NOT B – 1 mark. ANDing A, B and C – 1 mark.
12aii	3	1	1 mark only is awarded for column D being correct. Column E is incorrect. No mark is awarded for ANDing candidates E with C.

12bi	1	0	Generic advantage is not related to context / function and therefore no mark is awarded.
12bii	2	2	Less component required (cause) with less emissions into air (effect) related to environment. This response is awarded full marks.
13ai	3	0	No mark is awarded for the incorrect substitution. There is no final answer from candidate working.
13aii	2	NR	No response.
13b	2	1	1 mark is awarded as the first description for forces on ropes acceptable as is cables in the MIs. Boat is too generic for second specific role and is therefore not awarded a mark.
14a	4	2	1 mark only is awarded for the reference to the motor switching on.
14b	4	2	1 mark is awarded for substitution with a further mark being awarded for transposition. The final answer is awarded no mark due to the incorrect unit being used (Ω rather than kΩ).
14c	1	0	Incorrect response.
14d	1	0	Incorrect value read.
14e	3	2	1 mark is awarded for substitution with a further mark being awarded for transposition. Candidate uses incorrect units and so is not awarded a final answer mark.
15ai	4	4	Candidate provides the correct final answer with unit express to appropriate s.f.
15aii	2	2	VR is correctly calculated and therefore achieves full marks.
15b	1	0	Incorrect response.
15c	3	1	Time delay before piston instroking is awarded 1 mark.
15d	2	0	Candidate gives an incorrect explanation and is therefore awarded no marks.
15e	2	1	1 mark is awarded for substitution however the final answer is incorrect due to unit error.
16ai	1	1	No gasses emitted is awarded 1 mark as per the MIs.
16aii	1	0	The economic impact of more power stations is not described and therefore is awarded no mark.
16b	3	2	Candidate provides the correct final answer, but the unit is expressed in Ω rather than kΩ. 1 mark is awarded for substitution with a further mark awarded for R_p
16ci	2	1	The correct value is stated, but no units and so 1 mark is awarded for substitution only.
16cii	4	1	V_p is not calculated. 1 mark is awarded for transposition, but using an incorrect unit (A rather than mA) in the final answer so no further follow through error.
16d	2	0	No named emerging technology or impact is explained therefore, no marks are awarded.
17a	3	2	Input and output energy type and value are named and therefore, 2 marks are awarded.
17b	2	2	The correct final answer is expressed to appropriate s.f. 2 marks are therefore awarded.

17ci	1	1	The correct control is stated and therefore 1 mark is awarded.
17cii	3	3	Feedback look with arrow and starting from node achieves 1 mark. Thermistor and heater are named in the correct sub-system and therefore, 2 marks are awarded.
17di	2	1	The incorrect symbol is given, but the correct orientation therefore, 1 mark is awarded.
17dii	1	0	Candidate provides Insufficient detail in the description and therefore, no marks are awarded.