



## External Assessment Report 2014

Subject(s)	Mechatronics
Level(s)	Higher

The statistics used in this report are prior to the outcome of any Post Results Services requests

This report provides information on the performance of candidates which it is hoped will be useful to teachers/lecturers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding. It would be helpful to read this report in conjunction with the published question papers and marking instructions for the examination.

# Comments on candidate performance

## General comments

This year shows a very good performance, with all candidates achieving a passing grade. As mentioned in past reports, this is a unique course and, unlike most Highers, stands alone at this level. The candidates are meeting a course content that is almost entirely new, and there is very little prior learning that is directly applicable. Even with this initial position, it is clear to see that the candidates were able to assimilate a great deal of knowledge from the course and apply this to the question paper, resulting in approximately 73% of them achieving a grade A pass.

Once again, there was a good demonstration of learning, knowledge and application in Mechatronics. Mechatronics as an applied subject cannot be taught by examples, but requires elements of new situations and applications which candidates may never have seen before.

The top candidates showed an extremely well-developed skill in responding to such scenarios; the less able were less successful, though still showing a good measure of capability. The candidate group, though fairly small, has seen entry numbers increase by 30% over last year's cohort.

The average level of candidate ability this year is noticeably higher. The grade distributions this year, though similar to those of previous years, benefited from the absence of the small group of very poor candidates seen in the past.

## Areas in which candidates performed well

### Section A

- ◆ Question 1(a) and (b): most candidates answered correctly.
- ◆ Question 2: most candidates answered correctly.
- ◆ Question 3: most candidates answered correctly.
- ◆ Question 4(a)(i) and (a)(ii): most candidates answered correctly.
- ◆ Question 6(b) and (c): most candidates answered correctly.
- ◆ Question 7: most candidates answered correctly.
- ◆ Question 8(a), (b) & (d): most candidates answered correctly
- ◆ Question 9: most candidates answered correctly.
- ◆ Question 10: most candidates answered correctly.

### Section B:

- ◆ Question 11(a)(i) and (a)(ii): most candidates who attempted question 11 were able to identify the inputs and outputs correctly.
- ◆ Question 11(b): most candidates who attempted question 11 were able produce a good flowchart.
- ◆ Question 12(b): most candidates who attempted question 12 were able produce a good flowchart.

- ◆ Question 13(a): most candidates who attempted question 13 were able produce a good flowchart.

## **Areas which candidates found demanding**

### **Section A**

- ◆ Question 1(c): more than half the candidates had difficulty stating two advantages of a Microcontroller verses a hard wired system.
- ◆ Question 4(b): more than half the candidates had trouble with stating two applications of an optical incremental encoder.
- ◆ Question 5: the flow chart challenged a number of candidates — the average score was 3 out of 5.
- ◆ Question 6(a): one third of the candidates had trouble stating how to change the controlling action of an ASIC and a PLC.
- ◆ Question 8(c): just over half the candidates found this arithmetic question challenging.

### **Section B**

- ◆ Question 11(g)(ii): more than half of the candidates' who attempted Q11 had difficulty identifying any issues with interfacing an electric motor to a PLC.
- ◆ Question 12(a)(i) & (a)(ii): some candidates, while they could identify the inputs and outputs correctly, failed to allocate them to a Microcontroller input or output.
- ◆ Question 12(e): more than half the candidates who attempted question 12 were unable to describe or sketch the operation of a thermocouple.
- ◆ Question 12(f): more than half the candidates' who attempted Q12 did not know about differential pressure sensors.
- ◆ Question 13(d)(ii): more than half of the candidates' who attempted Q13 were unable to describe how to modify the control strategy and signals involved in providing variable speed control to a conveyor.
- ◆ Question 13(f)(i) & (f)(ii): more than half of the candidates' who attempted Q13 were unable to describe a system that would detect if glass was damaged prior to packing and enable the system to dispose of damaged glass.

## **Advice to centres for preparation of future candidates**

A small number of candidates had a poor standard of handwriting that made it difficult for the markers to read their answers.

The section A average total mark was greater than 39, and the section B average total mark was greater than 36 across all centres. This demonstrates that candidates were, in general, well prepared.

## Statistical information: update on Courses

Number of resulted entries in 2013	27
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Number of resulted entries in 2014	38
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## Statistical information: Performance of candidates

### Distribution of Course awards including grade boundaries

Distribution of Course awards	%	Cum. %	Number of candidates	Lowest mark
Maximum Mark 100				
A	68.4%	68.4%	26	70
B	18.4%	86.8%	7	60
C	2.6%	89.5%	1	50
D	0.0%	89.5%	0	45
No award	10.5%	-	4	-

## General commentary on grade boundaries

- ◆ While SQA aims to set examinations and create marking instructions which will allow a competent candidate to score a minimum of 50% of the available marks (the notional C boundary) and a well prepared, very competent candidate to score at least 70% of the available marks (the notional A boundary), it is very challenging to get the standard on target every year, in every subject at every level.
- ◆ Each year, SQA therefore holds a grade boundary meeting for each subject at each level where it brings together all the information available (statistical and judgemental). The Principal Assessor and SQA Qualifications Manager meet with the relevant SQA Business Manager and Statistician to discuss the evidence and make decisions. The meetings are chaired by members of the management team at SQA.
- ◆ The grade boundaries can be adjusted downwards if there is evidence that the exam is more challenging than usual, allowing the pass rate to be unaffected by this circumstance.
- ◆ The grade boundaries can be adjusted upwards if there is evidence that the exam is less challenging than usual, allowing the pass rate to be unaffected by this circumstance.
- ◆ Where standards are comparable to previous years, similar grade boundaries are maintained.
- ◆ An exam paper at a particular level in a subject in one year tends to have a marginally different set of grade boundaries from exam papers in that subject at that level in other years. This is because the particular questions, and the mix of questions, are different. This is also the case for exams set in centres. If SQA has already altered a boundary in a particular year in, say, Higher Chemistry, this does not mean that centres should necessarily alter boundaries in their prelim exam in Higher Chemistry. The two are not that closely related, as they do not contain identical questions.
- ◆ SQA's main aim is to be fair to candidates across all subjects and all levels and maintain comparable standards across the years, even as arrangements evolve and change.