External Assessment Report 2013

Subject(s)	Mechatronics
Level(s)	Higher

The statistics used in this report are pre-appeal.

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

In general, this year shows another good performance, with most candidates achieving a pass. 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's 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 half 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. Although the candidate group is fairly small, the entry numbers are stable and the grade distributions this year are similar to those of previous years.

Areas in which candidates performed well

Section A

- Question 1a) and b): most candidates answered correctly.
- Question 3a) and b): most candidates answered correctly and demonstrated a fair understanding of different robot joint types and end effectors.
- Question 5a) and b): most candidates demonstrated a firm grasp of rotary encoders and associated codes.
- Question 9a), b) and c): most candidates answered well and demonstrated a good understanding of open and closed loop control.
- Question 10c), d) and e): most candidates answered correctly.

Section B

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

Areas which candidates found demanding

Section A

- Question 1c): half the candidates had difficulty deciding the nature of the data flow on the control bus in a microcontroller.
- Question 3a): most candidates failed to answer correctly the nature of Joint 2 on a polar robot.
- Question 7a): a fair proportion of candidates' descriptions were too brief.

- Question 7c): more than half of the candidates' were not able to calculate the speed of the disc.
- Question 10a): a fair proportion of candidates' answered incorrectly.

Section B

- Question 11d): a fair proportion of candidates who attempted Q11 did not know about differential pressure sensors.
- Question 11f)ii): most candidates who attempted Q11 struggled with identifying methods of reducing energy usage.

Advice to centres for preparation of future candidates

A 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 30, and the section B average total mark was greater than 28 across all centres. This demonstrates that candidates were, in general, well prepared.

In Section B

- Question 11 was attempted by 23 candidates.
- Question 12 was attempted by 18 candidates.
- Question 13 was attempted by 15 candidates.

Question 12 in section B efficiently discriminated between candidates who were comfortable with PLCs and those who were not.

Question 13 in section B efficiently discriminated between candidates who were comfortable with Robotics and those who were not.

Statistical information: update on Courses

Number of resulted entries in 2012	30

Number of resulted entries in 2013	27

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	51.9%	51.9%	14	70
B	25.9%	77.8%	7	60
C	11.1%	88.9%	3	50
D	3.7%	92.6%	1	45
No award	7.4%	100.0%	2	-

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.