External Assessment Report 2015

Subject(s)	Electronic and Electrical Fundamentals
Level(s)	Intermediate 2

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 was the last year of the Electronic and Electrical Fundamentals Intermediate 2 examination and only three candidates from one centre sat the examination. This compares with 23 candidates sitting in 2014 and 39 in 2013. All three candidates passed and achieved a grade 'A'.

It should be noted that the Electronic and Electrical Fundamentals Intermediate 2 course has now been replaced by the National 5 Practical Electronics Course, details of which can be found on SQA's website.

Areas in which candidates performed well

Given that only three candidates sat the paper, and all three gained marks in excess of 70%, it is evident that the candidates performed well in nearly all parts of the paper.

Areas which candidates found demanding

Q2 Candidates still seem to find transistor pin identification challenging.

Q12 Over the years, candidates have generally found the Section B Analogue Electronics question the most challenging of the three Section B questions, and some candidates have been reluctant to attempt this question.

Advice to centres for preparation of future candidates

As this is the final examination for Intermediate 2 Electronic and Electrical Fundamentals it is perhaps important to reflect on those areas of theoretical electronics that candidates have found easy and those that have proved more challenging. The three main areas of electronics covered in the Electronic and Electrical Fundamentals Intermediate 2 Course are: electrical principles, digital electronics, and analogue electronics.

Electrical Principles

This is an area where the examination team saw significant improvements in candidate performance over the years. Candidates became more competent in solving network problems requiring the application of Kirchhoff's Voltage and Current Laws. It is hoped that a strong emphasis continues to be placed on candidates applying Kirchhoff's Laws to different electrical and electronic circuits, as a sound grasp of the application of the two laws is fundamental to electrical and electronic engineering.

Candidates also demonstrated an ability to calculate power and energy in electrical networks. They were generally good at solving magnetic field problems including the

calculation of electromotive force (emf), current, force etc. where, on occasions, transposing a formula was required. Candidates also showed an ability to interpret information on sinusoidal waveforms and to calculate root mean square values of voltage and current.

Digital Electronics

In general terms candidates performed best in this area of electronics, demonstrating an ability to recognise digital gates and their truth tables, produce Boolean expressions and truth tables for combinational logic circuits, translate Boolean expressions into truth tables, and solve combinational logic problems expressed in terms of a series of statements.

The one area that some candidates found more challenging was solving fault problems in digital circuits. Such problems are good because they require candidates to develop a logical, problem solving approach to fault finding exercises — something they may find really helpful when diagnosing faults in complex engineering systems.

Analogue Electronics

Analogue electronics proved to be the area in which candidates performed least well. Subjects which candidates found challenging include:

- component and pin recognition
- half and full wave rectification (and in particular smoothing)
- transistor biasing
- power electronic components and their applications

In general terms candidates found work on operational amplifier circuits a little more straightforward, although it was not uncommon for candidates to mix up inverting and non-inverting circuit configurations when, for example, calculating gain.

It may be argued that with widespread digitisation in the electronics field that the need for a fundamental understanding of analogue electronic is increasingly unnecessary. However, such an argument may leave candidates short of a fundamental knowledge and understanding of, for example, how components (including integrated circuits) behave in circuits and systems. It is suggested that the teaching of analogue electronics is still very important, and, as such, that teachers should explore the best way to teach the subject so that candidates' knowledge and understanding of what most experts continue to regard as a difficult subject is enhanced.

Statistical information: update on Courses

Number of resulted entries in 2014	23

Number of resulted entries in 2015	3

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	100.0%	100.0%	3	70
B	0.0%	100.0%	0	60
C	0.0%	100.0%	0	50
D	0.0%	100.0%	0	45
No award	0.0%	-	0	-

For this Course, the instrument of assessment and approach to marking is unchanged. As such, the grade boundaries remained at the notional values of 50% for a Grade C and 70% for a Grade A.

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.