



External Assessment Report 2011

Subject	Electronic and Electrical Fundamentals
Level	Intermediate 2

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

The number of candidates sitting the Electronic and Electrical Fundamentals Intermediate 2 Course in 2011 was 72 compared with 71 in 2010, 115 in 2009, and 120 in 2008. Six centres presented for the examination in 2011, compared with four in 2010. Candidate entries have now stabilised after a significant fall in numbers in 2010 due to there being no entries from further education colleges that year. In 2011, there were two entries from one further education college.

As reported in the 2010 External Assessment Report, a number of colleges have moved over to the new National Certificate in Electronic Engineering at SCQF level 5 Course which does not contain the Units making up the Electronic and Electrical Fundamentals Intermediate 2 Course and, therefore, some colleges no longer have candidates for the Electronic and Electrical Fundamentals Course. The Principal Assessor will undertake a mapping exercise to see if it is possible to find broadly equivalent Units between the new National Certificate in Electronic Engineering award and the Units making up the Electronic and Electrical Fundamentals Intermediate 2 Course, with a view to allowing candidates studying the new National Certificate award to sit the external examination for the Electronic and Electrical Fundamentals Intermediate 2 Course.

The pass rate for the Electronic and Electrical Fundamentals Intermediate 2 Course in 2011 was somewhat lower than that of 2010 and the mean mark also dropped by almost 5%. However, an analysis of the 2011 results reveals that both the pass rate and mean mark were distorted by the particularly poor performance of candidates from one non-Scottish centre that normally submits the majority of candidates for the Course. The pass rate from this one centre was in the region of 15%, which is substantially below expectations.

It is interesting to note that the pass rate among candidates from Scottish centres was 62% with one school achieving a 100% pass rate. Furthermore, across all centres, 6.8% of candidates achieved an upper-A pass in the 2011 examination with a further 13.7% achieving a lower-A pass. This level of 'A' passes (20.8% in total) suggests that the 2011 examination paper was of an appropriate standard for candidates who had been taught the Electronic and Electrical Fundamentals Intermediate 2 syllabus well and had been suitably prepared for the examination.

Anecdotal evidence from colleagues teaching in secondary schools continues to suggest that studying the Electronic and Electrical Fundamentals Intermediate 2 Course provides candidates with good preparation for the Electrical/Electronics Unit in the current Higher Physics Course.

Areas in which candidates performed well

(This section specifically relates to the candidates from Scottish centres.)

Question 1: As in previous years, the coding questions were generally answered well.

Question 3: Most candidates made a reasonable attempt at this question.

Question 4: The majority of candidates were able to determine the correct logic inputs for the three gates.

Question 8: Most candidates scored well on this question.

Question 10 (a): Most candidates performed the binary additions correctly.

Question 10 (c): This question was answered well by most candidates who attempted it.

Question 11 (b): Candidates in the main answered both parts of this question well, demonstrating an ability with regard to (b)(ii) to transpose the formula $F = Bli$ to calculate current.

Question 12 (c): Most candidates who attempted this question were able to identify the circuit configuration and determine the gain and input voltage of the circuit.

Areas which candidates found demanding

(This section specifically relates to the candidates from Scottish centres.)

Question 2: Few candidates were able to identify the pin connections for the field effect transistor (FET).

Question 5: Quite a few candidates were not able to identify the circuit configuration as a common source amplifier or FET amplifier.

Question 7: Only a small number of candidates answered part (c) of this question correctly as V_{OUT} of 500 mV requires a gain of 10 but the maximum possible gain for the amplifier as configured in the question was only 5.

Question 10 (d): Quite a few candidates used ANSI rather than BS symbols when drawing the logic diagram.

Question 10 (e): Not many candidates determined which gate was at fault and what the nature of the fault condition was.

Question 11 (a): Some candidates determined the peak-to-peak value rather than the peak value in question (i) which led to an incorrect answer in (ii).

Question 12 (a): Many candidates had problems in identifying the circuit configuration as a common emitter amplifier and the purpose of C_1 and C_2 as coupling capacitors and C_3 as a decoupling or bypass capacitor.

Question 12 (b): As in previous years, most candidates struggled with this transistor biasing question.

Question 12 (c): Only a few candidates were able to identify the process in (iii) B as offset null adjustment.

Question 12 (d): Sketches of output waveforms tended to be poor with no values shown on the sketches.

Advice to centres for preparation of future candidates

General

The Markers observed that some candidates continue to demonstrate a solid grasp of many of the basic concepts and principles in both electronic and electrical engineering. With regard to electronic principles, this was noticeable in some answers to Questions 4, 7, 8 and parts of Question 10 and 12. In the case of electrical principles, this could be seen in the answers some candidates gave to Questions 3, 6, 9 and parts of Question 11. Centre staff are to be congratulated for the good teaching and learning of basic electronic and electrical concepts and principles which is taking place and are encouraged to maintain this excellent work.

On the downside, candidates are still finding it difficult to answer questions involving aspects of analogue electronics (eg transistor pin connections, amplifier configurations, transistor biasing, coupling/decoupling capacitors and rectifier circuits). Many candidates are also having difficulties in solving fault problems in digital electronic questions. Such fault analysis provides candidates with opportunities to develop their problem solving skills and teachers/lecturers are encouraged to give candidates plenty of formative assessment exercises on this topic so that such skills can be developed.

It is also evident from candidate performance in the examination that some candidates are being provided with very good support in preparing for the external examination. However, it was noticeable in this year's examination, as in previous years' examinations, that some candidates did not read some of the questions correctly (ie using ANSI symbols in diagrams when BS symbols were asked for) and, thus, gave wrong answers to these questions.

Teachers/lecturers should advise their candidates to read questions in full and to make sure they understand what questions are asking for.

Statistical information: update on Courses

Intermediate 2

Number of resulted entries in 2010	71
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Number of resulted entries in 2011	72
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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	20.8%	20.8%	15	70
B	8.3%	29.2%	6	60
C	8.3%	37.5%	6	50
D	5.6%	43.1%	4	45
No award	56.9%	100.0%	41	-

Candidates presented by centres within Scotland

Distribution of Course awards	%	Cum. %	Number of candidates	Lowest mark
Maximum Mark 100				
A	39.4%	39.4%	13	70
B	12.1%	51.5%	4	60
C	12.1%	63.6%	4	50
D	6.1%	69.7%	2	45
No award	30.3%	100.0%	10	-

Candidates presented by centres outwith Scotland

Distribution of Course awards	%	Cum. %	Number of candidates	Lowest mark
Maximum Mark 100				
A	5.1%	5.1%	2	70
B	5.1%	10.2%	2	60
C	5.1%	15.3%	2	50
D	5.1%	20.4%	2	45
No award	79.5%	100.0%	31	-

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, therefore, SQA 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 Head of Service 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.