External Assessment Report 2012

Subject(s)	Electronic and Electrical Fundamentals
Level(s)	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 2012 was 23, compared with 73 in 2011, 71 in 2010, 115 in 2009, and 120 in 2008. There was a 68% decrease in candidate entries between 2012 and 2011. This sharp drop in candidate entries is entirely due to there being no entries from the overseas centre which has previously presented the majority of candidates for the examination.

Four centres presented for the examination in 2012, compared with six in 2011. All four centres were secondary schools: three being returning centres and the other presenting for the first time. There were no entries from any of the further education colleges. All colleges have now moved over to the new National Certificate in Electronic Engineering at SCQF Level 5, which no longer contains the units making up the Electronic and Electrical Fundamentals Intermediate 2 course.

The pass rate the Electronic and Electrical Fundamentals Intermediate 2 in 2012 was 91.3%, compared with 37% in 2011, 52.1 % in 2010 and 55.7% in 2009. The pass rate rose by 54.3% in 2012 compared with 2011. The mean mark also rose to 65.4% in 2012 compared with 41.6% in 2011. The explanation is quite simple — in 2011 the pass rate and mean mark were distorted downwards by the poor performance of candidates from the overseas centre that normally submits the majority of candidates. With no candidate entries from this centre in 2012 this effect was removed.

Despite the significant rise in both pass rate and mean mark, the vetting and setting teams, memberships of which have not significantly changed over a number of years, hold the view that the 2012 Examination was of a comparable standard to examinations sat by candidates in previous years.

Due to the significant drop in candidate entries in 2012 it is not possible to make many meaningful comparisons between grades achieved in 2012 and those achieved in 2011 and earlier. However, it is pleasing to report that 12 out of 23 candidates (52.2%) achieved a Grade A in the 2012 Examination, with two candidates achieving a Grade B, seven a Grade C, and only two candidates failing the examination. The four secondary schools that entered candidates for the examination, and the candidates themselves, are to be congratulated for the very good performance in this year's examination.

An analysis of the school results by stages reveals that eight out of nine S4 candidates, 11 out of 12 S5 candidates and two out of two S6 candidates passed 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

Q1	As in previous years the coding questions were generally answered well.
Q5	This question was generally answered well although a few candidates thought the circuit configuration represented an inverting amplifier.
Q6	Most candidates made a good attempt at this question.

Q10 (a) & (b) These questions were generally answered satisfactorily although most candidates when determining V_{IN} in Q10 (b) failed to add the 10V across the resistor to the 10V output voltage, V_{OUT}, to get the correct value for V_{IN}.

Q11 As is normally the case the Part B 'digital' question was answered well with many candidates scoring high marks.

Q12 (c) (i) Most candidates were able to name the two components correctly as Diac and Triac.

Areas which candidates found demanding

Q2 (a) Some candidates thought the component was a thermistor rather than a pre-set resistor.

Q2 (a) & (b) A few candidates forgot to give applications for the two components.

Q3 (b) Some candidates forgot to convert the 500 mm to 0.5 m.

Q4 (b) Several candidates used the peak to peak rather than the peak voltage to calculate rms voltage.

Q7 This question was generally poorly answered. Common mistakes included not converting the rms voltage to a peak voltage and not taking account of the 0.7V volt drop across the diode. Sketches were often not labelled.

Q 8 (a) Several candidates stated the phase difference as 0^o rather than 180^o.

Q 8 (b) This question was answered poorly with few candidates being able to explain why the gain falls drastically when C_E is removed.

Q10 (c) Some candidates failed to make the link between maximum resistance gives minimum current and vice versa.

Q12 (a) (ii) No candidates identified the input terminals labelled '-' and '+' as inverting and non-inverting terminals.

Q12 (c) (ii) Few candidates were able to explain the purpose of R_V.

Advice to centres for preparation of future candidates

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 Q5, Q6, Q8, Q9 and parts of Q11 and Q12. For electrical principles it could be seen in the answers some candidates gave to Q3, Q4, and Q10. Centre staff are to be commended for the good teaching and learning of basic electronic and electrical concepts and principles, and are encouraged to continue this very good work.

Some candidates are still finding it difficult to answer questions involving aspects of analogue electronics (eg transistor pin connections, amplifier configurations, transistor biasing, the purpose of a bypass capacitor and rectifier circuits). Some candidates are also having difficulties in solving fault problems in digital electronic questions. Fault analysis provides candidates with opportunities to develop their problem solving skills, and teachers/lecturers are advised to give candidates plenty of formative assessment exercises on this topic so that such important skills can be developed.

With regard to electrical principles, teachers/lecturers may wish to spend a little more time explaining the relationship between nodal voltages and volt drops in circuits given that most candidates were unable to determine V_{IN} in Q10 (b) correctly.
It is evident from their performance in the Question Paper that candidates are being provided with good and helpful support when preparing for the external examination. Few candidates this year failed to read questions correctly (eg using ANSI symbols in diagrams when BS symbols were asked for) which is something of a contrast to previous years.

Statistical information: update on Courses

Intermediate 2

Number of resulted entries in 2011	72

Number of resulted entries in 2012	23

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	52.2%	52.2%	12	70
B	8.7%	60.9%	2	60
C	30.4%	91.3%	7	50
D	4.3%	95.7%	1	45
No award	4.3%	100.0%	1	-

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