

## Principal Assessor Report 2004

**Assessment Panel:**

**Engineering**

**Qualification area**

**Subject(s) and Level(s)  
Included in this report**

**Electronic and Electrical Fundamentals  
Intermediate 2**

## Statistical information: update

Number of entries in 2003	99
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Number of entries in 2004	98
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### General comments re entry numbers

It is slightly disappointing to report that the number of candidates sitting the Electronic and Electrical Fundamentals Examination Paper in 2004 was virtually the same as the number sitting the paper in 2003: that is 98 in 2004 compared with 99 in 2003. It was anticipated that there would have been another significant rise in candidate numbers in 2004 as there had been in 2003 when there was of 55% increase in the numbers sitting the Examination. It was hoped that both secondary schools and FE colleges would have found entering candidates for the Examination more attractive given that the paper has been made more 'user friendly' to both sectors of education (the inclusion of the use of both electronic flow and conventional current flow in questions) and the steps taken to change the standard of the examination paper to make it more consistent with Intermediate II level.

The overseas centre in Bahrain entered 46 candidates in 2004 compared with 44 in 2003. This number represents nearly half of the candidate numbers that were entered for the examination. Without these entries the number of wholly Scottish candidates would have been 52 compared with 55 Scottish candidates in 2003.

Seven centres put forward candidates for the Examination compared with eight centres in 2003. These centres comprised of five FE colleges, one secondary school and one overseas centre.

Given the levelling off in numbers entering the Electronic and Electrical Fundamentals Int. 2 Examination in 2004 there would be real value in SQA marketing the Electronic and Electrical Fundamentals paper to both schools and colleges, perhaps through some form of joint seminar, in order to increase candidate numbers.

## Statistical Information: Performance of candidates

### Distribution of awards

The distribution of marks for the 2004 Examination is shown below.

Year	Entries	Upper A		Lower A		B		C		D		N/A	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<b>2004</b>	<b>98</b>	<b>14</b>	<b>14.3</b>	<b>25</b>	<b>25.5</b>	<b>19</b>	<b>19.4</b>	<b>7</b>	<b>7.1</b>	<b>4</b>	<b>4.1</b>	<b>29</b>	<b>29.6</b>
2003	99	3	3.0	18	18.2	17	17.2	20	20.2	-	-	41	41.4

The mean mark for the 2004 Examination was 59% (50%).

The percentage number of candidates achieving Grade C or better was 66.3% (59%).

### Comments on any significant changes in percentages or distribution of awards

The 2002 Principal Assessor's Report contained the Assessor's view that the standard of the Electronic and Electrical Fundamentals Examination Paper was too demanding. This view was supported by a fairly detailed analysis of available data that was also presented in the Report. Both setting and vetting teams also supported the view that the paper was not appropriate to the level.

The two teams took action to adjust the standard of the paper to correspond more closely to the Intermediate 2 level. Such actions included the following: -

- Using certain new terms that candidates' might more easily understand
- Reducing the complexity of certain of the electrical fundamentals and analogue electronics questions
- Reducing the level of integration of subject matter in Section B of the examination paper (i.e. have one question that is essentially analogue electronics in nature, one question that is electrical fundamentals in nature and one combinational logic question)

The results for 2003 showed that the incorporation of the above steps taken by the setting and vetting teams had helped to establish a more appropriate standard. However, it was acknowledged in the 2003 PA Annual Report that a failure rate of 41% was still too high. Furthermore, the fact that only 3 candidates achieved Band 1 passes suggested that the paper was still on the difficult side. This view was confirmed by the 2003 National Rating for the paper of -0.37 (although this represented a considerable improvement over the figure of -1.65 in the previous year). Both setting and vetting teams recognised that the 2003 paper was the first stage in a two stage/year process of adjusting the standard of the paper to make it more consistent with Int. II level. The 2004 paper would represent the second stage in this adjustment process. It is very pleasing to report that there has been a further improvement in candidate performance in the 2004 Examination as can be noted in the figures above. For example, the mean mark has risen to 59% compared with 50% in 2003. Fourteen candidates achieved a Band 1 pass compared with the 3 in 2003. The percentage number of candidates achieving Grade C or better has risen to 66.3% compared with 59% in 2003. The Principal Assessor believes that the two stage process of standard adjustment has been successful and the 2004 Electronic and Electrical Fundamentals Examination Paper is consistent with Int. 2 level.

## Grade boundaries for each subject area included in the report

Distribution of awards	%	Cum %	Number of candidates	Lowest mark
A	39.8	39.8	39	70
B	19.4	59.2	19	60
C	7.1	66.3	7	50
D	4.1	70.4	4	45
No award	29.6	100	29	

### General commentary on passmarks and grade boundaries

- While SQA aims to set examinations and create mark schemes which will allow a competent candidate to score a minimum 50% of the available marks (notional passmark) and a very well-prepared, very competent candidate to score at least 70%, it is almost impossible to get the standard absolutely on target every year, in every subject and level
- Each year we therefore hold a passmark meeting for each subject at each level where we bring together all the information available (statistical and judgmental). 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 senior management team at SQA
- We adjust the passmark downwards if there is evidence that we have set a slightly more demanding exam than usual, allowing the pass rate to be unaffected by this circumstance
- We adjust the passmark upwards if there is evidence that we have set a slightly less demanding exam than usual, allowing the pass rate to be unaffected by this circumstance
- Where the standard appears to be very similar to previous years, we maintain similar grade boundaries
- 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 are different. This is also the case for exams set in centres. And just because SQA has altered a boundary in a particular year in say Higher Chemistry 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
- Our main aim is to be fair to candidates across all subjects and all levels and maintain standards across the years, even as syllabuses evolve and change

### Comments on grade boundaries for each subject area

Based on the performance of candidates the pass mark for the 2004 Examination was set at 50% and the mark at which a Grade A was awarded was set at 70%. These are the same values as were used in the 2003 Examination.

## Comments on candidate performance

### General comments

As already noted there has been a further improvement in the performance of candidates in the 2004 Examination compared with the 2003 examination. In 2004 66.3% of candidates passed the Examination compared with 59% in 2003.

At 59%, there was also a significant improvement in the candidate mean mark in the 2004 paper compared with a mean of 50% in the 2003 paper. This 9% increase in the mean provides clear evidence that the continued steps taken by the setting and vetting teams to adjust the standard of the Examination to reflect more closely the Intermediate 2 level have been effective. Maintaining, these standards is an on-going process and will be a continuing challenge for both setting and vetting teams in setting future papers.

39 candidates achieved Grade A passes in 2004 compared with 21 in the 2003 paper. There were 14 Band 1 passes in 2004 compared with only 3 Band 1 passes in the 2003 paper. 19 candidates achieved Grade B in 2004 compared with 17 in 2002 and 7 candidates obtained Grade C in contrast to 20 in 2003. These further improvements are yet more evidence that the steps taken by the setting and vetting teams to get the standard of the paper right are working.

As in previous papers the combinational logic questions were the most popular and the best answered. It is pleasing to report that there continues to be a clear improvement in candidate responses to the electrical fundamentals questions with the possible exception of the voltage and current division questions in Q. 12. It is also pleasing to report that some candidates continue to demonstrate competence in transposing simple equations, entering values into the transposed equation and arriving at the correct answer. As in previous examinations, the analogue electronics questions were the least well answered, although there were some indications that they were answered better than in previous papers. The issue of the poor answering of analogue electronics questions has been commented on in a number of PA Reports and is an on-going problem in electronic engineering courses at all levels (see comments in the section on Feedback to Centres).

It is also pleasing to report, that as was the case with last two years' paper, there was clear evidence that candidates were using better exam techniques when attempting the Intermediate 2 paper

### Areas of external assessment in which candidates performed well

Q.1 As normal candidates answered the number changing questions well

Q.4 It was pleasing to see the number of candidates who were able to transpose the formulae correctly in Q.4(b) and obtain the correct answer.

Q.10 This was a new style electrical principles question that was answered well by most candidates.

Q.11 The most popular of the Section B questions, generally answered well, with a number of candidates getting d(iii) a fault finding question correct.

### **Areas of external assessment in which candidates had difficulty**

Q. 8 Some candidates appeared to find this question difficult and it was apparent they were guessing their answers.

Q.13 This proved to be the least popular and most poorly answered question in Part B although part (a) the power supply question seemed to be answered reasonably well. Part (c), biasing in a Common Emitter Amplifier, continues to cause candidates difficulties.

## Recommendations

### Feedback to centres

As commented under the Comments on Candidate Performance section there is clear evidence of a continued improvement in candidate performance in this year's Examination Paper compared with the last three Examination papers. For example, five centres achieved a higher than 80% pass rate. However, two centres, which entered a significant number of candidates, had very low pass rates in the examination. This situation reinforces the need for centres to ensure that their candidates are being entered for the correct course. It would be advantageous for centres with low pass rates to have their internal assessments externally moderated and to receive developmental support from the SQA where this is appropriate.

Whilst the setting and vetting teams are pleased with the improvement in candidates' performance they are not complacent and are committed to continually monitoring and evaluating the standard of the Examination Paper and candidates' performance. They will be particularly interested to see if candidates' performance in the 2005 Examination is as good as that for the 2004 Examination.

The setting and vetting teams continue to be concerned about the number of poor responses they see from candidates in the analogue electronics questions. The teams recognise that candidates' tend to find this subject area more difficult than the combinational logic area. It is clear from seeing a large number of candidate responses that the amplifier configuration type questions (both BJT and FET) prove particularly difficult for candidates (this is not the case with the operational amplifier questions). Colleagues in schools and colleges are encouraged to explore ways of improving candidates' knowledge and understanding of what is traditionally a difficult subject area.