Version 1.0: 0809

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Electronics 1431/2431

ELEC1 Introductory Electronics

Report on the Examination

2009 examination - June series

Further copies of this Report are available to download from the AQA Website: www.aqa.org.uk

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX
Dr Michael Cresswell Director General

General Comments

This is the first examination of the new specification. During the revision, some topics were removed completely from the overall specification, while other topics were moved to different units. The details of the changes to content are available on the Teacher Resource Bank.

The aim of these changes was to make ELEC1 and ELEC2 unit examinations more evenly matched. ELEC1 and ELEC2 are also now evenly weighted in the overall award, with each examination being worth 67 marks and of one hour duration.

The examination reflected the style of the previous specification papers, with questions being set in the context of real applications wherever possible, so recognising the importance of electronics in the real world.

The ELEC1, Introductory Electronics, paper resulted in candidates gaining a wide spread of marks, as was usual on the comparable previous specification paper, ELE1. The marks this year ranged from a minimum of 4 up to the maximum of 67, with a peak in the mid to high 40s. The number of candidates gaining very low marks, below 20, was broadly similar to the performance on ELE1 in previous years.

All questions on the paper proved accessible to candidates, since maximum scores for every question were noted and some maximum scores were noted for the complete paper. Judging by the spread of marks, the accessibility of the paper was high, and this paper stretched all but a tiny minority of the most able candidates. The complete nature of candidates' answers to the questions, particularly the last question, demonstrated that there was adequate time for the paper to be completed.

Question 1

This question on logic was generally well answered by the great majority of candidates who, in the main, appear to have been well prepared for this type of question, and only a few mistakes were made.

(a) The labels on the logic diagram were correctly completed by nearly all candidates.

(b) Candidates failed to gain marks here by either not following the instructions correctly and not using the required variables, or attempting a simplification that was not required, and making mistakes; it pays to read the question carefully.

(c) Many candidates were able to correctly complete the truth table and gained the four marks here.

(d) This question tripped up all but the most careful, able candidates.

Question 2

This question followed a format that was introduced three years ago on the previous specification. It continued this year with some practical elements of choice to attain a specific goal. This year, some simple calculations were required.

(a) Candidates continue to improve their understanding of system diagrams. The response was good, except from those who were not able to give the extra detail in the area of the comparators. Others thought the sensors connected directly to the logic gate and did not gain credit. Most were able to correctly draw the final stages of the system.

(b) This section was well answered; most candidates are aware of the correct devices to be used in the required subsystems.

(c) Many correct calculations were given here.

Question 3

This year, the longest question on the paper used three pages arranged so that candidates could easily refer back to the second page when answering questions on the third page facing it, the content on the first page being a separate issue.

(a) Many candidates were able to gain both marks here, either by adopting a full Ohm's law calculation or by spotting the proportionality between voltages and resistances.

(b) This was very well answered indeed, most were able to recognise the function of the op-amps as comparators.

(c) Answers based on either real or ideal op-amps were allowed here, but a significant few implied some linear relationship between the input and output voltages and so failed to gain marks.

(d) The green LED was mostly correctly connected here with its series resistor. A few candidates were unsure of the connection to the rest of the circuit and left one end hanging in space. No credit was given in this instance, as it simply would not work as intended. Most knew why the series resistor was needed and were able to give a calculation of its value.

(e) This final part proved too difficult for all but the most able candidates. A few enterprising answers used extra logic gates so that the LED could be connected eventually to 0V; since this would work; it was given equal credit, following the underlying principles that have been established in marking electronics papers.

Question 4

This question on combinational logic dealt with the issue of converting a logic diagram using any gates into one that used a single type of gate. It proved a fruitful hunting ground for marks for many candidates.

(a) Many correct attempts to redraw the diagram were noted.

(b) Not so many were able to identify the redundant gates in the required manner.

(c) Despite the poor response to part (b), many correct answers were given here to the final form of the diagram, and it seemed that most candidates were able to state the advantages of this technique.

Question 5

Some basic work using a transistor, and calculation and selection of a suitable resistor was generally well done by most candidates.

(a) Most knew the names of the leads, but a few labelled the diagram as if the transistor were a MOSFET and so failed to gain marks. The diode symbol and resistor symbol in their correct locations were also frequently seen.

(b) Most candidates were able to follow the implied instruction to calculate the base current of the transistor and then correctly apply Ohm's law here. The only part that met with a poor response was in calculating the value of the base resistor. Most often this was spoilt by not allowing for V_{be}. Even where the incorrect value was given for the calculation, it was still possible to gain a mark for the final part due to the error carried forward rule.

Question 6

This final question was on the Zener diode, and there was a good response to many parts of it.

(a) Most candidates picked up these straightforward marks, so at least there is some familiarity with the correct circuit for a voltage regulator based upon a Zener diode.

(b) The first part, to calculate the minimum voltage across the resistor, was well done. Some then failed to gain the next mark by subtraction of the currents, rather than addition, or some other calculation. The following two calculations were well done, even if an error was carried forward. The choice of preferred value sometimes went in the wrong direction and failed to gain the mark. The colour code proved problematic only for those who could not correctly code for no zeros.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the **Results statistics** page of the AQA Website.