



General Certificate of Education

Electronics 1431/2431

ELEC1 Introductory Electronics

Report on the Examination

2010 examination - June series

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

Copyright © 2010 AQA and its licensors. All rights reserved.

COPYRIGHT

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

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 6E

General Comments

The content of this paper was broadly similar to last year, given the attempts to level the accessibility between ELEC1 and ELEC2 which were noted in the responses and perhaps reflected in the group of very low marks. It seems that the length of time allowed to answer the paper (one hour), was sufficient. All questions on the paper proved to be accessible to some candidates, since maximum scores for every question were noted and again five 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 except a tiny minority of the most able candidates.

Question 1

This first question on logic continues to be the opening feature of the paper giving it a familiar look to settle candidates. This question was generally well answered by the majority of candidates who in the main appear to have been well prepared for this type of question. Only a few mistakes were made by candidates largely in the final section.

- (a) The truth table was correctly completed by nearly three quarters of all candidates.
- (b) Two thirds of all candidates drew the correct diagram here, using the specified gates in the correct relationship to each other. The other third either could not connect the gates correctly, or used gates not given in the question.
- (c) This was the most difficult section of this question; just over one third of all candidates offered the correct logic function.

Question 2

This question followed a format that was introduced several years ago. It continued this year with some practical elements of choice to design a system. As was the case on last years paper some simple calculations were required.

- (a) The response to drawing the diagram was good, except for the issue of those candidates who were not able to give the extra detail in the area of the comparators, at this level they should be familiar with the need for a voltage divider to provide a reference voltage. Other candidates thought the sensors connected directly to the logic gate and lost credit, as last year. Most candidates were able to correctly draw the final stages of the system.
- (b) This section was well answered. The majority of candidates are aware of the correct devices to be used in the required subsystems.
- (c) Many correct calculations were given here, although more candidates were able to calculate the current than were able to calculate the power.

Question 3

This question contained requirements to calculate, select of appropriate component value, and comment on operating conditions of the system. Responses were generally good but tailed off through the question as it got more demanding, as expected.

- (a) Many candidates were able to gain many marks here. The only parts of the question that caused problems were the latter two, where the total current consumption had to be calculated, followed by a comment on battery suitability. It is obvious that many candidates did not have a concept of the capacity of a commonly used battery.
- (b) This part was more demanding and many candidates could not estimate the current at all. Some candidates missed the point altogether on the final part, not realising that the common resistor would interfere with the operation of the system.

Question 4

This short question focussed on the MOSFET and the electromagnetic relay.

- (a) The correct MOSFET symbol and the names of its leads are known to less than half of all candidates. Too many candidates still confuse this with the bipolar transistor (that was asked for last year and caused similar confusion).
- (b) More candidates knew the component required to protect the active device from the effects of back emf from a relay coil. Not all candidates could locate the required diode correctly.
- (c) Less than half of all candidates were able to correctly identify the relay contacts even when given the accepted shortened terms.

Question 5

This question dealt with further combinational logic, a topic that was brought into this module with the advent of the new specification. This question again dealt with the issue of converting a logic diagram using any gates into one that used a single type of gate. It proved a good source of marks for many candidates.

- (a) More than half of all candidates were able to write the appropriate Boolean expression, credit was not awarded for long strings of unfactorised terms. It is worth noting here that a few spotted a simpler but more advanced solution, they were of course awarded equal credit.
- (b) Nearly half of all candidates drew the required logic diagram faultlessly and so gained full credit. It is worth noting here that those candidates who spotted the simpler but more advanced solution to the previous section, were of course awarded equal credit for the appropriate diagram that went with it.
- (c) This simpler section met with a surprisingly poor response. It was answered less well than the preceding section despite being of a more accessible nature as it referred back to basic theory and was “stand alone”. This section did not need input from the preceding section, maybe this was not spotted by candidates.

- (d) This was the most demanding section of the question and was attempted by virtually all candidates, but met with the lowest response as was to be expected. Less than a quarter of all candidates gained maximum marks here. Since there will always be a more demanding logic question on this paper, candidates should expect and prepare for it.

Question 6

This final question returned to the op-amp theme which has not been well answered in recent years. This year there were not good responses to parts of it.

- (a) The response to this accessible section was predictably good, nearly two thirds of all candidates gaining full marks here. It should be emphasised that all the working should be shown in a calculation.
- (b) The most frequently seen answer here gained only a single mark out of the maximum of three marks available. Most candidates need more input on the use of voltage dividers and working within the practical constraints imposed. Some candidates were not fully conversant with the need to keep the current within set bounds, or even the issue of preferred values despite this last part being supported by the data sheet.
- (c) Less than one third of all candidates gained credit on the last two question parts despite a range of answers allowed for credit due to the issue of real versus ideal output voltages possible. This point should be covered both in theory and practice.

Most candidates this year completed their answers to this paper and indeed most of the final question indicating that there was sufficient time to complete this years' paper in the allotted hour.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results statistics](#) page of the AQA Website.