A-LEVEL
PHYSICS

7408/3BE Electronics
Report on the Examination

7408
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General Comments

This was the first examination in 'Electronics' under the option scheme brought in as part of the new A-level Physics specification.

Question 1

01.1 The virtual earth point was identified correctly by many students.

01.2 The terminal was correctly identified by most students.

01.3 A significant number of students did not explain their thinking behind the derivation. The key points in the mark scheme included the same current flowing in the input and feedback resistors, and the use of the virtual earth point when considering the voltage across the resistors.

01.4 Unfortunately, a number of students ignored or forgot the sign in this relatively straightforward calculation. Both sign and number were needed for the single mark.

01.5 This calculation was a little more complex, particularly involving the signs. The allocation of two marks enabled students who showed proof of a correct method to gain some credit, even if an error was made in the final step.

01.6 A range of sensible answers was accepted. It was a pity that some students lost sight of the application, but on this occasion the mark was awarded just for a simple statement of fact.

Question 2

02.1 Most students did not appear to be distracted by the context of this question and the truth table was done well.

02.2 A small number of students committed to analysing this using a complex piece of Boolean algebra, which did not lead to the simplest solution. Most, however, spotted the short-cut.

02.3 A number of students were thrown by two aspects of this circuit which has been designed so that '0' or a blank is never shown on the display.

a) The counter starts at 0000, but the logic process allows the display to be '1' (1 dot). Effectively the display is always one ahead of the decimal equivalent of the binary code on the counter.
b) The reset binary code is 0110 and only lasts for a split second, so no output is shown for this code. However, when the reset has been completed then the counter code will be 0000 and the display will show decimal '1' (1 dot).

As a result of the above, students were still able to gain credit for using a single AND gate, even if they did not use the correct tap off points on the counter.

02.4 Most students were able to draw/complete the logic diagram form the Boolean expression provided. This is a vital skill in the digital section of the specification.

Question 3

03.1 Some students struggled with extracting C from the formula, and one or two lost some powers of ten. Again, it is recommended that students always show all stages of their working, so that some credit can be gained even if the final answer is wrong.

03.2 Most students answered this question well, although a significant number failed to show on the graph the appropriate frequencies matched to the ~ 0.7 voltage gain point.

03.3 Some students were rather 'clinical' in their response to this question and forgot to relate their answer to the context of the 'listener'.

Question 4

04.1 This proved to be a straightforward question.

04.2 This also proved to be straightforward.

04.3 This was a complex graph, but most students produced a result that was within the acceptable range of values given in the mark scheme.

04.4 It was disappointing to see a number of students not being able to follow through an Ohm's Law calculation when given all necessary values. Otherwise the question was answered well.

04.5 This question required students to correctly apply the comparator rule to give 0 Volts output, then to appreciate that the voltage drop across the LED would turn it on. A number of students successfully gained the first mark but then wrongly assumed that a 0 Volt output would turn the LED off, forgetting that the comparator would sink current.

Question 5

This question was designed to give students the chance to write about 'ground, sky and space waves' related to the two radio frequency bands, LW and SW, and also to the use of microwaves as communication links. Only a relatively small number of students gained scores in the upper mark band, mainly due to confused knowledge of this part of the specification as opposed to a lack of eloquence.

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on how students have performed for each question.

Mark Ranges and Award of Grades

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