Version 1.0: 0807

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Electronics 3432

Tier H Higher

Report on the Examination

2007 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

The paper was similar in format to previous years and those who had used past papers for revision purposes should not have experienced any undue surprises. Most candidates had been prepared thoroughly for the exam and a large number of excellent examination papers were produced. As in previous years a small number of centres had entered some candidates for the wrong tier. It appeared that these candidates might have done well at Foundation Tier and answered more questions but this paper did not offer them the opportunity to show what they could do. Centres are encouraged to think carefully about the tier of entry so that candidates are not disadvantaged. It was regrettable that almost 3% of candidates did not receive a grade because they were entered for the wrong tier.

Nearly all candidates seem to have had sufficient time to complete the paper. Most kept going with questions and even if they struggled with an early part gained marks later on; this is a valuable technique for candidates at this tier.

The few particular gaps in the preparation of candidates are mentioned later on. The op-amp as a comparator was the most obvious area where candidates struggled. Generally candidates performed well and had been prepared thoroughly with approximately 82% scoring over half marks and 61% over 100/150.

In marking the papers the Principal Examiner used the principle of error carried forward. There were many good attempts at the calculations. Handling powers of ten was probably the most demanding technique but was handled competently by many candidates. The omission of units was not a particular problem but some candidates did fail to gain marks here.

Question 1

Although filling in the blanks is an easy format for learners there were some parts of this question which candidates found difficult. In most cases (a), (b) and (c) produced correct responses. “Power supply” was a rare but acceptable alternative for (c). Part (d) was more demanding with many guesses including voltmeter, digital meter and oscilloscope/. Most candidates were able to answer part (e) correctly but some failed to gain two marks by getting the answers the wrong way round – though some of these went on to draw a correct diagram for Question 2 (b)(ii). Part (f) was found one of the most difficult parts with “megabyte” being the most common, incorrect, answer. Part (g) produced several incorrect computer terms and only a minority of candidates were familiar with “address”. “Writing” to memory was also not very widely known. Most candidates identified the wave as frequency modulated but a fairly common response was “de” (demodulated).

Question 2

There were many high marks awarded for this question but it covered different topics, not all of which were well known to many candidates. Parts (a) and (b) of this question caused problems and showed gaps in knowledge of basic electricity. Part (a)(i) was meant as a help to candidates to ensure that they were using amps for later calculations but unfortunately it caused confusion for some. Many performed a calculation which was not successful and answers of 0.03 A and 0.3 A were fairly common. Often candidates who just wrote 100 mA and missed the part (i) mark were the most successful in the later parts of the question. Many "error carried forward" marks were awarded for later parts. Most candidates could use their value to calculate a voltage in part (ii) but part (iii) was more awkward and a substantial minority did not give a correct unit. In part (iv) "error carried forward" marks were again awarded but some candidates circled the closest value and not a higher one. In part (b)(i) complex calculations were sometimes attempted but the vast majority of candidates were successful with (b)(ii). (Only the occasional series voltmeter was seen.)
Many full marks were awarded for (c) but some able candidates who did well on the rest of the paper failed to gain marks here – perhaps through over confidence.
Some centres had prepared their candidates well for a question on MOSFETs and knowledgeable answers were given. A high standard was demanded for the symbol mark. Some demonstration of an understanding of the concept of "gain" was expected for full marks for (ii). Some centres seem to have neglected MOSFETs.

Question 3

Many candidates scored very high marks and quite a number were given full marks for this question. Nearly all drew the correct boxes but some failed to gain a mark in part (b) by missing the input box (and labelling one of the outputs as an input) or labelling the section between the decision box and "delay 30s" as a loop. Many high marks were obtained for part (c) but some candidates failed to gain marks through carelessness. A precise answer quoting times was required for (iii) and was frequently missed.
The flowchart diagrams were generally good (perfect diagrams were not required for full marks) but the most common reason for missing a mark was to omit a means of detecting that an input button had been pressed and then looping round from the decision box. This was considered essential.

Question 4

Again, high marks were awarded for this question. A frequent wasted mark was due to not labelling the output. Some candidates were confused by the pull up resistor and tried to connect a timing capacitor to it and were then left to decide what to do with discharge and threshold so possibly missing out on 3 marks.
Not unexpectedly part (b) was found very demanding. Most candidates stated that the LEDs would be damaged by the high voltage. The mark was only awarded if it was clear that the ICs could not provide enough current/voltage.
Part (c) also caused problems with basic electricity. Often many of the marks awarded were for "error carried forward" situations. Knowledge of the use of preferred values was good. (A tiny minority demonstrated their knowledge by showing that, allowing for the 5% tolerance, an 18Ω resistor was not adequate. This was impressive but unnecessary.)
High marks were usually gained for part (d); common collector configurations and hybrids were acceptable. Candidates who showed the diode connected the wrong way round did not obtain a mark. Some candidates added an unnecessary "protective diode" to the switching circuit. The

few candidates who could not name the transistor leads (or carelessly forgot to attempt this) failed to gain any of the 3 marks.
Many candidates obtained full marks for part (e). Nearly all those who attempted it obtained several marks and the very few who made no attempt lost out on what were generally found to be “easy marks” for Higher Tier candidates.

Question 5

Many candidates scored high marks but some found part (a) difficult perhaps not treating it as an oscilloscope question. They brought 1.4 into (i) and tried to use T = 1/f for (ii). 30 V was one of the more common, incorrect, answers for (i) but error carried forward marks were given for (iv). Many “error carried forward marks were also given for part (iii).
Some answers for (b)(i) were not clear and only one mark was awarded. Most candidates obtained the mark for (b)(ii). Most candidates could obtain some marks for part (b)(iii) either by their knowledge or working out a sensible answer from the graph.
In part (c) most candidates obtained the marks for (i) but fewer were successful in calculating the power as the peak value (9W) was not acceptable. No marks were given for answers around 6W where candidates had used one peak and one rms value. Some successful candidates used V^2/R.

Question 6

Generally this was a high scoring question as candidates generally do well with logic. However, bringing in the op-amp did cause problems for candidates from some centres who were not prepared for it.
Part (a) caused no problems for many candidates and the vast majority drew the mark scheme networks. A small minority produced other acceptable (= working) answers. Part (iii) was a little unusual for this paper but most candidates were either familiar with the concept or were able to work out the answer from the information given in parts (i) and (ii).
The op-amp section in part (b) scored some of the lowest marks on the paper. Only the most able were able to give a clear description of how the op-amp acts as a comparator. The calculations were demanding for many and some of those who had answered part (i) correctly did not get the mark for (iv).
Most candidates were familiar with dividing circuits but many failed to gain marks unnecessarily by omitting to label the inputs and outputs. A diagram of a pulse stream was not accepted as an input label as pulses form the input and the output. Most candidates were familiar with binary numbers and obtained both marks. Some made mistakes with the higher numbers. Many perfectly correct answers for part (d) were seen. Some marks were awarded for “errors carried forward”.

Question 7

Although it is demanding, many accurate calculations obtained full marks for part (a). Powers of 10 were handled with competence. It appeared that candidates had practised this.
Breadboard is the only construction technique candidates are expected to be familiar with. Many found no problems with (b) but a surprising number of mistakes were made. Candidates who spotted immediately that the battery was the wrong way round often fared better than others. (If this was not spotted then often complicated, repetitive and incomplete points were made.) Several candidates said pin 5 should be connected to zero volts, many said pin 7 should be connected between R_1 and R_2 not realising that it was and many said pins 4 and 8 should not be connected together
There were many correct answers to part (c) but several referred to the CK and D inputs. Most candidates tackled the timing diagrams competently and they were high scoring but there were some attempts which seemed fairly random.
Many candidates seemed to be familiar with the OR gate used as a latch and obtained all three marks for (e). Part (f) caused slightly more problems but many could describe the resistor as a pull up resistor or alternatively explain it preventing shorting when the switch is pressed. A minority incorrectly gave its use as protecting the gates, limiting the current to the gates or limiting “the flow of voltage” to the gates. Part (iii) produced some excellent answers from the more able candidates. Some gave concise and comprehensive answers. Some wrote at length overflowing the lines provided but still being essentially accurate. Some explanations gained no marks and displayed muddled thinking. It was not uncommon to find candidates who thought pressing the switch would cause the circuit to act as a latch. Several candidates gained 2 stating that the output would go high until the switch was pressed. They offered no further explanation but many appreciated the output would only go low when the switch was pressed *if* the input was low.

Mark Ranges and Award of Grades

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