GCSE
ELECTRONICS

Unit 1
Report on the Examination

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General comments

The specification is now well established and the exam followed a similar format to previous years. The majority of the specification is examined each year and candidates who have used past papers should recognise the style of questions and will be familiar with much of the content. Although some parts of topics are tested less frequently, centres are generally aware that their coverage should be complete.

The high marks obtained by candidates this year indicates that centres had prepared their candidates well and that the knowledge gained was applied successfully. It is, in fact, impressive that so many candidates have a sound grasp of the content and are able to answer questions with so few slips!

The specification has a single tier of entry so questions are designed to cover the full ability range. Generally questions early in the paper are more accessible.

Responses indicated that most candidates had sufficient time to complete the paper and reports suggested many finished early. Candidates should be encouraged to work methodically and not rush. Some candidates obtained the bulk of their marks on the earlier questions but most kept going and found material with which they were familiar later on amongst the more demanding questions and were able to obtain marks here.

Many candidates gave accurate answers but also presented their work to a high standard. The many candidates who used rulers for diagrams generally scored high marks. Some free hand diagrams were also high scoring.

Calculations were generally well organised with candidates working from left to right and down the page ending in a correct answer but this was not universal. Sometimes the answer was given in the middle of crossings out and working out.

Generally if the final answer is correct then candidates are awarded the marks and it is assumed the working is correct. If the final answer is incorrect then marks are awarded for working and so it is advantageous for this to be shown.

Calculations are generally handled well including keeping track of powers of 10 and using calculators. When rearranging formulae is required this is found more challenging. Most candidates know that a numerical answer should usually have a unit and its omission is penalised in some questions. They also give their answers to an appropriate number of significant figures but markers do not insist on this.

In written answers it is important that candidates read the question and answer what has been set. It is not necessary to repeat information given in the question or to repeat the same information more than once in their answer.

Question 1

Part (a) was answered well. There are always a few high scoring and able candidates who surprisingly make a mistake on the colour of the conductors in a three pin plug. The cable grip was the most difficult label and although several alternatives were allowed, “base” and “casing” were not.

In part (b) most candidates scored only 1 mark because they described how a fuse works rather than stating its purpose. No marks were given for stating a fuse is a thin wire which melts. (How a fuse works has been tested previously.) For those who stated a fuse offered protection it was not always clear what it was protecting.

The vast majority of candidates obtained full marks for the power calculation in part (c) and included the correct unit.

Question 2

Over 90% of candidates scored full marks on this question. Some candidates were able to use a process of elimination to identify the less familiar symbols and there were few blanks. More usually candidates are asked to draw symbols for named components and this is found more demanding.

Question 3

This was another question designed for candidates targeting the lower grades and followed a well established format. Most candidates scored high marks. (90% for (a)).

A small number of candidates may have been reluctant to give “driver” as the answer to both 3 (b) and 3 (c) (ii).

Part (d) was found to be the most difficult with only about half the entry gaining full marks. The most common omission was a description of the role of the driver. Answers along the lines “the signal is passed to the OR gate and then passes to the driver and then to the buzzer” did not gain credit. Also “the driver drives the buzzer” did not gain credit. Many candidates unnecessarily repeated information given in the question or explained the operation of the comparators.

Question 4

This was another high scoring question. Nearly all candidates understood what was required either from the introductory paragraph or the example and were successful up to the truth table in part (b) (i) and naming the gate required in (b) (ii). An error carried forward mark was given in part (b) (ii) for consistent answers. Error carried forward marks were also gained by a few candidates in part (b) (iii) and three quarters obtained full marks. The most common reason for losing a mark was failure to label the output. (A and B were allowed as labels for the inputs as these letters are used in the question but Q was not allowed as meaning an output.)

Question 5

Part (a) was found to be difficult by many candidates. Marks were lost both for the comparator part of the question and also for the transistor. Some candidates did not know the symbol for a thermistor and a significant number could not complete the connections to the op-amp. There were many poorly drawn symbols for an npn transistor and the resistor was frequently positioned in series with the lamp not the base connection where it is essential. One of the three marks was allowed for those drawing a correctly connected MOSFET instead of an npn transistor.

Over half of the entry was able to complete correctly the potential divider question in part (b). Some used ratios and some used the potential divider equation and some credit was given for working where the final answer was incorrect. (Those simply stating the correct answer were given full marks.)

Nearly all candidates knew how to use the resistor colour code for part (c). If a mistake was made it was usually on the third band.

Question 6

The flow chart question was as usual high scoring. Drawing the symbols was found more difficult than labelling the boxes. “Open lock” was often shown as a process not an output. In view of the large number of past papers the number of errors is a little surprising. In only a small number of cases was it not possible to distinguish between input/output and processes boxes either due to careless drawing or unclear crossing out. A small number of candidates did not attempt to label the boxes and if this was an oversight then it is again surprising as this is now a very standard question on the paper. The weakest candidates identified the “start” and “end” boxes as inputs and outputs. A very few candidates labelled the “yes” branch as a loop. The decision box was the most accessible.

Part (c) was understood by most. The best, perhaps, included “There is a 30 minute delay after which the counter resets *and the safe waits for an input*.” but full credit was given for other answers in the mark scheme.

There were many neat and accurate answers to part (d) and some which were less neat still gained full marks. Several candidates lost one mark for missing “store the new code”. Some unnecessarily split the compare action into two boxes (process and decision). Nearly all labelled the outputs of the decision box as “yes” and “no”. Some candidates included instructions for flashing the LED which was quite acceptable and a reasonable interpretation of what was required.

Question 7

Part (a) was known by most. However, the majority of candidates chose a power output for the amplifier well above the correct answer. This may have been because they knew the typical output of some commercial amplifiers or it may be they chose the middle of the range offered.

It is usually found that candidates know the range of human hearing so it was pleasing that most chose the correct range within a range for part (c).

Most candidates could correctly calculate the gain of the amplifier. Most gave the answer as 20 and a few as 20×. A significant number gave 20 V but they were not penalised on this occasion. Answers of 0.05 or 0.02 were not unusual and 1 mark for working could sometimes be awarded. The candidate who converted both voltages to peak values and gave a final answer very close to 20 received full marks.

The majority of candidates were able to calculate the peak value of the voltage in part (e) and gave an answer to an appropriate number of significant figures as well as a unit. Weaker candidates were unable to rearrange the equation and no credit was given for 2.12 V. 11% of candidates did not attempt the question (the highest percentage for any question) suggesting that some centres may not have covered the topic.

In part (f) two thirds of candidates gained the full three marks. Some were confused by "rms" and partial credit was given to those using $3\sqrt{2}$ or $3/\sqrt{2}$. All candidates who converted the answer to mA did so correctly and most gave the correct unit for their answer. 8/3 gained no credit.

Nearly three quarters of candidates obtained full marks for part (g). The demodulator was the least well known subsystem.

For part (h) candidates at some centres (25%) had learnt immunity to noise as the advantage of FM. It was attempted by nearly all but answers that were a result of the waveband (range, bandwidth) rather than the type of modulation were not allowed. General answers such as "better quality" were also not given credit.

Part (i) was attempted by nearly all candidates and the marks awarded were spread fairly equally over the range zero to three. There were many accurate neat diagrams and generally those who used constructions lines (and a ruler) produced the best results. No credit was given for an AM wave. Some candidates who probably knew that the amplitude should be constant may have lost a mark because they did not show this on their diagram.

Question 8

Most candidates (65%) understood what was required, could draw the gates and received full marks for part (a). It was found more challenging for some and the full range of marks was awarded. A few candidates used a 3-input AND gate and received full credit. A working network using NOR gates was only given partial credit.

In part (b) (i) nearly all candidates remembered the truth table.

85% of candidates completed the truth table correctly for part (b) (ii). Like part (a) this is an important topic which can be expected to be tested every year. A few candidates were able to complete the final column having made serious errors in X, Y and Z. Alternatively a few others completed X, Y and Z and made an error in the final column.

Question 9

As intended this question was found more demanding.

For part (a) over half of the candidates knew all four names and most of the rest knew two or three names and scored one mark.

Part (b) was found difficult but all candidates had a go and many demonstrated their knowledge of the D-type flip-flop. About 30% scored zero. A few lost the marks because they used 1 and 0 which were not allowed in this case.

Part (c) began with about 70% of candidates gaining both marks for part (i) and 60% following the reasoning through to part (iii). In part (iv) 40% gained both marks and another 40% gained one mark – perhaps sometimes as a lucky guess.

Part (d) required a longer written answer and many were excellent. Size, cost, reliability and the expertise of the users were included. Some evaluated the flip-flop circuit in detail covering how the unused switches on the key pad could be connected and how the problem of pressing the same number twice could be eliminated using a microcontroller. Some pointed out that connecting the unused switches would involve more wiring.

Some lost marks because they were too general and although they mentioned programming they did not link it to changing the code. Although the question has open ended aspects candidates did need to address changing the code in order to obtain full marks – and most did. Some implied that microcontrollers are software devices and did not seem to know that there was complex internal circuitry and that software needs hardware. Some confused the advantages of microcontrollers with the advantages of ICs over discrete components. Many candidates displayed knowledge of microcontrollers beyond that required to gain full marks.

Part (e). Nearly all candidates displayed knowledge of using prototyping board. Most (64%) scored full marks. 14% lost one mark. The most common reason for losing a mark was missing the connection from ground to pin 1. A very few lost a mark for placing two wires in one hole. A very small number used the layout as a circuit diagram and drew all their lines going to the pins of the chip – showing a lack of understanding of prototyping board.

Question 10

60% of candidates gained all four marks for part (a). Many of those scoring full marks used a ruler and produced a very accurate diagram. Occasionally the first pulse was missed. Some lost a mark for carelessly positioned pulse edges. 27% of candidates did not understand what was required and although they attempted the question they scored zero.

Part (b). This had been learnt by most candidates. Many, but by no means all, of those obtaining full marks produced impressive diagrams using a ruler. Some lost a mark by connecting discharge and threshold. A few drew a monostable or something between an astable and a monostable and only obtained two or three marks.

Nearly two thirds of candidates gave the correct answer for (c) (i) despite it being a little unusual. Many showed clear working. Nearly everyone who calculated the correct answer also gave the

correct unit. Lack of a unit was penalised in this case. Some failed to see what was required and a very few calculated a voltage.

Well over half of the candidates were able to find the period required for (c) (ii) and nearly all of these went on to calculate the frequency in (c) (iii). Most candidates gave the correct unit for frequency. Error carried forward marks benefitted several candidates in part (iii) meaning three quarters gained both marks.

Part (c) (iv). Again 75% of the entry was successful and still trying at this late stage in the paper. Some candidates struggled. 10 V was not allowed.

Part (d). Many were able to substitute the values into the correct formula and keep track of exponents to arrive at the correct answer. Others gained partial credit for making some progress through the calculation.

Over 80% calculated the voltage for part (e) (i) and 60% went on to find the value of the resistor in (e) (ii). Some had difficulty with milliamps and a few used 0.05 A – still scoring one mark. A few gave the appropriate E24 value showing understanding although this information was not required on this occasion.

Part (f). Just under half of the candidates scored full marks. Another 20% lost only one mark and this was often for the end of the final graph. The final rising edge did not have to be shown if the graph was ended at the final dotted guideline but candidates who continued the low beyond the last guideline were penalised.

Mark Ranges and Award of Grades

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

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

UMS conversion calculator