Version 1.0: 08/10

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Design and Technology: Electronic Products 45401

Unit 1: Written Paper

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

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

General Comments

This is the first time Electronic Products has been sat as a single tier paper. On this basis, it is not being compared with previous higher or foundation papers. The paper was designed to be accessed across the spectrum of candidates' experience and ability, as in it provided scope and opportunity for candidates to extend the detail in their responses to secure appropriate marks.

The first section of the paper (A) worth around 25% of the total marks was structured around a bath water level sensing design. The preparation sheet sent to centres described fluid level monitoring, allowing scope for adequate preparation.

Section A
Question 1

(a) This was a design worth a maximum of 15 marks spread across a number of technical and design criteria. Almost all candidates were able to secure a range of marks for their responses.These were drawn and annotated design proposals that variously met the criteria set.

(b) The block diagram relating to INPUT–PROCESS-OUTPUT was poorly understood by over half the candidates.

(c) This question related to input devices and their suitability for sensing water levels. Most could identify suitable sensors but could not then substantiate the advantages of their choice.

(d)(i) When asked to develop responses relating to one-off manufacture, answers were poor. They focused on generic materials and showed weak understanding of suitable processes and reasons for their choice.

(d)(ii) This part related to batch manufacture and achieved slightly better, more accurate responses to process and reasoning. Again, generic materials named were not an appropriate response.

Section B

Question 2

(a) An ohms' law question, this looked for suitable use of formulae, transposition/calculation, as well as the correct value and units. Around 40% of candidates confidently handled this. Most achieved some credit on the question.

(b)(i) This was a pin identification task and was only moderately scored, despite it being basic knowledge.

(b)(ii) Candidates had the opportunity to develop their response, comparing filament lamps and LEDs. This was done well in 50% of cases.

Question 3

(a) This provided scope for answers to accumulate marks as the basic battery circuit was drawn. 46% of candidates scored 2 or the maximum 3 marks allocated. Diagrams were often weak and difficult to read.

(b) Almost all candidates responded well to discussing disposable batteries and alternatives, as well as environmental issues. Answers were often quite extended pieces of writing beyond that required by the question.

(c) This question on voltage regulators was an area of poor understanding and awareness by candidates.

Question 4

(a) This was a sound question on 555 timer components. Well answered by the majority who correctly identified capacitors and resistors.

(b) More than 50% of candidates could correctly name the variable resistor as the most suitable component for varying time delays.

(c) For many this question produced a strong response, with clear annotated diagrams and correctly positioned components. For those that sketched correctly, most also identified the function of the pull up resistor and trigger push-to-make switch correctly as well.

(d) This question demands application of the time constant formulae and associated maths. The majority scored something on this question with a number achieving 3 and 4 marks. Understanding using formulae and stating values and units is important.

(e) Less than half of candidates were aware of component leakage and tolerances in components in their responses.

(f) This part of the question gave freedom to candidates to start exploring their knowledge of PIC applications. Half of all answers gained some marks. Most responses were unable to correctly describe three key advantages of microcontrollers. This area of teaching is as important as PIC programming and programme writing.

Question 5

(a) Identifying an operational amplifier was poorly answered or not answered at all.

(b) Correctly naming and explaining the inverting and non inverting terminals was slightly better answered but often vague responses and poor explanations were more common. Operational amplifiers remain a key building block in electronic products. As such, appropriate teaching should be included to fulfil basic understanding and operation of operational amplifiers in theoretical and practical circuits.

(c)(i) Unsurprisingly, this weak area of knowledge continued with generally poor response to the use of a reference voltage for operational amplifiers and the need to vary that voltage.

(c)(ii) Rather more candidates, still less than half, correctly drew a thermistor symbol as a temperature sensor. Responses should be placed in the space provided on the paper too.

(c)(iii) More than half of the responses correctly named the thermistor as a suitable device.

Question 6

This question explored, in depth, candidates' knowledge and application for transistors in circuits. Over half the responses of all candidates gained credit across the range.

(a) A large number of quality responses were in this area. Understanding the application of an LDR driven circuit and the use of a limiting resistor for the base current was good too. Many candidates could correctly explain the function of a transistor as a switch or current amplifier.

(b) Improved pin identification is needed by candidates for simple devices such as this NPN transistor.

(c) Almost half of all candidates were able to correctly identify and describe a 'darlington' pair configuration with varying success.

Question 7

This question provided opportunity for candidates to develop and relate to their own PIC based learning. Applying their knowledge to a flashing product warning device was required as well as testing their quality of written communication.

(a) Almost all candidates understood about design considerations and correctly name and describe them.

(b) Sequences of LED outputs for a PIC was well understood and described by 2 out of 3 candidates.

(c) Drawing a flowchart or similar sequence of PIC program commands proved a reasonable request for many candidates. Schematic symbols were often weak but

supported by correct commands and labelling helped achieve good coverage. As in previous years, candidates found difficulty in presenting a programme on the exam paper that for many, they have only ever developed on screen using software.

(d) This last part of the question leaned strongly on the quality of written communication and exposed that area of weakness in candidate competency. It is really important to develop writing skills and to follow up obvious grammatical and punctuation errors in day to day teaching and learning. This was an opportunity missed by at least 30% of candidates.

Question 8

Focusing on designing and making electronic parts it was anticipated this would be an area with a strong response. This was the case throughout with this question.

(a) A number of PCB design faults were provided and this was well answered by the majority.

(b) Manufacturing a PCB is an experience most candidates have been through. The majority of responses were clear and detailed with just a few misconceptions or a key part of the process missing.

(c) Surprisingly, when asked, a large number of candidates could not correctly name a suitable circuit testing device.

(d) Safety hazards should be a key area of working practice and theory too. Far too many responses did not correctly identify safety hazards.

Examiners note:

It is really important to teach towards and prepare for the written examination once the coursework element is completed. Ensuring that the specification is covered in detail is important and can be taught through the coursework elements too. For many candidates, it is imperative that they read the question carefully and do not misdirect themselves. Key areas of competency also centre on performing calculations, understanding programming sequences and commands, as well as a good grounding in applications and technical literacy.

Along with technical understanding of components and circuit design, it is important to provide experience and understanding of methods of production. This should for a range of materials and processes and include industrial practice. An increasing emphasis on sustainable and environmental issues will prove valuable, as well as exploring the widening range of applicable smart materials too.

The preparation sheet is sent to centres to allow a sound preparation for the Section A design question. It is important to ensure that due importance is attached to that preparation and advice.