



## **General Certificate of Secondary Education**

# **Design and Technology (Systems and Control Technology) 3546/H**

**3546/H      Higher Tier**

## **Report on the Examination**

*2007 examination - June series*

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*Dr Michael Cresswell Director General.*

## GENERAL

This year was the first series using the new format examination paper and preparation sheet, which gave information about the theme of the examination. Whilst it was not necessary for the candidates to have prior knowledge of railways, the preparation sheet was introduced to help candidates to understand the context of the questions prior to the examination. The examination paper now has a single Section A, which was written to be answerable in either a mechanical or pneumatic focus, followed by a Section B where candidates must answer one question, again choosing either the pneumatic or mechanical focus.

Most of the questions were attempted by all candidates, with varying degrees of success. Many questions on the paper were developed to build upon the knowledge and skills developed by candidates during their coursework.

Questions requiring the candidates to design systems met with a range of responses. Design issues and Health and Safety questions were answered very well and the majority of candidates gained good marks. AQA is pleased to note the high quality responses to the logic and the control sequence questions. However, it was noted that few candidates gave the correct colours for the resistor using the colour code printed in the front of the exam paper.

Some candidates lost marks because their answers were unreadable. Although marks are not given for hand writing or presentation skills, candidates should be reminded that if their answers cannot be understood, it will obviously affect the mark they can attain.

At the lower end of the ability range some questions were not attempted. Candidates need to be reminded that an attempt at a question always has the chance of gaining marks.

## HIGHER TIER 3546/H

### Section A

#### *Question 1(a)*

This question was generally well answered by most candidates. A common error was suggesting an inappropriate material for the door track.

#### *Question 1(b)*

This question had a variety of responses from a fully worked rack and pinion to a poor attempt at a system.

#### *Question 1(c)*

Most candidates managed to describe their systems operation.

#### *Question 1(di)*

The majority of responses were accepted if they were justified by the candidate.

#### *Question 1(dii)*

The question was well answered but not all responses were a specific component for two marks.

*Question 1(diii)*

The question was generally well answered. Some incorrect responses referred to workshop Health and Safety.

*Question 1(e)*

This question received a variety of responses, with few candidates gaining two marks by explaining how their system would slow the door down. Incorrect responses included a brake or jamming the mechanism.

*Question 1(f)*

A variety of answers from candidates ranging from totally correct to zero marks. Common errors included shorting out the power supply and joining the switch terminals together.

*Question 2(a)*

Generally well answered, most candidates completed the truth tables correctly; some could not name the gates or draw the symbols correctly. A common response of candidates was to complete the XOR truth table for the OR gate.

*Question 2(b)*

Well answered by most candidates. A common error from candidates was not drawing the logic symbols correctly.

*Question 3*

Well answered by most candidates, common errors included not returning the push button decision boxes to below the start box and not returning the passenger sensor to above the open door box.

*Question 4*

There was a wide variety in the responses to this question but few candidates gave answers that were fully workable or well explained. The question was written so that it could be answered in a number of ways;

- |                        |   |
|------------------------|---|
| ▪ Mechanically         | Linkages, Rods, Cables etc.                           |
| ▪ Electro-mechanically | Solenoid, Motor with Crank / Rack & Pinion / Cam etc. |
| ▪ Pneumatically        | Valve, Cylinder                                       |

Many candidates failed to account for the 10 metre distance between their input and output or the 10mm of movement required by their system.

Most candidates that attempted the question gained some marks.

*Question 5*

This question was attempted by most candidates. Some responses lacked detail or explanation and did not receive full marks. Another common error was duplicating the answer when asked for two responses.

*Question 5(a)*

Candidates scored well on this question when they had a good understanding of the advantages of an automatic door system for passengers. Credit was given in (ii) even if the answer given earlier was incorrect.

*Question 5(b)*

Candidates scored well on this question when they had a good understanding of the advantages for the train company. Credit was given in (ii) even if the answer given earlier was incorrect.

*Question 5(c)*

Methods of escape were well known. Credit was given for a clear description or a range of methods suggested. Candidates generally scored well.

*Question 5(d)*

This question was not well answered; the point about maintenance requirements was often missed. Common errors such as giving door design criteria and 'checks' and 'testing' were seen.

*Question 5(e,f)*

Candidates scored well on these questions. Many common environmental issues and methods used to encourage car drivers to use public transport were seen in candidate responses.

*Question 6*

There were a wide variety of responses to this question. Candidates answered the first part of the question asking them to design a system to sense the box height more successfully than the second part of the question where they had to divert the boxes. Some of the sketching was of a low standard, confusing rather than clarifying their suggested solution. Many solutions were floating in space and they did not show how the solution would be constructed or mounted.

## **Section B**

*Question 7(a)*

This question was well answered by most candidates.

*Question 7(b)*

The question was attempted by most candidates but there was some confusion as to what to compare the chain drive to. Few responses to this question attained full marks.

*Question 7(c)*

There were a variety of responses to this question, with few candidates drawing a device that attained full marks. Some candidates missed the information that this was a hand brake and most did not show suitable mountings to the beam or brake shoe.

*Question 8*

This question was only attempted by a few candidates. Those that did attempt this question generally answered it well, however candidates struggled on the last part of the question, how to make the brake failsafe.