



GCE A level

354/03

**DESIGN AND TECHNOLOGY
SYSTEMS AND CONTROL
TECHNOLOGY DT4**

A.M. FRIDAY, 13 June 2008

3 hours

ADDITIONAL MATERIALS

In addition to this examination paper, you will need a 12 page answer book.

INSTRUCTIONS TO CANDIDATES

Answer **three** questions from Section A.

Answer **four** questions from Section B.

Answer **two** questions from Section C.

INFORMATION FOR CANDIDATES

When and where appropriate, answers should be amplified and illustrated with sketches and/or diagrams.

Section A and **Section B** answers should be no more than half a page. These sections are designed to demonstrate your **breadth** of knowledge in Systems and Control Technology.

Your **Section C** answers should be substantial and demonstrate your **depth** of knowledge in Systems and Control Technology.

Candidates are reminded of the necessity for good English and orderly presentation in their answers.

SECTION A

Answer **three** questions from this section.

The maximum length of each answer should be no more than about 150 words.

This section is designed to demonstrate your **breadth** of knowledge in Systems and Control Technology.

Each question carries 8 marks.

1. What are the factors which influence the success of a product when purchasing decisions are being made by the consumer? [8]

2. Describe how CAM has been used effectively to replace manual construction techniques in the production of a named product. [8]

3. Describe the importance of :
(a) *Technology Push*
and
(b) *Market Pull*
as driving forces for the development of new products which include control systems. 2 x [4]

4. Describe how the *build quality* of a control system within a product impacts on the target audience anticipated by the manufacturer. [8]

5. *Block diagrams* can often be used to simplify complex systems and help designers visualise the system more clearly.
(a) Produce a *Block Diagram* of a typical household central heating system. [4]
(b) Explain the use and importance of feedback in central heating systems. [4]

SECTION B

Answer **four** questions from this section.

The maximum length of each answer should be no more than about 150 words.

This section is designed to demonstrate your **breadth** of knowledge in Systems and Control Technology.

Each question carries 8 marks.

6. What is the essential difference between a Registered Trade Mark and a Registered Design? [8]
7. Explain how ISO Standards (International Organisation for Standardization) impact on the design and manufacture of products. [8]
8. (a) Describe **two** different methods of modelling mechanical control systems. 2 x [2]
(b) Analyse the advantages of **each** method of modelling to the designer. 2 x [2]
9. Products with modern control systems often feature historical or retro styling. [8]
Explain the benefits of including historical or retro styling in a modern systems product.
10. The properties and characteristics of semiconductors play an important part in their selection for control systems.
(a) Name a semiconductor of your choice and sketch its symbol. [2]
(b) Describe the properties and characteristics of the named semiconductor. [6]
11. Describe, with examples, the properties which enable certain materials to be classified as *SMART*. [8]

SECTION C

*Answer **two** questions from this section.*

*Your answers should be substantial and show the **depth** of your knowledge in Systems and Control Technology.*

Each question carries 22 marks, 2 of which are for clarity of communication.

- 12.** Identify a specific product or a range of products that include control systems. Give a detailed account of the changes in design and/or styling that have been attributed to a particular designer from the 1970s onward. [22]

- 13.** Quality Control is critical when manufacturing printed circuit boards. Describe the stages where quality control is required and their implications to the manufacturer. [22]

- 14.** Designers have a responsibility to develop environmentally friendly and energy efficient control systems for products. Using named examples, describe how this has been achieved. [22]

- 15.** Programmable microcontrollers can be used to replace other control components in products. Describe the benefits of using programmable microcontrollers and how they affect the function of products. [22]

- 16.** Describe **two** creative designing strategies that are often used by designers to stimulate creative thinking and explain how you would employ both in your own design work. [22]