



GCE A level

1113/03

**DESIGN & TECHNOLOGY
SYSTEMS AND CONTROL TECHNOLOGY - DT3**

P.M. WEDNESDAY, 13 June 2012

2½ hours

ADDITIONAL MATERIALS

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

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Answer **three** questions from Section A.

Answer **three** 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 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.*

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

Each question carries 8 marks.

1. (a) Fully describe the product life cycle using diagrams where relevant. [6]
(b) Draw a labelled diagram demonstrating the life cycle of an incrementally improved product. [2]

2. Explain the impact CAD has in the designing and development of control systems for products. [8]

3. The product champion and the entrepreneur are two key facilitators in the process of innovation. Considering the process of product innovation describe the role of:
(a) the product champion; [4]
(b) the entrepreneur. [4]

4. Using diagrams where necessary, describe how a relay switch can be used to connect a low voltage sensing control system to a high voltage control system. [8]

5. The control system components chosen by designers for the manufacture of products often have a significant impact on sales.
(a) Name and briefly describe **two** specific products that have benefited from the innovative use of control system components. [4]
(b) Describe the typical characteristics of **one** control system component used in either product. [4]

SECTION B

*Answer **three** questions from this section.*

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

Each question carries 8 marks.

6. (a) Name **two** forms of product management systems that could be used in school when tracking the development of a product. [2]
- (b) Explain **one** such system in detail. [6]
7. (a) Explain the importance of on-going evaluation when designing. [4]
- (b) Evaluate the impact that the design specification has on this process. [4]
8. Rights granted by the Intellectual Property Office can protect the outward appearance of a product.
- (a) Name the form of Intellectual Property that affords this protection. [2]
- (b) Briefly describe the essential elements of this Intellectual Property. [6]
9. Microcontrollers which can be re-programmed offer major advantages to systems designers. Describe **two** advantages of using programmable microcontrollers in control systems. $2 \times [4]$
10. When a control system for a product is manufactured in volume explain the part played by:
- (a) Quality Control; [4]
- (b) Quality Assurance. [4]

SECTION C

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

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

Each question carries 26 marks.

- 11.** Give a detailed description of the aesthetic and functional style of a designer you admire and explain how the designer has influenced the style of other similar products. [26]

- 12.** ‘Often it is the control system within a product that is the main driving force in product innovation.’

With the use of named products, explain how this statement may be supported. [26]

- 13.** An essential attribute that designers need to produce a successful product is a detailed knowledge and understanding of the materials or components selected for the product.

Describe the particular purpose, characteristics and working properties of **two** materials or components that have been selected for use in a particular named product and explain what features made them appropriate for use. [26]

- 14.** Describe how the development of a design consciousness within society has impacted on the design and development of control systems used in products.

In your answer discuss the materials and components selected, the manufacturing considerations, the product life cycle and the eventual disposal of the product. [26]

- 15.** ‘The art of designing is often said to be a social activity.’

Explain how this phrase is depicted in the many activities that designers are involved with when designing a product. [26]