



GCE AS/A level

1111/03

**DESIGN AND TECHNOLOGY
SYSTEMS AND CONTROL
TECHNOLOGY DT1**

P.M. WEDNESDAY, 18 May 2011

2 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 **five** questions from Section A.

Answer **one** question from Section B.

INFORMATION FOR CANDIDATES

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

Section A is designed to demonstrate your **breadth** of knowledge in Systems and Control Technology.

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

You are reminded that assessment will take into account the quality of written communication used in answers that involve extended writing (Section B).

SECTION A

*Answer **five** 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) Explain the difference between *qualitative* and *quantitative* performance criteria when drawing up a design specification. [4]
- (b) For a named product, state **two** examples of *qualitative* performance criteria and **two** examples of *quantitative* performance criteria. $2 \times [2]$

2. Both ergonomics and anthropometrics make an important contribution to the successful design of products.
Describe **two** examples where:
 - (a) ergonomics are important within working environments; $2 \times [2]$
 - (b) anthropometrics are important in the design of products. $2 \times [2]$

3. Circuit diagrams, block diagrams and flow diagrams can be used to describe control systems.
 - (a) Describe how **one** of the above methods can be used to design electronic systems. [4]
 - (b) Describe how **one** of the other methods can be used to design pneumatic systems. [4]

4. Some materials used in electronics may be classified into either *semi conductors* or *dielectrics*.
 - (a) Name **two** specific materials within **each** category. $2 \times [2]$
 - (b) For **each** category describe how **one** of your materials is used in a named component. $2 \times [2]$

5. Describe the features and benefits of the following *Intellectual Property Rights* with reference to specific products within **each**:

(a) patents; [4]

(b) trade marks. [4]

6. (a) Name **two** materials commonly used to make the cases for hand held electronic devices. [2]

(b) Describe a method used to manufacture cases using **one** of these materials. [6]

7. BSI (British Standards Institute) and ISO (International Organisation for Standardisation) are quality standards applied to a range of products.

Describe **two** different types of product testing and discuss the positive effects they have on the design of specific products. $2 \times [4]$

8. Performance modelling is a process used by designers which includes bread board modelling and CAD (Computer Aided Design) simulations.

Describe these **two** modelling processes and state the advantages of **each**. $2 \times [4]$

SECTION B

*Answer **one** question from this section.*

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

Each question carries 30 marks.

- 9.** *Successful designers create products using their understanding of technology, production methods and market needs.*

Discuss the validity of this statement in relation to a specific product or range of products.

[30]

- 10.** Identify a process device that you are familiar with and which could be replaced by a microcontroller in a control system.

Describe this process device, its functionality and the implications for the manufacturer and consumer if it were replaced by a microcontroller.

[30]

- 11.** When designing products, designers consider the implications of:

(a) material and component selection;

(b) product disposal.

Discuss the importance of these areas in relation to product design.

[30]