GCE AS/A level

1111/03

DESIGN AND TECHNOLOGY – DT1
Systems and Control Technology

A.M. TUESDAY, 14 May 2013

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. Designers and manufacturers use ICT to produce pre-production prototypes.

(a) Give **two** reasons why using ICT to produce pre-production prototypes is important to the designer. 2 × [2]

(b) Give **two** different reasons why using ICT to produce pre-production prototypes is important to the manufacturer. 2 × [2]

2. *(a)* Name **two** sensing devices that could be used to sense movement within a given system. 2 × [1]

(b) Describe how **each** could be used in a system to detect movement. 2 × [3]

3. Designers and researchers ensure products are suitable for their intended users by assessing against the categories of aesthetics, function and reliability.

Describe a means of assessing a named product in **two** of the above categories and state the criteria you would use for the assessment. 2 × [4]

4. Planned obsolescence is a feature of some everyday products.

For a named product:

(a) describe **two** benefits of planned obsolescence to the consumer; 2 × [2]

(b) describe **two** benefits of planned obsolescence to the designer and manufacturer. 2 × [2]

5. A 3 volt dc electric motor drives the back wheels of a small toy car via a worm and worm wheel. The worm wheel has 20 teeth.

(a) Explain the reasons for the use of this gear system in the toy car. [6]

(b) State the formula you would use and calculate the velocity ratio of the gear system. 2 × [1]

6. Ergonomics and anthropometric data are essential to the success of products.

Describe **two** examples in **each** of the following where:

(a) ergonomics is used to inform successful design in working environments; 2 × [2]

(b) anthropometric data is used to inform successful design in specific products. 2 × [2]

7. Problem solving strategies are used by product designers to initiate design ideas.

Describe any **two** problem solving strategies from the following:

inversion, morphological analysis, lateral thinking, brainstorming. 2 × [4]

8. *(a)* Identify a system that uses a resistor and capacitor or a restrictor and reservoir to create a time delay. [2]

(b) For the system describe, with the aid of a circuit diagram, how the components create a time delay. [6]

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. The improvements to systems and their manufacture have brought benefits to the manufacturer and the consumer.

With reference to named systems and manufacturing processes, evaluate the benefits of these improvements to both the manufacturer and the consumer. [30]

10. Designers and manufacturers have to consider manufacturing methods, product life and environmental factors when designing and manufacturing products.

Discuss all the elements of the above statement with reference to named products. [30]

11. The design and manufacture of products increasingly involves research and design development being undertaken in one location and manufacturing in another.

Discuss the advantages and disadvantages of this form of product development to the designer, manufacturer and the consumer. [30]

