WJEC
CBAC

GCE AS/A level

351/03

DESIGN AND TECHNOLOGY
SYSTEMS AND CONTROL TECHNOLOGY DT1

A.M. TUESDAY, 20 May 2008

2½ Hours

ADDITIONAL MATERIALS

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

INSTRUCTIONS TO CANDIDATES

Answer **six** 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 answers should be no more than half a page. This section 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 of the necessity for good English and orderly presentation in your answers.

SECTION A

Answer **six** *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. Research for product design draws on various sources in order to provide reliable information for the designer.

(a) Define the terms *Primary* research and *Secondary* research. 2 × [2]

(b) Describe the kind of information gained through *Primary* research and *Secondary* research. 2 × [2]

2. *(a)* State the purpose of a *design specification* when designing and manufacturing a product. [2]

(b) Describe **three** different ways in which a design specification is used during the design and manufacture of a product. 3 × [2]

3. State **four** benefits or reasons why a designer or a manufacturing company might *Patent* a product. 4 × [2]

4. A capacitor consists of **two** metal plates separated by an insulator called a *dielectric*.

(a) Name **four** dielectric materials used in the construction of capacitors. 1 × [4]

(b) Describe with the aid of a sketched circuit diagram an application of a capacitor in a system. [4]

5. In many systems bearings are used to support rotating shafts.

(a) Describe with the aid of a sketch **two** types of rotary bearing. 2 × [3]

(b) State a use for **each**. 2 × [1]

6. Electronic systems are checked for defects throughout their manufacture.

(a) Describe **two** types of checks that can be carried out on an electronic system during the manufacturing process. 2 × [2]

(b) State **two** reasons why these checks are important to the manufacturer. 2 × [2]

7. Describe a five-step risk assessment plan that would be appropriate for a named manufacturing process in a school or college workshop. [8]

8. Manufacturing systems use either *cell production* or *assembly line production* or a combination of both in the organisation of their workforce.

(a) Describe **two** features of cell production. 2 × [2]

(b) Describe **two** features of assembly line production. 2 × [2]

9. Flow diagrams, ladder logic and block diagrams are techniques used in the design of systems.

Describe with the aid of diagrams **two** of the techniques above. 2 × [4]

10. The use of ICT can have a significant effect on the design and manufacture of products.

(a) Describe **two** aspects where ICT can be used effectively within research and designing. 2 × [2]

(b) Describe **two** aspects where ICT can be used effectively within the development and manufacturing process. 2 × [2]

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 22 marks, 2 of which are for clarity of communication.

11. Designers use a range of strategies such as *disassembly*, *brain writing*, *inversion* and *morphological analysis* when developing initial ideas and possible design solutions.

Compare and contrast any **two** of these strategies and describe how they are used by designers to generate ideas. [22]

12. Within a production system samples of the material, component or product may be tested to verify the quality of a batch.

Describe in detail **four** Quality Control procedures that may be used within a production system. 4 × [5]

Clarity of Communication. [2]

13. Mass production of electronic systems often uses surface mount technology (SMT), through-hole or a combination of both in the construction of a circuit board.

Describe the construction methods involved and the implications for the designer and manufacturer when using these construction methods. [22]