WELSH JOINT EDUCATION COMMITTEE
General Certificate of Education
Advanced Subsidiary/Advanced

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351/03

DESIGN AND TECHNOLOGY AS

SYSTEMS AND CONTROL TECHNOLOGY DT1

A.M. TUESDAY, 6 June 2006

(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.

Candidates are reminded of the necessity for good English and orderly presentation in their 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. Draw a block diagram and a flow diagram to illustrate a house alarm system that has window and door sensors along with an entry time delay which will enable the alarm to be switched off. 2 × [4]

2. Linear and reciprocating motion can be produced by many types of output devices.

With the aid of drawings, describe **two** named output devices that produce linear or reciprocating motion. 2 × [4]

3. Materials used in the production of products have to undergo both *qualitative* and *quantitative* testing.

Explain **each** of these terms. 2 × [4]

4. There are a number of specific *production stages* when manufacturing products.

Describe **two** of these production stages with reference to a specific product. 2 × [4]

5. Primary research and secondary research draw from a variety of sources in order to produce reliable information for the systems designer.

(a) Describe what is identified through *primary research*. [4]

(b) Describe what is identified through *secondary research*. [4]

6. Name a product which has improved significantly through the introduction of modern materials. [2]

Describe **three** changes that have improved the product as a result of modern materials being introduced. 3 × [2]

7. *Above the line* and *below the line* are terms used in product analysis.

In relation to a named product:

(a) explain the term *above the line*; [4]

(b) explain the term *below the line*. [4]

8. Working models and prototypes may be created by using a range of traditional materials or through computer generated models.

(a) State **two** benefits of producing models using traditional materials. 2 × [2]

(b) State **two** benefits of producing computer generated models. 2 × [2]

9. *Bought in* or standardised *part assembled* components are used by manufacturers in the production of products.

(a) Explain what is meant by *bought in* or *standardised part assembled* components. [2]

(b) State **three** *disadvantages* to the manufacturer of using bought in or standardised part assembled components. 3 × [2]

10. *(a)* Describe with the aid of a drawing, the construction of a diode. [2]

(b) Name **two** types of diode. [2]

(c) Describe with the aid of a circuit diagram, an application for a diode. [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 22 marks, 2 of which are for clarity of communication.

11. *Ethical issues increasingly influence the design, production and eventual disposal of a product.*

Discuss this statement fully and state to what extent you agree with it. [22]

12. Logic integrated circuits and microcontrollers pose problems for systems designers when they are directly connected to high power output devices.

(a) Describe, with the aid of circuit diagrams, a method of enabling high power output devices to be driven from logic integrated circuits or microcontrollers. [6]

(b) Describe further problems associated with the use of electro magnetic devices, such as motors and solenoids, and suggest solutions the systems designer can employ. [14]

Clarity of Communication. [2]

13. Problem solving strategies are used by systems designers to initiate design ideas.

Describe **two** problem solving strategies and evaluate their effectiveness in particular problem solving situations. $2 \times [10]$

Clarity of Communication [2]