

351/03

DESIGN AND TECHNOLOGY AS
SYSTEMS AND CONTROL TECHNOLOGY DT1

A.M. TUESDAY, 5 June 2007

(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. Describe the features and characteristics of products that would make them suitable for:
 - (a) Batch production [4]
 - (b) Mass production [4]

2. Light dependent resistors (LDR) and thermistors can be used as sensors in electronic systems.
In terms of voltage and resistance describe with the aid of a circuit diagram how:
 - (a) an LDR or thermistor can be used to turn on a transistor; [6]
 - (b) the sensitivity of the system can be adjusted. [2]

3. *Primary processing* and *secondary processing* are **two** important stages in the production process.
 - (a) Define these **two** stages of production. $2 \times [2]$
 - (b) Describe the processes that will be specific to **each** in a named product. $2 \times [2]$

4.
 - (a) Define the term *Just in Time* (JIT) in manufacturing. [2]
 - (b) List **three** benefits of JIT to the manufacturer. $3 \times [2]$

5. Flow charts, GANTT charts and critical path analysis charts are used by product designers and manufacturers within project management.
For any two of the above project management systems:
 - (a) describe the main features; [4]
 - (b) describe how they are used in effective project management. [4]

6. (a) Explain the term *Reverse Engineering*. [2]
- (b) For a specific product identify **three** important insights a designer might gain through reverse engineering. $2 \times [3]$
7. Describe four advantages of microcontroller based systems over CMOS logic based systems. $4 \times [2]$
8. (a) What are the advantages of using gold, in place of other conductive materials, in the construction of electrical connections in computers? [2]
- (b) Name two other materials in common use as conductors in electrical systems and state two appropriate properties of one of the named materials. [6]
9. Describe **two** qualitative and **two** quantitative tests which can be carried out on a named product or component. $2 \times [4]$
10. Pneumatic or electrical components can be used to construct systems with different logic functions. Draw a circuit diagram and explain one chosen logic function. [8]

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.** Global manufacturing can involve the *research* and *design development* being undertaken in one country and *production* in another.

Discuss the advantages and disadvantages of global manufacturing to the designer, manufacturer and consumer. [22]

- 12.** Describe the changes that developments in ICT have brought about in the design and manufacture of consumer products and analyse their impact. [22]

- 13.** When designing, aesthetics, function, maintenance, cost and disposal are important considerations for the product designer.

Discuss this statement in relation to named products. [22]