

354/03

**DESIGN AND TECHNOLOGY**  
**SYSTEMS AND CONTROL TECHNOLOGY DT4**

P.M. TUESDAY, 20 June 2006

(3 Hours)

**ADDITIONAL MATERIALS**

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

**INSTRUCTIONS TO CANDIDATES**

Answer **three** questions from Section A.

Answer **four** questions from Section B.

Answer **two** questions from Section C.

**INFORMATION FOR CANDIDATES**

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

**Section A** and **Section B** answers should be no more than half a page. These sections are designed to demonstrate your **breadth** of knowledge in Systems and Control Technology.

Your **Section C** answers 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 **three** 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. (a) Describe the important features of a design specification. [4]  
(b) Explain how a design specification is used to guide designing. [4]
  
2. (a) Explain how you would construct a PCB and populate it in a school setting. [4]  
(b) Describe how this process is carried out in industry for volume manufacturing. [4]
  
3. Describe **four** benefits of using computer-controlled machines to cut sheet materials during the manufacturing process.  $4 \times [2]$
  
4. Explain the need for a manufacturer to identify the risks associated with the use of particular named products. [8]
  
5. Some computers are programmed using hexadecimal code.  
(a) Explain what is meant by hexadecimal notation. [4]  
(b) Convert the following binary numbers to hexadecimal:  
01011001  
11100011  $2 \times [2]$

## SECTION B

*Answer **four** 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.***

6. (a) Describe the essential elements of *Design Registration*. [4]  
 (b) Explain what you understand by the term *Design Right*. [4]
7. Describe how some electronic consumer products or their components have been redesigned to make them more environmentally friendly. [8]
8. Describe **four** sources of alternative energy and describe **one** method of converting an alternative energy source into electrical energy. [8]
9. Explain how government policies are used to impact positively on the sale of some products whilst having a negative impact on others. [8]
10. Explain **each** of the following using examples of consumer products:  
 (a) how *needs* can impact on the design and manufacture of products; [4]  
 (b) how *wants* can impact on the design and manufacture of products. [4]
11. Smart materials have particular characteristics and working properties which enable them to be used within particular products.  
 Name a specific Smart material and describe:  
 (a) **two** characteristics of the material; [4]  
 (b) **two** working properties of the material. [4]

### SECTION C

Answer **two** questions from this section.

Your answers 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.**

12. Give a detailed account of the impact and influence that an eminent product designer or design movement, from the 1970s onwards, has exerted on a particular field of electronic product design. [22]

13. Identify **two** principal materials that you have used when designing and making your A2 product.

Describe the particular characteristics and working properties of the **two** materials that were appropriate and which fit the purpose for which they were intended.  $2 \times [10]$

*Clarity of communication.* [2]

14. Globally, the use of ICT has had a great impact on the design and development of products.

Fully describe how software, CAM machines and the use of the Internet have enabled this. [22]

15. Quality Control and Quality Assurance are important factors to be considered when manufacturing electronic products.

Fully describe these terms with references to named electronic products whenever possible. [22]

16. “Designing is a distinctive kind of skilled intellectual activity. It draws on some features of, say scientific or artistic activity, but in many ways it is noticeably different.”

*(An Introduction to Design – Design Processes and Products – OU Press – 1986)*

Fully express your opinion regarding the above statement and where possible include your own experiences of designing over your course of study. [22]