

General Certificate of Education  
June 2005  
Advanced Level Examination



**DESIGN AND TECHNOLOGY:  
SYSTEMS AND CONTROL TECHNOLOGY  
Unit 6 Written Paper**

**SCT6**

Tuesday 21 June 2005 1.30 pm to 4.30 pm

**In addition to this paper you will require:**

- an unlined answer book (7024) which is provided separately;
- normal writing and drawing instruments.

Time allowed: 3 hours

**Instructions**

- Use blue or black ink or ball-point pen. Pencil and coloured pencils should be used only for drawing.
- Write the information required on the front of your answer book. The *Examining Body* for this paper is AQA. The *Paper Reference* is SCT6.
- Answer **four** questions.
- Answer **one** question from each of Sections A, B and C and **one** other question from any section.

**Information**

- The maximum mark for this paper is 100.
- Mark allocations are shown in brackets.
- 24 marks are allocated to each question and 4 marks overall for quality of written communication.
- This paper carries 20 per cent of the total marks for Advanced Level awards.
- You are reminded of the need for good English and clear presentation. The quality of your written communication will be assessed across all questions.

**Advice**

- Your answers should be illustrated with sketches and/or diagrams wherever you feel it is appropriate.

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Answer **four** questions.

Answer **one** question from each of Sections A, B and C and **one** other question from any section.

Each question carries 24 marks.

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### SECTION A: MATERIALS AND COMPONENTS

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**1** The safety control system for rotating machinery in schools workshops should:

- prevent the machine from operating if the guard is left open;
- stop the machine by the use of a push switch;
- stop the machine if the electrical supply is interrupted. The machine should not restart when the electrical supply is reinstated, until the machine's start switch is operated.

- (a) With the aid of diagrams, explain **two** systems that could be fitted to a machine to detect if a guard is closed. (2 × 4 marks)
- (b) (i) Draw a circuit diagram for the safety control system of a rotating machine in a school workshop, as described above. (8 marks)
- (ii) Explain the operation of your circuit given in part (b)(i). (4 marks)
- (c) With the aid of sketches show in detail a method of holding a guard closed. It should **not** be possible to open the guard with a spanner or screwdriver. (4 marks)

- 2** (a) (i) Using annotated sketches, explain in detail **two** different methods of *permanently* joining ferrous metals together. (2 × 6 marks)
- (ii) Using annotated sketches, explain **two** different *non-permanent* methods of joining dissimilar materials together. In each case you should indicate the materials joined. (2 × 4 marks)
- (iii) Describe **one** specific example of a product where a permanent and a non-permanent method of joining has been used. Explain why these methods have been used. (2 × 2 marks)

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**SECTION B: DESIGN AND MARKET INFLUENCES**

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- 3 Discuss the relative advantages **and** disadvantages of mains electrical powered, compressed air powered and rechargeable battery powered tools. *(24 marks)*
- 4 When developing products or systems, various types of testing are required.
- (a) Describe in detail **two** different destructive tests that might be appropriate within the development programme of a product of your choice. *(2 × 6 marks)*
- (b) Describe in detail how a range of push switches could be tested for reliability. Your answer should show the testing system, the observation you would record and how you would use your observations to compare reliability. *(12 marks)*

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

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**SECTION C: PROCESSES AND MANUFACTURE**

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- 5 (a) Describe in detail **two** ways of producing complex 3D forms using redistribution/forming processes. *(2 × 5 marks)*
- (b) (i) For each of the **two** methods you have described in part (a) suggest a suitable material. *(2 × 1 mark)*
- (ii) State a property each material has that enables it to be worked in that way. *(2 × 1 mark)*
- (c) Describe **three** advantages redistribution/forming has over wastage or fabrication as a method of producing products. *(3 × 2 marks)*
- (d) Describe, with reasons, **one** physical property a metal object produced by redistribution/forming would have over a similar metal object produced by wastage. *(4 marks)*
- 6 (a) Use a flowchart to explain the operation and control of a lift as it goes *between two floors*. Your answer should make reference to:
- the control buttons in the lift
  - the control buttons on each floor
  - the doors
  - the lift cage
  - the drive motor
  - the lift position sensing system. *(12 marks)*
- (b) (i) Describe, in detail, **two** different systems that could be used to move a lift cage capable of holding up to 12 adults. *(2 × 4 marks)*
- (ii) For *each* of the systems described in part (i) give **two** relative advantages. *(4 × 1 mark)*

**END OF QUESTIONS**