

General Certificate of Education  
June 2005  
Advanced Subsidiary Examination



**DESIGN AND TECHNOLOGY:  
SYSTEMS AND CONTROL TECHNOLOGY  
Unit 3 Design and Market Influences**

**SCT3**

Friday 10 June 2005 Morning Session

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

- an 8-page answer book (AB08);
- normal writing and drawing instruments;
- two sheets of A3 paper for use with Question 2 (enclosed).

Time allowed: 1 hour 30 minutes

**Instructions**

- Use blue or black ink or ball-point pen. Pencil and coloured pencils should be used only for drawing.
- Two sheets of A3 paper are provided for use with Question 2. No further sheets are to be used.
- Write the information required on the front of your answer book. The *Examining Body* for this paper is AQA. The *Paper Reference* is SCT3.
- Answer **both** questions.

**Information**

- The maximum mark for this paper is 100, 4 marks of which are for Quality of Written Communication.
- Mark allocations are shown in brackets.
- This paper carries 30 per cent of the total marks for Advanced Subsidiary award and 15 per cent for Advanced Level award.
- 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**

- You are advised to spend about 20 minutes on **Question 1** and about 1 hour 10 minutes on **Question 2**.
- Your answers should be illustrated with sketches and/or diagrams wherever you feel it is appropriate.

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Answer **all** questions.

You are advised to spend about 20 minutes on **Question 1** and about 1 hour 10 minutes on **Question 2**.

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**Theme: Testing of Mechanical Components / Systems – When, why and how we test**

- 1 (a) (i) With reference to the **development** of a product or system of your choice, describe with reasons, a situation where a **destructive test** would be required. *(3 marks)*
- (ii) With reference to the **development** of a product or system of your choice, describe with reasons, a situation where a **non-destructive test** would be required. *(3 marks)*
- (iii) For each of the above situations state the information the tests would provide and how it could be used. *(2 × 3 marks)*
- (b) Explain **two** reasons why a product or system would need to be tested before it is marketed. *(2 × 2 marks)*
- (c) Describe **two** advantages the testing of products brings to the **consumer**. *(2 × 2 marks)*

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Use the **two** separate A3 sheets to answer **Question 2** where appropriate.  
Clearly indicate the sections of the question you answer on the sheets.

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**2** Compression springs are tested for their suitability for a specific application.

One test involves 1000 compressions of the spring by a set amount, it is then checked for any distortion.

- (a) Produce a flowchart showing the main stages of the testing cycle. This should include reference to the measurements taken to find if the spring has distorted. *(8 marks)*
- (b) **Figure 1** shows the dimensions of the spring that is to be tested. The force applied must be linear and the spring must be compressed by 10 mm. (The force required to compress the spring by 2 mm is 5 Newtons).



**Compression Spring**

Length = 40 mm

Diameter = 20 mm

**Figure 1**

- (i) Using an annotated sketch describe a system that would retain the spring and automatically compress it by 10 mm. *(8 marks)*
- (ii) With the aid of sketches show how it would be possible to vary the speed of compression on your system. *(4 marks)*
- (iii) Explain in detail how it would be possible to adapt your system so the amount of compression could be set to either 10 mm or 20 mm. *(8 marks)*

**QUESTION 2 CONTINUES ON THE NEXT PAGE**

**Turn over ►**

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- (c) **Develop** your ideas from part (b) into a design for a system that compresses the spring by 10 mm and then releases it. Your design should include a system that automatically stops the testing after 1000 cycles.

Your design should show:

- how the spring is retained;
- how the cycle of compression and release is achieved;
- the power source used;
- the method of determining 1000 cycles;
- the method of automatically stopping after 1000 cycles.

Part (c) is worth 48 marks.

Marks will be awarded as follows:

- |  |                   |
|--|-------------------|
| (i) Quality of communication                     | <i>(8 marks)</i>  |
| (ii) Development of the system                   | <i>(20 marks)</i> |
| (iii) Originality and innovation                 | <i>(4 marks)</i>  |
| (iv) Appropriateness of materials and components | <i>(8 marks)</i>  |
| (v) Methods of construction.                     | <i>(8 marks)</i>  |

**END OF QUESTIONS**