General Certificate of Education
June 2007
Advanced Level Examination

ASSESSMENT and QUALIFICATIONS ALLIANCE

DESIGN AND TECHNOLOGY: SCT6
SYSTEMS AND CONTROL TECHNOLOGY
Unit 6 Written Paper

Tuesday 19 June 2007 1.30 pm to 4.30 pm

For this paper you must have:
- 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. Use pencil and coloured pencils 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 marks for questions are shown in brackets.
- The maximum mark for this paper is 100.
  Four of these marks will be awarded for using good English, organising information clearly and using specialist vocabulary where appropriate.
- There are 24 marks for each question.

Advice
- Illustrate your answers with sketches and/or diagrams wherever you feel it is appropriate.

Answer **four** questions.

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

There are 24 marks for each question.

SECTION A - MATERIALS AND COMPONENTS

1 Suggest appropriate *materials* for each of the following products.

Give specific reasons for your choice, making reference to the product's function, manufacturing processes and the scale of production.

(a) A garden shed
(b) A bottle for holding carbonated drinks
(c) The tip of a soldering iron
(d) A lathe cutting tool *(4 × 6 marks)*

2 (a) With the aid of sketches, describe in detail a suitable process for the batch production of printed circuit boards (PCBs). *(8 marks)*

(b) Explain **two** quality control checks that need to be carried out on a PCB before the components are inserted. *(2 × 3 marks)*

(c) Discuss the advantages and limitations of using programmable integrated circuits for the operation of 240 V a.c. electrical devices. *(10 marks)*

SECTION B - DESIGN AND MARKET INFLUENCES

3 (a) With reference to your own experience of designing and making, explain how computer modelling, computer simulations and Computer Aided Design (CAD) can assist in the development and evaluation of a design. *(16 marks)*

(b) Discuss the advantages and limitations of CAD/CAM (Computer Aided Manufacture) for small batch production. *(8 marks)*

4 (a) Discuss the advantages and disadvantages of rapid technological advances for the:

- manufacturer,
- repair industry,
- consumer. *(3 × 4 marks)*

(b) With reference to a product of your choice, describe its development over the last 10 years and the technological advances that made this development possible. *(12 marks)*

Turn over for the next question

SECTION C - PROCESSES AND MANUFACTURE

5 A system is required to maintain automatically the temperature in an office to a value set by the occupants.

(a) Use a flowchart to explain the operation of this system.

Your answer should make reference to the:

- temperature setting system,
- heating system,
- cooling system. *(12 marks)*

(b) Describe, with the aid of diagrams, how the system in part (a) could be achieved. (The heating and cooling units operate from 240 V a.c.) *(12 marks)*

6 (a) With the aid of sketches, describe in detail **two** different methods of converting non-finite (renewable) sources of energy into electricity.

Your answer should clearly show the energy conversions that take place. *(2 × 8 marks)*

(b) Discuss the advantages of using non-finite energy sources in place of finite energy sources as a method of generating electricity. *(8 marks)*

END OF QUESTIONS