

General Certificate of Education
June 2008
Advanced Level Examination



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

SCT6

Friday 13 June 2008 9.00 am to 12.00 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 black ink or black 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 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.
- The marks for questions are shown in brackets.

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 products' function, manufacturing processes and the scale of production.

- (a) a car exhaust pipe
- (b) an electrical contact in a switch
- (c) a litter bin to be used in the street
- (d) a large roadside direction sign *(4 × 6 marks)*

2 (a) With the aid of annotated sketches describe in detail how rotary motion is transferred between two parallel shafts using:

- (i) a belt and pulley system,
- (ii) a toothed belt system,
- (iii) a chain and sprocket system. *(3 × 6 marks)*

(b) Compare the relative advantages of the **three** systems referred to in part (a). *(6 marks)*

SECTION B – DESIGN AND MARKET INFLUENCES

- 3 (a) Discuss the advantages to a manufacturer of using CAD/CAM for batch producing a range of similar products. *(8 marks)*
- (b) Describe how critical path analysis can be used when planning the production of a fabricated product. *(6 marks)*
- (c) Discuss the advantages and disadvantages to the manufacturer of using production lines as a method of producing products. *(10 marks)*
- 4 Using annotated sketches to support your answer, describe with reasons, **six** pieces of anthropometric data that would need to be taken into account when designing the driver's seating requirements in a car. *(6 × 4 marks)*

Turn over for the next question

Turn over ▶

SECTION C – PROCESSES AND MANUFACTURE

- 5 (a) Describe, in detail, the advantages microcontroller based systems have compared to those produced from discrete electronic components. *(6 marks)*
- (b) With the aid of a circuit diagram, show how a 5 V – 100 mA output from an electronic circuit can be interfaced to:
- (i) switch on a 250 V – 30 A heater, *(6 marks)*
 - (ii) reverse a 12 V – 2 A dc motor, *(6 marks)*
 - (iii) activate the push stroke of a double acting pneumatic cylinder. *(6 marks)*
- 6 (a) With the aid of examples, discuss how advances in rechargeable battery technology have enabled improvements in the design and technical specifications of hand-held products. *(12 marks)*
- (b) Describe the relative advantages of mechanical, electrical and pneumatic systems as methods of storing and transferring energy. *(12 marks)*

END OF QUESTIONS