



General Certificate of Education
Advanced Level Examination
June 2010

Design and Technology: **SYST3** Systems and Control Technology

Unit 3 Design and Manufacture

Wednesday 16 June 2010 1.30 pm to 3.30 pm

For this paper you must have:

- an AQA 8-page unlined answer book which is provided separately
- normal writing and drawing instruments.

Time allowed

- 2 hours

Instructions

- Use black ink or black ball-point pen.
- Write the information required on the front of your answer book. The **Examining Body** for this paper is AQA. The **Paper Reference** is SYST3.
- Answer **three** questions.
- Answer **one** question from each of Sections 1 and 2, and **one** other question from either section.
- Do all rough work in your answer book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 84.
- There are 28 marks for each question.
- You will be marked on your ability to:
 - use good English
 - organise information clearly
 - use specialist vocabulary where appropriate.

Advice

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

Answer **three** questions.

Answer **one** question from each of Sections 1 and 2
and **one** other question from either section.

Section 1

Question 1

- 0 1** With the aid of annotated sketches, describe **two systems** for transferring rotary motion between two parallel shafts. Explain the changes of rotary kinetic energy that take place in **each system**. (2 x 8 marks)
- 0 2** State the relative advantages and limitations of the **two systems** you described in **0 1**. (6 marks)
- 0 3** With the aid of an annotated sketch, describe **one system** for transferring rotary motion between two perpendicular shafts. (6 marks)

Question 2

- 0 4** Using annotated sketches to support your answer, describe with reasons **four** pieces of anthropometric data that would need to be taken into account when designing a mobile phone. (4 x 4 marks)
- 0 5** With reference to a product of your choice, explain in detail the necessity for good ergonomic design for control systems and information displays in potentially hazardous situations. (12 marks)

Question 3

- 0 6** With reference to your own experience of designing and making, discuss the advantages and disadvantages of using *computer simulations* when developing an electronic circuit. (16 marks)
- 0 7** With reference to a product of your choice, explain where and why models may have been used in its development. (12 marks)

Section 2

Question 4

0 8 With the aid of annotated sketches, describe an automatic system for providing precise angular positioning of a turntable to an accuracy of 0.05 of a degree. (14 marks)

0 9 With the aid of a diagram, explain how an analogue electrical signal ranging between 0 volts and 2.55 volts can be converted to an 8 Bit digital code. (14 marks)

Question 5

1 0 Using annotated sketches, explain in detail **two** different methods of *permanently* joining pieces of plastic. (2 x 5 marks)

1 1 Using annotated sketches, explain in detail **two** different methods of *permanently* joining pieces of non-ferrous metal. (2 x 6 marks)

1 2 Describe **three** possible problems associated with jointing methods that involve the use of heat. (3 x 2 marks)

Question 6

1 3 With the aid of annotated sketches, describe a system that will measure the time it takes a long jumper to complete their run up. Your answer should make reference to:

- the sensing system
- the timing system
- the type of output display used and how this is driven. (16 marks)

1 4 Describe in detail, the advantages and disadvantages of using pneumatic cylinders for providing linear motion. (8 marks)

1 5 Explain why a double acting cylinder cannot produce the same force on the out and in stroke of its cycle. (4 marks)

END OF QUESTIONS

There are no questions printed on this page