AQA

A-level

DESIGN AND TECHNOLOGY: SYSTEMS AND CONTROL TECHNOLOGY

Unit 3 Design and Manufacture

Friday 10 June 2016 Morning Time allowed: 2 hours

Materials
For this paper you must have:
- an AQA 12-page unlined answer book, which is provided separately
- normal writing and drawing instruments.

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 SYST3.
- Answer **three** questions.
- Answer **one** question from each of Sections 1 and 2, and **one** other question from either section.
- If you choose to answer a question which has several parts, you should answer **all** parts of the question.
- Do all rough work in your answer book. Cross through any work you do not want to be marked.

Information
- The marks for the 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.

For each question that you answer, you should answer all parts of that question.

Section 1

Question 1 Answer both parts of this question.

0 1 Suggest **one** appropriate **material** for each of the following products. Give specific reasons for your choice, making reference to the product's function, the material's properties, the manufacturing processes and the quantity of the product being produced.

- Electrical wire
- An external casing for a barbecue
- A traffic cone
- A bird feeding table

[4 x 4 marks]

0 2 Compare and contrast **two** alternative methods of testing electronic circuit prototypes before a Printed Circuit Board (PCB) is produced.

[12 marks]

Question 2 Answer both parts of this question.

0 3 Explain how anthropometric data would have been used when each of the following products was designed.

- Piano keyboard
- The handle of a hammer
- A drinking mug
- A staircase

[4 x 4 marks]

0 4 Compare and contrast the suitability of Computer Numerical Control (CNC) machining and manual machining for the one-off **and** the batch production of metal components.

[12 marks]

Question 3 Answer both parts of this question.

0 5 Compare and contrast **three** different methods suitable for storing energy.

Your answer should make reference to:

- how the energy is stored
- suitable applications
- storage capacity
- energy type
- energy recovery.

[16 marks]

0 6 Describe in detail **two** different methods of converting non-finite (renewable) energy into a form of energy that can be stored. Use sketches to support your answer. Your answer should clearly show the energy conversions that take place.

[2 x 6 marks]

Turn over for Section 2

Section 2

Question 4 Answer both parts of this question.

0 7 In many areas of the world people spend a long time in the sun and their skin can become damaged.

Describe a system that will produce an audible warning when a person is at risk of skin damage from the sun. Use annotated sketches to support your answer.

Your design should show:

- how the intensity of the sunlight is determined
- how the intensity of the sunlight controls the time period
- how the suitable time period could be adjusted for different users
- how the audible warning is activated and how the system is reset.

[16 marks]

0 8 Discuss the suitability of stepper motors, direct current motors and pneumatic cylinders for providing accurate movement in computer controlled machinery.

[12 marks]

Question 5 Answer both parts of this question.

0 9 Describe a system for producing a programmable sequence of musical notes. The system must be able to produce 8 different notes **and** a minimum sequence of 50 notes. Use annotated sketches to support your answer.

Your answer should make reference to:

- the method of inputting the sequence
- sequence storage
- how the sequence is changed
- how notes are generated
- how the notes are activated.

[16 marks]

1 0 With reference to fabricated products of your choice describe where **three** different jointing methods have been used and explain why each method has been used.

[3 x 4 marks]

Question 6 Answer both parts of this question.

1 1 Describe in detail how the body of a saucepan for use on a gas cooker or an electric cooker could be manufactured by a deformation/redistribution process. Use annotated sketches to support your answer.

Your answer should make reference to:

- choice of material
- manufacturing process **and** scale of production
- any jigs, moulds or formers needed
- finishing.

[16 marks]

1 2 Compare and contrast **two** different systems for the conversion of rotary motion to linear motion in control situations.

Use examples to support your answer.

[12 marks]

END OF QUESTIONS

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