

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	



General Certificate of Education
Advanced Subsidiary Examination
June 2012

Design and Technology: SYST1 Systems and Control Technology

Unit 1 Materials, Components and Application

Tuesday 22 May 2012 1.30 pm to 3.30pm

For this paper you must have:

- normal writing and drawing instruments.

Time allowed

- 2 hours

Instructions

- Use black ink or black ball-point pen. Use pencil for drawing only.
- Fill in the boxes at the top of this page.
- Answer **all** questions in Section A.
- Answer **one** question from Section B, either Question 5 or Question 6.
- Answer the question in Section C.
- You must answer the questions in the spaces provided. Do not write outside the box around each page.
- Do all rough work in this 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 80.
- There are 20 marks for Section A, 20 marks for Section B and 40 marks for Section C.

Advice

- Illustrate your answers with sketches and/or diagrams wherever you feel it is appropriate.
- You are advised to spend approximately 30 minutes on Section A, 30 minutes on Section B and one hour on Section C.



J U N 1 2 S Y S T 1 0 1

M/Jun12/SYST1

SYST1

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ANSWER IN THE SPACES PROVIDED**



Section A

Answer **all** the questions in this section.

1 (a) Name a man-made board that uses lamination for strength.

.....
(1 mark)

1 (b) (i) Name an alloy.

.....
(1 mark)

1 (b) (ii) List the two main materials that make up the alloy you have named above.

.....
.....
(2 marks)

2 With the aid of a diagram show how three 1K Ω resistors can be connected to form a network with a total resistance of 1K5 Ω .

(2 marks)

4

2

Turn over ▶



3 With the aid of an annotated sketch, describe a method of temporarily joining two pieces of metal together so they can be disassembled for maintenance purposes.

.....

.....

.....

.....

.....

.....

(4 marks)

4



- 4 (a) Complete the logic network so that it will function as shown in the truth table below.

A—

B—

C—

—**Q**

A	B	C	Q
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0

(6 marks)

- 4 (b) With the aid of a diagram, show how a DPDT switch can be used to reverse the direction of rotation of a motor.

(4 marks)

10

Turn over ▶



Section B

Answer **either** Question 5 **or** Question 6.

- 5 (a)** With the aid of diagrams, describe **two** different systems for continuously flashing a normal LED.
The LED should switch on for approximately 2 seconds then off for approximately 3 seconds.

Your solutions should include any relevant calculations.

- 5 (a) (i)** System 1

(8 marks)



5 (a) (ii) System 2

(8 marks)

5 (b) Choose one of your solutions from part 5(a). Explain how it would be possible to modify the system for switching on a 240volt ac lamp.

.....

.....

.....

(4 marks)

20

Turn over ▶



Do **not** answer Question 6 if you have answered Question 5.

6 (a) Using annotated sketches, describe a suitable test that could be carried out to compare the resistance to bending forces of a range of *plastics*.

Your answer should indicate:

- the approximate size of the sample
- the method of applying the load
- the data that needs to be collected
- the method of collecting the data
- how the data is analysed.

(10 marks)



- 6 (b)** Using annotated sketches, describe in detail a suitable manufacturing process for the main body of a plastic bucket.

(10 marks)

20

Turn over ▶



Section C

Answer this question.

7 (a) A system is required to automatically monitor and control the temperature in a room.

With the aid of diagrams, show **two** systems that would produce an electrical output of at least 2 volts at 10mA when the temperature exceeds 25°C.

7 (a) (i) System 1

(4 Marks)

7 (a) (ii) System 2

(4 Marks)



7 (b) With the aid of annotated sketches, show **two** systems for producing 200 mm of linear movement when triggered by an electrical pulse.

You should clearly show how the amount of linear movement is limited to 200 mm.

7 (b) (i) System 1

(6 marks)

7 (b) (ii) System 2

(6 marks)

Turn over ▶



- 7 (c)** Using your ideas from parts **7(a)** and **7(b)**, produce a design for a complete system that will automatically open a window by 200 mm when the temperature rises above 25°C and close the window when the temperature falls below 25°C.

Your diagram should clearly show a window and window frame.

Marks will be awarded for:

- the window and window frame *(3 marks)*
- how the system is positioned and attached *(3 marks)*
- the sensing and control system *(8 marks)*
- assembly of the sub-systems *(2 marks)*
- selection of materials and components. *(4 marks)*



END OF QUESTIONS

40



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