

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
LEVEL 1/2**

R113/01

**CAMBRIDGE NATIONAL IN SYSTEMS
CONTROL IN ENGINEERING**

Electronic principles

MONDAY 5 JUNE 2017: Afternoon

**DURATION: 1 hour
plus your additional time allowance**

MODIFIED ENLARGED

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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Candidates answer on the Question Paper.

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

A calculator may be used

A CALCULATOR MAY BE USED FOR THIS PAPER

READ INSTRUCTIONS OVERLEAF



INSTRUCTIONS TO CANDIDATES

Use black ink. HB pencil may be used for graphs and diagrams only.

Complete the boxes on the first page with your name, centre number and candidate number.

Answer ALL the questions.

Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).

INFORMATION FOR CANDIDATES

The total number of marks for this paper is 60.

The number of marks for each question is given in brackets [] at the end of the question or part question.

Dimensions are in millimetres unless stated otherwise.


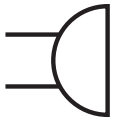
Quality of written communication will be assessed in questions marked with an asterisk (*).

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Answer ALL questions

- 1 (a) Complete the table by using words from the list below. [2]

Ammeter
And Gate
Bell
Bridge
Buzzer

Symbol	Component
	
	

- (b) Name the quantity that is being measured when a voltmeter is connected across a 2 V cell.

E _____ M _____ F _____ [1]

- (c) A resistor has a current flowing through it of 0.2 A and a voltage across it of 2 V.
Calculate the value of the resistor in ohms.

_____ [2]

(d) Give THREE reasons why you would select solar power over other forms of power source.

1 _____

2 _____

3 _____

[3]

(e) State TWO advantages of using rechargeable batteries as compared to non-rechargeable batteries.

1 _____

2 _____

[2]

- 2 (a) Complete the **THREE** missing values of the preferred E12 series resistor series shown below.

10	12		18	22	27		39	47	56		82
----	----	--	----	----	----	--	----	----	----	--	----

 [1]

- (b) Calculate the maximum and minimum value a resistor will have if it is rated at $120\Omega \pm 10\%$.

Maximum value _____

Minimum value _____

[3]

- (c) (i) Explain with the aid of a diagram what is meant by the term 'Darlington Pair'.**

[4]

- (ii) A Darlington Pair is used as part of a moisture detector circuit.
State the name of TWO other circuits that could use a Darlington Pair.**

1 _____

2 _____

[2]

- 3 (a) Describe, using ONE example, what is meant by the term 'latching switch'.**

[2]

- (b) Draw a labelled circuit diagram to show how a Double Pole Double Throw (DPDT) switch can be used to control the direction of rotation of a DC motor. [5]**

(c) (i) State the meaning of the term 'Shape Memory Alloy (SMA)'.

_____ **[1]**

(ii) Give the name of TWO Shape Memory Alloys.

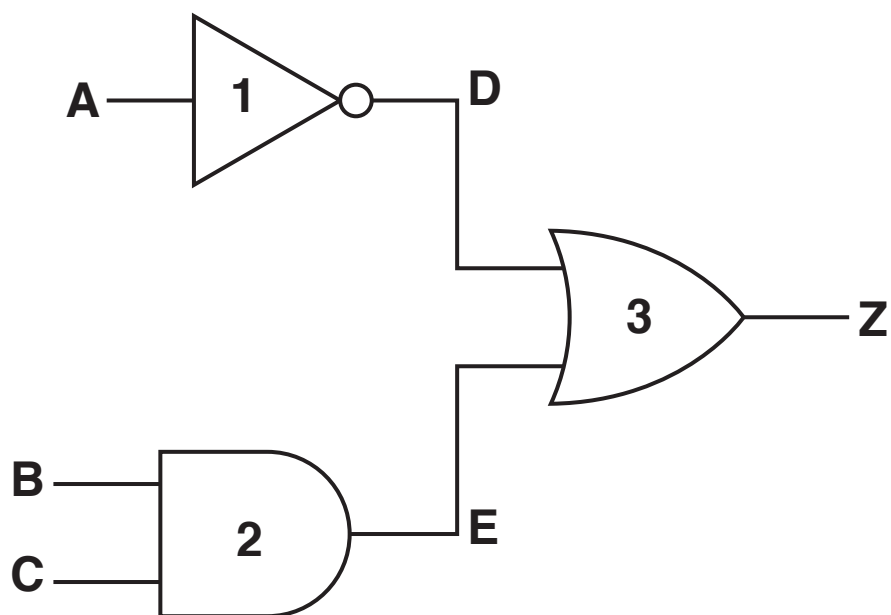
1 _____

2 _____

_____ **[2]**

- 4 (a) Fig. 1 shows a logic gate circuit being used by a test technician.

FIG. 1



- (i) State the name of each of the logic gates in Fig. 1.

Gate 1 _____

Gate 2 _____

Gate 3 _____

[3]

(ii) Complete the table below with the test results the technician should obtain. [3]

Input A	Input B	Input C	D	E	Z
0	0	0			
0	0	1			
0	1	0			
0	1	1			
1	0	0			
1	0	1			
1	1	0			
1	1	1			

(b) State FOUR types of fault that are often found when a visual inspection of a completed printed circuit board (PCB) takes place.

1 _____

2 _____

3 _____

4 _____

[4]

- 5 (a) Explain what is meant by the term 'Surface Mount Technology'.

[2]

- (b) State THREE benefits and THREE drawbacks of using surface mount components in commercial circuit construction. [6]

Benefit 1 _____

Benefit 2 _____

Benefit 3 _____

Drawback 1 _____

Drawback 2 _____

Drawback 3 _____

- (c) Complete the table below with a tick (✓) to identify which TWO statements are correct for quality assurance methods used during commercial printed circuit board production. [2]

Quality Assurance Method	tick (✓)
Half split method	
Visual inspection	
Automatic test	
Truth table test	

6 A cable of resistance $0.05\ \Omega$ carries a current of 2 A.

(a) (i) Calculate the power in watts absorbed by the cable.

[3]

(ii) Calculate the energy in watt hours consumed by the cable if it is in use for THREE hours.

[1]

(b)* Discuss the applications of solid core cables, multi-core cables and ribbon cables. [6]

[illegible]

END OF QUESTION PAPER

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