



Monday 5 June 2017 – Afternoon

LEVEL 1/2 CAMBRIDGE NATIONAL IN SYSTEMS CONTROL IN ENGINEERING

R113/01 Electronic principles

Candidates answer on the Question Paper.

OCR supplied materials:

None

Other materials required:

· A calculator may be used

Duration: 1 hour



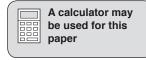
Candidate forename				Candidate surname				
Centre number					Candidate nu	ımber		

INSTRUCTIONS TO CANDIDATES

- Use black ink. HB pencil may be used for graphs and diagrams only.
- Complete the boxes above 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).
- Do not write in the barcodes.

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 (*).
- This document consists of 8 pages. Any blank pages are indicated.



[2]

[3]

2

Answer all questions

1 (a) Complete the table by using words from the list below.

Ammeter And Gate Bell Bridge Buzzer

Symbol	Component

(b)	Name the quantity that is being measured when a voltmeter is connected across a 2V c	ell.
	E M F	[1]
(c)	A resistor has a current flowing through it of 0.2A and a voltage across it of 2V. Calculate the value of the resistor in ohms.	
(d)	Give three reasons why you would select solar power over other forms of power source	
	2	
	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]

© OCR 2017 Turn over

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)	Des	scribe, using one example, what is meant by the term 'latching switch'.
			[2]
	(b)		w a labelled circuit diagram to show how a Double Pole Double Throw (DPDT) switch can 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.

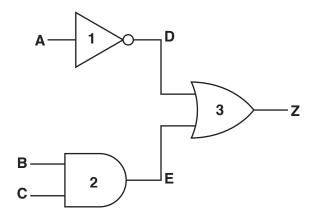


Fig. 1

(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.

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			

[3]

	(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.
		Benefit 1
		Benefit 2
		Benefit 3
		Drawback 1
		Drawback 2
		Drawback 3
		[6]

[2]

(c) Complete the table with a tick (\checkmark) to identify which **two** statements are correct for quality assurance methods used during commercial printed circuit board production.

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

6

A cable	of resistance 0.05Ω carries a current of 2A.
(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.
	[41]

Question 6(b)* begins on page 8

© OCR 2017 Turn over

8

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

END OF QUESTION PAPER



Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.