

OCR

Oxford Cambridge and RSA

Monday 4 June 2018 – 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	
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Centre number						Candidate number				
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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.



**A calculator may
be used for this
paper**

Answer **all** the questions.

- 1 (a) Complete the table by drawing the graphical symbol for each component listed.

Component	Symbol
AND Gate	
Capacitor	
Fuse	
Buzzer	

[4]

- (b) Calculate the current, in amps, flowing through a 100Ω resistor connected across a 2V supply.

.....

 [3]

- (c) Calculate the power, in watts, absorbed by a heater of resistance 220Ω when a current of 2A is flowing.

.....

 [3]

3

- 2 (a) Complete the table below using a tick (✓) to identify **four** output devices.

Component	Output device
Solenoid	
Liquid Crystal Display module	
Microphone	
Piezo-electric buzzer	
Pressure switch	
Seven Segment display	
NCT thermistor	

[4]

- (b) The frequency of oscillation in an astable circuit is given by $f = 1/(1.38RC)$ where R is in ohms and C is in farads.

Calculate the frequency of oscillation in Hertz given that $R = 110\text{k}\Omega$ and $C = 3.3\mu\text{F}$.

.....

 [3]

- (c) Complete the truth table below for the following two-input gates: OR, AND, NAND.

Input A	Input B	OR gate output	AND gate output	NAND gate output
0	0			
0	1			
1	0			
1	1			

[3]

3 (a) Different manufacturing processes are used in commercial circuit construction.

(i) Explain what is meant by the 'flow (wave) solder' process.

.....

.....

.....

..... [2]

(ii) Explain what is meant by the 'pick and place robot' process.

.....

.....

.....

..... [2]

(b) Draw lines to connect each activity to the correct sequence of events for soldering a surface mount resistor on to a printed circuit board (PCB).
The first one has been done for you.

Sequence of events

Activity

1	Apply flux to all pads on the circuit board.
2	The resistor should now be fastened on one side; apply solder to the soldering tip again and touch the iron tip on the other side.
3	Check that the tip of the soldering iron and the resistor are clean.
4	Inspect the solder joints with a magnifying glass to make sure the connection is good.
5	Place the resistor in position and hold it there with a pair of tweezers.
6	Touch the soldering tip so that it heats both the resistor and circuit board pad.
7	Apply some solder to the tip of the iron and touch the circuit board pad with the tip so that some of the solder passes on to the pad.

[6]

5 Fig. 1 shows an incomplete circuit diagram.

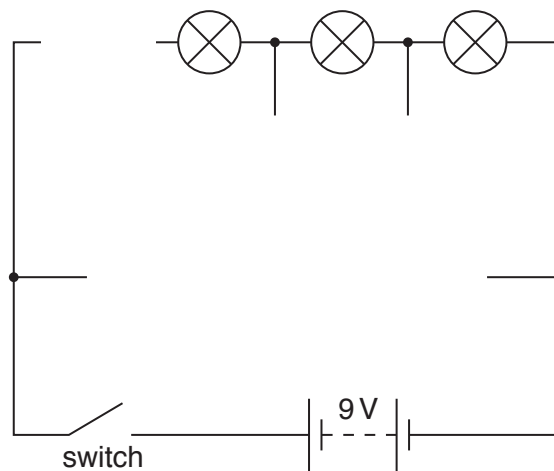


Fig. 1

(a) Complete the circuit diagram in Fig. 1 with:

- an ammeter to measure total current flow
- a voltmeter to measure the potential difference across one lamp
- a voltmeter to measure the circuit electromotive force (EMF).

[3]

(b) (i) State the contact arrangement of the switch used in the circuit.

..... [1]

(ii) State what type of lamp is used in the circuit.

..... [1]

(c) (i) Calculate the total resistance of the lamps if each lamp has a resistance of $1.8\ \Omega$.

..... [2]

(ii) Calculate the energy consumed in 10 hours by one lamp that is rated at 4 W.

..... [3]

6 (a) State the name of **three** techniques that are used to identify potential electrical hazards.

1

.....

2

.....

3

.....

[3]

(b) Give **two** reasons for using a virtual signal generator to test a simulated circuit.

1

.....

2

.....

[2]

Question 6 (c) begins on page 8

(c) Fig. 2 shows a virtual signal generator.

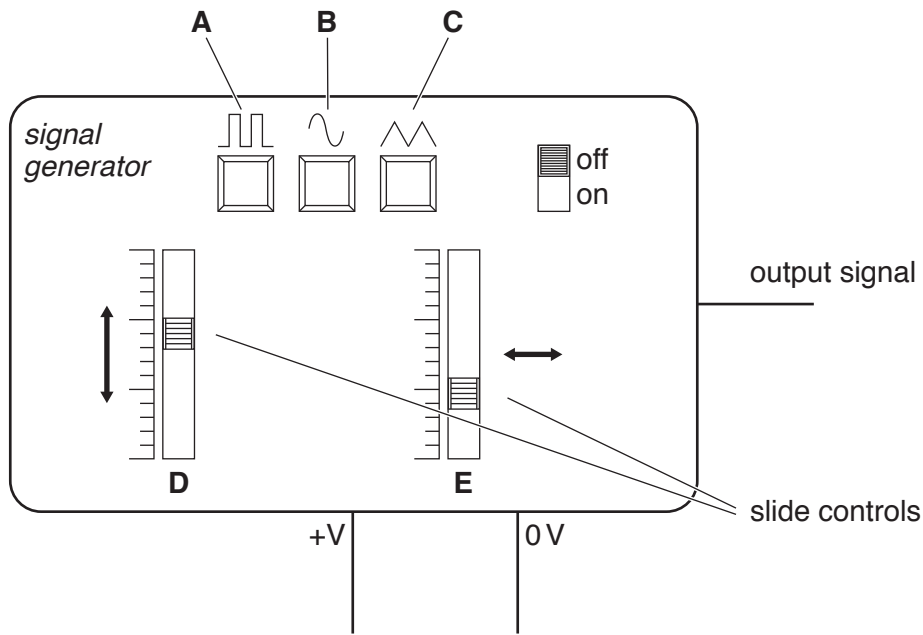


Fig. 2

(i) State the name of the wave form at **A**, **B** and **C** in Fig. 2.

- A**
- B**
- C**

[3]

(ii) Fig. 2 shows two slide controls, **D** and **E**.
State the function of slide controls **D** and **E**.

- D**
- E**

[2]

END OF QUESTION PAPER

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