



Oxford Cambridge and RSA

Thursday 13 June 2019 – Morning

**LEVEL 1/2 CAMBRIDGE NATIONAL IN SYSTEMS
CONTROL IN ENGINEERING**

R113/01 Electronic principles

Time allowed: 1 hour



Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
• A calculator may be used



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

Candidate number

First name(s) _____

Last name _____

INSTRUCTIONS

- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.

INFORMATION

- 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.

Answer **all** questions.

- 1 (a) Complete the table using a tick (✓) to identify **three** types of power supply.

Components	Power supply (✓)
Diode	
230 V AC socket	
Operational amplifier	
NPN Transistor	
12 V DC Battery	
Solar Panel	

[3]

- (b) Calculate the potential difference, in volts, across a coil if the coil resistance is $15\ \Omega$ and the current flowing through the coil is 800 mA.

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..... [3]

- (c) Calculate the power input, in watts, to a motor taking a current of 4A from a 6 V DC supply.

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..... [2]

- (d) Calculate the energy, in joules, used by a 50W lamp in 2 minutes.

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- 3 (a) Explain with the aid of a diagram the function of an operational amplifier being used as a comparator.

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- (b) Use notes and sketches to describe the trigger signal and output signal of a monostable integrated circuit.

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- (c) Complete the truth table below for the following two-input gates: **OR** and **NOR**.

Input A	Input B	OR gate output	NOR gate output
0	0		
0	1		
1	0		
1	1		

[2]

4 (a) From the following list identify **four** items of test equipment for electronic circuits.

- Logic probe** **Microphone** **Multimeter**
Power supply unit **Relay**
Residual current device **Signal generator** **Solenoid**
- 1
- 2
- 3
- 4
- [4]**

(b) The activities necessary for placing a component on a printed circuit board using a pick and place manufacturing process are shown below, but they are not in the correct sequence.

Complete the table, using numbers 1 to 7, to put the activities in their correct sequence. One has been done for you.

Activity	Sequence
Carry out a quality assurance check	
Check that the components are ready and available	
Check that the robot is switched on and programmed to carry out the manufacturing process	1
Place the component on the printed circuit board	
Check that the vacuum suction cups are working	
Rotate the robotic arm to the correct orientation	
Use the vacuum suction cups to lift the component	

[6]

5 (a) (i) Describe how a residual current device (RCD) operates.

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..... [3]

(ii) Explain why RCDs are compulsory in new electrical installations.

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(b) State **four** benefits to a manufacturer of using surface mount components compared to through hole components.

1
2
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4 [4]

6 (a)* Discuss the function and application of a solenoid as an output device.

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(b) Name **four** types of output device that act as a display in electronic equipment.

1
2
3
4 [4]

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).

A large rectangular area with a solid vertical line on the left side and horizontal dotted lines across the rest of the page, providing space for writing answers.



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