

Modified Enlarged 18pt

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Tuesday 11 January 2022 – Afternoon

**Level 1/2 Cambridge National in Systems Control in
Engineering**

R113/01 Electronic principles

**Time allowed: 1 hour
plus your additional time allowance**

**YOU MUST HAVE:
a scientific or graphical calculator**

Please write clearly in black ink.

Centre number

Candidate number

First name(s) _____

Last name _____

READ INSTRUCTIONS OVERLEAF



INSTRUCTIONS

Use black ink. You can use an HB pencil, but only for graphs and diagrams.

Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.

Answer ALL the questions.

INFORMATION

The total mark for this paper is 60.

The marks for each question are shown in brackets [].

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

ADVICE

Read each question carefully before you start your answer.

BLANK PAGE

Answer ALL the questions.

- 1 (a) (i) Complete the table by using words from the list below.
Each word may be used once or not at all. [3]**

Automatic

Continuous

Portable

Sustainable

Unsustainable

Power Source	Type of Power Source
6 V Battery	
1 kW Solar Panel	
230 V AC Mains	

- (ii) Give ONE drawback of using a sustainable power source.**

_____ [1]

- (iii) Give ONE example of a combined power source for portable equipment.**

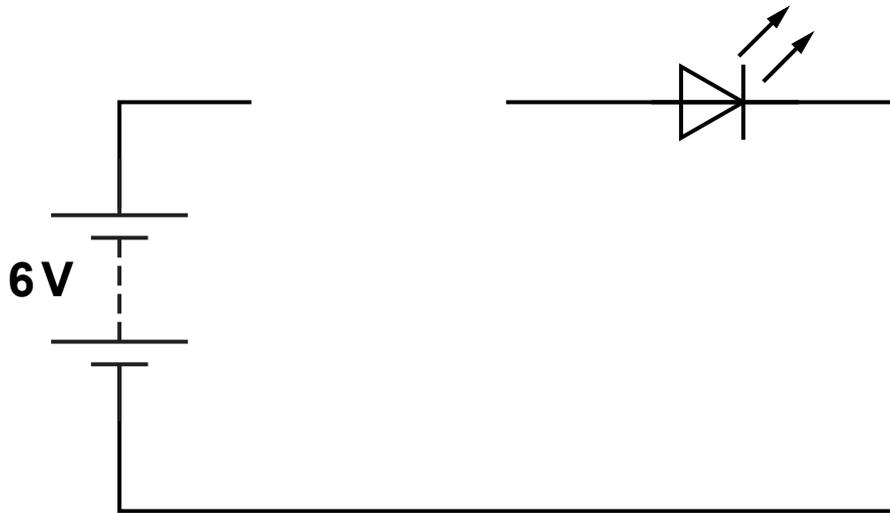
_____ [2]

(b) Calculate the potential difference across a heating element if its resistance is $70\ \Omega$ and the current flowing through it is 3.3A .

[4]

2 FIG. 1 shows part of a circuit diagram with an LED rated at 2V 20mA.

FIG. 1



(a) Complete the circuit diagram in FIG. 1 by drawing a resistor in the space provided. [1]

(b) Calculate the potential difference across the resistor.

[2]

(c) Give TWO reasons for having a resistor in the LED circuit.

1 _____

2 _____

(d) Describe the operation of an LED.

[2]

(e) Calculate a suitable value for the resistor if the current flow required is 20 mA.

[3]

- 3 (a) Complete the table, using a tick (✓) against THREE techniques that can be used to identify potential electrical hazards. [3]

Techniques	Tick (✓)
Portable appliance testing	
Power supply unit	
Truth tables	
Use of residual current device	
Visual inspection of equipment	

- (b) The half split method is a fault finding procedure for electronic circuits.

Describe how this works.

[3]

(c) State TWO benefits of using a virtual signal generator for testing a simulated circuit.

1 _____

2 _____

[2]

(d) In the space provided below, draw the shape of a signal that could be provided by a virtual signal generator. [2]



(b) State the names of THREE manufacturing processes used within commercial circuit construction.

1 _____

2 _____

3 _____

[3]

(c) Name ONE item of test equipment which is used for testing electronic circuits.

_____ **[1]**

5 (a) Identify TWO smart modern materials.

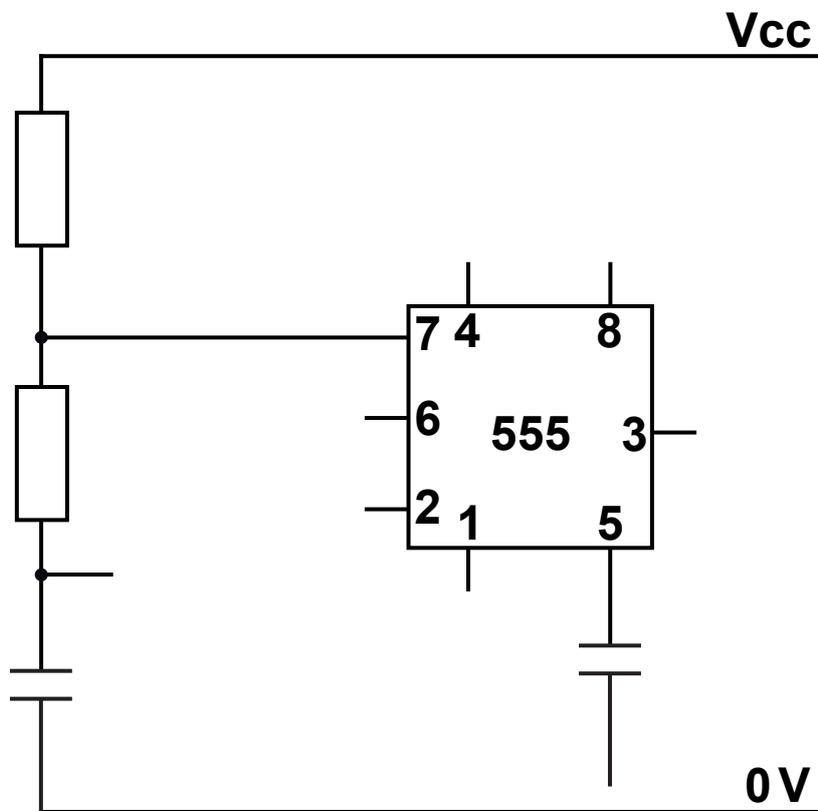
1 _____

2 _____

[2]

(b) FIG. 2 shows part of a circuit diagram for an astable circuit using a 555 timer.

FIG. 2



Complete the circuit diagram in FIG. 2 by drawing in the connections for pins 1, 2, 4, 5, 6, 8. [4]

(c) Draw a label on the circuit diagram in FIG. 2 to show what pin 3 is used for. [1]

(d) Complete the sentence using words from the list below:

Each word may be used once or not at all.

external

internal

irregular

regular

sawtooth

square

An astable circuit will produce a

_____ signal in the form of

a _____ wave, without needing an

_____ trigger. [3]

6 (a) The block diagram in FIG. 3 opposite shows an alarm system for heat and smoke.

(i) State the names of the TWO blocks that will give an input to the system.

_____ [2]

(ii) State which block of the system represents the output stage.

_____ [1]

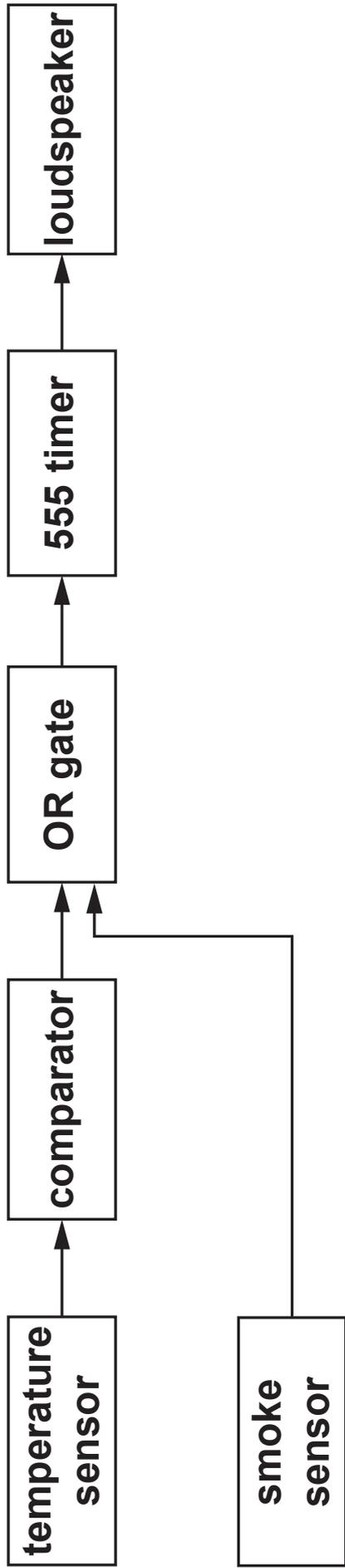
(iii) State in which block an operational amplifier is used.

_____ [1]

(iv) State in which block a thermistor is used.

_____ [1]

FIG. 3



(b) Describe what is meant by the term ‘capacitor voltage rating’.

[2]

(c) Calculate the maximum and minimum value a capacitor will have if it is rated at $120\ \mu\text{F} \pm 10\%$.

Maximum value _____

Minimum value _____

[3]

END OF QUESTION PAPER

