

Write your name here

Surname

Other names

Centre Number

Candidate Number

Edexcel GCSE

Design and Technology: Electronic Products

Unit 2: Knowledge and Understanding of Electronic Products

Thursday 21 June 2012 – Afternoon

Time: 1 hour 30 minutes

Paper Reference

5EP02/01

You do not need any other materials.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches it must be dark (HB or B). Coloured pens, pencils and highlighter pens must **not** be used.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
– *you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.*
- Candidates may use a calculator.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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PEARSON

Answer ALL the questions.

For each question 1 to 10, choose an answer A, B, C or D. Put a cross in the box indicating the answer you have chosen ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 Which **one** of the following components is an input device?

- A Moisture sensor
- B Voltmeter
- C LCD (liquid crystal display)
- D PIC (peripheral interface controller)

(Total for Question 1 = 1 mark)

2 Which **one** of the following components is an output device?

- A NOR gate
- B Buzzer
- C Capacitor
- D Solar cell

(Total for Question 2 = 1 mark)

3 On a PCB, the copper lines are called

- A strips
- B bars
- C tracks
- D rails

(Total for Question 3 = 1 mark)

4 Which type of switch could be used to detect if a door is open or closed?

- A Key switch
- B Push to make switch
- C Slide switch
- D Toggle switch

(Total for Question 4 = 1 mark)



5 Which **one** of the following processes would be used to form a right angle in a piece of 3 mm thick acrylic?

- A Injection moulding
- B Vacuum forming
- C Line bending
- D Blow moulding

(Total for Question 5 = 1 mark)

6 Which **one** of the following is a process component?

- A Piezo electric sensor
- B Solenoid
- C Carbon nanotubes
- D Biosensor

(Total for Question 6 = 1 mark)

7 What do the letters MDF stand for?

- A Moderate density foamboard
- B Minimum dust fibreboard
- C Medium density fibreboard
- D Maximum desirability foamboard

(Total for Question 7 = 1 mark)

8 Use the formula $R_t = R_1 + R_2$ to calculate the value of R_1 if $R_t = 100k$ and $R_2 = 10k$. Which **one** of the following values is correct?

- A 10k
- B 90k
- C 10R
- D 110k

(Total for Question 8 = 1 mark)



9 Which **one** of the following light sources is the least energy efficient?

- A Bulb
- B LED
- C 7 segment display
- D LCD

(Total for Question 9 = 1 mark)

10 Which **one** of the following conditions would cause a piezo sensor to generate an output?

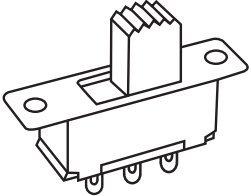
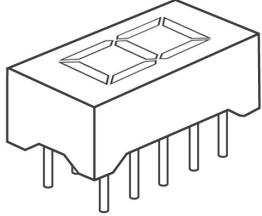
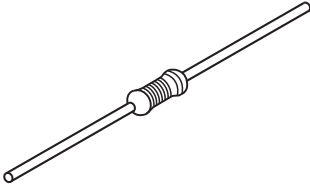
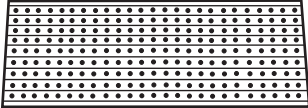
- A Cold
- B Heat
- C Light
- D Pressure

(Total for Question 10 = 1 mark)



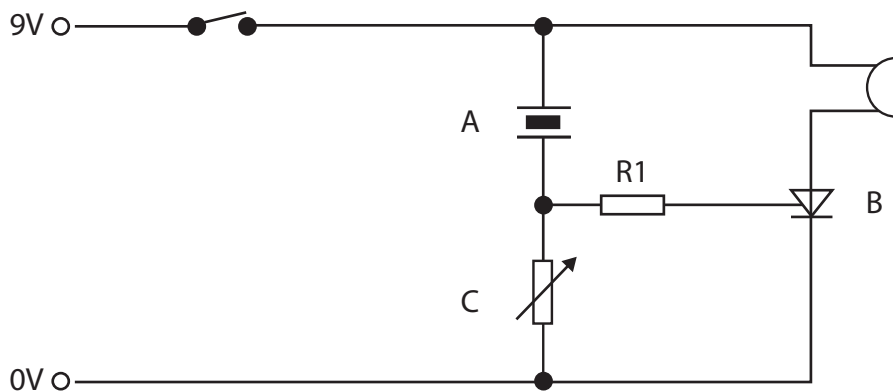
11 (a) The table below shows some components.

Complete the table by giving the missing names and uses.

Components	Name	Use
	<p>..... switch</p> <p>(1)</p>	<p>Turning a circuit on/off</p>
	<p>(1)</p>	<p>Displaying digits from 0–9</p>
	<p>Resistor</p>	<p>(1)</p>
	<p>Stripboard</p>	<p>(1)</p>



(b) A student is making an automatic intruder alarm using the circuit below.



Name the components labelled A and B.

(2)

A

B

(c) Indicate on the circuit above with **two** crosses (x) where a voltmeter would be connected to show the voltage across the buzzer.

(2)

(d) Explain the function of component B.

(2)

.....

(e) The purpose of resistor R1 is to protect component B.

What is likely to damage component B?

(1)

.....

(f) Copper is used for making the printed circuit board (PCB).

Give **two** ways to reduce the environmental impact of using copper for PCB production.

(2)

1

2



(g) The case for the intruder alarm is manufactured using off-shore manufacturing.

(i) Explain the term 'off-shore manufacturing'. (2)

(ii) Give **one** advantage and **one** disadvantage of off-shore manufacturing to the manufacturer of the plastic case. (2)

Advantage

Disadvantage

(h) Give **two** reasons why High Impact Polystyrene (HIPS) is suitable for injection moulding cases, other than being recyclable and economical. (2)

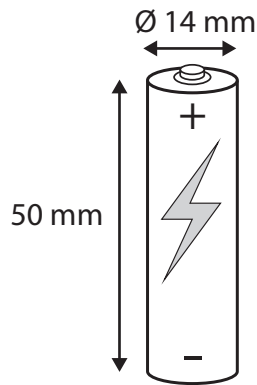
1

2

(Total for Question 11 = 19 marks)



12 You have been asked to design the casing for a battery charger.



The specification for the casing for the battery charger is that it must:

- charge two AA batteries at a time
- allow batteries to be inserted and removed easily
- use conductive material to connect to the batteries
- be able to be turned on and off
- clearly indicate if it is switched on or off
- clearly indicate the batteries' level of charge
- protect the user from mains electricity
- be capable of being disassembled for recycling.

In the spaces opposite, use sketches and, where appropriate, brief notes to show **two different** design ideas for the battery charger that meet the specification points above.

Candidates are reminded that if a pencil is used for diagrams/sketches it must be dark (HB or B).

Coloured pens, pencils and highlighter pens must **not** be used.

PLEASE DO NOT WRITE OR DRAW IN THIS SPACE.

PLEASE USE THE SPACES OPPOSITE FOR YOUR DESIGNS.



Design idea 1

(8)

Design idea 2

(8)

(Total for Question 12 = 16 marks)



13 The picture below shows a desk lamp.



(a) Explain **two** reasons for using mains electricity to power this lamp.

(4)

1

2



(b) Give **two** different ways in which the energy consumption of this lamp could be reduced.

(2)

1

2

(c) Explain how the lamp succeeds in meeting the following specification points:

(i) the user is able to direct the light where it is required.

(2)

.....
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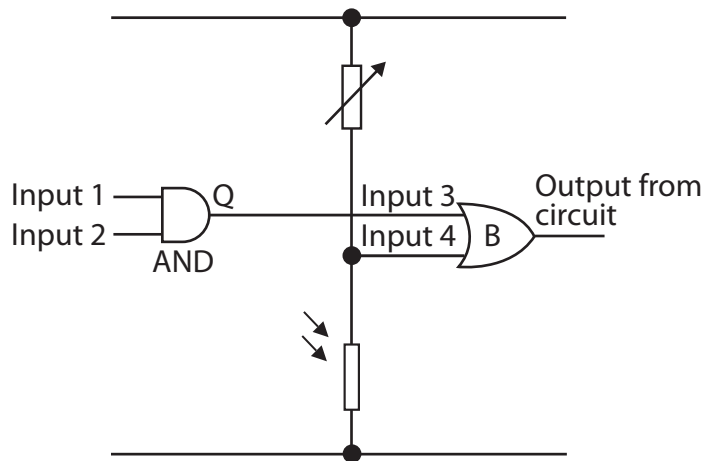
(ii) the bulb can be easily changed.

(2)

.....
.....
.....
.....



14 The illustration below is part of a logic circuit.



(a) (i) Name the type of logic gate marked B. (1)

(ii) Complete the truth table for the AND gate. (4)

Input 1	Input 2	Output
0	0	
0	1	

(iii) Describe how the components connected to Input 4 produce an input signal 1 to logic gate B. (2)

.....

.....

.....

.....



(iv) The output current from component B is too low.

Describe **one** way in which this current could be increased.

(2)

.....

.....

.....

.....

(b) This circuit is going to be built on a printed circuit board which will be made using the photo etching process.

Give **one** advantage and **one** disadvantage of using the photo etching process.

(2)

Advantage

.....

.....

Disadvantage

.....

.....



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