

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

Wednesday 22 May 2013 – 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 type of switch would provide the best security on an electric product?

- A** Keyswitch
- B** Toggle switch
- C** Microswitch
- D** Tilt switch

**(Total for Question 1 = 1 mark)**

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**2** Brass is rarely used for electronic product cases because:

- A** it rusts
- B** it absorbs moisture
- C** it conducts electricity
- D** it cracks easily

**(Total for Question 2 = 1 mark)**

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**3** Which **one** of the following is a biofuel?

- A** LPG
- B** Diesel
- C** Coal
- D** Wood

**(Total for Question 3 = 1 mark)**

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**4** The common name for automated component placement is:

- A** locate and solder
- B** insert and fix
- C** pick and place
- D** permanent component positioning

**(Total for Question 4 = 1 mark)**

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5 What voltage would you expect to measure across a single cell (battery)?

- A Up to 1.5 V
- B Up to 3.0 V
- C Up to 4.5 V
- D Up to 9.0 V

(Total for Question 5 = 1 mark)

6 Which **one** of the following components may be used to detect changes in temperature?

- A Transformer
- B Thermistor
- C Transistor
- D Thyristor

(Total for Question 6 = 1 mark)

7 Which **one** of the following components must be inserted the correct way round in order to work?

- A LED
- B LDR
- C Tilt switch
- D Bulb

(Total for Question 7 = 1 mark)

8 The 4 Rs for minimising waste production are reduce, recover, recycle and:

- A replace
- B renew
- C repair
- D reuse

(Total for Question 8 = 1 mark)

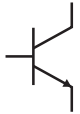
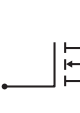
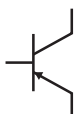
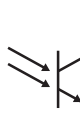


9 Carbon nanotubes can be used as:

- A a switch
- B a semiconductor
- C an insulator
- D an optical device

(Total for Question 9 = 1 mark)

10 Which symbol represents a field effect transistor (FET)?

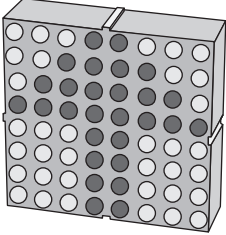
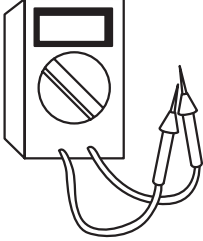
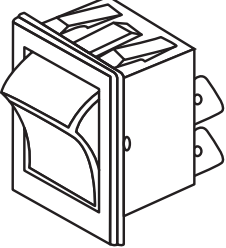

- A 
- B 
- C 
- D 

(Total for Question 10 = 1 mark)



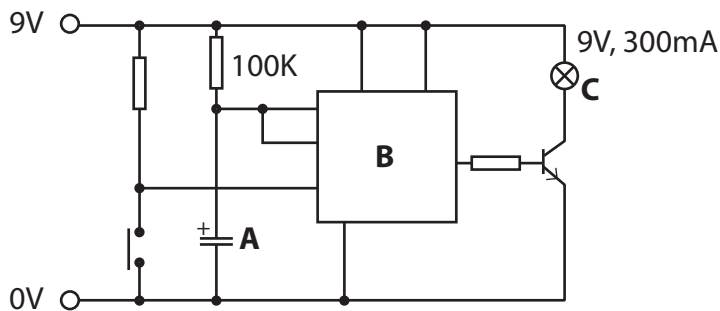
11 (a) The table below shows some tools and components.

Complete the table below by giving the missing names and uses.

Tools/Components	Name	Use
	LED Dot Matrix Display	(1)
	Multimeter	(1)
	..... switch (1)	To turn a circuit on or off
	(1)	To remove excess solder



(b) The circuit below is a monostable timing circuit. When activated, component C turns on for a fixed time period.



Name the components labelled **A**, **B** and **C**.

(3)

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

(c) Explain why a transistor has been used between components **B** and **C**.

(2)

.....

.....

.....

.....

(d) (i) Describe **one** modification to the circuit that would allow the time delay to be adjustable.

(2)

.....

.....

.....

.....



(ii) Give **two** reasons why prototyping board (breadboard) is more suitable for constructing a prototype of this circuit than a printed circuit board (PCB).

(2)

1 .....

.....

2 .....

.....

(e) Use the resistor colour code below to give the three colour bands of the 100K resistor:

Black	Brown	Red	Orange	Yellow	Green	Blue	Violet	Grey	White
0	1	2	3	4	5	6	7	8	9

(3)

Band 1 .....

Band 2 .....

Band 3 .....

(f) The timing circuit will be enclosed in a medium density fibreboard (MDF) case. MDF is economical and readily available.

(i) Give **two** additional advantages of using MDF for the case of an electronic product.

(2)

1 .....

.....

2 .....

.....

(ii) Give **one** method of recovering energy from waste MDF.

(1)

.....

.....

**(Total for Question 11 = 19 marks)**



**12** You have been asked to design the casing for a bath water-level alarm. The casing will be made in a school workshop.

Design the **casing** only. Do **not** design any circuits.

The specification for the bath water-level alarm is that it must:

- have a 'water' theme appropriate for children
- fix to the side of the bath easily
- have a means of sensing the water level
- be adjustable for different water levels
- have an audible alarm if the bath overfills
- be able to be switched on and off
- show the user when batteries are low
- be made from an insulating material.

In the spaces opposite, use sketches and, where appropriate, brief notes to show **two different** design ideas for the bath alarm 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)

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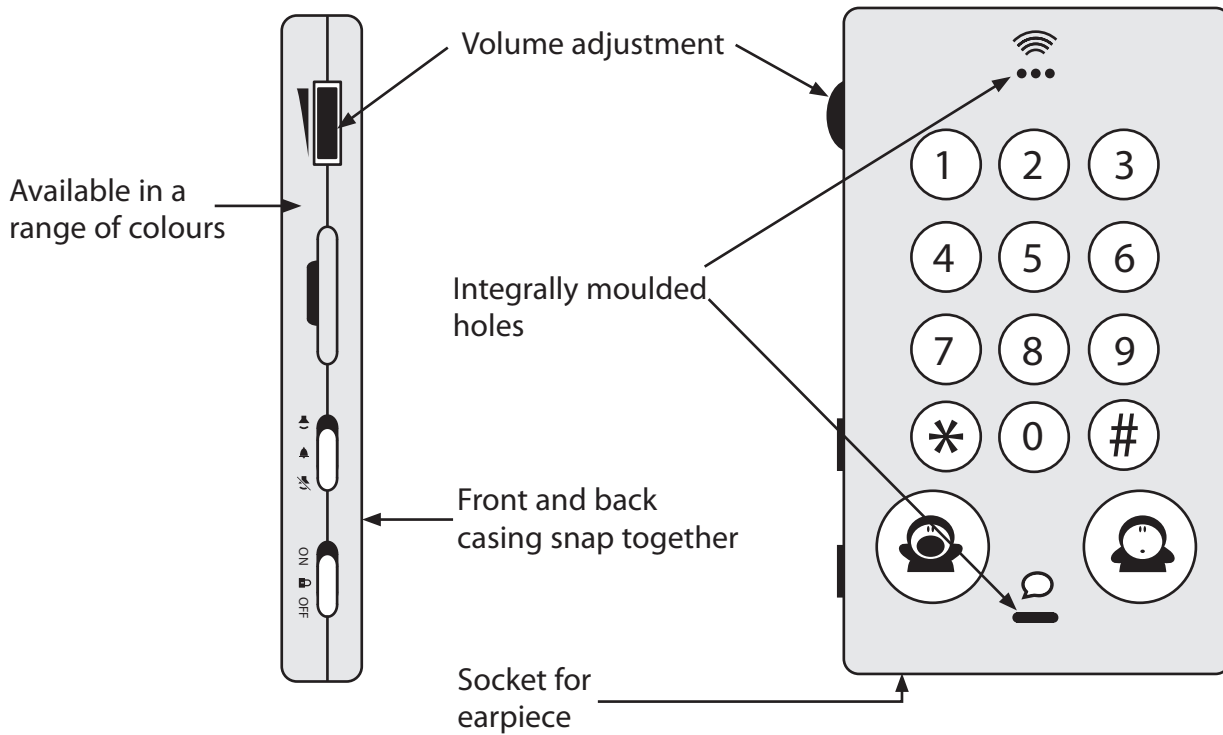
**Design idea 2**

(8)

**(Total for Question 12 = 16 marks)**



13 The pictures below show John's Phone®. This is a mobile phone that is designed to be as simple to use as possible.



The case of the phone is injection moulded from High Impact Polystyrene (HIPS).

(a) Give **two** reasons why HIPS is a suitable material for manufacturing the case of this phone.

(2)

1 .....

2 .....

(b) Explain **two** reasons why injection moulding is a suitable forming technique for making the case of this phone.

(4)

1 .....

2 .....



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

(i) the phone is as simple to use as possible.

(2)

.....

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(ii) the phone is suitable for use in a quiet environment.

(2)

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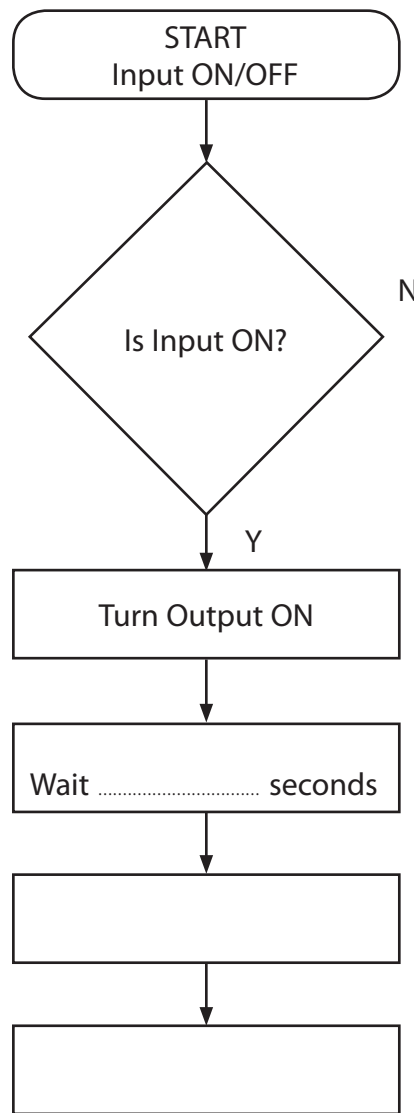
14 A Peripheral Interface Controller (PIC) is being programmed using a flowchart.

The programme is designed to control a PIC that will:

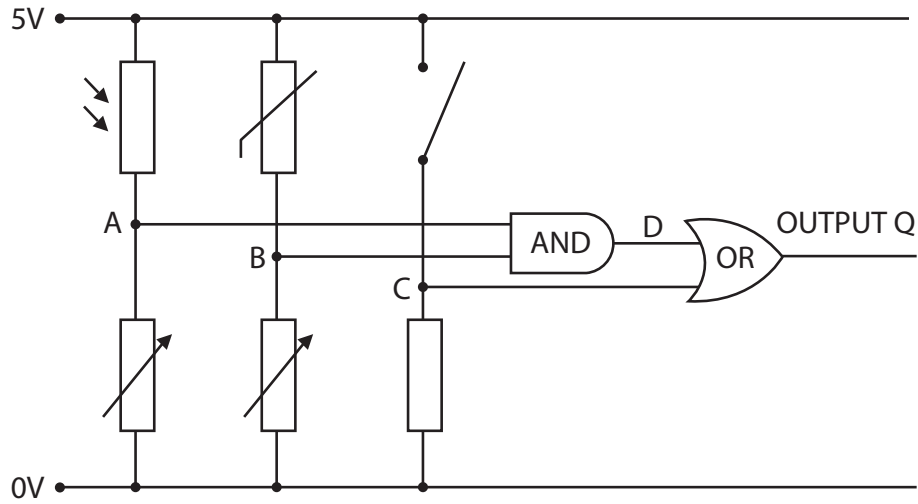
- sense when an input is ON
- turn an output ON for 5 seconds
- turn the output OFF for 3 seconds
- repeat the procedure until the input is OFF

(a) Complete the flowchart below and add the necessary feedback paths to make the PIC work as intended.

(5)



Part of a desk fan circuit is shown below. It uses logic gates to turn an output on automatically when it is light and hot. The output can also be turned on manually at any time.



(b) Complete the truth table for the combined AND and OR logic gates.

(3)

A	B	C	D	Q
0	0	0	0	
0	0	1		1
0	1	0	0	0
0	1	1	0	1
1	0	0	0	0
1	0	1	0	1
1	1	0		
1	1	1	1	1





(d) The UK switched across to digital TV broadcasting between 2009 and 2012.

(i) Give **two** advantages for the viewer of introducing digital TV broadcasting.

(2)

1 .....

.....

2 .....

.....

(ii) An information leaflet about digital TV was posted through the door of every house in the UK showing this cartoon character.

How did the advertisers ensure no one was offended by this character?



(2)

.....

.....

.....

.....

(e) State the scale of production suitable for printing leaflets for every house in the UK during the advertising campaign.

(1)

.....

**(Total for Question 14 = 19 marks)**

**TOTAL FOR PAPER = 80 MARKS**

