

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 June 2011 – Morning

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.*

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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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 Buzzer
- B Thermistor
- C Transistor
- D Battery

(Total for Question 1 = 1 mark)

2 Which **one** of the following components is a process device?

- A Moisture sensor
- B Solenoid
- C Thyristor
- D Ammeter

(Total for Question 2 = 1 mark)

3 Which **one** of the following safety precautions should be used when soldering?

- A Gloves
- B Ear defenders
- C Ventilation
- D Safety footwear

(Total for Question 3 = 1 mark)

4 Which **one** of the following materials is likely to rust?

- A Aluminium
- B Brass
- C Copper
- D Mild steel

(Total for Question 4 = 1 mark)



5 Which **one** of the following logic gates has only one input?

- A NOT
- B AND
- C OR
- D NOR

(Total for Question 5 = 1 mark)

6 Which **one** of the following instruments is used to measure current?

- A Ammeter
- B Voltmeter
- C Ohmeter
- D Wattmeter

(Total for Question 6 = 1 mark)

7 Which device is most suited for use in the screen of a modern mobile phone?

- A Bulb
- B Light emitting diode (LED)
- C 7-segment display
- D Liquid crystal display (LCD)

(Total for Question 7 = 1 mark)

8 A blister pack consists of a plastic shell and pre-printed card.

Which **one** of the following manufacturing processes is most suited to batch producing blister packs?

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

(Total for Question 8 = 1 mark)



9 Which **one** of the following components allows current to flow in one direction only?

- A Resistor
- B Reed switch
- C Diode
- D Solenoid

(Total for Question 9 = 1 mark)

10 Which **one** of the following switches could be used to control the direction of rotation of a motor?

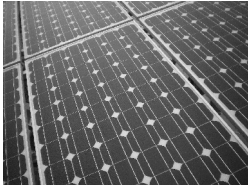


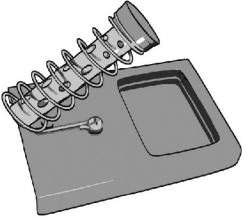
- A Single pole single throw (SPST)
- B Push to make (PTM)
- C Double pole double throw (DPDT)
- D Push to break (PTB)

(Total for Question 10 = 1 mark)



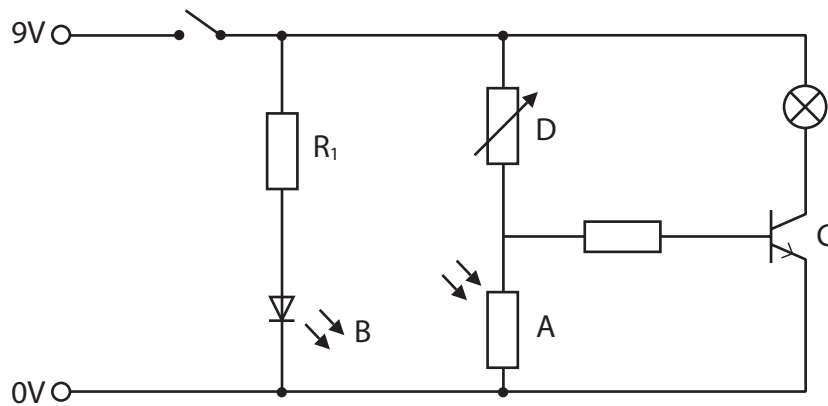
11 (a) The table below shows some tools and components.

Complete the table by giving the missing names and uses.

Tools/Components	Name	Use
	Solar cells	(1)
	Relay	(1)
	(1)	To convert electrical energy to sound
	(1)	To hold a soldering iron safely



(b) A student is making a nightlight. This is a circuit that will automatically switch a lamp on when it becomes dark. The circuit is shown below.



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

(3)

A

B

C

(c) Component **D** is a variable resistor.

Describe the purpose of component **D** in this circuit.

(2)

.....

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.....

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(d) Use the formula $R = \frac{V}{I}$ to calculate the resistance of R_1 when 7 volts across it gives a current of 2 mA. Remember to include the units in your answer.

(3)

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(e) The nightlight could be powered by solar power (with storage batteries) or by disposable batteries.

Give **one** advantage and **one** disadvantage of these power sources for the nightlight.

(4)

Disposable Batteries – Advantage

Disposable Batteries – Disadvantage

Solar power – Advantage

Solar power – Disadvantage

(f) The Kyoto Protocol is an international agreement to limit the emission of greenhouse gases.

(i) Name the main greenhouse gas that the Kyoto Protocol aims to control.

(1)

(ii) State **two** ways in which the emission of greenhouse gasses could be reduced.

(2)

1

2

(Total for Question 11 = 19 marks)



12 You have been asked to design the casing for an alarm that will alert parents when their child wanders too far away. The casing will be made in a school workshop.

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

The specification for the child alarm is that it must:

- look attractive to young children
- attach to the child or their clothing
- have a means of being switched on and off
- have a 'power on' indicator
- emit a loud noise when activated
- have its own power supply
- be made using an appropriate material
- be made using an appropriate manufacturing method.

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

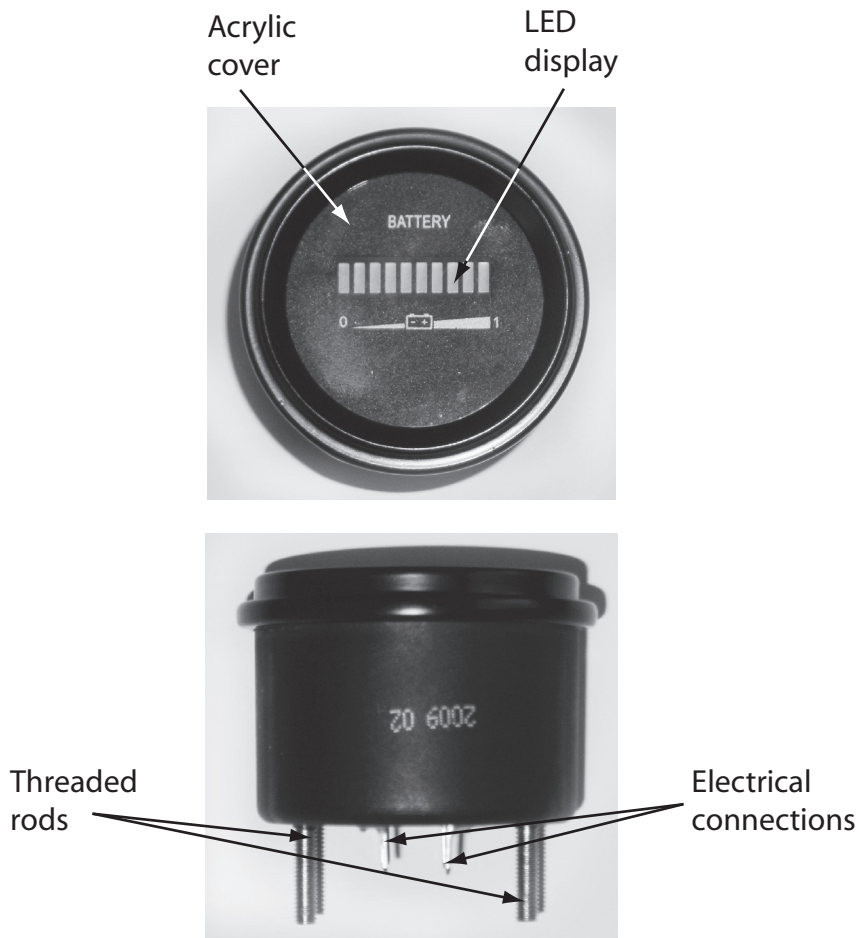
Design idea 2

(8)

(Total for Question 12 = 16 marks)



13 The pictures below show a battery condition indicator which uses an LED display. It is used in electrically powered vehicles to indicate how much energy remains in the batteries.



(a) Give **two** advantages of an LED display compared with other forms of visual indication.

(2)

1

2



(b) The LED display is protected by a clear acrylic cover.

Give **two** features of acrylic that make it suitable for making the cover.

For each feature, justify your answer.

(4)

Feature 1

Justification

Feature 2

Justification

(c) Explain how the battery condition indicator is successful in meeting the following specification points:

(i) The driver has a clear indication of how much energy remains in the battery.

(2)

(ii) The indicator can easily be inserted into a car dashboard.

(2)



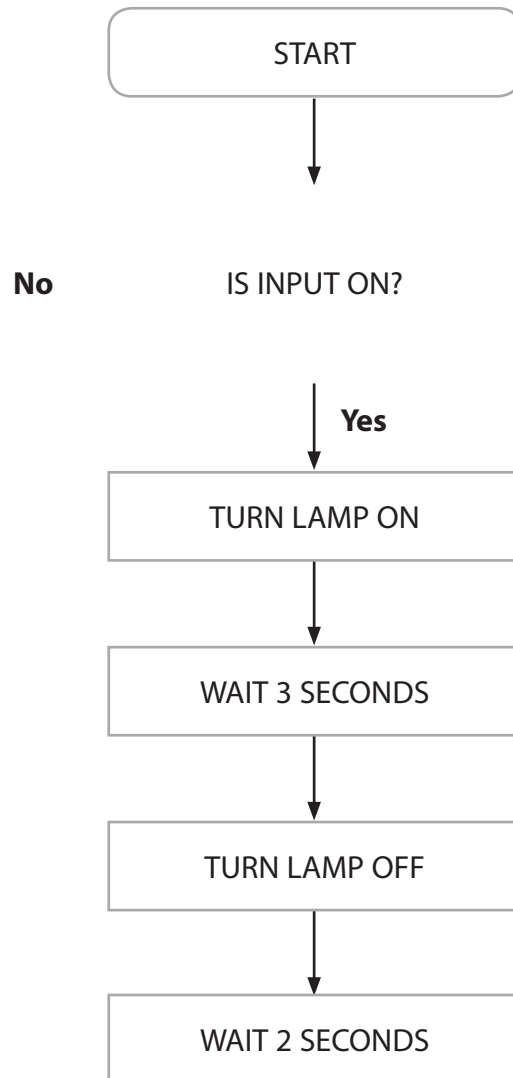
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14 The flowchart below is a PIC program which will make a lamp flash continuously when the 'input' signal is on.

(a) Complete the flowchart by adding the correct shape symbol and feedback to make the lamp flash continuously.

(3)



(b) (i) Give **two** reasons why a manufacturer may prefer to use a PIC rather than a 555 timer chip in this application.

(2)

1

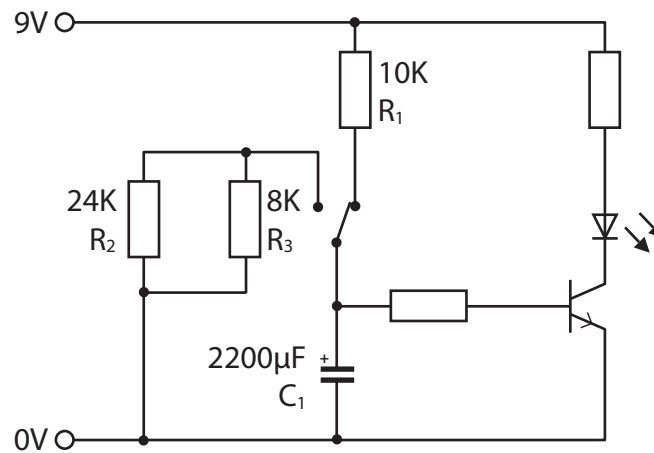
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2

.....



(d) The circuit below is a time delay circuit. When the switch is moved to the position shown, the LED will come on after a short time delay.



(i) Give **two** means of identifying the anode (positive terminal) on a polarised capacitor.

(2)

1

.....

2

.....

(ii) Use the formula $\frac{R1 \times R2}{R1 + R2}$ to calculate the total resistance of resistors R2 and R3 in parallel.

(1)

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.....

..... ohms



(iii) Discuss the function of R1, C1 and the transistor in creating the time delay.

(3)

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(Total for Question 14 = 19 marks)

TOTAL FOR PAPER = 80 MARKS



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