

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	
Tuesday 22 June 2010 – 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.

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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 a sensor?

- A Loudspeaker
- B Transistor
- C Light dependent resistor
- D Capacitor

(Total for Question 1 = 1 mark)

2 Which **one** of the following describes a type of switch?

- A PCB
- B SPDT
- C FET
- D LED

(Total for Question 2 = 1 mark)

3 Which colour band on a resistor indicates a tolerance of $\pm 5\%$?

- A Gold
- B Silver
- C Brown
- D Red

(Total for Question 3 = 1 mark)

4 Which **one** of the following units is used to measure resistance?

- A farad
- B amp
- C ohm
- D volt

(Total for Question 4 = 1 mark)



5 Which **one** of the following is the most suitable method for making 10,000 plastic bottles?

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





(Total for Question 5 = 1 mark)

6 Which **one** of the following materials requires surface protection when used outdoors?

- A Pine
- B Copper
- C Acrylic
- D Aluminium

(Total for Question 6 = 1 mark)

7 Which **one** of the following PIC flowchart symbols is used for the commands 'Start' and 'Stop'?

- A 
- B 
- C 
- D 

(Total for Question 7 = 1 mark)

8 Which **one** of the following equations gives the Time Period for an RC circuit?

- A $T = R+C$
- B $T = RC$
- C $0.7T = RC$
- D $TC = 0.7R$

(Total for Question 8 = 1 mark)



9 Which **one** of the following is found on a field effect transistor (FET)?

- A Emitter
- B Gate
- C Base
- D Collector

(Total for Question 9 = 1 mark)

10 Which **one** of the following input conditions would give an output of 1 from a two-input NOR gate?




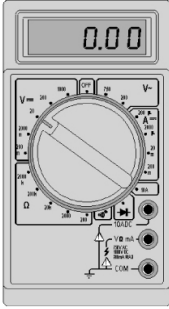
- A 00
- B 01
- C 10
- D 11

(Total for Question 10 = 1 mark)



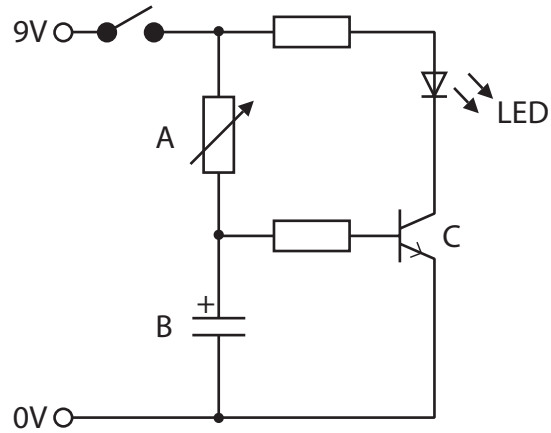
11 (a) The table below shows some tools and components.

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

Tools/Components	Name	Use
	Reed switch	(1)
	(1)	To display numbers
	Side cutters	(1)
	(1)	For testing voltage, resistance, current.



(b) A student is making a game timer using the circuit below.



(i) Name the components labelled A, B and C. (3)

A

B

C

(ii) Describe the function of component C in this circuit. (2)

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(c) A resistor has a resistance of 330R.

The resistor colour code is given below.

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

Band 1 of the resistor is coloured orange.

State the colours of: (2)

Band 2

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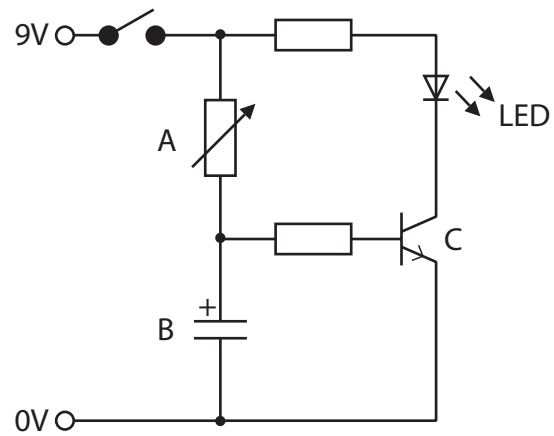
Band 3

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- (d) The student wishes to measure the voltage across the LED.
Show on the diagram below with clear crosses (x) where the **two** probes of a voltmeter should be connected.

(2)



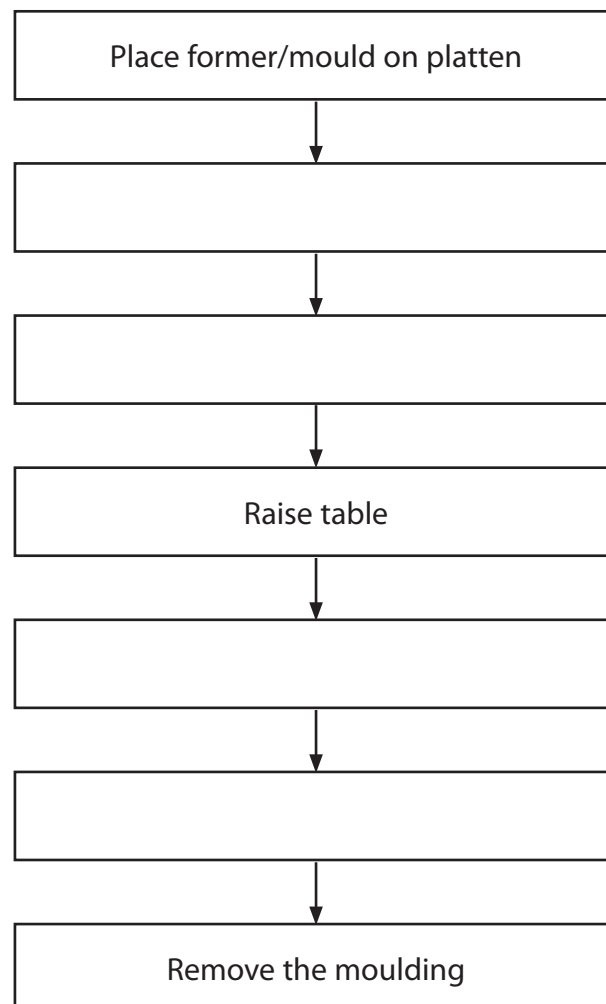
- (e) Some packages for electronic circuits are manufactured using the vacuum forming process.

- (i) Using the stages written below, complete the boxes to show the correct sequence for the vacuum forming process.

(4)

Stages in the process:

- Allow to cool
- Heat the plastic sheet
- Switch on the suction pump
- Place plastic sheet in the vacuum former



(ii) Give **two** safety precautions which should be followed when using a vacuum forming machine in a school workshop.

(2)

1

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2

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(Total for Question 11 = 19 marks)



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Turn over for question 12



12 You have been asked to design an alarm for a bicycle. The alarm will sound if the bicycle is moved.

The specification for the alarm is that it must:

- have a simple casing
- be attached to the bicycle
- be switched on and off
- be battery powered
- allow the battery to be replaced
- detect movement of the bicycle
- have an audible output
- be made using materials available in a school workshop.

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)

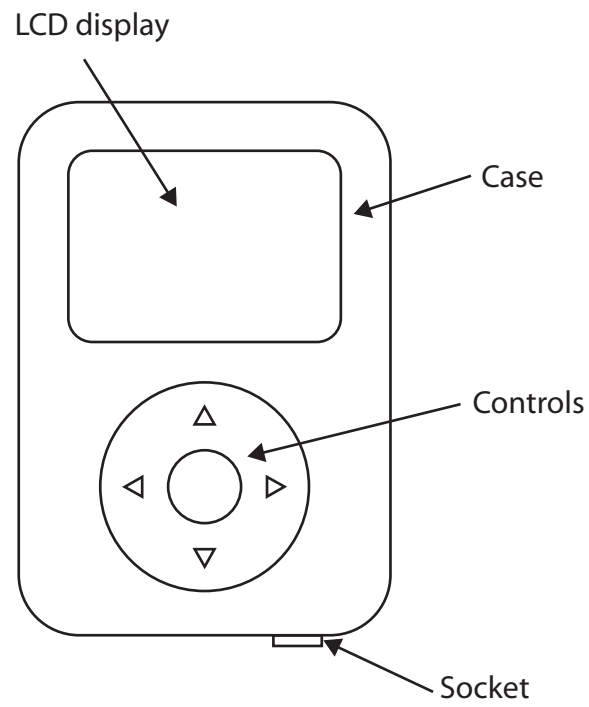
Design idea 2

(8)

(Total for Question 12 = 16 marks)



13 The picture below shows an MP3 player.



(a) Explain how the MP3 player meets the following specification points:

(i) easy to read the display

(2)

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(ii) easy to connect to headphones.

(2)

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(b) The case of the MP3 player is made of high impact polystyrene (HIPS).

Give **two** properties of HIPS that make it a suitable material for the case of the MP3 player.

For each property, give **one** reason why it is suitable.

(4)

Property 1

Reason

Property 2

Reason

(c) MP3 players are designed with built-in obsolescence in mind.

Explain **one** benefit to the manufacturer of built-in obsolescence.

(2)

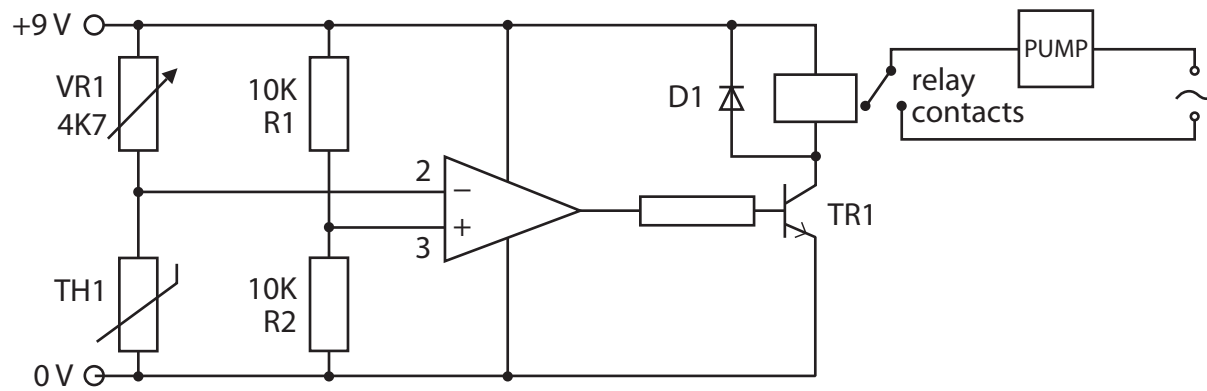


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Turn over for question 14



14 The circuit below automatically controls a solar heating pump. When the water is hot, the pump circulates the water. When the water is cold, the pump turns off.



(a) (i) State the function of VR1 in the circuit. (1)

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(ii) Explain the function of diode D1 in the circuit. (2)

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(iii) The resistance of R1 and R2 in series is 20 K.
 Calculate the current flowing through these resistors.
 Use the formula $I = V/R$ (2)

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(iv) R1 and R2 ensure the voltage at pin 3 of an Op-Amp is fixed.

Explain why this is important when using Op-Amps.

(2)

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(b) This circuit could be built on a breadboard, stripboard, or on a PCB.
Explain **one** advantage of using each of these three methods.

(i) **One** advantage of using a breadboard is:

(2)

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(ii) **One different** advantage of using a stripboard is:

(2)

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(iii) **One different** advantage of using a PCB is:

(2)

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