

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**  
**DESIGN AND TECHNOLOGY**  
**Electronics and Control Systems**  
Sustainable Design

**A512**

Candidates answer on the question paper.

**OCR supplied materials:**  
None

**Other materials required:**  
None

**Wednesday 22 June 2011**  
**Morning**  
**Duration: 1 hour**



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**INSTRUCTIONS TO CANDIDATES**

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Answer **all** the questions **in Section A and Section B**.
- Do **not** write in the bar codes.

**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- Your quality of written communication is assessed in questions marked with an asterisk (\*).
- This document consists of **16** pages. Any blank pages are indicated.

**Section A**

Answer **all** questions.

You are advised to spend 15 minutes on this section.

On questions 1–5 **circle** your answer.

- 1 A charity organisation collects unwanted furniture and sells it to provide funds for worthy causes. Are they promoting:
- (a) Reliance
  - (b) Reuse
  - (c) Reliability
  - (d) Rot-proofing chemicals for wood
- [1]

- 2 Fig. 1 shows a symbol found on products. What does it represent?



**Fig. 1**

- (a) Certainly easy to use
  - (b) Contains electricity
  - (c) That the product meets the requirements of the applicable European Directive
  - (d) Cannot be recycled
- [1]
- 3 Methane is produced by domestic waste when it is placed in landfill sites. Methane is:
- (a) A green gas
  - (b) Good for helping plants grow
  - (c) Useful in preserving the ozone layer
  - (d) A greenhouse gas
- [1]

- 4 A biomass boiler burns which of the following to produce energy:
- (a) Plant and wood-derived pellets or shavings
  - (b) Coal
  - (c) Crude Oil
  - (d) Natural Gas
- [1]
- 5 Supermarkets are promoting the re-use of carrier bags to:
- (a) Save the planets resources
  - (b) Save them the trouble of packing your shopping
  - (c) Save storage space in their depot
  - (d) Promote their home delivery service
- [1]
- 6 State what the abbreviation '**RoHS**' represents.
- ..... [1]
- 7 State why the use of recycled paper is a good idea.
- ..... [1]
- 8 Why are plumbers required to use lead-free solder for connecting domestic water pipes?
- ..... [1]
- 9 What term describes the design of furniture to ensure the comfort of its user?
- ..... [1]
- 10 State how electronic equipment should be disposed of.
- ..... [1]

4

Decide whether each of the following statements is **true** or **false**.

Tick (✓) the box to show your answer.

	<b>True</b>	<b>False</b>	
<b>11</b> If a product is described as a “one-off” it can only be used once	<input type="checkbox"/>	<input type="checkbox"/>	<b>[1]</b>
<b>12</b> Riding your pushbike on cycle paths contributes to global warming	<input type="checkbox"/>	<input type="checkbox"/>	<b>[1]</b>
<b>13</b> The Forestry Commission is the government department responsible for the protection of Britain’s forests and woodlands	<input type="checkbox"/>	<input type="checkbox"/>	<b>[1]</b>
<b>14</b> Car sharing decreases overall carbon emissions	<input type="checkbox"/>	<input type="checkbox"/>	<b>[1]</b>
<b>15</b> Filament bulbs are being phased out to save energy	<input type="checkbox"/>	<input type="checkbox"/>	<b>[1]</b>

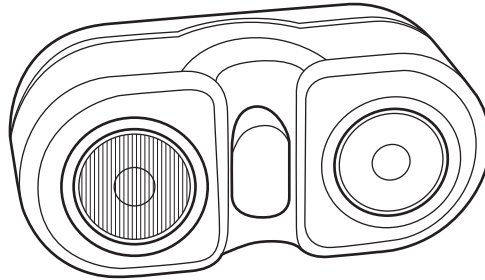
**Total [15]**

**Section B**

Answer **all** questions.

You are advised to spend 45 minutes on this section.

**16** Fig. 2 shows a bicycle rear light made from a plastics material.



**Fig. 2**

**(a)** Identify **four** specification points relating to the design of the bicycle rear light shown in Fig. 2

- Point 1 .....
- Point 2 .....
- Point 3 .....
- Point 4 ..... **[4]**

**(b) (i)** Name a suitable manufacturing method for the plastic body of the bicycle rear light shown in Fig. 2.

..... **[1]**

**(ii)** The manufacturing method used to produce the bicycle rear light parts produces a small amount of waste material.

State which **one** of the 6Rs may be applied to the waste material.

..... **[1]**

**(iii)** Bicycle rear lights often use primary cells as a power source.

Give **two** possible modifications that would lower the lights environmental impact during its service life.

Modification 1 .....

.....

Modification 2 .....

..... **[2]**

(c) Explain how electronics can be used in the design of a superior product.

.....  
.....  
.....  
.....  
.....  
..... [4]

(d) The organiser of a large off-road cycle race wishes to reduce the environmental impact of the event. They record mileages covered by everyone to get to and from the venue and then “carbon offset” the calculated total.

(i) State the meaning of the term **carbon offsetting**.

..... [1]

(ii) Give **two** examples of practical carbon offsetting.

1 .....

2 ..... [2]

**Total [15]**

17 Fig. 3 shows an assembled solar powered lamp.



Fig. 3

(a) The solar powered lamp is packaged in a box made of recycled cardboard.

(i) State why this is considered good environmental practice.

..... [1]

The manufacturer has printed assembly instructions showing how to assemble the lamp on the outside of the box.

(ii) State which of the 6Rs this illustrates.

..... [1]

(iii) State **two** benefits of printing the assembly instructions on the outside of the box.

Benefit 1 .....

Benefit 2 ..... [2]

(b) The solar powered lamp contains a Ni-Cad cell.

After 4 years use the Ni-Cad cell in the solar powered lamp will be worn out.

(i) State how a worn out Ni-Cad cell should be disposed of.

..... [1]

(ii) If the worn out cell was replaced, state which of the 6Rs would have been fulfilled.

..... [1]

(iii) Since 2008 an EU directive has banned all manufacturers/distributors from importing Ni-Cad batteries into Europe.

Give **one** reason why this legislation has been introduced.

.....  
..... [1]

(c) The WEEE Directive aims to both reduce the amount of electrical and electronic equipment being produced and to encourage everyone to reuse, recycle and repair it.

Look at Fig. 4a and 4b and explain how the designer has made the solar powered lamp WEEE compliant.



Fig. 4a



Fig. 4b

.....  
.....  
.....  
.....  
.....  
..... [3]



(d) Fig. 5 shows a solar torch built using the components from a solar powered lamp.



**Fig. 5**

State which of the 6Rs the designer of this product has applied.

..... [1]

(e) Although fully functional, the solar torch in Fig. 5 lacks user appeal.

Produce an annotated sketch to show an improved version of the torch below.

[4]

**Total [15]**

**Turn over**

18 Fig. 6 shows details on a mains power unit.



Fig. 6

(a) State what the symbol labelled **X** on Fig. 6 indicates.

(i) ..... [1]

State why symbols rather than text are often used on products sold across Europe.

(ii) ..... [1]

(b) In use the mains power unit gets warm.

State what **type** of energy is being wasted by the power unit.

(i) ..... [1]

State in what **form** the wasted energy appears.

(ii) ..... [1]

(c) Give **three** methods of saving energy in the home.

Method 1 .....

.....

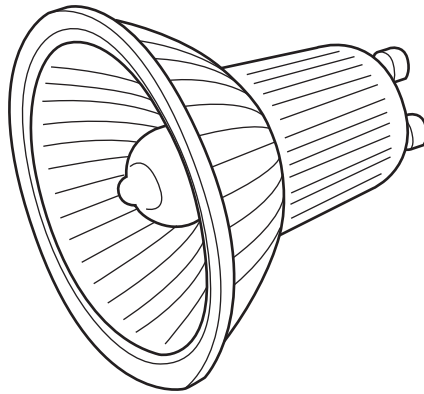
Method 2 .....

.....

Method 3 .....

..... [3]

(d) LED bulbs are now available as replacements for the halogen bulb shown in Fig. 7.



**Fig. 7**

Give **two** environmental benefits from replacing halogen bulbs with their LED equivalents.

Benefit 1 .....

Benefit 2 ..... [2]

Fig. 8 shows a wind farm that contains over a hundred wind turbines.



**Fig. 8**



**14**  
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