GCSE
ENGINEERING
Unit 1 Written Paper

Tuesday 24 May 2016 Morning Time allowed: 1 hour

Materials
For this paper you must have:
• normal writing and drawing instruments.

Instructions
• Use black ink or black ball-point pen. Use pencil only for drawing.
• Fill in the boxes at the top of this page.
• Answer all questions.
• You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
• Do all rough work in the answer book. Cross through any work you do not want to be marked.
• All dimensions are given in millimetres unless otherwise stated.

Information
• The marks for questions are shown in brackets.
• The maximum mark for this paper is 75.
• You are reminded of the need for good English and clear presentation in your answers. Quality of Written Communication will be assessed in Question 4(b)(i).
Answer all questions in the spaces provided.

1  **Figure 1** shows the inside of an electric whisk.

1 (a) Describe the function of each labelled part.  

[6 marks]

Control knob
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Locating holes
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
Ventilation slots
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
1 (b) Electrically powered tools operate using an electrical circuit as shown in Figure 2.

Figure 2

A +

M

B

C

1 (b) (i) In the spaces below, identify the components labelled A to C.

A

B

C

[3 marks]

1 (b) (ii) Some electrical tools have Light Emitting Diodes (LEDs) that light up.

Complete the circuit diagram below to include an LED and resistor.

[2 marks]
1 (b) (iii) Describe the function of an electrical switch.  

[2 marks]

1 (b) (iv) Describe the function of a resistor.  

[2 marks]
Figures 3 and 4 show two types of whisk.

Describe three differences between the two types of whisk.

[6 marks]
3 (a) All metals are classified as ferrous or non-ferrous.

Complete the table below to show the correct category and a typical use for each metal. The first one has been completed for you as an example.

<table>
<thead>
<tr>
<th>Metal</th>
<th>Category</th>
<th>Typical use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium</td>
<td>Non-Ferrous</td>
<td>Drinks cans</td>
</tr>
<tr>
<td>Stainless Steel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cast Iron</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3 (b) Using notes and sketches describe a welding process.
3 (c) Riveting is a method of joining sheet materials together.

Give one advantage and one disadvantage of using riveting. In each case you should fully explain your answers.

[6 marks]

Advantage __________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Disadvantage _______________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
An electric jigsaw is shown in Figure 5. It can be used to cut sheet metals.

**Figure 5**

4 (a) Name **three** health and safety hazards when handling or cutting sheet metal.

For each hazard, suggest a safety measure.

**[6 marks]**

Hazard 1 ____________________________________

Safety measure ____________________________________

_________________________________________________

Hazard 2 ____________________________________

Safety measure ____________________________________

_________________________________________________

Hazard 3 ____________________________________

Safety measure ____________________________________

_________________________________________________
4 (b) (i) In industry, sheet materials are often cut using Computer Numerically Controlled (CNC) devices.

Explain how you would instruct a CNC device to cut a design from a sheet of material.

Quality of Written Communication will be assessed in your answer. [6 marks]

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

4 (b) (ii) Give two advantages and two disadvantages of using CNC devices to cut materials instead of cutting them by hand. [4 marks]

Advantage 1

____________________________________________________________________________________

Advantage 2

____________________________________________________________________________________

Disadvantage 1

____________________________________________________________________________________

Disadvantage 2

____________________________________________________________________________________
Garden hedge trimmers often look like the one shown in Figure 6.

Figure 6

A client asks a designer to create a new garden hedge trimmer.

Suggest three user requirements a designer would need to research before producing a specification for the trimmer.

For each requirement, state one reason why the designer would need the information. [6 marks]

Requirement 1
Reason

Requirement 2
Reason

Requirement 3
Reason
6. **Figure 7** shows an image of a typical jigsaw blade.

![Figure 7](image)

The maximum dimensions of the blade are as follows:

- Length = 140 mm
- Width = 12 mm
- Thickness = 3 mm

Using standard drawing conventions, label the drawing below to show **two** dimensions of the blade.

[4 marks]
A pillar drill is used to make two holes in a length of low carbon (mild) steel bar as shown in **Figure 8**.

**Figure 8**

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of bar</td>
<td>200 mm</td>
</tr>
<tr>
<td>Width of bar</td>
<td>50 mm</td>
</tr>
<tr>
<td>Diameter of holes</td>
<td>20 mm</td>
</tr>
<tr>
<td>Distance between centres</td>
<td>160 mm</td>
</tr>
</tbody>
</table>

7 (a) Describe the process of accurately marking and drilling the holes. 

[4 marks]
7 (b) (i) A manufacturer wants to make a batch of 100 of the bars shown in Figure 8.

Using notes and sketches show how the holes are drilled in the correct position without marking them out.

[4 marks]

7 (b) (ii) Give four benefits of using jigs or templates when manufacturing products.

[4 marks]

Benefit 1

Benefit 2

Benefit 3

Benefit 4

END OF QUESTIONS