Monday 22 May 2017 Morning Time allowed: 2 hours

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 in Section A.
• Answer one question from Section B, either Question 6 or Question 7.
• Answer the question in Section C.
• 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 this book. Cross through any work that you do not want to be marked.

Information
• The marks for questions are shown in brackets.
• The maximum mark for this paper is 80.
• There are 20 marks for Section A, 20 marks for Section B and 40 marks for Section C.

Advice
• Illustrate your answers with sketches and/or diagrams wherever you feel it is appropriate.
• You are advised to spend approximately 30 minutes on Section A, 30 minutes on Section B and one hour on Section C.
### Section A

**Answer all questions in this section.**

1. **(a)** What is meant by the term ‘hardwood’?
   
   [1 mark]

   ___________________________________________________________
   ___________________________________________________________

1. **(b) (i)** Name a specific hardwood. Give an application for this hardwood.
   
   [2 x 1 mark]

   Hardwood _________________________________________________
   Application _______________________________________________

1. **(b) (ii)** Give one reason to explain why this hardwood is suitable for the application you have named in part (b)(i).
   
   [2 marks]

   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________
   ___________________________________________________________

1. **(c)** Hardwoods and softwoods are available in ‘rough sawn’ stock form and in ‘P.S.E.’ stock form. Explain the meaning of ‘rough sawn’ and ‘P.S.E.’.
   
   [2 x 1 mark]

   Rough sawn _______________________________________________
   ___________________________________________________________
   P.S.E ______________________________________________________
2 What do the acronyms 'COSHH' and 'PPE' stand for? [2 x 1 mark]

COSHH

PPE

3 Knock-down (K-D) fittings are used in flat pack furniture.

Name three knock-down (K-D) fittings. [3 marks]

K-D fitting 1

K-D fitting 2

K-D fitting 3

4 (a) Which classification of material does bronze belong to? [1 mark]

4 (b) (i) Give an application for bronze. [1 mark]

4 (b) (ii) Give one reason why bronze is suitable for the application you have given in part (b)(i). [2 marks]
Match each product to the most appropriate material. [4 marks]

<table>
<thead>
<tr>
<th>Product</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Garden paving slab</td>
<td></td>
</tr>
<tr>
<td>Swimming pool slide</td>
<td></td>
</tr>
<tr>
<td>Body armour</td>
<td></td>
</tr>
<tr>
<td>Drill bit</td>
<td></td>
</tr>
</tbody>
</table>

A  Glass-fibre Reinforced Plastic (GRP)
B  Tungsten carbide
C  Polylactide (PLA)
D  Kevlar
E  Concrete
Section B

Answer either Question 6 or Question 7.

6 (a) Explain in detail why each material is suitable for the given product.

In your answer you may wish to consider manufacture, function and aesthetics.

<table>
<thead>
<tr>
<th>Material</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polypropylene</td>
<td>Margarine tub</td>
</tr>
<tr>
<td>Stainless steel</td>
<td>Kitchen sink</td>
</tr>
</tbody>
</table>

Do not write outside the box
6 (a) (i) Polypropylene (PP) – margarine tub.

[8 marks]
6 (a) (ii) Stainless steel – kitchen sink.

[8 marks]
6 (b) (i) Explain the meaning of the term 'biodegradable polymer'. [2 marks]

6 (b) (ii) Explain why biodegradable polymers can be used for carrier bags. [2 marks]
The photograph below shows a portable external hard drive for use with a computer. The outer cover of the hard drive is made from aluminium.

7 (a) (i) Explain in detail why aluminium is suitable for the outer cover of the hard drive.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
7 (a) (ii) The aluminium outer cover could have been made by press forming.

Use notes and diagrams to describe press forming the aluminium outer cover.  

[9 marks]
7 (b) The aluminium outer cover has been anodised.

The diagram below shows the anodising process. Label the diagram. [5 marks]
8 The photograph shows a re-usable drinks bottle. The drinks bottle is made from Low Density Polyethylene (LDPE).

8 (a) (i) Explain in detail why Low Density Polyethylene (LDPE) is suitable for the drinks bottle.

[6 marks]
The drinks bottle body could have been manufactured using the blow moulding process.

Use notes and diagrams to describe the blow moulding process for the drinks bottle body.

[9 marks]
8 (b) (i) The drinks bottle top could have been manufactured using the injection moulding process.

Use notes and diagrams to describe the injection moulding process for the drinks bottle top.

[9 marks]
Question 8 continues on the next page
8 (b) (ii) Explain why injection moulding is a suitable process for manufacturing the drinks bottle top.

[4 marks]
8 (c) Use notes and diagrams to develop retail packaging for the drinks bottle shown on page 15.

The retail packaging should:

- be suitable for a single drinks bottle
- attract the target market of users aged 12 years or older.

In your answer you should make reference to:

- function
- aesthetics
- materials
- manufacture.

[12 marks]