CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

DESIGN AND TECHNOLOGY 9705/03

Paper 3

May/June 2003

2 hours 30 minutes

Additional Materials: Answer paper
A3 Drawing paper (5 sheets)
A range of design drawing equipment

READ THESE INSTRUCTIONS FIRST

Write your name, Centre number and candidate number in the spaces provided on the answer paper/answer booklet.

Section A
Answer any two questions from one of the Parts A, B or C.

Section B
Answer one question.
Write your answers on the separate answer paper provided.
If you use more than one sheet of paper, fasten the sheets together.

The number of marks is given in brackets [ ] at the end of each question or part question.
All dimensions are in millimetres.
The instruction ‘discuss’ denotes that you should:
• examine critically the issues raised by the question;
• explain and interpret these issues as appropriate;
• introduce evidence wherever possible to support conclusions of arguments.
Section A

Answer two questions from one of the Parts A, B or C.

Part A – Product Design

1 Use sketches and notes to describe two different methods of manufacturing a Ø 30 sphere. (The sphere may be either hollow or solid.)

For each method include details of the specific material used and methods used to ensure accuracy. [10 x 2]

2

<table>
<thead>
<tr>
<th>High carbon steel screwdriver blade process: hardening and tempering</th>
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<td>![High carbon steel screwdriver blade image]</td>
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<th>Plastic fan cover process: compression moulding</th>
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<td>![Plastic fan cover image]</td>
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<td>section through fan cover</td>
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<th>Wood picture frame section process: moulding</th>
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<td>![Wood picture frame image]</td>
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Fig. 1

Choose two of the items shown in Fig. 1 and for each:

(a) use sketches and notes to describe the process that relates to the chosen item; [7x2]

(b) explain why the process is particularly suitable for the production of the item. [3 x 2]

3 Discuss how designers would take into consideration cultural and aesthetic needs when designing jewellery. Use illustrations and examples to support your answer. [20]
Part B – Practical Technology

4 (a) Use examples to explain the difference between a natural and a manufactured structure.

(b) Use examples to explain the difference between a monocoque and a frame structure.

(c) Structures are subjected to many forces. Use one example for each of the following to describe the effect that forces have on, and how they are withstood by:

(i) a natural structure;

(ii) a manufactured structure.

5 Increasing consumer awareness of environmental issues has led to a greater focus on the development of energy efficient products.

(a) State how energy efficiency is calculated.

(b) (i) Identify two energy efficient domestic products or systems and describe the purpose of each.

(ii) Explain how the energy efficiency is achieved within the products or systems identified in part (i).

6 Materials can be joined in many different ways.

(a) Use notes and sketches to explain the differences between soft soldering and welding (electric or gas).

Give one example of a suitable application of each method.

(b) Describe in detail the process of preparing surfaces and applying the following adhesives to make a successful joint.

In each case, state appropriate materials to be joined.

- Epoxy resin
- Polyvinyl Acetate (PVA)
- Contact adhesive
7 Fig. 2 shows a design for a village hall.

![Diagram of a village hall]

**Fig. 2**

Building contractors require a high quality presentation drawing to use on their promotional literature.

(a) Draw, approximately twice full size, a presentation view of the village hall using estimated two point perspective. [14]

(b) Render the walls, roof, windows and door to make the village hall look realistic. [6]

8 Discuss how computers have influenced the design and manufacture of products in the following areas:

- research;
- working and presentation drawings;
- stock control;
- the control of production machines. [20]
Graphic methods are often used to present information in a clear and easily understood form.

(a) Explain using an example:
(i) a pictogram;
(ii) a flow chart. [6]

(b) Fig. 3 shows a full size isometric view of a bracket.

Fig. 3

(i) Draw views A and B twice full size in orthographic projection. [6]
(ii) Take approximate measurements from Fig. 3 to fully dimension the drawings. [6]
(iii) Indicate the angle of projection. [2]
You should approach the design question of your choice in the following manner:

Analysis
   Produce an analysis of the given situation/problem, which may be in written or graphical form. [5]

Specification
   From the analysis produce a detailed written specification of the design requirements. [5]

Exploration
   Use bold sketches and brief notes to show your exploration of ideas for a design solution, with reasons for selection. [25]

Development
   Show using bold sketches and notes, the development, reasoning and composition of ideas into a single design proposal. Give details of materials, constructional and other relevant technical details. [25]

Proposed solution
   Produce drawings of an appropriate kind to show the complete solution. [15]

Evaluation
   Give a written evaluation of the final design solution. [5]

[Total : 80]
A popular pastime at sunny holiday resorts is to relax on the beach, either sunbathing or reading.

Design a product that is capable of:

- safely and comfortably supporting an adult when reading or sunbathing;
- being adjusted to a range of positions from a reclining position to an upright reading position;
- being easily carried to and from the boot of a car to the beach.

To assist you in your design work, anthropometric data is given in Fig. 4
Money boxes, to collect for charities, are more likely to attract attention and use if the donor has a response when a coin is deposited.

A money box is to be situated in the entrance hall of a school.

You are to design a mechanical/electronic system which is activated by inserting a coin. It is to be attached to the money box shown in Fig. 5.

The system must:
- react to the insertion of a coin by having a mechanical movement;
- use either lights or noise to amuse the donor;
- attach securely to the money box.

Details of the construction of the money box are not required.
A company wishes to promote a new range of fruit drinks. The drinks are designed for children and will come in three flavours:

- Annie Apple
- Laurie Lemon
- Oliver Orange

The company will promote the drinks by offering a pack of three ceramic mugs at a special price.

You are to design the following:

- a cartoon style character for one of the flavours. It is to be printed on the space indicated on the mug shown in Fig. 6;
- an easy to carry card package to hold and protect three mugs. Include full details of nets/developments;
- an appropriate lettering style for the flavour of your choice should be seen clearly on the packaging.

Fig. 6