

**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

**NOVEMBER 2002**

**GCE Advanced Level**

<b>MARK SCHEME</b>
<b>MAXIMUM MARK : 120</b>
<b>SYLLABUS/COMPONENT : 9705 /3</b> <b>DESIGN AND TECHNOLOGY</b> <b>(WRITTEN 2)</b>

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## Section A

### Part A – Product Design

- 1 (a) appropriate material including:
- aluminium
  - mild steel
  - appropriate wood laminate
- 1
- Reasons including:
- strength
  - comfort
- 2 [3]
- (b) description to include:
- appropriate method;
  - shaping;
  - forming;
  - drilling.
- quality of description:
- fully detailed 3 - 6
  - some detail, 0 - 2
- quality of sketches up to 2 [8]
- (c) explanation could include:
- change in process;
  - change in materials;
  - use of templates, jigs, formers;
  - simplification of design.
- quality of explanation:
- logical, structured 4 - 7
  - limited detail, 0 - 3
- quality of sketches up to 2 [9]
- [Total: 20]

2 (a) examples could include:

- seat height;
- leg room
- steering wheel position;
- head rest

for four examples                      3 x 4                      [12]

(b) explanations could include:

- physiological – seat angle
- force required to turn wheel;
- psychological – shape:
- colour;
- room;
- interior quality.

For two explanations                      4 x 2                      [8]

[Total: 20]

3 (a) requirements could include:

- durability;
- vandal proof;
- strength;
- finish;
- appearance;
- comfort.

For five requirements (qualified statements)    1 x 5                      [5]

(b)    appropriate design                      3  
        construction                              1  
        quality of sketch                      up to 2                      [6]

(c) appropriate material including:

- aluminium
- mild steel
- appropriate wood                      1

Reasons including:

- strength;
- comfort;
- appearance.                              2                      [3]

(d)    understanding of aesthetics                      3  
        quality of explanation                      3                      [6]

[Total: 20]

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### Part B – Practical Design

- 4 (a) description of process
- fully detailed 3 - 5
  - some detail, 0 - 2
- quality of sketches up to 2 7 x 2 [14]
- (b) die casting:
- complex shape;
  - quality finish;
  - can be repeated;
- extrusion:
- little wastage;
  - once set up, vast production runs;
  - reliable dimensions;
- blow moulding:
- once set up, vast production runs;
  - complex shape;
  - speed of production. 3 x 2 [6]
- [Total: 20]
- 5 (a) explanation: monocoque – shell structure  
frame – components 2
- examples: egg; 2 [4]  
pylon
- (b) graphic method (create parallelogram) 1 x 2
- Correct answer 10.8 N, 10.4 N (+or- .3) 1 x 2 [4]
- (c) understanding may include:
- capital letters for spaces between forces; 2
  - lower case on vector diagrams 2
- reference to forces / framework diagram 2
- sketch/s 2 [6]
- (d) tray: ribs, fold over top
- bookshelf: brace
- bolted structure: gusset plate 2 x 3 [6]
- [Total: 20]

- 6 (a)  $R = \frac{R1 \times R2}{R1 + r2}$  1
- $\frac{220}{32}$  1
- 6.875K $\Omega$  1
- (or calculation leading to correct answer 3 marks) [3]

- (b) diode: suppress noise and back emf.s;  
steer electronic signals;  
convert ac to dc in a rectifier circuit.

Strain gauge: wires stretch – resistance changes  
Sensor in structures

Explanations 2 x 2  
Applications 1 x 2 [6]

- (c) (i) digital devices – inputs and outputs either logic 0 or logic 1 2

(ii) NAND

0	0	1
0	1	1
1	0	1
1	1	0

OR

0	0	0
0	1	1
1	0	1
1	1	1

NOR

0	0	1
0	1	0
1	0	0
1	1	0

for each; 1 mark for symbol  
2 marks for truth table

[9]

[Total: 20]

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### Part C – Graphic Products

7	correct exploded view	2	
	correct isometric sketch	2	
	approx twice full size	1	
	quality of linework	3	
	overall shape / proportion (each component 1, 2 for main arm)	9	
	thick / thin line technique	3	
			[Total; 20]
8	(a) pyramid;		
	- accuracy (inc true length)	2	
	- correct net	4	
	- tabs	1	
	cone:		
	- accuracy	2	
	- correct net	5	
	- tabs	1	[15]
	(b) description could include:		
	- templates;		
	- cutters/creasers;		
	- assembling.		
	Quality of description up to 5 marks		[5]
			[Total: 20]
9	(a) considerations could include;		
	- language;		
	- shock value?		
	- Print volume;		
	- Audience.		
	For four considerations (qualified statements)	1 x 4	[4]
	(b) appropriate symbol	4	
	quality	3	
	monochrome	1	[8]
	(c) appropriate unit	3	
	dimension	1	
	folding/disassembly	2	
	communication	2	[8]
			[Total: 20]

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## Section B

Questions 10, 11, 12

<b>(A)</b>	<b>Analysis</b>		<b>5</b>	<b>[5]</b>
<b>(S)</b>	<b>Specification</b>		<b>5</b>	<b>[5]</b>
<b>(I)</b>	<b>Ideas</b>	range	<b>5</b>	
		annotation related to specification	<b>5</b>	
		marketability	<b>5</b>	
		selection / rejection of ideas	<b>5</b>	
		communication	<b>5</b>	<b>[25]</b>
<b>(D)</b>	<b>Development</b>	clear development of selected idea/s	<b>5</b>	
		reasoning	<b>5</b>	
		materials	<b>3</b>	
		construction	<b>7</b>	
		communication	<b>5</b>	<b>[25]</b>
<b>(P)</b>	<b>Proposed Solution</b>		<b>10</b>	
	<b>details / dimensions</b>		<b>5</b>	<b>[15]</b>
<b>(E)</b>	<b>Evaluation</b>		<b>5</b>	<b>[5]</b>
<b>(T)</b>	<b>Total</b>			<b>[80]</b>