<table>
<thead>
<tr>
<th>MARK SCHEME</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAXIMUM MARK: 120</td>
</tr>
<tr>
<td>SYLLABUS/COMPONENT: 9705/3</td>
</tr>
<tr>
<td>DESIGN AND TECHNOLOGY (WRITTEN 2)</td>
</tr>
</tbody>
</table>
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]
Part B – Practical Design

4 (a) description of process
   - fully detailed          3 - 5
   - some detail             0 - 2
   quality of sketches      up to 2  \( 7 \times 2 \) [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.  \( 3 \times 2 \) [6]

[Total: 20]

5 (a) explanation: monocoque – shell structure
   frame – components     2

examples: egg;
          pylon             2 [4]

(b) graphic method (create parallelogram)  \( 1 \times 2 \)

Correct answer 10.8 N, 10.4 N (+or-.3)  \( 1 \times 2 \) [4]

(c) understanding may include:
   - capital letters for spaces between forces;
   - 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  \( 2 \times 3 \) [6]

[Total: 20]
6 (a) \[ R = \frac{R_1 \times R_2}{R_1 + r_2} \]

\[ \frac{220}{32} \]

\[ 6.875\Omega \]

(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

\[
\begin{array}{ccc}
0 & 0 & 1 \\
0 & 1 & 1 \\
1 & 0 & 1 \\
1 & 1 & 0 \\
\end{array}
\]

OR

\[
\begin{array}{ccc}
0 & 0 & 0 \\
0 & 1 & 1 \\
1 & 0 & 1 \\
1 & 1 & 1 \\
\end{array}
\]

NOR

\[
\begin{array}{ccc}
0 & 0 & 1 \\
0 & 1 & 0 \\
1 & 0 & 0 \\
1 & 1 & 0 \\
\end{array}
\]

for each; 1 mark for symbol
2 marks for truth table [9]

[Total: 20]
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 9
   (each component 1, 2 for main arm) 3
   thick / thin line technique

[Total; 20]

8 (a) pyramid;
   - accuracy (incl 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]
Section B

Questions 10, 11, 12

(A) Analysis 5 [5]

(S) Specification 5 [5]

(I) Ideas
range 5
annotation related to specification 5
marketability 5
selection / rejection of ideas 5
communication 5 [25]

(D) Development
clear development of selected idea/s 5
reasoning 5
materials 3
construction 7
communication 5 [25]

(P) Proposed Solution
details / dimensions 10 [15]

(E) Evaluation 5 [5]

(T) Total [80]