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**DESIGN AND TECHNOLOGY**

**9705/32**

Paper 3

**October/November 2018**

MARK SCHEME

Maximum Mark: 120

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**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2018 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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This document consists of **9** printed pages.

**Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

**GENERIC MARKING PRINCIPLE 1:**

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

**GENERIC MARKING PRINCIPLE 2:**

Marks awarded are always **whole marks** (not half marks, or other fractions).

**GENERIC MARKING PRINCIPLE 3:**

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

**GENERIC MARKING PRINCIPLE 4:**

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

**GENERIC MARKING PRINCIPLE 5:**

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

**GENERIC MARKING PRINCIPLE 6:**

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

**Section A****Part A – Product Design**

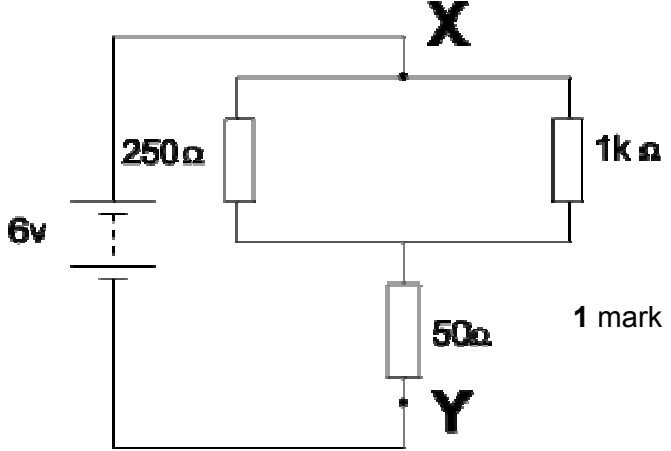
<b>Question</b>	<b>Answer</b>	<b>Marks</b>	
1(a)	Description of process - fully detailed - some detail  Quality of sketches	3–5 0–2  up to 2 7 × 2	<b>14</b>
1(b)	Dowel joint - quick process - strong joint - standard components available  Riveting - strong permanent join - can provide feature/same material rivet - hand or machine quick process  Vacuum forming - complex shapes formed - very quick once original former produced - repeated production	          3 × 2	<b>6</b>

<b>Question</b>	<b>Answer</b>	<b>Marks</b>	
2(a)	Suitable material: - abs/polypropylene/HDPE - appropriate hardwood for laminating/bending - aluminium alloy, brass, copper - mild steel (with finish) - stainless steel  Reasons: - rigid, will hold shape - can be bent to required shape - high quality finish, look attractive in desired environment	          1    2 × 1	<b>3</b>
2(b)	Quality of description: - fully detailed - some detail  Quality of sketches	3–7 0–2  up to 2	<b>9</b>

Question	Answer	Marks
2(c)	<p>Explanation could include:</p> <ul style="list-style-type: none"> <li>- change in process;</li> <li>- change in materials;</li> <li>- use of jigs, formers, moulds;</li> <li>- simplification of design.</li> </ul> <p>Quality of explanation:</p> <ul style="list-style-type: none"> <li>- logical, structured</li> <li>- limited detail</li> </ul> <p>Quality of sketches</p>	<p><b>8</b></p> <p>4–6</p> <p>0–3</p> <p>up to 2</p>

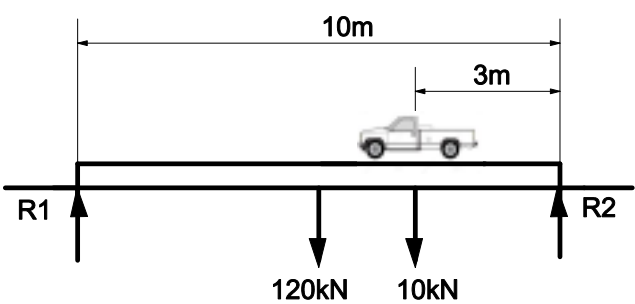
Question	Answer	Marks
3	<p>Discussion could include:</p> <ul style="list-style-type: none"> <li>- target market</li> <li>- anthropometrics</li> <li>- ergonomic factors</li> <li>- fashion/trends</li> </ul> <p>Examples/evidence could be</p> <ul style="list-style-type: none"> <li>- teenage/adult market</li> <li>- specific placement</li> <li>- promotions – celebrities, BOGOF</li> </ul> <p>Examination of issues</p> <ul style="list-style-type: none"> <li>- wide range of relevant issues</li> <li>- limited range</li> </ul> <p>Quality of explanation</p> <ul style="list-style-type: none"> <li>- logical, structured</li> <li>- limited detail</li> </ul> <p>Supporting examples/evidence</p>	<p><b>20</b></p> <p>4–8</p> <p>0–3</p> <p>4–8</p> <p>0–3</p> <p>4</p>

**Part B – Practical Technology**

Question	Answer	Marks																		
4(a)(i)		<p><b>2</b></p>																		
4(a)(ii)	$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{1000} + \frac{1}{250} = \frac{5}{1000}$ <p>R = 200 Ω</p> <p>RT = 200 + 50 = 250 Ω</p>	<p>2 marks</p> <p>1 mark</p> <p>1 mark</p>																		
4(a)(iii)	<p>V = I × R</p> $I = \frac{V}{R} = \frac{6}{250}$ <p>0.024 amps</p>	<p>1 mark</p> <p>1 mark</p> <p>2 marks</p>																		
4(b)(i)	<p>NAND</p>	<p><b>1</b></p>																		
4(b)(ii)	<table border="1" data-bbox="300 1384 1002 1816"> <thead> <tr> <th colspan="2">Inputs</th> <th>Output</th> </tr> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> </tr> </tbody> </table>	Inputs		Output	X	Y	Z	0	0	1	0	1	1	1	0	1	1	1	0	<p><b>2</b></p>
Inputs		Output																		
X	Y	Z																		
0	0	1																		
0	1	1																		
1	0	1																		
1	1	0																		
4(b)(iii)	<p>Flip-flop or latch</p> <ul style="list-style-type: none"> <li>- fundamental building block of digital circuit</li> <li>- 2 stable states</li> <li>- stores information</li> </ul>	<p>1 mark</p> <p>1 mark</p> <p>1 mark</p> <p><b>3</b></p>																		

Question	Answer	Marks
4(b)(iv)	<p>flip flop NAND</p> <p>flip flop NOR</p> <p>Fully detailed arrangement of gates cross coupled</p>	<p><b>4</b></p> <p>4 marks</p>

Question	Answer	Marks
5(a)	<p><b>Monocoque</b> – is often a one piece structure that supports loads through its external skin</p> <p>Example: ping pong ball, egg shell, car frame, aircraft fuselage</p> <p><b>Frame</b> – is a structure built up of parts (struts, ties) to withstand loads</p> <p>Example: pylon, buildings, bridge, chair</p> <p>Description 2</p> <p>Example 1</p> <p>3 × 2</p>	<p><b>6</b></p>
5(b)	<p><b>Twisting</b></p> <p>torsional pressure 1</p> <p>resulting in deformation or breaking 1</p> <p>communication 1</p> <p><b>Buckling</b></p> <p>small increase in load at a point 1</p> <p>on structure can lead to collapse and deformation 1</p> <p>communication 1</p> <p><b>Fatigue</b></p> <p>weakening 1 caused by repeated load over time 1</p> <p>communication 1</p> <p>3 × 3</p>	<p><b>9</b></p>

Question	Answer	Marks
5(c)	 <p>Taking moments about R2  <math>R1 \times 10 = (10 \times 3) + (120 \times 5)</math>  <math>10 R1 = 30 + 600</math>  <math>R1 = 63 \text{ kN}</math>  <math>R2 + 63 = 120 + 10</math>  <math>R2 = 130 - 63</math>  <math>R2 = 67 \text{ kN}</math></p>	5

Question	Answer	Marks
6(a)	<p>Appropriate product 1</p> <p>Appropriate process described up to 4</p> <p>Quality of explanation</p> <ul style="list-style-type: none"> <li>- logical, structured 3–5</li> <li>- limited detail 0–2</li> </ul>	10
6(b)	<p>Understanding of non – destructive testing 2</p> <p>Quality of explanation</p> <ul style="list-style-type: none"> <li>- logical, structured 4–8</li> <li>- limited detail 0–3</li> </ul>	10





**Section B**

Question	Answer	Marks
	<p><b>Analysis</b> Analysis of the given situation/problem. [0–5]</p> <p><b>Specification</b> Detailed written specification of the design requirements.  At least five specification points other than those given in the question. [0–5]</p> <p><b>Exploration</b> B Bold sketches and brief notes to show exploration of ideas for a design solution, with reasons for selection.  range of ideas [0–5] annotation related to specification [0–5] marketability, innovation [0–5] evaluation of ideas, selection leading to development [0–5] communication [0–5]</p> <p><b>Development</b> Bold sketches and notes showing the development, reasoning and composition of ideas into a single design proposal. Details of materials, constructional and other relevant technical details.  developments [0–5] reasoning [0–5] materials [0–3] constructional detail [0–7] communication [0–5]</p> <p><b>Proposed solution</b> Produce drawing/s of an appropriate kind to show the complete solution.  proposed solution [0–10] details/dimensions [0–5]</p> <p><b>Evaluation</b> Written evaluation of the final design solution. [0–5]</p>	<b>80</b>