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**COMPUTER SCIENCE**

**0478/12**

Paper 1

**March 2018**

MARK SCHEME

Maximum Mark: 75

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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.

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This document consists of **11** printed pages.

**PUBLISHED****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.

Question	Answer	Marks							
1	<table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: left; width: 50%;">Description</th> <th style="text-align: left; width: 50%;">Type of software</th> </tr> </thead> <tbody> <tr> <td style="border: 1px solid black; padding: 5px;">Free to download</td> <td rowspan="2" style="border: 1px solid black; padding: 5px;">Free software</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">Code can be modified and redistributed</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">Subject to copyright legislation</td> <td style="border: 1px solid black; padding: 5px;">Freeware</td> </tr> </tbody> </table> <p>1 mark for each 'Type of software' if correct lines are attached to it.</p>	Description	Type of software	Free to download	Free software	Code can be modified and redistributed	Subject to copyright legislation	Freeware	<b>2</b>
Description	Type of software								
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Question	Answer	Marks
2(a)	<p>Any <b>three</b> from:</p> <ul style="list-style-type: none"> <li><u>Scans</u> files for viruses // detects/identifies a virus</li> <li>Can constantly run in background</li> <li>Can run a scheduled scan</li> <li>Can automatically updating virus definitions</li> <li>Can quarantine a virus</li> <li>Can delete a virus</li> <li>Completes heuristic checking</li> <li>Notifies user of a possible virus</li> </ul>	<b>3</b>

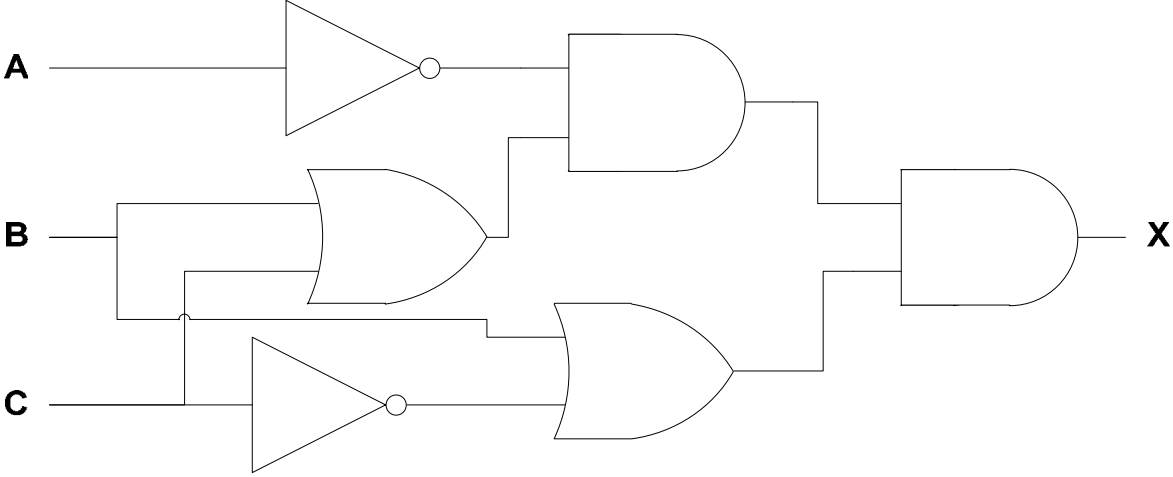
Question	Answer	Marks
2(b)	<p>Any <b>three</b> from:</p> <p>Use a firewall            Use of a proxy server            Do not use / download software / files from unknown sources            Do not share external storage devices / USB pens            Do not open / take care when opening attachments / link            Do not connect computer to network / use as stand-alone computer            Limiting access to the computer</p>	<b>3</b>

Question	Answer	Marks
3(a)	Byte 3 / 10110100	<b>1</b>
3(b)	<p>Odd parity used            Counted / added the number 1's // Most Bytes have an odd number of 1's            Byte 3 has an even number of 1's // Byte 3 didn't follow odd parity</p>	<b>3</b>

Question	Answer	Marks
4	<p>Any <b>six</b> from:</p> <p>Sensor(s) send data/signals to the microprocessor            Analogue signal/data from sensor is converted to digital (using ADC)            Microprocessor compares data value against set boundaries / pre-set data            If value between 21 and 24 ...            ... no action taken            If value &gt; 24 °C / signal is sent from microprocessor...            ... to turn conditioning unit ON/Set to cold            If value is &lt; 21 °C signal is sent from microprocessor...            ... to turn conditioning unit ON/Set to warm            Process is repeated for a continuous operation</p>	<b>6</b>

Question	Answer	Marks
5(a)	One mark for each correct Hexadecimal value <div style="display: flex; justify-content: space-around; border: 1px solid black; margin-top: 5px;"> <span style="border: 1px solid black; padding: 2px 10px;">C4</span> <span style="border: 1px solid black; padding: 2px 10px;">10</span> <span style="border: 1px solid black; padding: 2px 10px;">FE</span> <span style="border: 1px solid black; padding: 2px 10px;">09</span> </div>	<b>3</b>
5(b)	Any <b>two</b> from:  Easier / simpler to remember / write down // quicker to transcribe Less likely to make error Less digits to use	<b>2</b>

Question	Answer	Marks
6	1 mark for suitable example and 1 mark for suitable associated use.  Primary     RAM ... ... stores OS <u>when running</u> / data <u>currently in use</u> / instructions <u>currently in use</u> ROM ... ... stores boot instructions / BIOS Cache ... ... stores frequently used instructions  Secondary    HDD / SSD... ...stores files / applications (by example)  Offline        CD/DVD/Blu-ray/Flash Memory/USB stick/Removable HDD/Removable SSD... ... stores files / applications (by example)	<b>6</b>

Question	Answer	Marks																																				
<p>7(a)</p>	<p>4 marks for 8 correct outputs                      3 marks for 6 correct outputs                      2 marks for 4 correct outputs                      1 mark for 2 correct outputs</p> <table border="1" data-bbox="342 352 853 794"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>X</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>1</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table>	A	B	C	X	0	0	0	1	0	0	1	0	0	1	0	1	0	1	1	1	1	0	0	0	1	0	1	1	1	1	0	1	1	1	1	1	<p>4</p>
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<p>7(b)</p>	<p>1 mark per gate in correct location</p> 	<p>6</p>																																				

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7(c)	<p>4 marks for 8 correct outputs                      3 marks for 6 correct outputs                      2 marks for 4 correct outputs                      1 mark for 2 correct outputs</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>X</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td><td>0</td><td><b>0</b></td></tr> <tr><td>0</td><td>0</td><td>1</td><td><b>0</b></td></tr> <tr><td>0</td><td>1</td><td>0</td><td><b>1</b></td></tr> <tr><td>0</td><td>1</td><td>1</td><td><b>1</b></td></tr> <tr><td>1</td><td>0</td><td>0</td><td><b>0</b></td></tr> <tr><td>1</td><td>0</td><td>1</td><td><b>0</b></td></tr> <tr><td>1</td><td>1</td><td>0</td><td><b>0</b></td></tr> <tr><td>1</td><td>1</td><td>1</td><td><b>0</b></td></tr> </tbody> </table>	A	B	C	X	0	0	0	<b>0</b>	0	0	1	<b>0</b>	0	1	0	<b>1</b>	0	1	1	<b>1</b>	1	0	0	<b>0</b>	1	0	1	<b>0</b>	1	1	0	<b>0</b>	1	1	1	<b>0</b>	<b>4</b>
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Question	Answer	Marks																		
8(a)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th rowspan="2" style="text-align: center;">Descriptions</th> <th colspan="2" style="text-align: center;">Method</th> <th rowspan="2"></th> </tr> <tr> <th style="text-align: center;">Serial</th> <th style="text-align: center;">Parallel</th> </tr> </thead> <tbody> <tr> <td>Multiple bits are sent and received at the same time.</td> <td></td> <td style="text-align: center;">✓</td> <td style="vertical-align: middle;">[1]</td> </tr> <tr> <td>Bits are sent one at a time in a single direction.</td> <td style="text-align: center;">✓</td> <td></td> <td style="vertical-align: middle;">[1]</td> </tr> <tr> <td>Bits are sent using a single wire. Data can be sent or received, but not at the same time.</td> <td style="text-align: center;">✓</td> <td></td> <td style="vertical-align: middle;">[1]</td> </tr> </tbody> </table>	Descriptions	Method			Serial	Parallel	Multiple bits are sent and received at the same time.		✓	[1]	Bits are sent one at a time in a single direction.	✓		[1]	Bits are sent using a single wire. Data can be sent or received, but not at the same time.	✓		[1]	<b>3</b>
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Question	Answer				Marks	
8(b)	Descriptions		Type			<b>3</b>
			Simplex	Half-duplex	Duplex	
	Multiple bits are sent and received at the same time.			✓		
	Bits are sent one at a time in a single direction.	✓				
Bits are sent using a single wire. Data can be sent or received, but not at the same time.		✓				

Question	Answer	Marks
9	<p>Max 3 – 1 mark for correct answer and 2 marks for correct calculations.</p> <p>Any <b>two</b> from:</p> <p>16000 × 32</p> <p>512000 / 1024</p> <p>Or</p> <p>16000 × 8</p> <p>128000 × 32</p> <p>4096000 / 8</p> <p>512000 / 1024</p> <p><b>Correct answer:</b></p> <p>500 kB</p>	<b>3</b>

Question	Answer	Marks
10(a)(i)	10010	1
10(a)(ii)	11110001	1
10(b)	<p>Any <b>four</b> from:</p> <p>The program is stored on a secondary storage device            Data and instructions are moved to memory / RAM            Data and instructions are stored in the same memory / RAM            Data and instructions are moved to registers to be executed            Instructions are fetched one at a time</p>	4

Question	Answer	Marks
11(a)	Smaller file size reduces download / display time // reduces upload time	1
11(b)	<p>Any <b>four</b> from:</p> <p>A compression algorithm is used            Permanently deleting some data // file cannot be restored to original            Colour depth / palette can be reduced            Resolution can be reduced // number of pixels can be reduced            Less bits will be required for each pixel / colour</p>	4

Question	Answer	Marks
12(a)	<p>Quicker to scan ...            ... rather than type into a system</p> <p>Fewer errors ...            ... no human input</p>	4

Question	Answer	Marks
12(b)	Any <b>four</b> from:  Uses a barcode reader / scanner Reader shines light / red laser at barcode White lines reflect (more) light Sensors / photoelectric cells detect light reflected back Different reflections / bars will convert to different binary values	<b>4</b>

Question	Answer	Marks
13	Any <b>four</b> from <ul style="list-style-type: none"> <li>• (Provides an) interface</li> <li>• Loads / opens / installs / closes software</li> <li>• Manages the hardware // manages peripherals // spooling</li> <li>• Manages the transfer of programs into and out of memory</li> <li>• Divides processing time // processor management</li> <li>• Manages file handling</li> <li>• Manages error handling / interrupts</li> <li>• Manages security software</li> <li>• Manages utility software</li> <li>• Manages user accounts</li> <li>• Multitasking // Multiprocessing // Multiprogramming // Time slicing</li> <li>• Batch processing // real time processing</li> </ul>	<b>4</b>