Cambridge Assessment International Education

Cambridge O Level

COMPUTER SCIENCE **2210/12**

Paper 1 Theory **October/November 2022**

MARK SCHEME

Maximum Mark: 75

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 2022 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This document consists of **13** 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.

Please note the following further points:

The words in **bold** in the mark scheme are important text that needs to be present, or some notion of it needs to be present. It does not have to be the exact word, but something close to the meaning.

If a word is underlined, this **exact** word must be present.

A single forward slash means this is an alternative word. A double forward slash means that this is an alternative mark point.

Ellipsis (…) on the end of one-mark point and the start of the next means that the candidate **cannot** get the second mark point without being awarded the first one. If a mark point has an ellipsis at the beginning, but there is no ellipsis on the mark point before it, then this is just a follow-on sentence and **can** be awarded **without** the previous mark point.

Question	Answer	Marks
1(a)	Any **two** from: • Keyboard • Trackpad • Trackball • Microphone • Keypad • Sensor • Button • **Barcode**/**QR** scanner/reader • Webcam/**digital** camera	**2**
1(b)	Any **one** from: • Speaker • Headphones	**1**
1(c)(i)	Any **four** from: • The screen is made up of (two) layers/multiple layers • The user pushes the top layer into the bottom layer // The user pushes the layers together • The layers create a circuit (when pushed together) • causing electricity to flow • allowing the **co-ordinates**/**location** of the users touch to be **calculated**	**4**
1(c)(ii)	Any **two** from: • Cheap to **manufacture**/**buy** • Can still be used whilst wearing gloves • Waterproof // Can be used in bad weather • Does not easily shatter • Low power consumption • (Can) support multitouch	**2**

Question	Answer	Marks
1(c)(iii)	Any **two** from: • Does not (normally) support multitouch • Screen **visibility** can be poor in sunlight • Longevity issues • (Normally) lower resolution • Not very sensitive to touch // Lower response time (than capacitive) • Prone to scratches	**2**
1(c)(iv)	Any **one** from: • Capacitive • Infrared	**1**
1(d)	Any **two** from: • Data and instructions are stored in the **same** memory • and can only be fetched one at a time	**2**
1(e)	Any **three** from: • Multitasking • Multiprogramming • Input and output control • Running software • Memory management • Processor management • File management • Handling interrupts • Providing security • Managing user accounts • Batch / real-time processing	**3**

Question	Answer	Marks
1(f)(i)	• 000001100100 • 000011101011 • 000100101101	**3**
1(f)(ii)	• 22 • 119 • 857	**3**
1(f)(iii)	**One** mark for two correct characters in the correct place, **two** marks for three • 095 • AD1	**4**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(a)</td><td>Six from:

• Motion/proximity/infra-red sensor is used
• Sensor sends data to microprocessor
• Data is converted from analogue to digital (using ADC)
• Data is compared to stored/set value(s)
• If data is inside range/outside range/greater than/less than, signal is sent to turn water tap on
• If data is outside range /inside range/less than/greater than, tap remains off / signal is sent to turn water tap off
• Actuator is used to turn the tap off/on
• Whole process is continuous</td><td>6</td></tr>
<tr><td>2(b)</td><td>One mark for each correct sensor

<table><tr><th>Description of system</th><th>Sensor</th></tr><tr><td>it checks the air is dry enough in a garage that spray paints cars</td><td>Moisture/humidity</td></tr><tr><td>it automatically switches on the headlights on a car when it is dark</td><td>Light</td></tr><tr><td>it checks that the soil in a greenhouse has the correct level of acidity</td><td>pH</td></tr></table></td><td>3</td></tr>
</table>

Question	Answer	Marks
3	**One** mark for each correct row	**5**

Statement	Component		
	RAM (✓)	**Internal SSD (✓)**	**USB flash memory drive (✓)**
it is a type of primary storage	✓		
it is volatile	✓		
it uses NAND and NOR technology		✓	✓
it does **not** have any moving parts	✓	✓	✓
it is **not** directly connected to the Central Processing Unit (CPU)		✓	✓

Question	Answer	Marks
4	**One** mark for the method, **one** mark for a corresponding description • Create a back-up • this means the data can be **restored/recovered** • Add verification • to get the user to confirm they want to delete the data • Set access rights • so that she cannot delete any files	**4**

Question	Answer	Marks
5	**One** mark each for the correct byte and bit • Byte 4 • Bit 5 Any **two** from: • Counted all the 1s • An even parity has been used • Odd number of ones in that row (byte 4) **and** column (bit 5)	**4**

Question	Answer	Marks
6(a)	Any **two** from: • Check if web address starts with HTTPS • Check if there is a locked padlock • Check the digital certificate for the website	**2**
6(b)	• Transport layer security // TLS	**1**
6(c)	Any **four** from: • To act as intermediary between browser and web server • to filter/examine/monitor traffic to the web server • to help stop malicious traffic to the web server • To cache frequently viewed web pages • to allow faster response time for requests • to reduce the number of requests the server needs to process • To help prevent DoS • stopping the webserver being overloaded with requests • by redirecting away from server // by stopping DoS attack reaching server • To act as a firewall	**4**
6(d)(i)	• Spyware	**1**

Question	Answer	Marks
6(d)(ii)	**One** mark for a correct method, **one** mark for a corresponding description • Drop down boxes • this means that the keypresses cannot be recorded • Onscreen/virtual keyboard • this means that the keypresses cannot be recorded • Biometrics // by example • this means that the keypresses cannot be recorded • no password entered to be gathered • Anti-malware // anti-spyware • this will **scan for**/**remove** any malware that could be recording keypresses • Random/select values requested from password • this means that full password cannot be obtained (in a single login) • Firewall • to prevent the **download** of any malware that could gather keypresses	**6**
6(e)	**One** mark for each correct term in the correct order • URL • IP address • Web server • Web pages • HTML • Browser	**6**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>7(a)</td><td>One mark for each correct row
<table>
<tr><th>Statement</th><th>NAND (✓)</th><th>OR (✓)</th><th>XOR (✓)</th></tr>
<tr><td>if both inputs are 1, the output is 1</td><td></td><td>✓</td><td></td></tr>
<tr><td>if both inputs are different from each other, the output is 1</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>if both inputs are 0, the output is 0</td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>if both inputs are the same as each other, the output is always 0</td><td></td><td></td><td>✓</td></tr>
</table></td><td>4</td></tr>
<tr><td>7(b)</td><td>One mark for a correct logic gate, one mark for a corresponding truth table
AND
<table>
<tr><th>A</th><th>B</th><th>Output</th></tr>
<tr><td>0</td><td>0</td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>0</td></tr>
<tr><td>1</td><td>1</td><td>1</td></tr>
</table></td><td>2</td></tr>
</table>