Cambridge Assessment International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/12**

Paper 1 **October/November 2021**

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 2021 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This document consists of **12** printed pages.

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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.

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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.

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Question	Answer	Marks
1(a)	– Base-10	**1**
1(b)	– 5 – 32 – 26 – 171	**4**
1(c)(i)	– 00100101	**1**
1(c)(ii)	– 00011011	**1**
1(d)(i)	Any **one** from: – To represent **HTML colour** codes – In error messages	**1**
1(d)(ii)	Any **one** from: – Assembly code/language – Memory address locations – In error messages – Memory dump	**1**

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Question	Answer	Marks
2(a)	Any **one** from: – Printer – Speaker – Light/LED – Actuator	**1**
2(b)	Any **one** from: – Touchscreen – Trackpad / touchpad – Microphone – QR code reader – Barcode reader – Magnetic strip reader – RFID reader	**1**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3(a)</td><td>

One mark per each correct row.

<table>
<tr><th>Statement</th><th>Serial simplex (✓)</th><th>Parallel simplex (✓)</th><th>Parallel half-duplex (✓)</th><th>Serial duplex (✓)</th></tr>
<tr><td>bits are transmitted along a single wire</td><td>✓</td><td></td><td></td><td>✓</td></tr>
<tr><td>data is transmitted in both directions</td><td></td><td></td><td>✓</td><td>✓</td></tr>
<tr><td>it is only suitable for distances less than 5 metres</td><td></td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>Bits from the same byte are transmitted one after the other</td><td>✓</td><td></td><td></td><td>✓</td></tr>
<tr><td>data may not arrive in the correct sequence</td><td></td><td>✓</td><td>✓</td><td></td></tr>
<tr><td>data is transmitted in both directions, but only one direction at a time</td><td></td><td></td><td>✓</td><td></td></tr>
</table>

</td><td>6</td></tr>
<tr><td>3(b)</td><td>

Any **three** from:
– Can charge/power the mobile device (at the same time)
– (Uses serial transmission so) data less likely to be skewed / corrupted
– Universal / industry standard / connection
– Cable can only be plugged in one way // Cannot be inserted incorrectly
– Fast transmission speed
– Backward compatible
– Supports different transmission speeds
– **Automatically** detects device // **Automatically** downloads drivers

</td><td>3</td></tr>
</table>

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Question	Answer	Marks
4	**One** mark per each correct term in the correct order. – Capacitive – Conductive // Capacitive – Change – Coordinates – Resistive – Circuit – Manufacture	**7**

Question	Answer	Marks
5(a)	Any **three** from: – Password – Add a biometric device to the laptop // set biometric password – Use two-step verification // Use two factor authentication – Physically lock the laptop away in a secure cupboard // Taking laptop with him at all times	**3**
5(b)(i)	Any **three** from: – A compression algorithm is used – The resolution could be reduced – **Colour** depth could be reduced // bits per pixel reduced – **Sounds** not heard by human ear could be removed // Perceptual music shaping can be used – Repeating frames could be removed	**3**
5(b)(ii)	Any **one** from: – Quality may be reduced – Data is lost // **original** file cannot be reconstructed	**1**
5(c)(i)	Any **one** from: – Maintains quality // quality better than lossy – Original file is retained // Data is not **permanently** lost – A significant reduction in file size is not required	**1**

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Question	Answer	Marks
5(c)(ii)	Any **two** from: – Takes more time to transmit file // Takes more time to upload **to web server** // Takes more time to download **to customer** // Web page will load slower – Takes up more **storage** space – Data usage would be increased – Uses more bandwidth	**2**

Question	Answer	Marks
6(a)	Any **one** from: – They both translate **high-level language** into **machine code** / **low-level language** – They both check for errors – They both report errors	**1**
6(b)	**Four** from (Max 2 per translator): – An interpreter translates and executes the code line by line – … whereas a compiler translates and executes the whole code all in one go – An interpreter stops translating and reports an error as it finds one – … whereas a compiler produces an error report at the end of translation – An interpreter does not produce an executable file – … but a compiler does produce an executable file – An interpreter will execute the code until it finds an error – … whereas a compiler will not execute any code if there are errors present – An interpreter allows correction of errors in real-time – … whereas a compiler needs to retranslate the code each time after errors are found and corrected	**4**
6(c)	– Assembler	**1**

Question	Answer	Marks
7	**One** mark per each correct row.	**5**

Statement	3D scanner (✓)	Barcode reader (✓)	QR code reader (✓)
uses position and alignment markers for orientation when scanning			✓
scans the shape and appearance of an object	✓		
uses reflected light from a laser to convert a black-and-white pattern into binary		✓	(✓)
can often be built into an Electronic Point Of Sale (EPOS) terminal, for example, a supermarket checkout		✓	(✓)
it is an example of an input device	✓	✓	✓

Question	Answer	Marks
8	**Seven** from: – Timer is started – Pressure sensor (within each mat) – Sensor sends data to microprocessor – Analogue data is converted to digital (using ADC) – Microprocessor compares data to stored value(s) – If data matches / in/out range **microprocessor** stops timer – If data matches / in/out range **microprocessor** checks if **data has come** from **correct** colour mat **sensor** – If data matches / in/out range **microprocessor** checks to see if **timer** is stopped at less than 1 second – If data matches / in/out range **microprocessor** increments counter if timer is less than 1 second and colour/mat is correct – If correct colour/mat is hit, timer is reset and the whole process is repeated – If **data has not come** from the **correct** colour mat **sensor** the game ends	**7**

Question	Answer	Marks
9(a)	Any **three** from: e.g. – A suitable description of any error that might occur – A peripheral is connected/disconnected – A key on a keyboard is pressed – A mouse button click – A phone/video call is received – A buffer requires more data – A printer has a paper jam – A printer runs out of paper – A printer runs out of ink – When switching from one application to another NOTE: If three suitable different errors are described, this can be awarded three marks.	**3**
9(b)	Any **one** from: – The computer would only start a new task when it had finished processing the current task // by example – Computer will not be able to multitask – Errors may not be dealt with – Computer would become impossible to use	**1**

Question	Answer	Marks
10(a)	– Enables an encrypted link (between the browser and the web server) // It encrypts the data – … based on the authentication of an (SSL) certificate // and will only send it if the certificate is authentic	**2**
10(b)	– Transport Layer Security // TLS	**1**
10(c)	Any **two** from: – URL begins with HTTPS – Padlock symbol is locked – Check the certificate is valid	**2**

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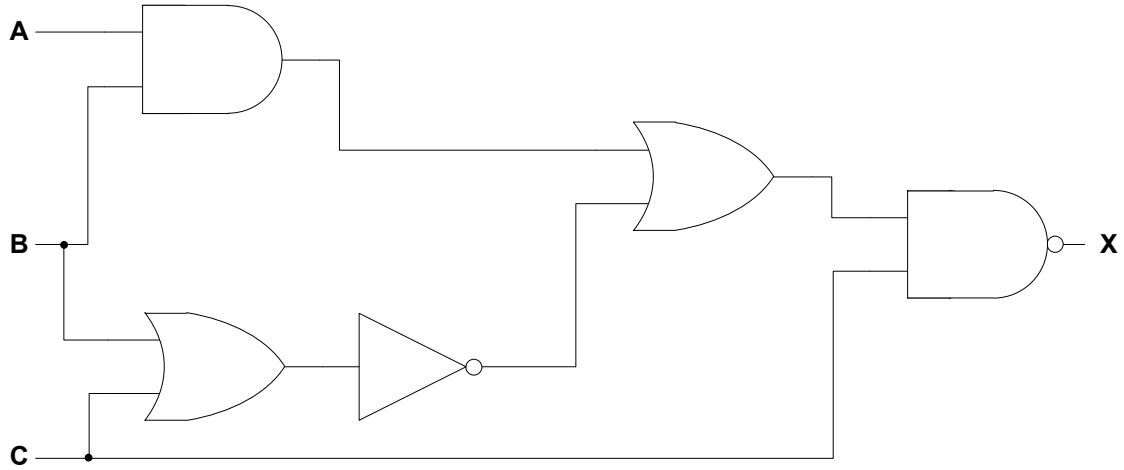
Question	Answer	Marks
11(a)	**One** mark per each correct logic gate with correct input(s) 	**5**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>11(b)</td><td>4 marks for 8 correct outputs
3 marks for 6/7 correct outputs
2 marks for 4/5 correct outputs
1 mark for 2/3 correct outputs
<table>
<tr><th>A</th><th>B</th><th>C</th><th>Working space</th><th>X</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td></td><td>1</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td></td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td></td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td></td><td>1</td></tr>
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<tr><td>1</td><td>1</td><td>0</td><td></td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td></td><td>0</td></tr>
</table></td><td>4</td></tr>
<tr><td>11(c)</td><td>– NOR
– XOR / EOR</td><td>2</td></tr>
</table>