Cambridge Assessment International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/13**

Paper 1 Theory **May/June 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 May/June 2022 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

This document consists of **13** 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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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.

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)</td><td>One mark for each correct row
<table>
<tr><th>Device</th><th>Input (✓)</th><th>Output (✓)</th><th>Storage (✓)</th></tr>
<tr><td>keyboard</td><td>✓</td><td></td><td></td></tr>
<tr><td>microphone</td><td>✓</td><td></td><td></td></tr>
<tr><td>headphones</td><td></td><td>✓</td><td></td></tr>
<tr><td>hard disk drive (HDD)</td><td></td><td></td><td>✓</td></tr>
<tr><td>actuator</td><td></td><td>✓</td><td></td></tr>
</table></td><td>5</td></tr>
<tr><td>1(b)</td><td>• Optical
• Solid state</td><td>2</td></tr>
</table>

Question	Answer	Marks
2(a)	Per each binary conversion, **one** mark for 2 correct character conversions, **two** marks for three correct character conversions • 0000 0101 1010 • 0001 1000 1100 • 0010 1001 1111	**6**

Question	Answer	Marks
2(b)	Any **two** from: • It has a bright screen/colours • It does not consume much power • It runs at a cool temperature • Longevity • Can operate in cold conditions • Can be small/compact/thin	**2**
2(c)	Per each hex conversion, **one** mark for 2 correct character conversions, **two** marks for three correct character conversions • 40D • 07E	**4**

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Question	Answer	Marks
3(a)	**One** mark for each correct row	**4**

Statement	AND (✓)	OR (✓)	XOR (✓)
if both inputs are 0, the output is 0	✓	✓	✓
if both inputs are different, the output is 1		✓	✓
if both inputs are 1, the output is 1	✓	✓	
if both inputs are the same, the output is always 0			✓

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

One mark for the correct name and **one** mark for the correct truth table

- NOR

<table>
<tr><th>A</th><th>B</th><th>Output</th></tr>
<tr><td>0</td><td>0</td><td>1</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>0</td></tr>
</table>

- NAND

<table>
<tr><th>A</th><th>B</th><th>Output</th></tr>
<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>
</table>

</td><td>4</td></tr>
</table>

Question	Answer	Marks
4(a)	**Three** from: • Protocol • Domain name / Web server name • Filename / web page name / folder name	3

Question	Answer	Marks
4(b)	• It is sent to a DNS … • which looks up the **corresponding**/**matching IP** address	**2**
4(c)(i)	• HTTPS	**1**
4(c)(ii)	Any **one** from: • It encrypts it • It applies encryption algorithm • It applies an encryption key	**1**

Question	Answer	Marks
5(a)	Any **two** from: • It processes data • It processes/executes instructions • It carries out calculations • It carries out logical operations Any **three** from: • Fetch • Decode • Execute	**5**

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Question	Answer	Marks
5(b)(i)	Any **four** from: • Memory data register / MDR • Control unit / CU • Arithmetic logic unit / ALU • Program counter / PC • Current instruction register / Instruction register / CIR / IR • Accumulator / ACC • Address bus • Data bus • Control bus	**4**
5(b)(ii)	Any **two** from: • To **temporarily** store • … the address of the next data/instructions required • … the address of the location in memory where data is to be stored • Stores the address that is to be collected by the **address bus**	**2**

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Question	Answer	Marks
5(c)(i)	Any **four** from: • It is RAM … • … which is volatile storage • It is ROM … • … which is non-volatile storage • It is directly accessible by the CPU Any **three** from: • BIOS • Start-up instructions • Programs that are **currently in use** • Data that is **currently in use** • Parts of OS **currently in use**	**7**
5(c)(ii)	Any **two** from: • Data can be permanently stored • … meaning that (application) software can be loaded/retrieved • … meaning that operating system can be loaded/retrieved • … meaning that user data/files can be accessed/retrieved	**2**

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Question	Answer	Marks
6(a)	• Image	**1**
6(b)	• Lossy compressed file	**1**
6(c)	Any **four** from: • A light is shone onto the surface of the document • The light is moved **across/down/under** the document • The reflected light is **captured** (using mirrors and lenses) • The reflections are converted to binary	**4**
6(d)	• Lossless compression	**1**

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Question	Answer	Marks
7(a)	• Data is sent multiple bits **at a time** • … down multiple wires • Data is sent in one direction only	**3**
7(b)	Any **two** from: • Parallel is not suitable for long distances // only suitable for short distances • … the data could become skewed • Parallel cables are not manufactured above approx. 5m	**2**
7(c)	Any **three** from (MAX 2 for ARQ): • Checksum used to detect errors (during transmission) • … using a calculated value • ARQ checks if data is received • … uses acknowledgement and timeout • … requests data be sent again if (checksum) detects error / not received	**3**

Question	Answer	Marks
8	**One** mark per each correct term in the correct place • high-level language • line by line • all at once • executable file • is not required • debugging	**6**

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