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Cambridge Assessment International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/13**

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.

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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.

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.

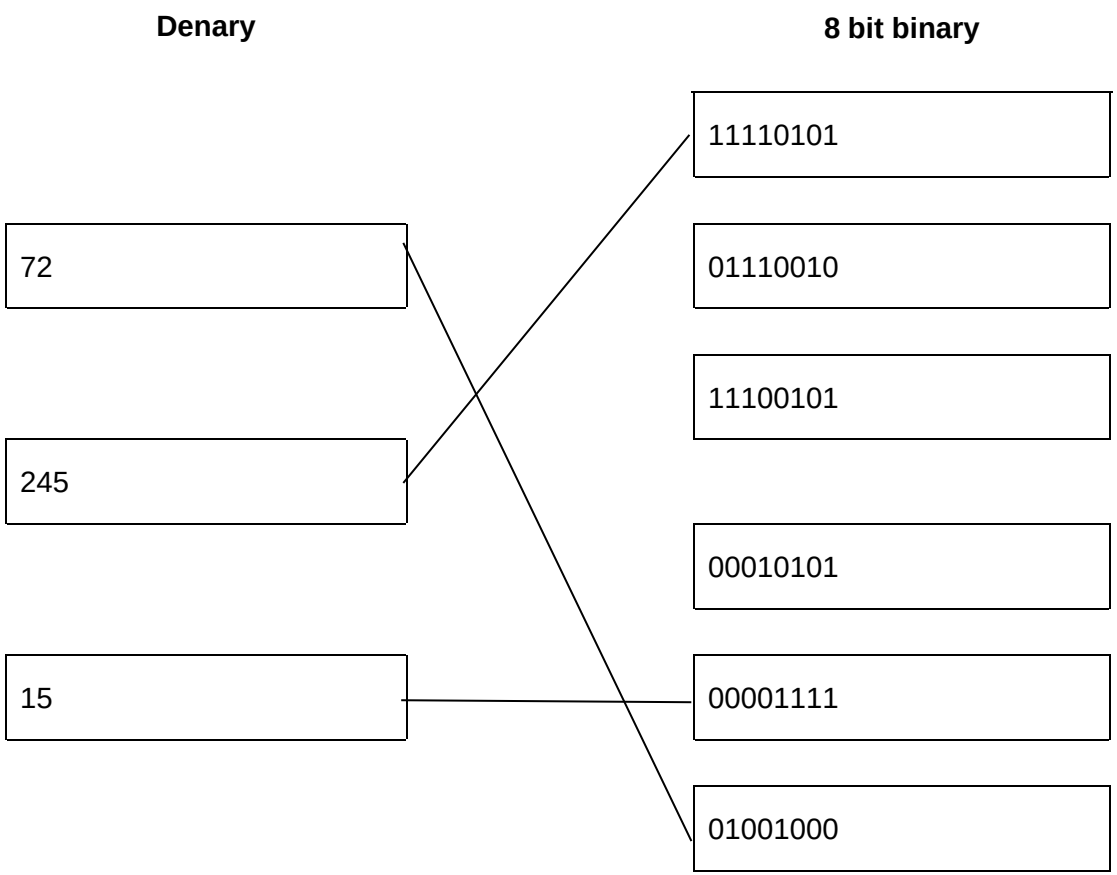
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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1</td><td>One mark for each correct row
<table>
<tr><th>Component</th><th>Input (✓)</th><th>Output (✓)</th><th>Storage (✓)</th></tr>
<tr><td>actuator</td><td></td><td>✓</td><td></td></tr>
<tr><td>register</td><td></td><td></td><td>✓</td></tr>
<tr><td>sensor</td><td>✓</td><td></td><td></td></tr>
<tr><td>mouse</td><td>✓</td><td></td><td></td></tr>
<tr><td>Digital Versatile Disc (DVD)</td><td></td><td></td><td>✓</td></tr>
</table></td><td>5</td></tr>
</table>

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Question	Answer	Marks
2(a)	**One** mark for each correct line  	**3**
2(b)	**One** mark for two correct characters, **two** marks for three correct characters, **three** marks for four correct characters, in the correct place • 09AE	**3**

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Question	Answer	Marks
3	**One** mark for the correct answer • 262 // 250 **Three** marks for three stages of working • 100 × 100 • 10 000 * 16 then / 8 // 10 000 *2 • 20 000 / 1024 or 1000 = 19.5 kB // 20 kB • 5 × 1024 = 5120 // 5 × 1000 = 5000 • 5120 / 19.5 // 5000 / 20	**4**

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Question	Answer	Marks
4(a)	**One** mark for a type of touchscreen technology, **three** marks for benefits • Resistive • … cheap to **manufacture/buy** • … more simple/easier technology to **manufacture** • … less affected by weather // more waterproof • … does not need bare finger // can be pressed with most things • … screen less likely to shatter/break • … lower power consumption • … (can) support multitouch • Capacitive • … good **visibility** in sunlight • … supports multitouch • … more longevity • … faster response times • … requires less/no pressure • … high quality **image/screen** • … doesn't need to be calibrated • … if screen is shattered, it will still register touch • Infrared • … good **visibility** in sunlight • … supports multitouch • … does not need bare finger // can be pressed with most things • … high quality **image/screen** • … if screen is shattered, it will still register touch • … does not need to be calibrated • … requires less/no pressure • … faster response times	**4**

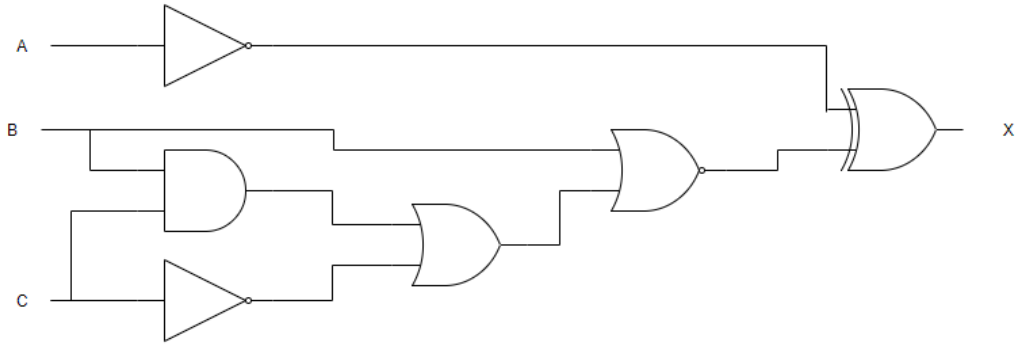
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Question	Answer	Marks
4(b)	**One** mark for the correct storage type and **one** mark for the explanation • Primary storage • Both **directly accessed** by the **CPU**	**2**
4(c)(i)	Any **two** from: • Using serial transmission • Data is sent one bit **at a time** • Data is sent down a single wire	**2**
4(c)(ii)	Any **three** from: • It can charge/power the device • It is a universal/industry standard • Fast rate of data transfer • Supports different data transmission speeds • **Automatically** detects the phone • Backward compatible • Little chance of data being skewed	**3**
4(d)	Any **four** from: • The interrupt signal is **sent to the CPU/processor** • The CPU stops the task it is currently processing … • … to service the interrupt • An interrupt service routine is used (to service the interrupt) • Once the interrupt is serviced, a message is displayed to notify the user of the call	**4**

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Question	Answer	Marks
5(a)	**One** mark for each correct logic gate with the correct inputs 	**6**

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Question	Answer	Marks
5(b)	**Four** marks for 8 correct outputs **Three** marks for 6/7 correct outputs **Two** marks for 4/5 correct outputs **One** mark for 2/3 correct outputs	**4**

A	B	C	Working space	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		**0**
1	1	1		**0**

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Question	Answer	Marks
6(a)	**Four** from: • The device shines a light/laser onto the QR code • Corners of code are used to determine position/orientation • Black and white sections of code reflect light differently • The device captures the light that is reflected back … • … using sensors • The light reflections are converted to binary • Link/URL to **video** is stored in the QR code	**4**
6(b)	• MP4	**1**
6(c)	Any **two** from: • Reduces the size of the **file** • Takes up less storage space • Quicker to transmit to device • Use less bandwidth • Less buffering	**2**
6(d)	**Four** from: • **Display** made up of pixels • … that are arranged in a matrix • LEDs are behind the screen • Light shone at pixels • Can have diffuser is used to distribute light evenly • RGB filters used • … and are mixed to create different colours	**4**

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Question	Answer	Marks
7	**One** mark for each correct term in the correct order • Fetched • MDR • Data bus • Decoded • ALU • Calculations • Execute	**7**

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Question	Answer	Marks
8(a)	Any **two** from: • They are both unique addresses • They can both be used to **identify** a device (on a network) • They are both assigned to hardware • They can both be represented as hexadecimal	**2**
8(b)	Any **two** from: e.g. • A MAC address is assigned by the manufacturer, whereas an IP address is assigned by the network/router/ISP • A MAC address is represented as hexadecimal, whereas an IP address can sometimes be represented as numeric • A MAC address is normally static, whereas an IP address can be dynamic • A MAC address has 6 groups of digits, whereas an IP address has 4/8 groups • A MAC address is 6 bytes (48 bit), whereas an IP address is 4/16 bytes (32/128 bit)	**2**

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Question	Answer	Marks
9	Any **six** from (MAX four for ARQ): • Odd or even parity is **set/agreed** for the data • A parity bit is added to each byte of data • … to make the number of 1s match parity • Data is checked after transmission to see if parity is correct • ARQ uses acknowledgement and timeout • If no error is found, a positive acknowledgement is sent to the sender / no acknowledgement is sent to the sender • If an error is found, a negative acknowledgement is sent to the sender … • … that triggers the data to be resent • When the data is sent, a timer is started • If an acknowledgement is not received within the time set, the data is resent ... • … until an acknowledgement is received / resend limit is reached	**6**

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Question	Answer	Marks
10(a)(i)	Any **three** from: • It is a secure protocol // hypertext transfer protocol secure • It is a set of rules for data transmission • It combines HTTP and SSL/TLS to transmit data • It encrypts data for transmission	**3**
10(a)(ii)	Any **one** from: • Look for a locked padlock • Check the digital certificate	**1**
10(b)	Any **three** from: • Hacking • Virus • Malware **Note**: If three different types of correct malware are given, they can be awarded.	**3**

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