Cambridge Assessment International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/12**

Paper 1 Computer Systems **October/November 2023**

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 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

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[Turn over

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.

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Mark scheme abbreviations

/ separates alternative words / phrases within a marking point
// separates alternative answers within a marking point
underline actual word given must be used by candidate (grammatical variants accepted)
max indicates the maximum number of marks that can be awarded
( ) the word / phrase in brackets is not required, but sets the context

Note: No marks are awarded for using brand names of software packages or hardware.

Question	Answer	Marks
1(a)	– A	**1**
1(b)	Any **one** from: – Spyware // Keylogger – Adware – Trojan horse	**1**
1(c)	– Anti-malware	**1**

Question	Answer	Marks
2(a)	– 227	**1**
2(b)	**One** mark for each correct character in the correct order: – E3	**2**
2(c)		**1**
2(d)	**One** mark for suitable working method e.g. flip and add 1 **One** mark for correct answer – 10011101	**2**
2(e)	**One** mark for each correct nibble (max 2) **One** mark for correct working e.g. correct carry **One** mark for showing overflow bit 1 1 1 1 0 0 0 1 1 + 0 1 0 0 1 1 0 0 1 0 0 1 0 1 1 1 1	**4**

Question	Answer	Marks
3(a)(i)	– The maximum number of FDE cycles/instructions a CPU can perform/process/execute in a second	**1**
3(a)(ii)	– Increases/improves the performance // Tasks can be performed quicker/faster – … because more FDE cycles/instructions can be processed in a second	**2**
3(b)	– **Stores** addresses … – … of next instruction/data to be fetched // where data is to be written to	**2**
3(c)	– Instruction set	**1**

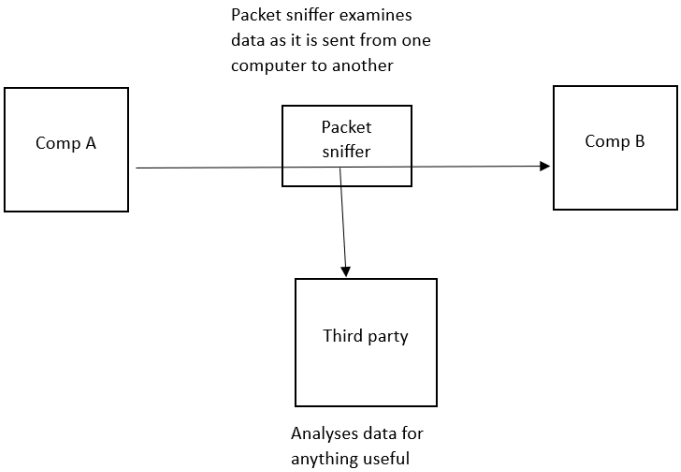
Question	Answer	Marks
4(a)	Any **two** from: – Performs a single/limited/dedicated function/task – It has a microprocessor – It has **dedicated** hardware – Uses firmware – It is normally built into a larger device/system – User normally cannot reprogram – It does not require much power – It is cheap **to manufacture** – Works automatically // works without human intervention – It is small (in size) – It is a real-time system	**2**
4(b)	**One** mark for each correct system: – security light system – freezer – vending machine	**3**

Question	Answer	Marks
5(a)	Any **one** from: – The recording of the song is more accurate/closer to original	**1**
5(b)	Any **one** from: – The file size will be increased – The file will require more **storage** space	**1**
5(c)	Any **two** from: – The number of bits that are used **per sample** – … that provides the variation in amplitude that can be stored for each sample // defines the number of different amplitudes that can be recorded – … that determines how quiet/loud the sounds are that can be recorded – Example e.g. 16-bit	**2**
5(d)	– Lossless	**1**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>6</td><td>One mark for each correct data transmission method:

<table>
<tr><th>Data transmission method</th><th>Description</th></tr>
<tr><td>serial simplex</td><td>Data is transmitted down a single wire, one bit at a time, in one direction only.</td></tr>
<tr><td>parallel half-duplex</td><td>Data is transmitted down multiple wires, multiple bits at a time, in both directions, but only one direction at a time.</td></tr>
<tr><td>serial full-duplex</td><td>Data is transmitted down a single wire, one bit at a time, in both directions at the same time.</td></tr>
<tr><td>parallel simplex</td><td>Data is transmitted down multiple wires, multiple bits at a time, in one direction only.</td></tr>
</table></td><td>4</td></tr>
</table>

Question	Answer	Marks
7(a)	Any **two** from e.g. – Barcode **scanner** – QR code **scanner** – Digital camera	**2**
7(b)	Any **six** from: – Proximity/infrared/pressure sensor used – Sensor **continually** sends **digitised** data to microprocessor // When driver pushes button, sensor sends **digitised** data to the microprocessor – Microprocessor compares data to stored value(s) – If in range/out of range/matches, microprocessor sends **signal** to close the door – **Actuator** used **to close door** – If not in range/out of range/does not match door will not close // If not in range/out of range/does not match actuator not activated/signal not sent as passenger in door // If not in range/out of range/does not match a timer is set to check again // If not in range/out of range/does not match a signal is sent to alert the driver/output a message – This process repeats **until the door can close**	**6**

Question	Answer	Marks
8(a)	The diagram demonstrates (**One** mark for each part of the diagram): – Data is being sent from one device to another – The data is being examined **during transmission** – Packet sniffer is used – Intercepted data is reported to a third-party **during transmission** … – … and analysed for anything useful – Connection hacked to spoof destination address e.g. 	**4**
8(b)	– Encryption … – … if the data is intercepted it will be **meaningless** (because they do not have the decryption key)	**2**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>9</td><td>
<table>
<tr><th>Term</th><th>Description</th></tr>
<tr><td>world wide web</td><td>the collective name for all the web pages available</td></tr>
<tr><td>cookie</td><td>a small text file, stored by the web browser, that can store a user’s personal data</td></tr>
<tr><td>uniform resource locator (URL)</td><td>the text-based address for a website // It is made up of the protocol, domain name and filename/folder name</td></tr>
<tr><td>web server</td><td>Stores web pages // receives requests from clients and returns requested web page</td></tr>
<tr><td>hypertext markup language // HTML</td><td>the language used to create a website. Example tags are <head> and <body></td></tr>
<tr><td>hypertext transfer protocol // HTTP</td><td>a protocol that is used to request and send web pages</td></tr>
</table>
</td><td>6</td></tr>
</table>

Question	Answer	Marks
10(a)	Any **one** from: – The ability to learn/adapt // machine learning abilities – The collection of data and the rules for using that data – The ability to reason // has problem solving abilities // makes predictions – Simulates intelligent/human behaviour – Analyses patterns	**1**
10(b)	Any **six** from: – It has an interface … – … used to input data/view output – It has a knowledge base – It has a rule base – It has an inference engine – Applies the rule base to/and the knowledge base to provide output/diagnosis/result/solution/decision – Decides what to ask next based on the data input	**6**

Question	Answer	Marks
11(a)	– Amount of liquid/gas/steam flowing/moving through an environment	**1**
11(b)	**Two** from (for benefit and matching description) e.g.: – Increases safety – …meaning that workers do not need to go into dangerous areas to collect data/make checks/do dangerous tasks – Can increase jobs/skills – …as employees are needed to learn/maintain the equipment – No need to do repetitive tasks – … so, they can use their time on other/more skilled tasks	**2**
11(c)	**Two** from (for drawback and matching description) e.g.: – High **set-up/installation** costs – … it would mean the company need to find a lot of money up front to pay for the equipment // employees will need training – Utility/maintenance/repair costs – … increase in bills such as electricity // skilled employees will be required to maintain the system // equipment will break/need updating – Deskilling of the workforce – … may mean that workers will no longer have the skills for some of the manufacturing jobs, should the equipment break	**2**

Question	Answer	Marks
12(a)	Any **two** from: – Only exists electronically – Can be a decentralised system – Can be a centralised system – Usually encrypted	**2**
12(b)	– Blockchain	**1**

Question	Answer	Marks
13(a)(i)	– C	**1**
13(a)(ii)	Any **one** from: – Directly accessed by the CPU – Has both volatile and non-volatile storage	**1**
13(b)	**One** mark for each correct term in the correct order: – Random access memory (RAM) – Hard disk drive (HDD) – Pages – Random access memory (RAM) – Virtual memory // Hard disk drive (HDD)	**5**

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