Cambridge Assessment International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/13**

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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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)	Any **two** from e.g.: – Touchscreen – Microphone – Keyboard – Keypad – Digital camera – Sensor // by example – Biometric device – Button	**2**
1(b)	Any **one** from e.g.: – Screen – Speaker – LED/Light – Actuator/Motor	**1**
1(c)(i)	– 8	**1**
1(c)(ii)	– 1024	**1**
1(d)	Any **three** from: – It **performs** the basic functions of a computer – It **manages** the hardware – It provides a platform to run software – It provides a user interface – It performs tasks such as (any example of function of an operating system)	**3**

Question	Answer	Marks
2(a)	Any **two** from: – It has a base of 2 – It only uses two **values** – … that are 1 and 0	**2**
2(b)	– (0000)1110 – (00)111011 – 11101010	**3**
2(c)	– 9 – 1A – 41	**3**
2(d)	**One** mark for suitable working method e.g. conversion to binary **One** mark for correct answer – 01111011	**2**

Question	Answer	Marks
2(e)	**One** mark for each correct nibble (max 2) **One** mark for correct working e.g. correct carries 1 1 1 0 0 1 1 0 0 1 1 + 0 1 1 1 1 0 0 0 1 0 1 0 1 0 1 1	**3**

Question	Answer	Marks
3(a)	– Accumulator (ACC) – Control unit (CU) – Program counter (PC)	**3**
3(b)	Any **two** from: – It is a type of storage – …that stores **frequently used** data/instructions – To speed up **access** – … as it is faster to access than RAM – It has different levels e.g. L1 – L3	**2**
3(c)	– Clock	**1**
3(d)	– Arithmetic logic unit // ALU	**1**

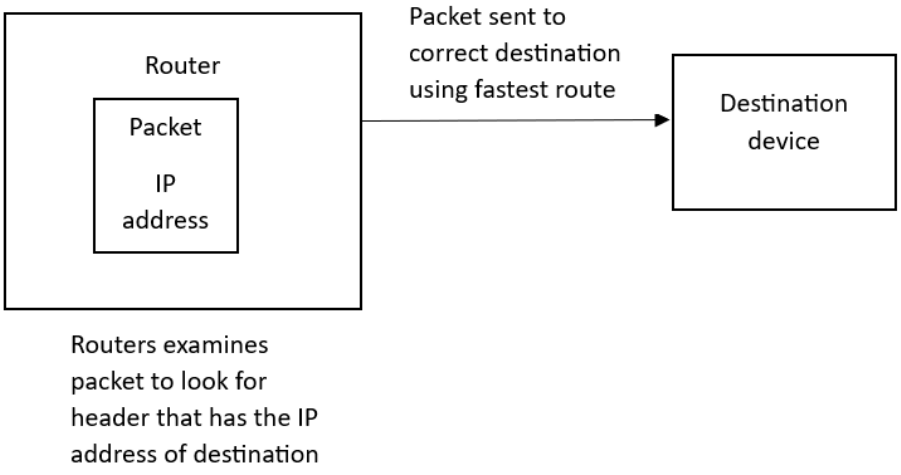
Question	Answer	Marks
4(a)	Any **two** from: – Display web pages – … by rendering HTML	**2**
4(b)	– Storing cookies	**1**
4(c)	Any **one** from: – Storing bookmarks – Storing favourites	**1**
4(d)	Any **one** from: – It encrypts it – Uses digital certificates	**1**

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Question	Answer	Marks
5(a)	– Interference // crosstalk	**1**
5(b)	– C	**1**
5(c)	Any **five** from: – Timer is started when sending device transmits a data packet to receiver – Receiving device checks the data packet for errors – Once the receiving device knows the packet is error free it sends an acknowledgement back to the sending device … – … and the next packet is sent – If the sending device does not receive an acknowledgement before the timer ends … – … a timeout occurs – … the data packet is resent … – … until acknowledgement received // until max number of attempts reached	**5**

Question	Answer	Marks
6(a)	– B	**1**
6(b)	**Four** from e.g.: – The data can be accessed from any location – … meaning that employees can work from anywhere with a connection – The **hardware** is **owned**/**maintained** by a **third party** – … meaning that the company are not responsible for maintaining // meaning the company aren't responsible for its security – Can increase the storage needed easily – … without needing to buy new hardware – Do not need to house the hardware needed – … costs can be saved on the space saved for this – Cloud system will back up the data – … meaning the company does not need to do this	**4**
6(c)	**Two** from e.g.: – Internet connection is needed/needs to be stable … – … and if this is not available/unstable the data cannot be accessed – Employees could be pressured to work outside of hours … – … as they can access the data from any location	**2**

Question	Answer	Marks
7(a)	– The dimensions of an image // Number of pixels wide by number of pixels high	**1**
7(b)	– The number of bits used to represent each/a colour	**1**
7(c)	Any **one** from: – A greater range of colours can be seen/used – Image will be closer to the actual content of the image/real life – The image will have more detail	**1**
7(d)	– Lossy	**1**
7(e)	Any **two** from: – Quicker to transmit/upload/download – Not as much bandwidth needed to transmit file – To fit in limitation of file size on e.g. email	**2**

Question	Answer	Marks
8	The diagram demonstrates (**one** mark for each part): – The router examining the packet … – … looks for the packet header – … looking for the IP address of destination – The packet being sent toward its correct destination – … by the fastest route // decides which route it takes – Router is shown connecting devices/networks – Router is shown assigning an IP address to a device e.g.  	**4**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>9(a)</td><td>One mark for each correct type:

<table>
<tr><th>Type of secondary storage</th><th>Statement</th></tr>
<tr><td>optical</td><td>data is stored using pits and lands</td></tr>
<tr><td>solid-state</td><td>data is stored using control gates and floating gates</td></tr>
<tr><td>magnetic</td><td>data is stored using electromagnets</td></tr>
<tr><td>optical</td><td>data is stored using a laser</td></tr>
<tr><td>magnetic</td><td>data is stored on a platter that is divided into tracks and sectors</td></tr>
</table></td><td>5</td></tr>
<tr><td>9(b)</td><td>Four from:
– Primary storage is directly accessible by the CPU
– … whereas secondary storage is not directly accessible by the CPU

– Primary storage stores the data that is currently in use/for booting the system
– … whereas secondary storage stores user’s files/data/operating system/application software

– Primary storage normally has a small capacity
– … whereas secondary storage normally has a larger capacity

– Some parts of primary storage are volatile
– … whereas secondary storage is non volatile

– Some parts of primary storage the data cannot be changed
– … whereas data in secondary storage can be changed

– Primary storage has faster access speeds to data
– … whereas secondary storage has slower access speeds to data</td><td>4</td></tr>
</table>

Question	Answer	Marks
10(a)	**One** mark for each correct term, in the correct order: – Knowledge base – Inference engine – Rule base // knowledge base – Knowledge base // rule base – Interface	**5**

Question	Answer	Marks
10(b)	Any **four** from: e.g. – It is a form of artificial intelligence – Means it can adapt/change (its own processes) // It can edit its own algorithms – It can edit its own data – It can be trained – … this can be supervised/unsupervised – … meaning it can learn with/without human interaction – Analyses patterns and stores **successful**/**unsuccessful** results … – … to influence future decisions – (Supervised) means a user tells the system the input and output – (Unsupervised) means the system is given the input and needs to work out the output	**4**

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