Cambridge Assessment International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/11**

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.

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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.

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.

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Question	Answer	Marks
1(a)	– A	**1**
1(b)	– C	**1**
1(c)	– Control unit	**1**
1(d)	Any **two** from: – (The CPU completes) 2.4 billion – … cycles/clock pulses **per second**	**2**
1(e)(i)	Any **two** from: – Stores data … – … that has been fetched/to be written to memory	**2**
1(e)(ii)	Any **three** from: – Memory address register // MAR – Program counter // PC – Current instruction register // CIR – Accumulator // ACC	**3**

Question	Answer	Marks
2(a)	**One** mark for each correct part of the fee, in the correct order: – 17 – 70 (Correct fee $17.70)	**2**
2(b)	**One** mark for each correct binary value: Register 1 – 00001110 Register 2 – 01100010	**2**

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Question	Answer	Marks
2(c)	**One** mark for each correct hexadecimal value, in the correct order. – A – 0 – 3 – D (Ticket number A03D)	**4**
2(d)	**Two** from: – It contains **logic gates**/**switches** … – … that process the values 1 and 0 // have two states	**2**
2(e)	Any **four** from: – Compares the ticket number received to stored data – … that is a **database/file** of ticket numbers – … checks the ticket number is listed as paid – If the **data** matches/cost is paid it sends a **signal** to raise the barrier – If the **data** does not match/cost is not paid, the barrier remains down	**4**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3</td><td>One mark for each correct term:

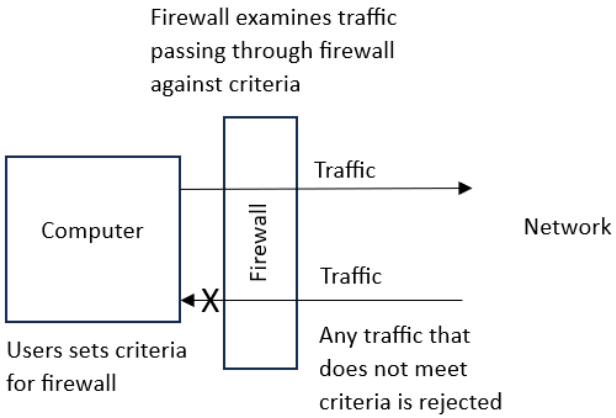
<table>
<tr><th>Term</th><th>Description</th></tr>
<tr><td>hardware</td><td>A collective term for the physical components of the computer system.</td></tr>
<tr><td>application software</td><td>A type of software that provides services that the user requires and allows the user to perform tasks on the computer.</td></tr>
<tr><td>operating system</td><td>A type of software that manages the main functions of the computer, including managing files and managing memory.</td></tr>
<tr><td>firmware</td><td>A type of software that is stored in the read only memory (ROM). It includes the basic input output system (BIOS) and the bootloader.</td></tr>
</table>
</td><td>4</td></tr>
</table>

Question	Answer	Marks
4(a)	**One** mark for each correct transmission method: – Serial half-duplex – Serial full-duplex	**2**
4(b)	Any **four** from: – The number of 1 s/0 s are counted – A parity bit is added to each byte/7 bits before transmission – … to make the **sum** of the bits/1 or 0 s in each byte **odd** – After transmission, if the number is **odd** no error is detected – After transmission, if the number is **even** an error is detected	**4**

Question	Answer	Marks
4(c)	– Echo (check)	**1**

Question	Answer	Marks
5(a)	Any **five** from: – (The analogue sound is) recorded using a microphone – The sound wave is sampled – … measuring the height/amplitude – Each amplitude has a unique binary value – The sample rate is set – … that is the number of samples taken per second – The sample resolution is set – … that is the number of bits used for each sample – Each sample taken is converted to binary	**5**
5(b)	**Two** from: – Increase the sample rate – Increase the sample resolution	**2**
5(c)	Any **three** from: – They want to be able to edit the original sound file – They want the highest sound quality for the file // They want the sound to be closest to the original recording – … using lossy would reduce the sound quality – … using lossy will permanently remove some of the data // no data will be permanently removed with lossless	**3**
5(d)	Any **four** from (**MAX 3** for ASCII/Unicode alone): – ASCII has limited/fewer characters // Unicode has a more characters – ASCII covers a limited set of languages/fewer languages – Unicode includes many/more languages/emojis – ASCII requires 7/8 bits per character – Unicode requires up to 16/32 bits per character – ASCII has 128/256 characters – Unicode has 65 536/4 294 967 296 characters // approx. 60/70 thousand/4 billion characters	**4**

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Question	Answer	Marks
6	The diagram includes (any **four** from): – Traffic passing both ways through the firewall – An indication that criteria is set for the firewall – Traffic is compared to criteria – Traffic being rejected if it does/does not meet criteria – Traffic being accepted if it does/does not meet criteria e.g. 	**4**

Question	Answer	Marks
7	**One** mark for each correct term, in the correct order: – header – destination address – routers – last	**4**

Question	Answer	Marks
8(a)	Any **two** from: – Data is stored on platters – (Platters) are divided into tracks and sectors – Has components that are spun – Data is read/written using a read/write arm – Data is read/written using electromagnets – Magnetic field determines the binary value – It is non-volatile	**2**
8(b)	Any **three** from: – Flashes data onto chips – Uses transistors – Uses NAND/NOR technology – Uses control gates – Uses flow gates – Controls the flow of electrons – It can be volatile or non-volatile	**3**
8(c)	**One** mark for an example in each storage type e.g.: Magnetic – HDD – Magnetic tape – Floppy disk – Magnetic strip Solid state – SSD – USB drive – SD card – RAM Optical – CD – DVD – Blu-ray	**3**

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Question	Answer	Marks
9(a)	Any **one** from: – Operating system // Interrupt handler	**1**
9(b)	Any **five** from: e.g. – Key press generates the interrupt – Interrupt given a priority – Interrupt is sent to CPU – Interrupt is placed in a queue – CPU stops current task to check the queue/service the interrupt … – … using an interrupt service routine – If key press is highest priority the interrupt is processed	**5**
9(c)(i)	Any **two** suitable hardware example e.g.: – Moving the mouse – Clicking a mouse button – Plugging in a device – Paper jam in printer – Printer out of paper	**2**
9(c)(ii)	Any **two** suitable software examples e.g.: – Division by zero – Two processes accessing the same memory location – Null value	**2**

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