CAMBRIDGE
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COMPUTER SCIENCE **0478/11**

Paper 1 Computer Systems **October/November 2024**

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 2024 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 descriptions 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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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)	B	**1**
1(b)(i)	• Lossy • Lossless	**2**
1(b)(ii)	Any **three** from: • The file requires less storage space • Takes less time to transmit • A lower bandwidth can be used to transmit the file • Less data usage for data allowance • More likely to meet file size limits set by email clients/apps	**3**

Question	Answer	Marks
2(a)	Any **two** from: For example: • Touchscreen • Microphone • Sensor // by example • Biometric device • Button • (Digital) camera	**2**
2(b)	Any **two** from: For example: • Screen • Speaker • LED • Actuator	**2**

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Question	Answer	Marks
2(c)(i)	Any **two** from: • To store data/files **permanently** • … otherwise, data/programs would need to be downloaded/entered/installed every time the smartphone was turned on • To allow **software** to be downloaded/installed on the smartphone // • To store user files • For the creating of virtual memory	**2**
2(c)(ii)	**One** mark for: Solid state Any **Three** from: • It is small/thin in size • … so it would fit easily into the smartphone device • It is lightweight • … so it wouldn't make the smartphone heavy to carry • It has no moving parts • … so it would be durable/robust • … if the smartphone is dropped the data is less likely to be damaged/lost • It has fast read/write speeds • … so it would be quick to load files/software • It runs at a cool temperature • … so it wouldn't make the smartphone hot to hold for the user • It doesn't make a lot of noise • … so it wouldn't ruin the user's experience of listening to music/watching videos • It doesn't require much power • … so it won't drain the battery • It can have a large storage capacity • … so can store files that are multimedia	**4**

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Question	Answer	Marks
3(a)	Unicode	**1**
3(b)(i)	• (0)1000001 • (0)1101101	**2**
3(b)(ii)	• 41 • 6D	**2**
3(c)(i)	121	**1**
3(c)(ii)	79	**1**
3(c)(iii)	00011110	**1**
3(d)	**One** mark for correct working, for example: carries **One** mark for each correct nibble. 1 1 1 1 0 1 0 1 0 1 0 0 0 1 1 1 0 1 0 0 1 1 0 0 1 0 0 0	**3**

Question	Answer	Marks
4(a)	Any **four** from: • The data packet has three sections • It has a packet header … • … that contains data such as the destination address • It has a payload … • … that contains the main data for the email • It has a trailer … • … that contains data such as the error detection system used	**4**

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Question	Answer	Marks
4(b)(i)	Any **four** from: • It sends the data multiple bits at the same time // It uses multiple wires • … so the transmission speed of the data will be fast • Data may not need to travel a long distance • … as the devices are all within a single room • It sends data in both directions at the **same time** • … so users on the network can send data to each other with **no delay**	**4**
4(b)(ii)	Any **two** from: • More interference/crosstalk (due to multiple wires) • **Data** may be skewed (due to multiple bits at a time) // bits may arrive out of order • More chance of data collisions (as data sent in both directions at the same time) • More chance of error in the data	**2**
4(b)(iii)	Any **one** from: • Serial simplex • Serial half-duplex • Serial full-duplex • Parallel simplex • Parallel half-duplex	**1**

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Question	Answer	Marks
5(a)	Any **two** from: • Program counter // PC • Memory address register // MAR • Memory data register // MDR • Current instruction register // CIR	**2**
5(b)	Any **three** from: • **CIR/CU** receives the instruction from the **MDR** // Instruction sent from **MDR** to **CIR/CU** • … using the data bus • Instruction is **separated** into opcode and operand • Control unit decodes the **instruction** • … using an instruction set	**3**
5(c)	Any **one** from: • Accumulator • Memory address register // MAR • Memory data register // MDR	**1**
5(d)	• data • address • control	**3**
5(e)	• It can now execute **more** instructions/FDE **per second** • … this will increase the performance of the CPU	**2**

Question	Answer	Marks
6(a)	Any **one** from: • Computer system that is designed to a perform dedicated/single function • Computer system that contains a microprocessor (and)/dedicated hardware • Computer system that is built into a larger system	**1**

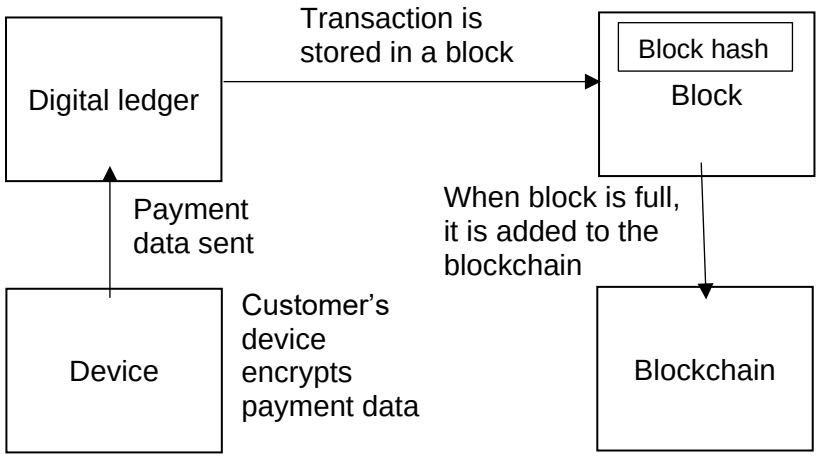
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Question	Answer	Marks
6(b)	Assembler	**1**
6(c)	Any **one** from: • Convert to hexadecimal • Convert to denary • A character set can be used	**1**
6(d)	Any **one** from: • More control over manipulating the hardware • Faster execution for testing than a high-level language • They can use machine specific instructions	**1**
6(e)	**Six** from (MAX **4** for stating features): Code editor … … that allows the user to enter and amend code in their program Run-time environment … that allows a program to be run and see the outputs of their program Error-diagnostic … to show the programmer where there are errors in the program Auto-completion … to give the user **options/suggestions** of key commands to select Auto-correction … to correct a command that has a **minor misspelling** Prettyprint … changes the colour of **key commands** do they are easy to identify	**6**

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Question	Answer	Marks
7(a)(i)	D	**1**
7(a)(ii)	**One** mark for identifying a function. **One** mark for a matching description. For example: • Memory management • … managing what gets allocated where in memory • Managing peripherals and drivers • … managing the communication between any input and output devices that are connected to the computer • Multitasking • … managing the process of **switching** between tasks that are being carrying out • Platform for running applications • … allowing communication between the applications software and the hardware • System security • … proving features such as username and password • User accounts • … allowing multiple user accounts to be created on a computer	**2**
7(b)	Any **one** from: • Firmware • Bootloader • BIOS • Bootstrap	**1**

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Question	Answer	Marks
8	**One** mark for each correct part. The diagram shows: • Digital **ledger** is used • Device encrypting data • Device sending data to digital **ledger** • Payment being recorded on digital **ledger** • … including details such as digital signature/time/date stamp • Transaction is stored in a block … • … in multiples • Each block has block hash/unique identifier • When block is executed or full • … it is applied to every device that has the blockchain // Block is added to blockchain (on each device) For example:  	**4**

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Question	Answer	Marks
9(a)	**One** mark for each correct term in the correct order. • artificial • interface • inference engine • knowledge base • rule base • inference engine • interface	**7**
9(b)	Machine learning	**1**

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