CAMBRIDGE
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COMPUTER SCIENCE **0478/13**

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.

 [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 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.

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

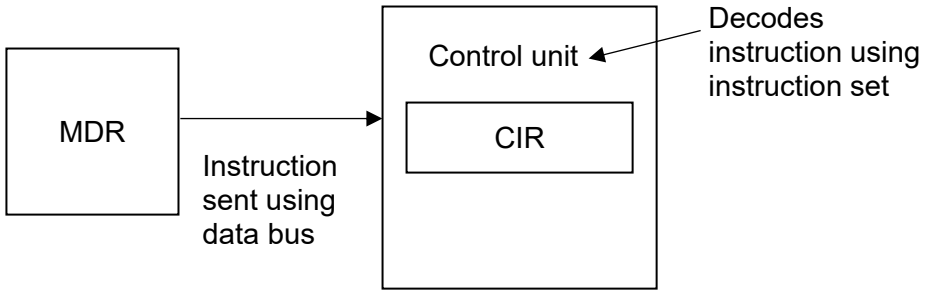
/ separates alternative words / phrases within a marking point
// separates alternative answers within a marking point
underline actual word given must be used by candidate (grammatical variants accepted)
max indicates the maximum number of marks that can be awarded
( ) the word / phrase in brackets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

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

Question	Answer	Marks
1(a)	B	**1**
1(b)	**One** mark for correct example. **Two** marks for matching explanation. • **RAM** • To **store** data/instruction that is **currently in use** • To **store** software/programs that are **currently in use** • For volatile storage // to store data **temporarily** • To allow data to be **accessed** directly **by the CPU/processor** // To allow data to be **stored closer** to the **CPU/processor** • **ROM** • To **store** the BIOS • To **store** the bootstrap/bootloader • To **store** start-up instructions • To **store** the firmware • For non-volatile storage // to store data **permanently** • To **store data/instructions** that **should not change** (unless needed) • **Cache** • To **store frequently** used instructions/data • For volatile storage // to store data **temporarily**	**3**
1(c)(i)	**One** mark for valid working, for example: 128 + 32 + 8 + 4 + 2 + 1 **One** mark for correct answer: 10101111	**2**
1(c)(ii)	• 0001 0101 • 0010 1101 • 0000 1001 0001	**3**
1(d)	**One** mark for each correct nibble. **One** mark for method of working, for example: carries. **One** mark for identification of overflow. 1 1 1 1 0 0 0 1 1 + 1 1 0 0 1 1 0 0 1 1 0 1 0 1 1 1 1	**4**
1(e)	**One** mark for correct working, for example: flip and add **One** mark for correct denary. –114	**2**

Question	Answer	Marks
2(a)	The file **size** will be reduced	**1**
2(b)	Any **two** from: • It will be under the file size limit for the email • It will be uploaded/transmitted/downloaded faster • It will take less storage space (on computer) • It will use less data allowance (if mobile data used) • Requires less bandwidth	**2**
2(c)	Any **three** from: • Data will be **permanently** removed • … and that could be **important**/**necessary** data • (The report will have text in it and) lossy is not suitable for **text files** • … as it will **damage**/**corrupt** the file • The report may have images in it and the quality of these will be reduced	**3**
2(d)(i)	Character set	**1**
2(d)(ii)	Any **two** from: • It can represent **more characters** • It can represent emojis/symbols • It can represent more languages	**2**
2(d)(iii)	Each character requires more **storage** space	**1**
2(e)(i)	• originator's address • destination address • packet number	**3**
2(e)(ii)	C	**1**
2(e)(iii)	Router	**1**
2(f)(i)	• A copy of the data is sent back to the employee's device/sender • The employee's device/sender **compares** the data sent to the data received back • If the **original and the copy** do not **match**, an error has occurred	**3**
2(f)(ii)	Any **two** from: • The checksum is **calculated** from/using the **data** • … using the **same algorithm** • … so, if the values are different the **data must be different**	**2**
2(g)(i)	Any **one** from: • To keep it secure • The data is sensitive/confidential • To make it meaningless	**1**

Question	Answer	Marks
2(g)(ii)	Any **one** from: • They both use a key • They both scramble the data // both make the data meaningless • They both turn plain text into cypher text	**1**
2(g)(iii)	Any **two** from: • Symmetric uses <u>one/public</u> key whereas asymmetric uses <u>two/public and private</u> keys • Symmetric can send the key with the data whereas asymmetric does not • Symmetric **decrypts** the data using the **same** key whereas asymmetric **decrypts** the data using a **different** key • Symmetric is less secure than asymmetric	**2**

Question	Answer	Marks
3(a)	Any **two** from: • Program counter // PC • Memory address register // MAR • Current instruction register // CIR	**2**
3(b)	**One** mark for each correct part of the diagram. The diagram shows: • Data/Instruction sent from the MDR to the CIR/CU • … using the data bus • … the CIR that is built into the CU • Data/instruction separated into operand and op code • <u>Control unit/CU</u> decodes instruction • … using an instruction set For example:  	**4**

Question	Answer	Marks
4	**One** mark for each correct term or description in the correct place. **Term** • World wide web // WWW • IP (address) • Domain name server // DNS • Proxy server **Description** • (Web browser) **Software/application** that allows users to view/access web pages by rendering HTML • (Hacking) Gaining **unauthorised** access to a computer/system	**6**

Question	Answer	Marks
5(a)	(A system) that can perform actions **without human intervention**	**1**
5(b)	• It receives data from the sensor • It **analyses** the data // It checks if the data is within/out of a range // • It sends **signals** to trigger actions based on the data	**3**
5(c)	**Any two** from: For example: • It stops the farmer having to handle heavy equipment • It frees the farmer up to do other jobs • It doesn't need to take breaks // Can work 24/7 • It can perform boring repetitive tasks • Can save money on **labour costs** • May be more accurate at ploughing/planting • May be more efficient than the farmer at ploughing	**2**
5(d)	Any **four** from: For example: • It could make use of machine learning • It could **gather data** from **ploughing** • … and use this data to **adapt** its **own process** • … so that it will make fewer mistakes • … such as the dimensions of the field • … such as the landscape of the field • … such as where obstacles are in the field • … to create a map of the field • … to develop the most efficient route to take • … so, it knows what to **avoid** in future	**4**

Question	Answer	Marks
6(a)	**One** mark for each correct term in the correct order: • web browser • session • temporary • web browser // session • persistent • permanent • expire	**7**
6(b)	Any **three** from: For example: • User preferences // by example • Login details • Payment details • User's **personal** details e.g. address • Contents of a shopping cart • Targeted advertising	**3**

Question	Answer	Marks
7	Any **four** from: • It is a piece of software • … used to write/develop/edit code • … used test/debug the code • … with features such as auto-completion // any suitable example • To translate the code to low level language/machine code	**4**