Cambridge Assessment International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/12**

Paper 1 Computer systems **February/March 2025**

MARK SCHEME

Maximum Mark: 75

Pre-standardisation

This document consists of **12** printed pages.

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Cambridge Assessment International Education – 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 descriptions for the question
- the specific skills defined in the mark scheme or in the generic level descriptions 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 descriptions.

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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 descriptions in mind.

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Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

Annotations

Annotation	Meaning
	Correct point
	Incorrect point
	Unclear response
FT	Follow through
REP	Repetition
I	Ignore
BOD	Benefit of doubt given
NBOD	Benefit of doubt not given
TV	Content of response too vague
NAQ	Not answered question

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Annotation	Meaning
	Omission
	Section not relevant
	Section incorrect
Highlighter	Information copied from the text
	Page or response seen by examiner

Question	Answer	Marks	Guidance
1(a)	1 mark for each completed item The binary number system is base **2**. The smallest denary number that can be represented an 8-bit binary number is **0**. The largest denary number that can be represented an 8-bit binary number is **255**. The hexadecimal number system is base **16**. Each hexadecimal digit is equivalent to **4** bits. The numbers 1 to 9 are used and the number 10 is represented by **A**. The hexadecimal number system continues up to the number 15, which is represented by **F**.	**7**	
1(b)	1 mark for working, 1 mark for each nibble For example: 1 0 0 1 1 0 1 1 + 0 0 0 1 0 0 1 1 1 0 1 0 1 1 1 0 1 1 1	**3**	
1(c)	C	**1**	
2(a)	1 mark from • Number of bits used to represent each colour • Number of colours that can be represented	**1**	
2(b)	1 mark each to max 2 • The higher the resolution the more pixels … • … the more bits to store … the larger the file size	**2**	Accept in reverse

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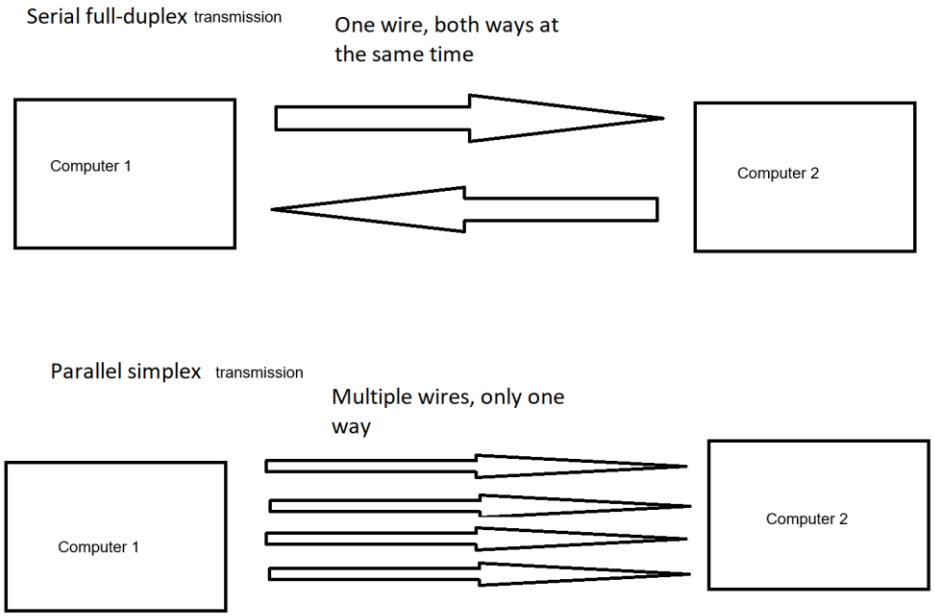
Question	Answer	Marks	Guidance
2(c)(i)	1 mark each to max 3 , examples: • The artist wants to provide a high quality image • Lossless will reduce the file size but retain all parts of the image // The artist does not want any of the image to be lost when downloaded • Lossy will reduce the quality // by example for data lost e.g. colour/resolution • Image may be small in file size anyway • … server has enough space to store the image • … download time is not excessive	**3**	
2(c)(ii)	1 mark for naming, max 2 for describing e.g. • Run-length encoding • Store consecutive pixels of the same colour … … as the colour and the number of repetitions	**3**	Accept other lossless methods of compressing a bitmap image
2(d)(i)	Max 5 overall 1 mark each to max 3 • Data is split into **fixed size** packets • The data is the payload • Each packet is given a header … • … with data e.g. Destination IP • Each packet has a trailer 1 mark each to max 3 Router directs each packet towards its destination … … by selecting the most efficient route Each packet can take a different route to the destination Packets can arrive out of order …after the last packet has arrived they are reordered	**5**	

Question	Answer	Marks	Guidance
2(d)(ii)	1 mark per bullet for completed diagram showing: • Serial full-duplex going both ways at the same time • Parallel simplex only going one way • Parallel simplex having multiple wires and serial having one wire For example: 	**3**	
3(a)	1 mark each • Accumulator • Current instruction register • Program counter	**3**	

Question	Answer	Marks	Guidance
3(b)	Execute/process instructions and data to produce output // Perform FDE cycle	**1**	
3(c)(i)	1 mark for Computer A 1 mark each to max 2 for justification • It has a 4 cores • …each core will execute one instruction at a time • 4 instructions can be executed simultaneously	**3**	
3(c)(ii)	1 mark each to max 2 It has a higher clock speed More FDE cycles can run per second More instructions can be executed per second	**2**	
3(d)	a list of all the commands that can be processed by a CPU	**1**	
4(a)(i)	infra-red/motion/movement	**1**	
4(a)(ii)	1 mark each to max 3 Receive digital data continually from the sensor Uses sensor data to calculate distance to person identified Compares calculated/sensor data to stored data/1m … if data indicates <=1m person detected (microprocessor sends signal to display welcome message on screen)	**3**	
4(b)	1 mark each • Dedicated function // special purpose device // not general purpose device Dedicated hardware // by description e.g. hardware is only used for ATM functions	**2**	

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Question	Answer	Marks	Guidance
4(c)	1 mark for input, for example: • Microphone • Braille keyboard/pad 1 mark for output, for example: • Speaker • Headphones	**2**	
5(a)(i)	1 mark each to max 2 • Receive data from the network… • … and convert it to be understood by the computer • Convert data from the computer to a form to be transmitted over the network • To allow a physical connection between a computer and a network	**2**	
5(a)(ii)	1 mark each to max 3 • (Represented) in hexadecimal • Numbers are separated by colons • Six groups of digits • Sets of 2-digit (hex) numbers	**3**	Question is structured as 1, 2, 3 but consider marking as a whole i.e. 2+ marks on one line
5(b)(i)	C	**1**	
5(b)(ii)	Router	**1**	
5(c)(i)	1 mark from • The collection of websites and web pages accessed using the internet • The websites hosted on the internet/web servers	**1**	

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Question	Answer	Marks	Guidance
5(c)(ii)	1 mark each to max 4 • Uses SSL/TSL • Encrypts data • … using asymmetric encryption • … data is encrypted using the web server's public key • … data can only be decrypted by the web server's private key • Data transmitted to the server can only be decrypted by the server	**4**	
5(c)(iii)	1 mark each to max 2 • Domain name • Web page/file name/directory	**2**	
6(a)	Any three from: • Collection of data • Rules for data • Ability to reason • Ability to adapt	**3**	Ability to learn is in the question
6(b)	Any three from: e.g. • Changes its data and rules • … according to feedback/results • … for example if a result does not give a suitable response this is recorded • … next time the result is changed • Supervised/unsupervised learning • Use of ranking algorithm to decide which appears first	**3**	Answers are simplified – consider responses that actually explain how it works at stm
7(a)	1 mark each: • Language: assembly • Translator: assembler	**2**	Consider FT for mnemonics. Consider object code and interpreter

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Question	Answer	Marks	Guidance
7(b)	Any four from • Each statement is translated and executed before the next • Translator stops when an error is found • … can correct and continue from where stopped // real time changes • ... does not need to retranslate all of the code again (unlike a compiler) • Can test sections of the code … • … without all of the program being functional/accurate/complete	**4**	
7(c)	Any three from e.g. • Code editor • Run-time environment • Error diagnostics // by example // BOD debugging tools // Breakpoints // Stepping // Variable watch window • Auto-complete • Auto-correct • Prettyprint // syntax highlighting • AI • Collapse/expand block • Auto-documentation Line numbers	**3**	Accept a MP by description, e.g. 'uses different colours for command words' for prettyprint

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