CAMBRIDGE
International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/11**

Paper 1 Theory **May/June 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.

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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.

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)	Any **two** from: Example: • Touch screen • Microphone • Button • Webcam // (digital) camera • Accelerometer • Biometric device	**2**
1(b)	Any **one** from: Example: • Screen • Speaker • LED	**1**
1(c)	SSD // Solid-state drive // Solid-state (device)	**1**

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Question	Answer	Marks
2(a)	**C**	**1**
2(b)	14 20 A5	**3**

Question	Answer	Marks
3(a)	00011000	**1**
3(b)	**D**	**1**
3(c)	**One** mark for correct working Example: Flip and add **One** mark for correct answer: −93	**2**
3(d)	1024	**1**

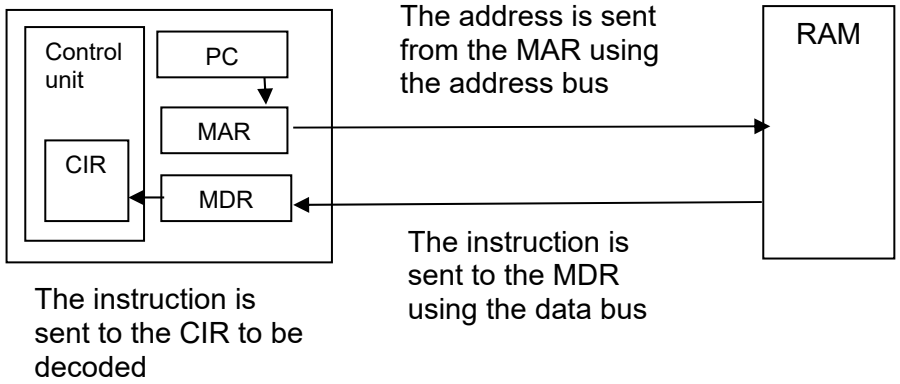
Question	Answer	Marks
4(a)	Any **three** from: • A packet is split into **three** different sections • … the header • … the payload • … the trailer	**3**
4(b)	Router	**1**

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Question	Answer	Marks
4(c)	Any **three** from: • The network may be spread over a long distance … • … so it is more **reliable** • Bits will be sent/arrive in **sequence** • …so bits less likely to be skewed • Less crosstalk/interference • … so less likely to have errors • The data may not need to be transmitted at a fast speed // data transmission speed of serial is adequate • The cables in the network only use serial transmission	**3**

Question	Answer	Marks
5(a)	To store data/files/software **permanently**	**1**
5(b)	Compact disk (CD) Digital versatile disk (DVD) Blu-ray disk	**3**
5(c)	Any **three** from: • To store data **temporarily** • To store data **currently in use** • To store software **currently in use** • Data can be **accessed** faster (than secondary storage) • To speed up the fetch stage (of the fetch-execute cycle)	**3**

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Question	Answer	Marks
5(d)	Any **four** from**:** The diagram shows: • The registers MAR, MDR and PC • **Address** sent from PC to MAR • …using address bus (award anywhere for correct use of address bus) • …PC is incremented • **Address** sent from MAR to RAM • **Data/instruction** sent from RAM to MDR • …using data bus (award anywhere for correct use of data bus) • **Data/instruction** sent from MDR to CIR/CU • Control unit sending control signal for any part of the process • … using control bus (award anywhere for correct use of control bus) Example: PC sends address to MAR then increments  	**4**

Question	Answer	Marks
6(a)	Any **one** from: • **Permanently** store instructions (in ROM) • Stores instructions to **boot up/start up** the computer • Provides the **operating system** with a platform to run on • Controls/manages/allows **communication** with hardware • **Store** instructions **securely** (to stop them being easily corrupted)	**1**
6(b)	Any **one** from: Example: • Bootstrap • Bootloader • BIOS • Operating system (in embedded system) • Programs (in embedded systems)	**1**
6(c)	Any **two** from: • Operating system • Utility software NOTE: Two examples of utility software can be awarded	**2**

Question	Answer	Marks
7	**One** mark for each correct term in the correct place. • plain text • cipher text • public key • private key	**4**

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Question	Answer	Marks
8(a)	The robot can perform actions **without human intervention**	**1**
8(b)	Any **three** from: • It has a **mechanical structure/framework** • It has **electrical** components • It is programmable • It can move	**3**
8(c)	Any **six** from: • A proximity sensor is used • The sensor **continuously** sends **digitised** data to the microprocessor • The microprocessor compares the data to a stored value/range of values • If the value is within the range/matches the robot continues planting • If the value is above/below/outside the range a **signal** is sent by the microprocessor to turn/stop the robot • … using an actuator to turn/stop the robot • This process repeats until the robot is turned off	**6**
8(d)	Any **two** from: Example: • The robot is more accurate when planting seeds • The robot does not need to take breaks // works 24/7 • The robot will not get bored of performing a repetitive task • The farmer can perform other tasks whilst the robot is planting the seeds • The robot may be faster/more efficient (at planting seeds) • Safer as the robot can work in a more dangerous environments (e.g. with animals in a field) • Doesn't need to pay **labour** costs/**wages**	**2**

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Question	Answer	Marks
8(e)	Any **two** from: Example: • The robot may have been expensive to **purchase** • The robot may need **maintenance** and this may be costly • The robot may take away jobs from humans that previously planted the seeds • Farmer/workers may be deskilled • Farmer may need training in how to use the robot • If it breaks the farmer will need to manually plant • If faulty it may cause damage to farm/seeds • Cannot adapt to a **new**/**unexpected** event	**2**
8(f)	Any **two** from: Example: • The robot can now **adapt itself** by changing its own **rules/data/ processes** • The robot will become more efficient • … as it has a **greater knowledge** of its **surroundings**/**environment** • … as it can remember where a fence is • … as it can remember the route it needs to take • … as it can remember where any obstacles are to avoid • … as it can remember where to start and stop sowing seeds • … as it may make fewer errors	**2**
9(a)	Any **three** from: • Data could be lost • Data could be gained/added • Data could be changed • Bits could be **reassembled** in the wrong order • Interference could occur • Crosstalk could occur • Data collisions could occur • Data packets could time out/reach their hop count • **Network** could be infected with malware	**3**

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Question	Answer	Marks
9(b)(i)	Any **eight** from: • The 1s are counted (in each byte) • Each **byte** has a parity bit • If the number of 1s are odd the parity bit **is 0** (otherwise it **is 1**) • (The first packet of) data is sent and a timer is started • The **receiving** device counts the number of 1s (in each byte) • If the **number of 1s are odd/data meets odd parity** an acknowledgement is sent to say the data is error free … • … the sender then sends the next packet of data … • … and the timer is restarted • If the number of 1s is even an acknowledgement is not sent • If **no acknowledgement** is received **within a set timeframe/before timeout** … • … the data packet is resent	**8**
9(b)(ii)	Any **two** from: • Echo check • Checksum • Even parity check • Negative ARQ	**2**
9(c)(i)	Any **five** from: • Criteria can be set (for traffic) • … such as a **blacklist/whitelist** (of IP addresses) • It will examine traffic coming into the network • It will check that the traffic meets the set criteria • … and will reject it if it does not meet criteria • Certain ports used by hackers can be blocked/closed	**5**

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Question	Answer	Marks
9(c)(ii)	Any **two** from: Example: • Virus • Worm • Trojan horse • Spyware • Adware • Ransomware	**2**

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