Cambridge Assessment International Education

Cambridge International AS & A Level

COMPUTER SCIENCE **9618/13**

Paper 1 Theory Fundamentals **October/November 2021**

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 2021 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.

GENERIC MARKING PRINCIPLE 5:

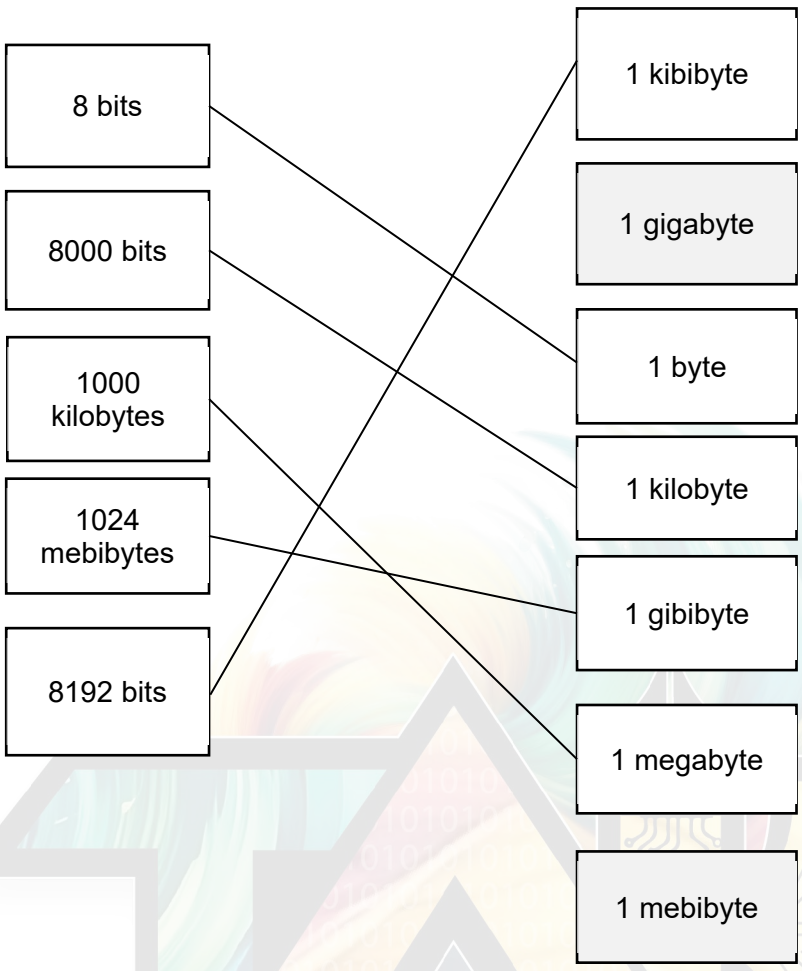
Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

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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Question	Answer	Marks
1(a)	**1 mark** for each correct line 	**5**
1(b)(i)	**1 mark** for answer **1 mark** for working e.g. 1010 1010 0011 0111 **1110 0001** 1 1 1 1 1 1 1	**2**
1(b)(ii)	The result is a larger number than can be stored in the given number of bits. // The result is greater than 255	**1**
1(c)	240	**1**

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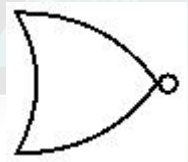
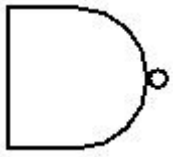
Question	Answer	Marks
2(a)	**1 mark** per bullet point • security is protecting data from loss / corruption • integrity is ensuring the consistency / accuracy of the data	**2**
2(b)(i)	**1 mark** per bullet point • validation checks that data is reasonable / sensible • example e.g. checking data is the right number / type of characters	**2**
2(b)(ii)	**1 mark** per bullet point • verification checks that data is the same as the original • by example e.g. double entry	**2**
2(c)	**1 mark** per similarity to **max 2** • Both are pieces of malicious software • Both are downloaded / installed/run without the user's knowledge • Both can pretend to be / are embedded in other legitimate software when downloaded // both try to avoid the firewall • Both run in the background **1 mark** for difference • Virus can damage computer data; spyware only records / accesses data • Virus does not send data out of the computer; spyware sends recorded data to third party • Virus replicates itself; spyware does not replicate itself	**3**

Question	Answer	Marks
3(a)	**1 mark** per bullet point • A AND B … • … XOR C … • … OR NOT B ((A AND B) XOR C) OR NOT B	**3**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3(b)</td><td>1 mark for each set of 4 rows (shaded)
<table>
<tr><th>A</th><th>B</th><th>C</th><th>Working space</th><th>X</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td></td><td>1</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td></td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td></td><td>0</td></tr>
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<tr><td>1</td><td>1</td><td>1</td><td></td><td>0</td></tr>
</table></td><td>2</td></tr>
<tr><td>3(c)</td><td>1 mark for gate, 1 mark for matching symbol, 1 mark for matching truth table
NOR

<table>
<tr><th>A</th><th>B</th><th>OUTPUT</th></tr>
<tr><td>0</td><td>0</td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>0</td></tr>
<tr><td>1</td><td>0</td><td>0</td></tr>
<tr><td>1</td><td>1</td><td>0</td></tr>
</table>
NAND

<table>
<tr><th>A</th><th>B</th><th>OUTPUT</th></tr>
<tr><td>0</td><td>0</td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>1</td></tr>
<tr><td>1</td><td>0</td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>0</td></tr>
</table></td><td>3</td></tr>
</table>

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Question	Answer	Marks
4(a)	**1 mark** per bullet point to **max 3** e.g. • He has ethical guidelines to follow • … so clients/other staff know the standards being applied • … so he does not have to decide what is ethical it's written down • Clients / staff know he is reputable • … recognition of his skills / knowledge • … there may be a test / requirements for entry • They provide help and support • … for example if he needs legal advice • They run training courses • … to keep his skills up-to-date	**3**
4(b)(i)	**1 mark** per bullet point to **max 2** e.g. • He can tell the manager he has not used it • … and how he will get up-to-date • He can perform his own research on how to use it • He can explain to the manager that he needs additional training • He can(ask the manager to book on a training course • He can ask for a mentor / to shadow someone • He can practice at home before starting	**2**
4(b)(ii)	**1 mark** for each correct tool e.g. • Colour coding // pretty printing • Auto-complete • Auto-correct • Context sensitive prompts • Expand and collapse code blocks	**3**
4(c)	**1 mark** per bullet point to **max 2** e.g. • He didn't act in best interest of product • … because the product might fail because he didn't report the error • He didn't act in best interest of client • … because if the product does not work then they have been let down because he didn't report the error • He didn't act in the best interest of the profession • … he is letting his profession down because he didn't report the error • He didn't act in best interest of the company • ... not correcting the error early could lead to later problems	**2**

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Question	Answer	Marks
4(d)	**1 mark** for each correctly completed term **Compilers** are usually used when a high-level language program is complete. They translate all the code at the same time and then run the program. They produce **executable/.exe/object code** files that can be run without the source code. **Interpreters** translate one line of a high-level language program at a time, and then run that line of code. They are most useful while developing the programs because errors can be corrected and then the program continues from that line. Assemblers are used to translate assembly code into **binary/machine code**.	**4**

Question	Answer	Marks
5(a)	**1 mark** for 2 or 3 correct ticks, **2 marks** for 4 correct ticks **Table** / **Field name** / **Primary Key (PK)** / **Foreign Key (FK)** MANAGER / ManagerID / ✓ / SHOP / ManagerID / / ✓ CAR / RegistrationNumber / ✓ / CAR / ShopID / / ✓	**2**
5(b)	**1 mark** per bullet point • Access rights give managers / himself access to different elements • … by having different accounts / logins • … which have different access rights e.g. read only // no access / read / write • Specific views can be assigned to himself and to the managers • … e.g. managers can only see the data for their own shop(s)	**3**

5(c)(i)	**1 mark** per correctly completed statement
	
	`SELECT COUNT(RegistrationNumber)`
	`FROM CAR`
	`GROUP BY ShopID`
		3

5(c)(ii)	**1 mark** for each correct statement
	
	`INSERT INTO CAR`
	`VALUES ("123AA","Tiger","Lioness",10500,"12BSTREET")`
		2

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Question	Answer	Marks
6(a)	**1 mark** for identification of line **and** description of error **1 mark** for the correct statement	**4**

Line number	Description of the error	Correct statement
2	Program Counter should be incremented, not decremented	PC ← [PC] + 1
3	It should be the contents of the address in the MAR	MDR ← [[MAR]]

Question	Answer	Marks
6(b)	**1 mark** for each correct row	**4**

Current contents of the ACC	Instruction	New contents of the ACC
11111111	OR 101	**11111111**
00000000	XOR #15	**00001111**
10101010	LSR #2	**00101010**
01010101	AND 104	**00000000**

Question	Answer	Marks
7(a)(i)	**1 mark** per bullet point • Smaller time gaps between the samples • Makes the **digital** sound **wave** more accurate • Smaller quantisation errors	**2**
7(a)(ii)	**1 mark** per bullet point • More samples/data are taken/recorded • … so more bits are stored altogether	**2**
7(b)(i)	**1 mark** per bullet point • Reduces the file size • Faster to transmit/download • Original file is too large for email storage/attachment	**2**
7(b)(ii)	**1 mark** per bullet point to **max 2** e.g. • Reduce amplitude to only the range used • … limited amplitudes mean fewer bits per sample • Run-length-encoding • … Where consecutive sounds are the same record the binary value of the sound and number of times it repeats • Record the changes instead of the actual sounds	**2**

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Question	Answer	Marks
8(a)	**1 mark** per bullet point • LAN • Small geographical area • No leasing external infrastructure / transmission media // does not use internet to transmit within the building	**3**
8(b)	**1 mark** per item • router • switch • hub	**2**
8(c)	**1 mark** per bullet point to **max 4** • Provide interface to wireless network • … as an antenna • Receives analogue radio waves • … convert them to digital / binary • Checks incoming transmissions for correct MAC / IP address • … ignore transmissions not intended for it • Encrypts / encodes the data • Decrypts / decodes the data • Takes digital/binary input and converts to analogue waves • … sends the radio waves via the antenna	**4**

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