Cambridge Assessment International Education

Cambridge IGCSE™

COMPUTER SCIENCE **0478/11**

Paper 1 **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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[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 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)	– Base-2	**1**
1(b)	– 9 – 16 – 40 – 161	**4**

Question	Answer	Marks
2(a)	– Microphone	**1**
2(b)	– capacitive	**1**
2(c)	– interrupt	**1**

Question	Answer	Marks
3(a)	**One** mark per each correct row.	**5**

Statement	**Checksum** (✓)	**Check digit** (✓)	**Parity check** (✓)
uses an additional bit to create an odd or even number of 1s			✓
checks for errors on data entry		✓	
compares **two** calculated values to see if an error has occurred	✓	✓	
will **not** detect transposition errors			✓
sends additional values when data is transmitted from one computer to another	✓		(✓)

3(b)	– ARQ	**1**

Question	Answer	Marks
4(a)	**Two** marks for any **two** correct workings and **one** mark for the correct answer. Working: – 100 × 50 = 5000 bits – 5000 × 8 = 40,000 bits – 40,000 / 8 = 5,000 bytes – 5,000 × 10 = 50,000 bytes – 50,000 / 1024 Answer: 48.83 kB // 49 kB **NOTE:** Alternative correct methods of working can be credited. Answer can be given to any number of dp.	**3**
4(b)	**One** mark per correct method, **two** marks per justification. – Lossless – Lossy would remove data **permanently** // lossless would not remove any data **permanently** // File could be restored to original … – … that could affect the quality (lossy) // … to maintain the quality (lossless)	**3**
4(c)	– Light – Lens – Charge-coupled – Analogue-to-digital – Pixel	**5**

Question	Answer	Marks
5(a)	Any **two** from: – Encryption – Biometric device – Firewall – Anti-spyware – Two-factor authentication // two-step verification	**2**
5(b)	Any **two** from: – Interrupt / error-handling – Peripheral management – Providing user interface – Platform for running applications // installing / removing software – Manages security // access rights/levels // user account management – Managing time slicing // multitasking	**2**

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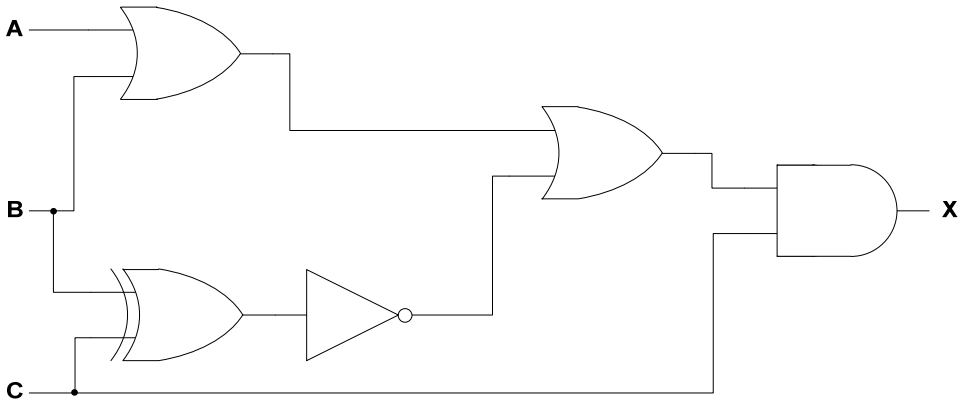
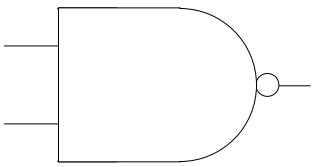
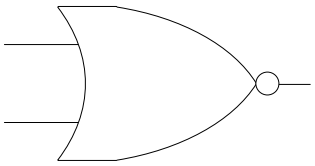
<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>6(a)</td><td>One mark per each correct row.

<table>
<tr><th>Statement</th><th>MAR (✓)</th><th>MDR (✓)</th><th>PC (✓)</th></tr>
<tr><td>it is a register in the CPU</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>it holds the address of the next instruction to be processed</td><td>(✓)</td><td></td><td>✓</td></tr>
<tr><td>it holds the address of the data that is about to be fetched from memory</td><td>✓</td><td></td><td>(✓)</td></tr>
<tr><td>it holds the data that has been fetched from memory</td><td></td><td>✓</td><td></td></tr>
<tr><td>it receives signals from the control unit</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>it uses the address bus to send an address to another component</td><td>✓</td><td></td><td>✓</td></tr>
</table></td><td>6</td></tr>
<tr><td>6(b)</td><td>– Arithmetic Logic Unit // ALU</td><td>1</td></tr>
</table>

Question	Answer	Marks
7(a)	**One** mark per correct storage, **two** marks for justification. – Secondary – It is non-volatile storage – It is not directly accessed by the CPU	**3**
7(b)	Any **four** from: – Uses flash memory – Data is flashed onto (silicon) chips – Uses NAND/NOR technology // Can use flip-flops – Uses transistors/control gates/floating gates … – … to control the flow of electrons – It is a type of EEPROM technology – When data is stored the transistor is converted from 1 to 0 / 0 to 1 – Writes (and reads) sequentially	**4**

Question	Answer	Marks
8(a)	– High-level	**1**
8(b)(i)	**One** mark for the correct translator, **two** marks for the benefit(s). – Interpreter – Easier to debug – … as errors are immediately reported when detected – Compiler – All errors are reported in a single report – … meaning they can all be fixed at the same time – No need to recompile code every time a test is run	**3**
8(b)(ii)	**One** mark for the correct translator, **two** marks for the benefits. – Compiler – Creates an executable file – … so, translator is no longer needed to run it – Source code cannot be stolen // can be provided without the source code	**3**

Question	Answer	Marks
9(a)	One mark per each correct sensor. **Task** / **Sensor** checking the water is 30 °C / **Temperature** checking the water acidity level after detergent is added / **pH** checking the weight of the clothes to make sure that the machine is **not** overloaded / **Pressure**	**3**
9(b)	**Six** from: – Sensor sends data to microprocessor – Data is converted from analogue to digital (using ADC) – Data is compared to stored value (of 30) If data is below 30 then a **microprocessor sends signal** is sent to a heater to heat the water up/add hot water – if data is above 30 then a **microprocessor sends signal** is sent to turn the heater off to allow the water to cool down/add cold water – Actuator used to turn headset on/off // Actuator used to add water – If data is 30 then no action is taken – It is a continuous process	**6**

Question	Answer	Marks
10(a)	**One** mark per each correct logic gate with the correct input(s). 	**5**
10(b)	**One** mark per logic gate name and **one** mark per correct drawing. – NAND  – NOR 	**2**

Question	Answer	Marks
10(c)		**4**

A	B	C	Working space	X
0	0	0		**0**
0	0	1		**0**
0	1	0		**0**
0	1	1		**1**
1	0	0		**0**
1	0	1		**1**
1	1	0		**0**
1	1	1		**1**

4 marks per 8 correct outputs
3 marks per 6/7 correct outputs
2 marks per 4/5 correct outputs
1 mark per 2/3 correct outputs

Question	Answer	Marks
11	One mark per each correct term.	**5**

Terms	Description
HTML	the language used to create a web page
Browser	the type of software application used to display a web page
IP address	an address given to a computer, by a network, to allow the computer to be uniquely identified
Cookie	a text file sent by a web server to collect data about a user's browsing habits
Internet Service Provider // ISP	the company that provides a connection to the Internet

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