Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

COMPUTER SCIENCE **0478/11**

Paper 1 Theory **October/November 2019**

1 hour 45 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

No calculators allowed.

READ THESE INSTRUCTIONS FIRST

Write your centre number, candidate number and name in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

No marks will be awarded for using brand names of software packages or hardware.

Any businesses described in this paper are entirely fictitious.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

The maximum number of marks is 75.

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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

Cambridge Assessment International Education

[Turn over

1 Andrew wants to produce advertising material for his company.

(a) Andrew can use an **Inkjet printer** or a **Laser printer**.

Draw lines to connect each printer to a correct statement. More than one line may be used to connect to each printer or statement.

Printer	Statement
	Can print in colour
Inkjet printer	
	Uses a charged drum to create the printed item
	Uses powdered toner
Laser printer	
	Creates output line by line using a print head

[2]

(b) Andrew wants to print a single page A4 leaflet. He wants to print 10 000 copies.

State whether he should use an inkjet or a laser printer.

..... [1]

(c) Andrew wants to produce small 3D models of the company logo.

Explain how a 3D cutter could be used to produce the models.

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..... [2]

2 An electronic guessing game compares denary integer values input by a user with pre-stored values. The pre-stored values are held in 10-bit binary format.

(a) Convert the binary values in the table to denary.

Binary	Denary
0001001110	
0110110111	
1000000001	

[3]

(b) When planning the game, the designer decided to use hexadecimal notation to represent the binary values.

Explain why the designer used hexadecimal notation.

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.....

.....

..... [2]

(c) State the hexadecimal equivalent of the binary value 1010110101

..... [3]

3 A company has several offices. It uses the Internet to transfer data between offices. The company also makes payments to staff and suppliers using online banking.

The company are concerned about spyware and other security aspects of using the Internet.

(a) Explain what is meant by spyware **and** how it is used to obtain data.

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.....

..... [3]

(b) The company uses a web page to log on to the online bank.

Identify **one** method that could be used by the online bank to reduce the impact of spyware when logging on.

State **how** the method prevents the use of spyware.

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..... [2]

(c) The company has installed a firewall as part of its data security.

Describe how a firewall can help protect against unauthorised access to data.

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..... [4]

(d) State **two** other methods the company could use to help prevent unauthorised access to data.

Method 1 .....

Method 2 .....

[2]

4 A zoo has an information point.

- Visitors use a menu to select information about animals.
- The menu includes 500 different animals.
- The information is provided only using high definition video with an audio track.

(a) State **one** input device that could be used for the information point.

..... [1]

(b) The output is shown on a monitor.

State **one** other output device that could be used for the information point.

..... [1]

(c) The video files are stored at the information point.

State **one** secondary storage device that could be used.

..... [1]

(d) The zoo decides to introduce Quick Response codes in different places in the zoo. These provide further information about the animals.

Describe how customers obtain the information from the Quick Response codes.

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..... [4]

[Turn over

5 Sonia shares files with her friends. The method of data transmission she uses is half-duplex serial transmission.

(a) Describe how data is transmitted using half-duplex serial data transmission.

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..... [4]

(b) The system uses parity bits to check for errors during data transmission.

The outcome of four bytes after transmission is:

Byte 1	Byte 2	Byte 3	Byte 4
00110011	01010100	10110100	01110111

One of the bytes has been transmitted incorrectly.

Identify the byte that was transmitted incorrectly.

Byte .....

Explain how you identified the byte that was transmitted incorrectly.

.....

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.....

.....

[4]

6 Ishan is a member of a software community that develops computer games. He has programmed a new feature for one of the community's existing games.

(a) Ishan compiles the program before he issues it to the community.

(i) Explain **one** benefit of Ishan compiling the program.

.....

..... [1]

(ii) Explain **one** drawback of Ishan compiling the program.

.....

..... [1]

(b) Ishan shares the program with community members over the Internet, using Secure Socket Layer (SSL).

(i) Explain how Ishan will know he is on a secure website.

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..... [1]

(ii) Describe how an SSL connection is established.

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..... [5]

(c) The community publishes completed games on the Internet as freeware.

Describe what is meant by freeware.

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..... [4]

(d) The program files for the games are compressed before they are published on the Internet.

(i) Describe **one** benefit of compressing the program files.

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.....

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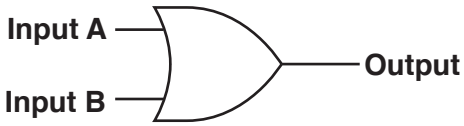
..... [2]

(ii) State whether **lossy** or **lossless** compression should be used.

..... [1]

7 A factory manufactures plastic pipes. It uses logic circuits to control the manufacturing process.

(a) Consider the logic gate:



Complete the truth table for this logic gate.

Input A	Input B	Output
0	0	
0	1	
1	0	
1	1	

[1]

(b) Consider the truth table:

Input A	Input B	Output
0	0	0
0	1	1
1	0	1
1	1	0

State the **single** logic gate that produces the given output.

..... [1]

[Turn over

(c) Plastic pipes of various sizes are manufactured by heating the plastic and using pressure.

The manufacturing system uses sensors to measure the pressure (P), temperature (T) and speed (S) of production.

The inputs to the manufacturing system are:

Input	Binary value	Condition
P	1	pressure is > 5 bar
	0	pressure is <= 5 bar
T	1	temperature is > 200 degrees Celsius
	0	temperature is <= 200 degrees Celsius
S	1	speed is > 1 metre per second
	0	speed is <= 1 metre per second

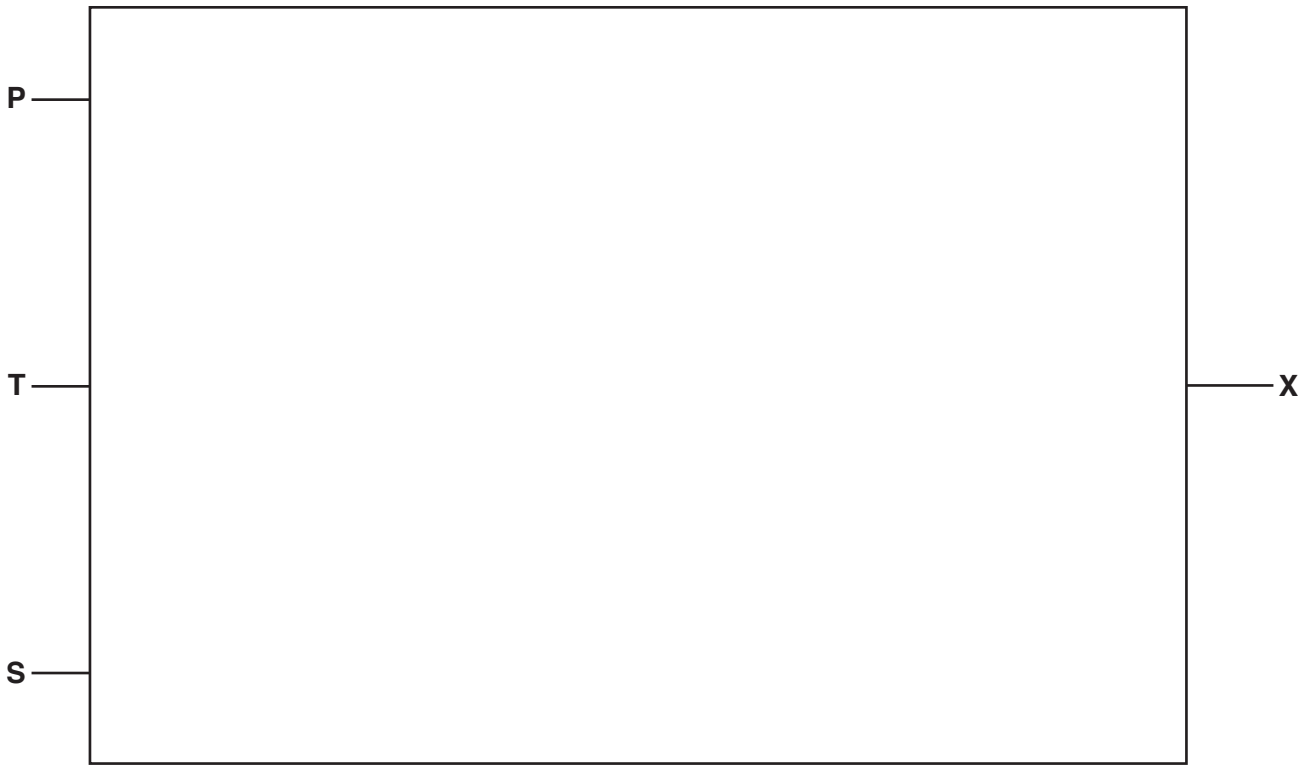
The system will sound an alarm (**X**) when certain conditions are detected.

The alarm will sound when:

Temperature is > 200 degrees Celsius and the pressure is <= 5 bar
or
Speed is > 1 metre per second and Temperature is <= 200 degrees Celsius

Draw a logic circuit to represent the above alarm system.

Logic gates used must have a maximum of **two** inputs.



[5]

(d) Give **two** benefits of using sensors to monitor the manufacture of plastic pipes.

1 .....

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2 .....

.....

[2]

8 Explain how an instruction is fetched in a Von Neumann model computer.

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..... [6]

9 HTML can be used to create the structure and the presentation of web pages.

(a) Describe what is meant by HTML structure.

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..... [2]

(b) Gloria writes a paragraph as an answer to an examination question about accessing a website.

Use the list given to complete Gloria's answer by inserting the correct **four** missing terms. Not all terms will be used.

- browser
- cookies
- Hypertext Markup Language (HTML)
- hypertext transfer protocol (http)
- hypertext transfer protocol secure (https)
- Internet Protocol address (IP address)
- Media Access Control address (MAC address)
- web server

The user enters the URL of the website. The ..... uses the DNS server to look up the ..... of the website.

The browser sends a request to the ..... to obtain the website files. The website files are sent as ..... that is interpreted by the browser.

[4]

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COMPUTER SCIENCE **0478/11**

Paper 1 **October/November 2019**

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 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

PUBLISHED

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:

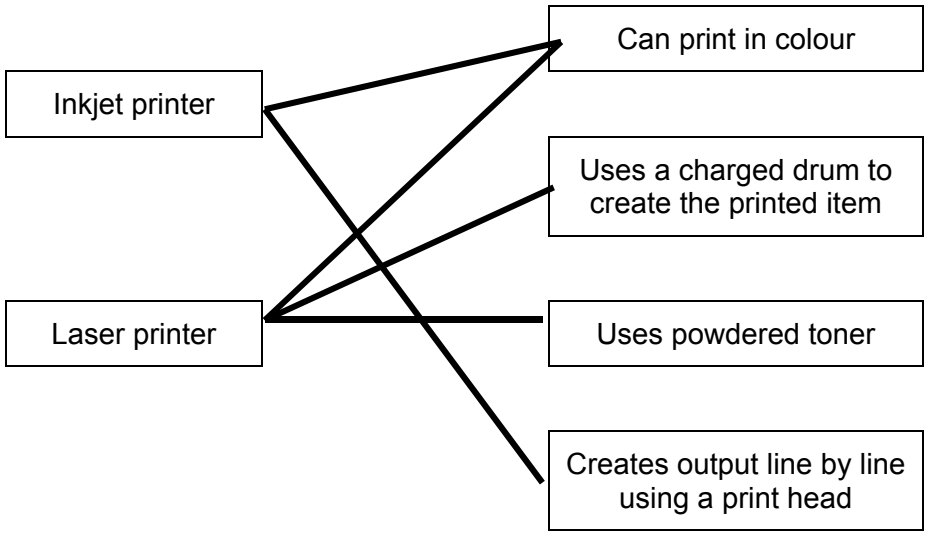
Marks must be awarded **positively**:

- 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.

Question	Answer	Marks
1(a)	**Printer** **Statement**  **One** mark for correct lines from inkjet **One** mark for correct lines from laser	**2**
1(b)	• Laser	**1**
1(c)	**Two** from: • Design is created on the computer / software / CAD • Material is loaded to cutter • Different types of material can be used • Uses lasers to cut material … • … that use infra-red • … that produces extreme heat • … that is focussed using a special lens • Can work on both the *x*,*y* and *z* axis	**2**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(a)</td><td>One mark for each correct denary value

<table>
<tr><th>Binary</th><th>Denary</th></tr>
<tr><td>0001001110</td><td>78</td></tr>
<tr><td>0110110111</td><td>439</td></tr>
<tr><td>1000000001</td><td>513</td></tr>
</table>
</td><td>3</td></tr>
<tr><td>2(b)</td><td>Two from:
• Uses fewer characters // shorter
• Easier to read / write / understand
• Less likely to make mistakes // less error prone
• Easier to debug</td><td>2</td></tr>
<tr><td>2(c)</td><td>One mark for each correct hexadecimal value in correct order
2 B 5</td><td>3</td></tr>
</table>

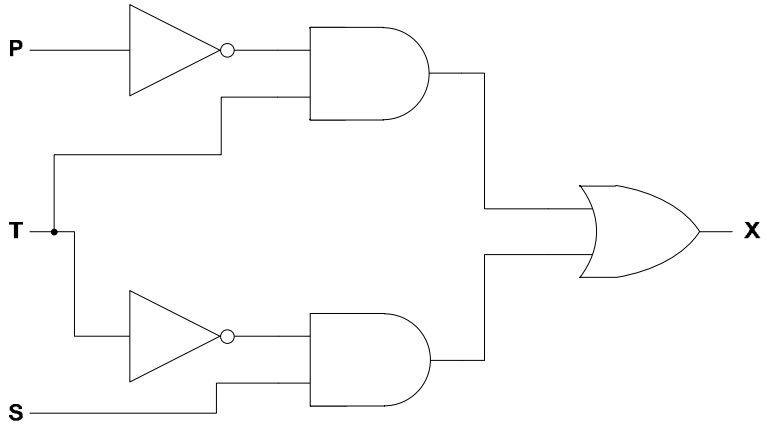
Question	Answer	Marks
3(a)	**Three** from: • Malicious software // type of malware • Tracks / records keypresses // keylogger • Sends data to third party • Collected data is analysed to obtain data	**3**
3(b)	**One** mark for identified method, **one** mark for how it prevents spyware: **Drop-down boxes // onscreen / virtual keyboard** • Means key logger cannot collect data **Only requires part of the password** • Hacker doesn't get the full password **Two-step verification // Two-factor authentication** • Extra data is sent to device making it more difficult for hacker to obtain it • Data has to be entered into the same system // if attempted from a remote location, it will not be accepted **Use a biometric device** • The person's biological data (e.g. their fingerprint) is also required	**2**
3(c)	**Four** from: • Monitors traffic coming into and out of the computer system • Checks that the traffic meets any criteria / rules set • Blocks any traffic that does not meet the criteria / rules set • Allows a set blacklist / whitelist // can block certain IP addresses • Can close certain ports	**4**
3(d)	**Two** from: • Passwords // biometrics • Levels of access • Proxy servers • Physical security methods – e.g. PC's in locked rooms, etc.	**2**

Question	Answer	Marks
4(a)	**One** from: • Touch screen • Keyboard • Microphone • Mouse	**1**
4(b)	**One** from: • Headphones • Speakers • Printer • Light / LED	**1**
4(c)	**One** from: • HDD • SSD • USB drive	**1**
4(d)	**Four** from: • QR code is scanned using a camera on a mobile device … • … and read / decoded using an application / software • Illuminator shone on code • Squares reflect light differently • Corners of code are used for orientation • Opens document with information // Directs to website with information • QR code can be saved for future reference	**4**

Question	Answer	Marks
5(a)	• Data is sent down a single wire … • … one bit at a time • Data is sent in both directions … • … but only one direction at a time	**4**
5(b)	**One** mark for correct byte (Byte) 2 // 01010100 **Three** from: • Added up / counted the 1s / 0s • Even parity used // 3 bytes are even • Byte 2 uses odd parity // 1 byte is odd	**4**

Question	Answer	Marks
6(a)(i)	**One** from: • Code will run without the need of an interpreter • (Object) Code is platform independent • Source code not available / cannot be modified	**1**
6(a)(ii)	**One** from: • Source code not available / cannot be modified • Comments, etc. not visible • Future changes will require code to be recompiled	**1**
6(b)(i)	**One** from: • Protocol is HTTPS • Padlock icon is locked • Can view website certificate	**1**
6(b)(ii)	**Five** from: • Browser / client sends request to webserver to request identification • Web server sends its digital / security certificate • Browser authenticates certificate … • … if authentic connection, is established • Any data sent is encrypted … • … using public and private keys	**5**
6(c)	**Four** from: • A type of software licence • Free of charge • Normally distributed without the source code • Can legally share / copy • Cannot legally modify code • Cannot resell	**4**

Question	Answer	Marks
6(d)(i)	**Two** from: • File size is reduced … • … so it uses less storage space • … so faster transmission • … so quicker to download	**2**
6(d)(ii)	• Lossless	**1**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>7(a)</td><td>
<table>
<tr><th>Input A</th><th>Input B</th><th>Output</th></tr>
<tr><td>0</td><td>0</td><td>0</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>1</td></tr>
</table>
</td><td>1</td></tr>
<tr><td>7(b)</td><td>• Exclusive OR / XOR / EOR</td><td>1</td></tr>
<tr><td>7(c)</td><td>One mark for each correct logic gate with correct inputs
 
</td><td>5</td></tr>
<tr><td>7(d)</td><td>Two from:
• Can work continuously
• Avoids human error
• It could be a dangerous environment and will avoid human risk
• Detect errors instantly
• Maintain consistent and correct conditions</td><td>2</td></tr>
</table>

Question	Answer	Marks
8	**Six** from: • PC holds address of the instruction • The address held in PC is sent to MAR … • … using address bus • MAR goes to location in memory where instruction is stored • Instruction sent to MDR … • … using data bus • Instruction sent to CIR • Control unit sends signals to manage the process … • … using the control bus	**6**
9(a)	**Two** from: • Layout of the webpage • e.g. where a paragraph is placed • Defined using tags	**2**
9(b)	**One** mark for each correct term in the correct order: • browser • IP address • web server • HTML	**4**