Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

1617936764

COMPUTER SCIENCE **0478/13**

Paper 1 Theory **October/November 2021**

1 hour 45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [ ].
- No marks will be awarded for using brand names of software packages or hardware.

This document has **12** pages.

© UCLES 2021

1 **(a)** Xia has **three** files stored on her computer.

Tick (✓) **one** box to show which is the largest file size.

File size	Tick (✓)
999 kB	
1 MB	
850 000 bytes	

[1]

(b) Denise has **three** files stored on her computer.

Tick (✓) **one** box to show which is the smallest file size.

File size	Tick (✓)
4000 MB	
2 GB	
2 500 000 kB	

[1]

2 A sports stadium has an electronic counter that counts each person that enters the stadium.

The count is stored as binary in a 16-bit register.

A denary value of the count is displayed on a screen at the entrance.

(a) The screen currently displays:

0	0	7	1

Give the binary value that is stored in the register to display the count shown.

Binary value: .....

Working space

.....

.....

.....

[2]

(b) More people enter the sports stadium and the screen now displays:

0	2	5	7

Give the binary value that is stored in the register to display the count shown.

Binary value: .....

Working space

.....

.....

.....

[2]

(c) After everyone has entered the stadium, the register stores the binary value:

000000100000100

Show what the screen will display when this binary value is stored.

Display:

[1]

Working space

.....

.....

.....

.....

(d) Sensors are used at the entrance to count the number of people entering the stadium.

(i) Identify **two** sensors that could be used to count the number of people entering the stadium.

Sensor 1 .....

Sensor 2 .....

[2]

(ii) Tick (✓) **one** box to show if a sensor is an example of an input device, storage device or output device.

Device	Tick (✓)
input	
storage	
output	

[1]

3 **Five** statements are given about error-checking methods.

(a) Tick (✓) to show whether each statement applies to Automatic Repeat reQuest (ARQ), check digit or checksum. Some statements may apply to more than **one** error-checking method.

Statement	ARQ (✔)	Check digit (✔)	Checksum (✔)
checks for errors on data entry			
uses a process of acknowledgement and timeout			
compares **two** calculated values to see if an error has occurred			
may resend data until it is confirmed as received			
checks for errors in data after transmission from a computer to another			

[5]

(b) Identify **one** other error-checking method.

..... [1]

4 Frederick prints a document that he has typed.

The printer begins to print the document, but then a message is displayed on Frederick's computer to say that the paper has jammed.

(a) Describe the role of an interrupt in generating a message on the computer that the paper has jammed.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) Give **two** other examples of when an interrupt signal could be generated.

1 .....

2 .....
[2]

(c) The type of data transmission between the computer and the printer is serial half-duplex data transmission.

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

.....

.....

.....

.....

.....

.....

.....

..... [4]

(ii) Explain why the data transmission needs to be half-duplex rather than simplex.

.....

.....

.....

..... [2]

5 In a Von Neumann model for a computer system, a Central Processing Unit (CPU) contains a number of different components.

The table contains the name of a component or a description of their role in the fetch-execute cycle.

Complete the table with the missing component names and descriptions.

Component name	Description
Memory Address Register (MAR)	....
Program Counter (PC)	....
.....	This is a register that is built into the arithmetic logic unit. It temporarily holds the result of a calculation.
.....	This is a register that holds data or an instruction that has been fetched from memory.
Control Unit (CU)	....
.....	This carries addresses around the CPU.

[6]

6 The paragraph describes an MP3 file, MP4 file and a MIDI file.

Complete the paragraph using the list of terms. **Not** all terms in the list need to be used.

- can
- cannot
- compressed
- image
- microphone
- MIDI
- MP3
- MP4
- notes
- pixels
- speaker
- should
- uncompressed

..... files are a multimedia format that stores video and audio.

..... files are only used as a digital recording of sound; they are created using a ..... and recording software. The data in the file is ..... .

..... files contain instructions on how to create the sound. They are created using digital instruments. The file stores individual ....., each **one** ..... be changed in this type of file.

[7]

7 Julius creates a computer application that calculates how many years it will take to pay for a house.

(a) Julius uploads his application to his website for people to download. Before he uploads the application, he translates the code using a compiler.

Explain why Julius uses a compiler, rather than an interpreter, to do this.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) Julius also creates videos to explain how to use the application that he has created. He reduces the file size of the videos using lossless compression.

(i) Describe how lossless compression reduces the file size of the video.

.....

.....

.....

.....

.....

..... [3]

(ii) State why Julius uses lossless compression, rather than lossy compression.

.....

..... [1]

(c) Julius wants to distribute his application to a wider audience. He is considering distributing it as freeware or free software.

(i) Describe freeware and free software.

Freeware .....

.....

.....

.....

Free software .....

.....

.....

.....

[4]

(ii) Julius also considers distributing a trial version of the application.

Identify the type of software he could use to distribute his application as a trial version.

..... [1]

(d) Julius makes sure that all data transmission to and from his website is secure.

One way a user can check if his website uses secure data transmission is to check its certificate.

Give **two** other ways that a user can identify if his website uses secure data transmission.

1 .....

.....

2 .....

.....

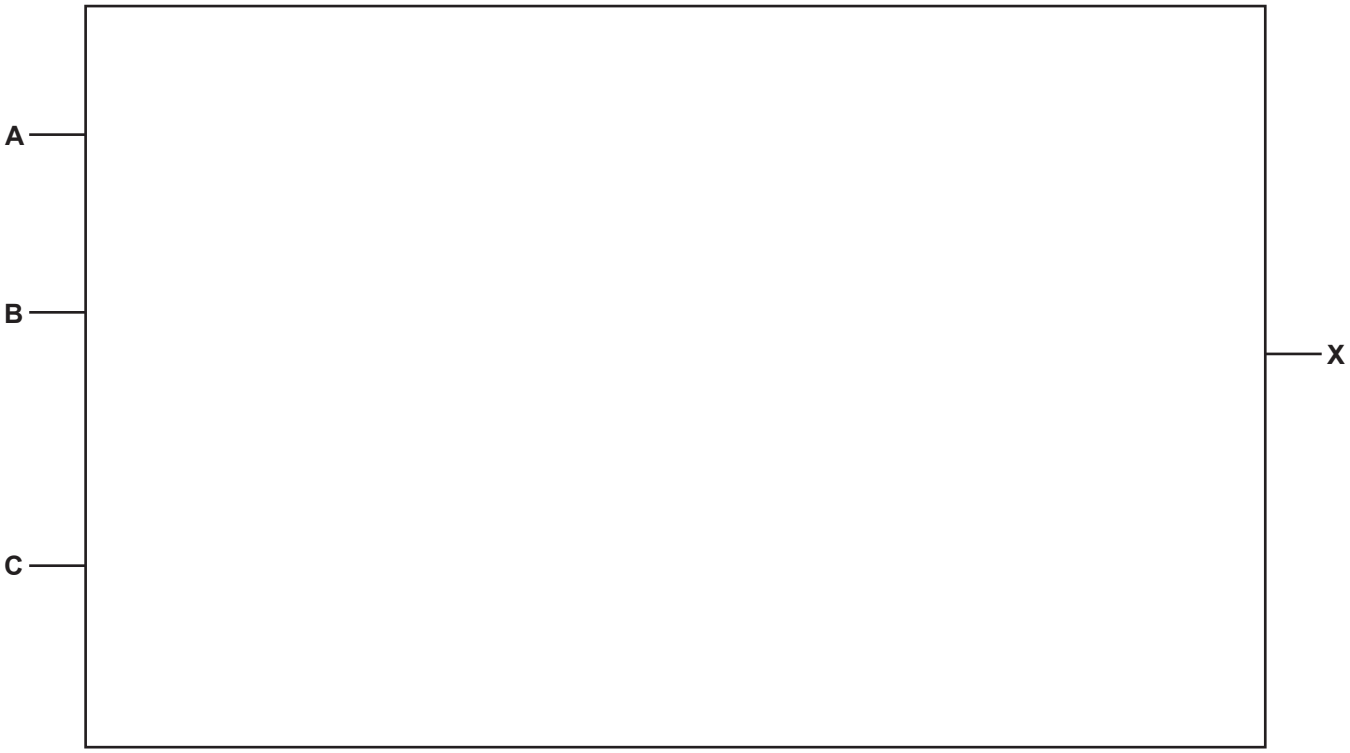
[2]

8 Consider the following logic statement:

X = (((**A** OR **B**) AND (NOT(**B** XOR **C**))) OR NOT **C**)

(a) Draw a logic circuit to represent the given logic statement.

Do **not** attempt to simplify the logic statement. All logic gates must have a maximum of **two** inputs.



[6]

(b) Complete the truth table for the given logic statement.

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

[4]

© UCLES 2021

9 A parity check is used to check for errors after transmission on the **four** given binary values.

All **four** values are transmitted and received correctly.

Identify whether each 8-bit binary value has been sent using odd or even parity by writing odd or even in the type of parity column.

Binary value	Type of parity
10011001	
01111110	
11100000	
00111001	

[4]

10 **(a)** A denial of service (DoS) attack is a type of Internet security risk.

State the purpose of a denial of service attack.

.....

..... [1]

(b) Phishing and pharming are also types of Internet security risk. They have the same purpose.

State the purpose of phishing and pharming.

.....

..... [1]

(c) Identify **three** other types of Internet security risk.

1 .....

2 .....

3 .....

[3]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which itself is a department of the University of Cambridge.

© UCLES 2021