Cambridge Assessment International Education

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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

3536262792

COMPUTER SCIENCE **0478/13**

Paper 1 Theory **May/June 2022**

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. Any blank pages are indicated.

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1 **(a)** The table lists **five** devices.

Tick (✓) to show if each device is an example of an input device, an output device or a storage device.

Device	Input (✓)	Output (✓)	Storage (✓)
keyboard			
microphone			
headphones			
hard disk drive (HDD)			
actuator			

[5]

(b) There are three different types of storage device. One type is magnetic.

State the other **two** types of storage device.

Type 1 .....

Type 2 .....

[2]

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2 An aeroplane has a small display screen above each seat, to display the seat number.

(a) The seat number is a hexadecimal value. A 12-bit binary register is used to store the data to display each seat number.

Three seat numbers, 05A, 18C and 29F, are allocated to passengers.

Give the 12-bit binary value that would be stored for each hexadecimal seat number.

05A .....

18C .....

29F .....

[6]

Working space

.....

.....

.....

.....

(b) The display screen used above each seat is a Light-Emitting Diode (LED) display screen.

Give **two** reasons why an LED display screen has been used.

Reason 1 .....

.....

Reason 2 .....

.....

[2]

(c) **Two** of the registers store the values 010000001101 and 000001111110

Give the hexadecimal seat number that would be displayed on the screen for each of these binary values.

010000001101 .....

000001111110 .....

[4]

Working space

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3 AND, OR and XOR are three examples of logic gates.

(a) **Four** statements are given about these logic gates.

Tick (✓) to show which statements apply to each logic gate. Some statements may apply to more than **one** logic gate.

Statement	AND (✓)	OR (✓)	XOR (✓)
if both inputs are 0, the output is 0			
if both inputs are different, the output is 1			
if both inputs are 1, the output is 1			
if both inputs are the same, the output is always 0			

[4]

(b) NOT, AND, OR and XOR are all examples of logic gates.

State the name of **two** other logic gates and complete a truth table for each.

Logic gate 1 .....

Truth table:

A	B	Output
0	0	
0	1	
1	0	
1	1	

Logic gate 2 .....

Truth table:

A	B	Output
0	0	
0	1	
1	0	
1	1	

[4]

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4 Freddie types a Uniform Resource Locator (URL) into the address bar of his browser.

(a) A URL is a text-based version of a website address. It is made up of several different parts.

State the names of **three** different parts of a URL.

Part 1 .....

Part 2 .....

Part 3 .....

[3]

(b) Explain how the URL is converted into an Internet Protocol (IP) address for the website.

.....

.....

.....

..... [2]

(c) A protocol is used to securely transmit the data for the website to the browser.

(i) State the name of this protocol.

..... [1]

(ii) Identify how this protocol changes the data to transmit the data securely.

..... [1]

5 Harriet has a computer that is based on a Von Neumann model for a computer system.

The computer has a central processing unit (CPU).

(a) Explain the purpose of the CPU.

Identify the **three** stages of the cycle performed by the CPU in your answer.

.....

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..... [5]

(b) The memory address register (MAR) is one component built into the CPU.

(i) Identify **four** other components that are built into the CPU.

Component 1 .....

Component 2 .....

Component 3 .....

Component 4 .....

[4]

(ii) Describe the purpose of the MAR in the CPU.

.....

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..... [2]

(c) Harriet's computer has both primary and secondary storage.

(i) Explain what is meant by primary storage.

Give **three** examples of what is stored in primary storage in your answer.

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..... [7]

(ii) The secondary storage in Harriet's computer is damaged, so it is removed for repair. This means the computer will no longer work.

Explain why the secondary storage is needed for the computer to work.

.....

.....

.....

..... [2]

6 Frida has a JPEG file stored on her computer.

(a) Tick (✓) to show which type of data is stored in a JPEG file.

	Tick (✓)
Video	☐
Sound	☐
Image	☐

[1]

(b) Compression can be used to reduce the size of a file.

Tick (✓) to show whether the JPEG file is a lossy compressed file or a lossless compressed file or **not** a compressed file.

	Tick (✓)
Lossy compressed file	☐
Lossless compressed file	☐
Not a compressed file	☐

[1]

(c) Frida scans a text document into her computer so that she can store a digital version. She uses a 2D scanner to do this.

Describe how the text document is scanned by the 2D scanner to create the digital version.

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..... [4]

(d) Frida compresses the document for storage.

The compression algorithm she uses recognises repeating patterns in the data and indexes these patterns. No data is permanently removed.

Identify the type of compression Frida has used.

..... [1]

7 Umar is a manager in an office. The data that he uses on a daily basis is stored on a file server close to his computer.

Data is sent from his computer to the file server using parallel simplex data transmission.

(a) Describe how the data is sent using parallel simplex data transmission.

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.....

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..... [3]

(b) The file server is moved to another building that is 1 km away.

Explain why the parallel simplex data transmission method that Umar uses is no longer suitable.

.....

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..... [2]

(c) Checksum and Automatic Repeat reQuest (ARQ) are both used when transmitting the data from a computer to the file server.

Explain why checksum and ARQ are both used.

.....

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.....

.....

..... [3]

8 The paragraph provides information about translators.

Complete the paragraph using the most appropriate terms from the list. **Not** all terms in the list need to be used.

- all at once
- assembler
- assembly language
- binary
- commenting
- compiling
- debugging
- executable file
- high-level language
- interpreted
- is **not** required
- is required
- line by line
- low-level language

A compiler and an interpreter translate ..... into machine code. An interpreter does this by translating and executing the code ..... and a compiler does this by translating and executing the code ..... .

One benefit of a compiler is that it creates an ..... , which means that a translator ..... each time to run the file.

..... is easier to do with an interpreter because it stops translating and reports an error at the place where it occurs in the code.

[6]

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