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Cambridge Assessment International Education

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CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

7690108004

COMPUTER SCIENCE **0478/12**

Paper 1 Computer Systems **May/June 2025**

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.

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[Turn over

1 A computer stores data temporarily in random access memory (RAM).

(a) RAM is one example of primary storage.

Give **one** other example of primary storage.

..... [1]

(b) Give **one** reason why data is only stored temporarily in the RAM.

.....

..... [1]

(c) The denary numbers 19 and 230 are converted to binary numbers to be stored in the RAM.

Convert the **two** denary numbers to binary numbers.

19 .....

230 .....

[2]

Working space

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(d) The hexadecimal numbers 35 and 8AD are converted to binary numbers to be stored in the RAM.

Convert the **two** hexadecimal numbers to binary numbers.

35 .....

8AD .....

[2]

Working space

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(e) The 8-bit binary numbers 01100101 and 01110000 are stored in RAM.

The binary numbers are added together.

Add the **two** binary numbers using binary addition.

Give your answer in binary. You must show all your working.

```
  0 1 1 0 0 1 0 1
+ 0 1 1 1 0 0 0 0
```

[3]

(f) An overflow occurs when two other 8-bit binary numbers are added together.

Explain why the overflow error occurs.

.....

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..... [2]

(g) The negative denary number –22 is stored in RAM.

Negative denary numbers can be represented as binary using two's complement.

Give the two's complement 8-bit binary integer that would be stored for the denary number –22.

You must show all your working.

Working space .....

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Two's complement 8-bit binary integer .....

[2]

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2 A student has an image file stored on their computer.

(a) The image file was taken by a digital camera.

Tick (✓) **one** box to show whether a digital camera is an example of an input, output, process or storage device.

A input ☐

B output ☐

C process ☐

D storage ☐

[1]

(b) The size of the image file is 3072 bytes.

(i) Give the size of the image file in kibibytes (KiB).

..... [1]

(ii) State the number of nibbles in 1 byte.

..... [1]

Working space

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(c) The image file has a colour depth of 32 bits.

(i) State what is meant by a colour depth of 32 bits.

.....

..... [1]

(ii) The colour depth of the image file is changed to 64 bits.

Explain what effect this change has on the image file.

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..... [2]

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(d) The student uses lossless compression to compress the image file.

Explain how the image file is compressed using lossless compression.

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..... [3]

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3 A programmer writes a program to store and sort all the data for the books in her home library.

(a) The programmer uses a high-level language to write the program.

One reason for writing the program using a high-level language is that it is easier to read and write.

Give **two** other reasons why the programmer chose to use a high-level language.

1 .....

.....

2 .....

.....

[2]

(b) The programmer uses an integrated development environment (IDE) to write the program.

One function of the IDE is to provide a translator.

(i) Complete the statements about translators.

Use the terms from the list. Some of the terms will **not** be used. You should only use a term once.

all together	all	assembler	binary	error
executable file	executing	interrupt	line by line	
partial code	some	translating	whole code	

A compiler translates the ..... at once before

..... it. A compiler produces an error report that displays

..... errors.

An interpreter translates and executes the code ..... .

An interpreter stops execution when an ..... is found

and continues once it is corrected.

[5]

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(ii) Give **two** other functions commonly found in an IDE.

State the role of each function.

Function 1 .....

Role .....

.....

Function 2 .....

Role .....

.....

[4]

(c) The programmer wants to print a list of all her books on paper.

(i) Identify a suitable type of printer that she could use to print this list.

..... [1]

(ii) The programmer needs to connect the printer to her computer. The printer is on the same desk as her computer.

Give a suitable method of data transmission that could be used to connect the computer to the printer.

Explain your choice.

Data transmission method .....

Explanation .....

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[6]

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(iii) An even parity check is used to detect errors in the data after it has been transmitted to the printer.

Describe how an even parity check detects an error.

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..... [4]

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4 An employee uses a computer that has a Von Neumann architecture to complete many different tasks in their working day.

(a) The computer has a central processing unit (CPU).

Complete the table of components in the CPU and their descriptions.

Component	Description
.....	It sends signals to all the components in the CPU to manage the flow of data through the CPU.
.....	It carries out all the arithmetic and logic operations in the CPU.
cache	....
program counter (PC)	....
.....	It controls the number of fetch–decode–execute (FDE) cycles that are performed per second.
.....	It stores data immediately before it is transmitted to RAM and immediately after it is received from RAM.

[6]

(b) The computer is an example of a general purpose computer and **not** an embedded system.

Explain why the computer is **not** an embedded system.

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..... [2]

5 A hospital has computers and technology that it uses when caring for its patients.

(a) One computer is an expert system that is used to help diagnose a patient's illness.

The doctor inputs the patient's symptoms into an interface and a diagnosis is output.

Describe how the expert system decides the diagnosis.

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..... [3]

(b) The hospital has a robot that is used to perform surgery. A doctor controls the robot from a different location to perform surgery on a patient.

(i) One feature of the robot is that it has electrical components.

Give **two** examples of the electrical components of a robot.

1 .....

2 .....

[2]

(ii) Explain the advantages of using the robot to perform surgery.

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(iii) Explain **one** disadvantage of using the robot to perform surgery.

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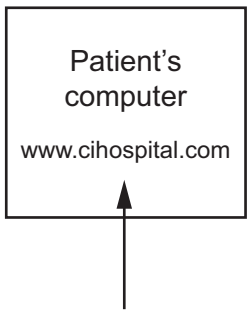
.....

..... [2]

(c) Patients use a web page to log into their account to pay for the treatment they have received in the hospital.

(i) The patient enters the uniform resource locator (URL) for the web page into their browser and the web page is requested and displayed.

Complete and annotate the diagram to show how the web page is requested for the patient.



[6]

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(ii) A patient is making a payment through a secure connection.

The secure connection is created using the secure socket layer (SSL) protocol.

Explain how a secure connection is created using the SSL protocol.

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..... [6]

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