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3770284893

COMPUTER SCIENCE **0478/12**

Paper 1 Computer Systems **October/November 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. Any blank pages are indicated.

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1 A toy store gives each of the toys it sells a unique code. The codes are 3-digit hexadecimal codes, for example A4B.

A computer is used to store a database of the codes. The computer has 12-bit registers.

(a) Give the largest hexadecimal number that can be stored in a 12-bit register.

..... [1]

(b) Give the largest denary number that can be stored in a 12-bit register.

..... [1]

(c) Two toys have the hexadecimal codes 429 and 1A3.

Convert the **two** hexadecimal codes to 12-bit binary numbers.

429 .....

1A3 .....

[2]

Working space

.....

.....

.....

.....

.....

(d) Two binary numbers that are stored in the registers are 100010100001 and 011100001011.

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

100010100001 .....

011100001011 .....

[2]

Working space

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(e) The hexadecimal code for each toy is stored in a barcode that is displayed on each toy.

Each time a customer buys a toy, the barcode is scanned and the amount of stock stored in the database for that toy is reduced by 1.

An item of hardware is used in this system to receive the hexadecimal code from the barcode scanner and find it in the database. The item of hardware is built into a single chip.

(i) Identify the name of the item of hardware.

..... [1]

(ii) Tick (✓) **one** box to show whether a barcode scanner is a type of input, output, process or storage device.

A input ☐

B output ☐

C process ☐

D storage ☐

[1]

(iii) The barcode scanner contains a sensor.

Identify the type of sensor that the barcode scanner could contain.

..... [1]

(iv) A backup of the database is made at the end of each day using optical storage.

Describe how the database is written to the optical storage.

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..... [4]

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2 Two binary numbers are stored in a computer.

(a) Add the **two** binary numbers using binary addition.

Give your answer in binary. Show all of your working.

```
  11110101
+ 00111001
```

[4]

(b) A logic right shift of **three** places is performed on the binary number 11110101.

Give the denary number for the binary number that would be stored after the logical shift of **three** places has occurred. Show all of your working.

Working space .....

.....

.....

.....

.....

Denary number .....

[3]

3 A programmer uses assembly language to create a program for a coffee machine.

(a) Describe what is meant by assembly language.

.....

.....

.....

..... [2]

(b) Identify the translator needed for assembly language.

..... [1]

(c) Tick (✓) **one** box to show which statement is an advantage of using assembly language.

A It is close to human language. ☐

B It is memory efficient. ☐

C It is easy to debug. ☐

D It is machine independent. ☐

[1]

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4 A computer with a Von Neumann architecture has a central processing unit (CPU) that performs the fetch–decode–execute (FDE) cycle.

(a) Complete and annotate the diagram to show how instructions are decoded and executed.



[5]

(b) The CPU is dual core and has a processor speed of 2.4 GHz.

Describe what is meant by a core.

.....

.....

.....

..... [2]

(c) Explain **two** ways that the performance of the CPU could be increased.

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..... [4]

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5 A computer system has a mouse.

An interrupt is sent to the CPU every time a button on the mouse is clicked.

(a) Identify the name of this type of interrupt.

..... [1]

(b) The interrupt is placed in a queue.

Explain how the interrupt is serviced after it is placed in the queue.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) The mouse is connected using a universal serial bus (USB) connection.

(i) Explain how data is sent using the USB connection.

.....

.....

.....

..... [2]

(ii) Give **two** benefits of using a USB connection for this purpose.

1 .....

.....

2 .....

.....

[2]

(iii) Give **one** drawback of using a USB connection for this purpose.

.....

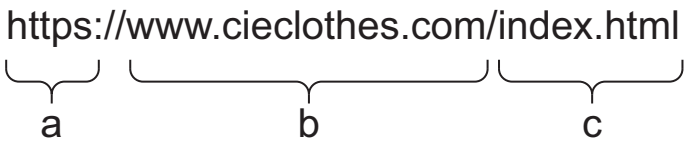
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6 An online clothing company has a homepage at the uniform resource locator (URL) https://www.cieclothes.com/index.html

(a) Write down the **three** different parts of the URL shown by the labels a, b and c.



a ..... b ..... c .....

[3]

(b) The web pages are stored on a web server. A proxy server is used to stop distributed denial of service (DDoS) attacks on the web server.

Describe how the proxy server can stop a DDoS attack reaching a web server.

.....

.....

.....

.....

.....

..... [3]

(c) Customers use the website to buy clothing from the company.

Complete the table with the missing terms and descriptions about retrieving and displaying web pages.

Term	Description
hypertext markup language (HTML)	....
domain name server (DNS)	....
.....	It is a numerical address used to locate the web server.
.....	It is a secure protocol that can be used to transmit data sent to and received from a web server.
.....	It is a piece of software that is used to display web pages.

[5]

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(d) The clothing company uses cookies to store customer details.

Complete the statements about cookies.

Use terms from the list. **Not** all terms need to be used. You should only use a term once.

asymmetric DNS dynamic persistent session

static symmetric user utility software web browser

Cookies are stored and managed by the ..... .

..... cookies are temporary files that are created when a user visits a web page.

..... cookies are permanent files that are created when a user visits a web page.

[3]

7 A house has a smart speaker that can take voice commands as input. A person in the house can tell the smart speaker to play music or audio books.

(a) The smart speaker cannot be described as a robot.

Explain why the smart speaker is **not** a robot.

.....

.....

.....

.....

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..... [3]

(b) Identify the input device that allows voice commands to be used as input.

..... [1]

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(c) The smart speaker has machine learning capabilities.

Explain how the smart speaker can use machine learning to improve the voice command input.

.....

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..... [4]

(d) The smart speaker is an example of an embedded system.

Explain why the smart speaker is an embedded system.

.....

.....

.....

..... [2]

(e) The music and audio books that are played by the smart speaker are stored in cloud storage.

Give **two** advantages of storing the music and audio books in cloud storage.

1 .....

.....

2 .....

.....

[2]

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(f) The data for the music and audio books needs to be checked for errors after being transmitted from the cloud.

(i) Explain how errors may occur in the data during transmission.

.....

.....

.....

..... [2]

(ii) Give **two** error detection methods that could be used to check for errors in the data after transmission.

1 .....

2 .....

[2]

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