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2857056089

COMPUTER SCIENCE **0478/13**

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.

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[Turn over

1 A student records himself singing a song for his music project. The recorded sound is converted to binary to be processed by a computer.

(a) Give **one** input device the student can use to record the song.

..... [1]

(b) The student uses sound editing software to edit the recorded sound.

Tick (✓) **one** box to show whether sound editing software is an example of application, security, system or utility software.

A application software ☐

B security software ☐

C system software ☐

D utility software ☐

[1]

(c) Two binary numbers stored from the recording are 00011001 and 10110100.

(i) Convert the **two** binary numbers to denary numbers.

00011001 .....

10110100 .....

[2]

Working space

.....

.....

.....

.....

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(ii) Convert the **two** binary numbers to hexadecimal numbers.

00011001 .....

10110100 .....

[2]

Working space

.....

.....

.....

.....

(iii) A logical right shift of two places is performed on the binary number 10100100.

Give the binary number that would be stored after the logical shift has taken place.

..... [1]

Working space

.....

.....

.....

(d) The two's complement 8-bit binary integer 11001001 is also stored.

Convert the two's complement 8-bit binary integer to denary. Show all of your working.

Working space .....

.....

.....

.....

Denary value .....

[2]

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(e) The table contains terms and descriptions about the process of converting analogue sound to binary.

Complete the table with the missing term and descriptions.

Term	Description
.....	This is the measurement of the height (amplitude) of a sound wave taken at regular time intervals.
sample rate	....
sample resolution	....

[3]

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2 A company employee is editing a video for the company's website.

Data is stored in the random access memory (RAM) when the video is edited.

The RAM becomes full and pages of data are transmitted to a partitioned section of the secondary storage to stop the computer from crashing.

(a) Give the name of the partitioned section of the secondary storage that is used in this process.

..... [1]

(b) The secondary storage is a hard disk drive (HDD). An HDD is an example of magnetic storage.

One feature of magnetic storage is that it uses platters.

Give **three** other features of magnetic storage.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(c) Give the reasons why an HDD is an example of secondary storage.

.....

.....

.....

..... [2]

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3 A computer with a Von Neumann architecture has several hardware components.

(a) Complete the table with the missing terms and descriptions about computer hardware.

Term	Description
.....	This is the address given to a network interface card (NIC) when it is manufactured.
register	....
clock	....
control unit (CU)	....
.....	This is a processing unit within the CPU that can fetch, decode and execute instructions.

[5]

(b) Identify **three** registers that are used in the fetch stage of the fetch–decode–execute (FDE) cycle.

1 .....

2 .....

3 .....

[3]

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(c) Circle the **two** buses that are used in the fetch stage of the FDE cycle.

binary control denary data

information hardware software

[2]

4 A computer has an operating system.

One function of the operating system is handling interrupts.

(a) Describe the role of the operating system in handling interrupts.

.....

.....

.....

..... [2]

(b) Give **two** other functions of an operating system.

1 .....

2 .....

[2]

(c) Hardware and software interrupts are two types of interrupt.

(i) Give **one** example of a hardware interrupt.

..... [1]

(ii) Give **one** example of a software interrupt.

..... [1]

5 An online company has a website that allows a user to buy products.

The user types in the uniform resource locator (URL) for the website and this is sent to a domain name server (DNS).

(a) Describe the role of the DNS.

.....

.....

.....

..... [2]

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(b) The website asks a user to input their username and password to log into their account.

The company want to make their login system more secure.

Tick (✓) **one** box to show **one** other security method that could be added to make the login system more secure.

A access levels ☐

B firewall ☐

C spyware ☐

D two-step verification ☐

[1]

(c) The company uses a proxy server to keep the web server safe from distributed denial of service (DDoS) attacks.

(i) Complete and annotate a diagram to show how a DDoS attack is carried out on the web server.



[5]

(ii) Identify **two** tasks that can be performed by a proxy server that are **not** performed by a firewall.

1 .....

.....

2 .....

.....

[2]

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(d) The company uses cookies to allow users to keep items in a shopping cart. The items remain in the cart after the user closes their web browser.

(i) Tick (✓) **one** box to show the type of cookie that is used for this process.

A dynamic ☐

B persistent ☐

C session ☐

D static ☐

[1]

(ii) Give **three** other ways that the company can use cookies.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(iii) Cookies are stored by a web browser.

Give **two** other functions of a web browser.

1 .....

.....

2 .....

.....

[2]

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6 A weather station uses automated systems to collect and analyse data about the weather.

The automated system uses sensors.

(a) Give **one** other component that would be part of the automated system.

..... [1]

(b) One sensor that is part of the automated system is a temperature sensor.

Give **one** other sensor that could be part of the automated system.

..... [1]

(c) An alert is sent to an employee in the weather office if a temperature above 40 °C is detected.

(i) Explain how a temperature above 40 °C is detected for the alert.

.....

.....

.....

.....

.....

..... [3]

(ii) The data for the alert is sent using serial simplex data transmission.

Explain how the data is sent using serial simplex data transmission.

.....

.....

.....

.....

.....

..... [3]

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(d) Give **two** advantages to the weather station employees of using an automated weather system.

1 .....

.....

2 .....

.....
[2]

(e) Give **one** disadvantage to the weather station employees of using an automated weather system.

.....

..... [1]

(f) The automated weather system is upgraded and given machine learning capabilities.

(i) Machine learning is part of a branch of computer science.

Identify the name of this branch of computer science.

..... [1]

(ii) Explain how the machine learning capabilities can be used to predict future weather.

.....

.....

.....

.....

.....

..... [3]

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7 Data is sent from an employee's computer to a server. The data is correct when it is sent, but an error is detected when the data is received.

(a) Describe how an error can occur in the data during transmission.

.....

.....

.....

..... [2]

(b) Methods of error detection and correction can be added to make sure that errors are identified after data is transmitted.

Complete the statements about methods of error detection and correction.

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

acknowledgement automatic repeat query (ARQ) binary bit

byte calculation check digit checksum correct

echo check error even incorrect negative

number odd positive timeout

A parity check is set to be ..... or

..... . A parity ..... is

added to each byte before transmission to make it match the set parity.

An ..... involves comparing the data sent to the data

received back from the receiving device.

An ..... uses acknowledgement and

..... . The acknowledgement system can be

..... or ..... .

[8]

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