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CANDIDATE NAME

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6221754083

COMPUTER SCIENCE **0478/13**

Paper 1 Computer Systems **October/November 2024**

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 Data can be measured using different units of storage.

(a) Tick (✓) **one** box to show which of the following is the largest unit of data storage.

A tebibyte (TiB) ☐

B pebibyte (PiB) ☐

C mebibyte (MiB) ☐

D gibibyte (GiB) ☐

[1]

(b) A computer has primary storage.

Give **one** example of primary storage.

Explain the purpose of your chosen example.

Example .....

Explanation .....

.....

.....

.....

[3]

(c) All data is converted to binary to be processed by a computer.

(i) Calculate the binary number for the denary number 175. Show all your working.

.....

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..... [2]

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(ii) Give the binary number for the given hexadecimal numbers.

15 .....

2D .....

091 .....

[3]

Working space

.....

.....

.....

.....

(d) Binary integers can be added together.

Add the **two** binary integers using binary addition. Show all your working. Give your answer in binary.

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

[4]

(e) Calculate the denary number for the two's complement binary integer 10001110. Show all your working.

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..... [2]

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2 An employee has a report that they need to email to their employer.

The employee compresses the report file before emailing it.

(a) State the effect the compression has on the report file.

.....

..... [1]

(b) Give **two** benefits of compressing the report file before emailing it.

1 .....

.....

2 .....

.....

[2]

(c) The employee decides to use lossless compression to compress the file.

Explain why lossy compression is **not** suitable.

.....

.....

.....

.....

.....

..... [3]

(d) When the employee enters the email address, the computer uses Unicode to convert the email address to binary.

(i) State what Unicode is an example of.

..... [1]

(ii) Give **two** advantages of the computer using Unicode instead of American standard code for information interchange (ASCII).

1 .....

.....

2 .....

.....

[2]

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(iii) Give **one** disadvantage of the computer using Unicode instead of ASCII.

.....

..... [1]

(e) The report is broken down into packets to be emailed.

(i) Circle **three** items of data that can be found in the packet header.

trailer originator's address payload

interrupt input operating system

destination address antivirus packet number

[3]

(ii) Each packet is sent along a different path from the employee's device to the employer's device.

Tick (✓) **one** box to show the name of this method of sending packets.

A packet networking ☐

B packet circuiting ☐

C packet switching ☐

D packet transferring ☐

[1]

(iii) A hardware device is used to control the path that each packet takes.

Give the name of this hardware device.

..... [1]

(f) The email data is checked for errors after it has been transmitted, using an echo check and a checksum.

(i) Explain how the echo check is used to check for errors in the email data.

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..... [3]

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(ii) In the checksum error detection method, two values are compared after transmission. If the values do **not** match, an error is detected.

Explain why the values **not** matching would show an error has occurred.

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..... [2]

(g) The email data is encrypted using asymmetric encryption before it is sent.

(i) Give **one** reason why the email data is encrypted.

.....

..... [1]

(ii) Give **one** similarity between symmetric encryption and asymmetric encryption.

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..... [1]

(iii) Give **two** differences between symmetric encryption and asymmetric encryption.

1 .....

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2 .....

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[2]

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3 An instruction is fetched from random access memory (RAM) into the memory data register (MDR) to be decoded.

(a) Identify **two** other registers that are used in the fetch stage of the cycle.

1 .....

2 .....

[2]

(b) Complete and annotate the diagram to show how the data is decoded once it has been fetched into the MDR.



[4]

4 Complete the table to give the missing term or description for the internet terms.

Internet term	Description
.....	the collection of web pages accessed using the internet
.....	the address given to a device when it connects to the internet
web browser	....
.....	the hardware that stores a database of matching website and IP addresses
.....	a type of hardware that can be used to prevent a distributed denial of service (DDoS) attack
hacking	....

[6]

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5 A farmer has a plough that is an automated system. The plough is used to dig the ground in a field to prepare it for planting seeds.

The plough uses sensors and a microprocessor to maintain a straight line when digging the ground.

(a) State what is meant by an automated system.

.....

..... [1]

(b) Describe the role of the microprocessor in this process.

.....

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.....

..... [3]

(c) Give **two** benefits to the farmer of using an automated system for this purpose.

1 .....

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2 .....

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[2]

(d) The plough uses artificial intelligence (AI) to navigate its way around the field.

Explain how the plough makes use of AI for this purpose.

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..... [4]

6 **(a)** Complete the statements about cookies.

Use only terms from the list.

Not all terms need to be used. Some terms may be used more than once.

binary close denary expire

hexadecimal image malware operating system

permanent persistent session sound

temporary web browser

Cookies are small text files that are stored by a ..... .

..... cookies are ..... text files that are deleted when the ..... is closed.

..... cookies are ..... text files that are stored on a user's secondary storage device until they are manually deleted or they ..... .

[7]

(b) Give **three** examples of the use of cookies.

1 .....

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2 .....

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3 .....

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[3]

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7 A computer programmer uses an integrated development environment (IDE) when creating a computer program.

Explain the purpose of the IDE.

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..... [4]

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