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COMPUTER SCIENCE **0478/11**

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. Any blank pages are indicated.

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[Turn over

1 The size of a file can be measured using different data storage units.

(a) Tick (✓) **one** box to show the smallest data storage unit.

A byte ☐

B gibibyte (GiB) ☐

C kibibyte (KiB) ☐

D nibble ☐

[1]

(b) State how many tebibytes (TiB) are equal to 2 pebibytes (PiB).

..... [1]

Working space

.....

.....

.....

(c) The size of a file needs to be reduced.

(i) Give the name of the process that is used to reduce the size of a file.

..... [1]

(ii) One reason the size of a file may need reducing is so that it has a shorter transmission time.

Give **one** other reason why the size of a file may need reducing.

.....

..... [1]

2 A clothes store has a ticket system to allow customers to speak to a personal shopper.

The ticket displays a ticket number in hexadecimal, for example 11B.

(a) The ticket system has an output device that creates a paper ticket.

Identify an appropriate output device to produce the paper ticket.

..... [1]

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(b) Each ticket number is stored as a binary number in the ticket machine.

(i) Two ticket numbers are 14B and 97A.

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

14B .....

97A .....

[2]

Working space

.....

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(ii) Give **two** reasons why the ticket number is displayed as hexadecimal instead of binary.

1 .....

.....

2 .....

.....

[2]

(c) The ticket numbers could also be represented as denary.

(i) Convert the **two** ticket numbers from hexadecimal to denary.

02C .....

10B .....

[2]

(ii) Convert the **two** denary numbers into hexadecimal.

109 .....

415 .....

[2]

Working space

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3 An image is converted to binary to be represented by a computer.

Complete the table with the missing terms and definition about representing an image.

Term	Definition
.....	This is the smallest component of an image.
resolution	....
.....	This is the number of bits used to create each colour in an image.
.....	This is additional data that is stored with an image that can provide information such as the time and date the image was taken.

[4]

4 A restaurant has an electronic ordering system. The system allows customers to select the food they want to order. The data for the order is transmitted across their network to a computer in the restaurant kitchen.

(a) The data is sent using serial full-duplex data transmission.

(i) Give **two** reasons why serial full-duplex is a suitable data transmission method for the data.

1 .....

.....

2 .....

.....

[2]

(ii) Give **one** improvement that would be made to the data transmission if parallel transmission is used instead of serial transmission.

.....

..... [1]

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(b) A checksum is used to check the data for errors after transmission.

(i) Describe the process of the checksum error detection method.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

(ii) Identify **one** other error detection method that could be used to check for errors in the data.

..... [1]

(c) A customer can also order food from home using the internet. The data for their order is broken down into packets and transmitted across the internet to the computer in the restaurant kitchen.

(i) Tick (✓) **one** box to show which item would **not** be included in a packet's header.

A destination address ☐

B originator's address ☐

C packet number ☐

D payload ☐

[1]

(ii) The packets of data may need to be reordered when they arrive at the computer in the restaurant kitchen.

Explain why the packets of data may need to be reordered.

.....

.....

.....

..... [2]

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5 Data is processed by the central processing unit (CPU) in a computer that has a Von Neumann architecture.

(a) Complete the table with the missing terms and definitions about processing data.

Term	Definition
current instruction register (CIR)	....
.....	This is a processing unit within the CPU that can fetch, decode and execute instructions.
.....	This is a list of all the commands that can be processed by the CPU.
cache	....
accumulator	....

[5]

(b) Identify the component in the CPU that is responsible for decoding an instruction.

..... [1]

(c) Explain how the clock speed can affect the performance of a CPU.

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.....

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.....

..... [3]

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6 Data can be encrypted using asymmetric encryption.

(a) Complete the paragraph about asymmetric encryption.

Use the terms from the list.

Some of the terms in the list will **not** be used. You may use a term more than once.

algorithm binary cipher text compression error

hardware hexadecimal meaningless plain text private

public readable transmission unreadable

Data is encrypted using an encryption key. This is a type of ..... that scrambles the ..... and turns it into ..... . This makes the data ..... . A ..... key is used to encrypt the data. This key cannot be used to decrypt the data. A ..... key is used to decrypt the data. Any device is able to request the ..... key, but only your device knows the ..... key.

[8]

(b) Data can also be encrypted using symmetric encryption.

Give **one** reason why a person would use asymmetric encryption instead of symmetric encryption.

.....

..... [1]

7 A student's computer has primary storage. One example of primary storage is random access memory (RAM).

(a) Identify **one** other example of primary storage.

..... [1]

(b) Explain why RAM is an example of primary storage and **not** secondary storage.

.....

.....

.....

.....

.....

..... [3]

(c) The student is editing a large video file for a project and during this process the RAM becomes full. This makes the computer crash.

Describe how virtual memory could be used in this process to stop the computer crashing.

.....

.....

.....

.....

.....

..... [3]

(d) The computer uses solid-state (flash memory) storage.

(i) Give **two** features of solid-state (flash memory) storage.

1 .....

.....

2 .....

.....

[2]

(ii) Give **two** examples of solid-state (flash memory) storage.

1 .....

2 .....

[2]

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8 A robot is used to move car parts in a factory.

(a) One characteristic of the robot is that it has a mechanical structure.

Give **one** other characteristic of a robot.

.....

..... [1]

(b) The robot has firmware.

State what is meant by firmware.

.....

..... [1]

(c) Interrupts are generated when the robot is operating in the factory.

Give **two** examples of interrupts that may be generated when the robot is in operation.

1 .....

2 .....
[2]

(d) Give **two** advantages to the workers in the factory of using robots to move the car parts.

1 .....

.....

2 .....

.....
[2]

(e) The robots have the ability to automatically adapt their own processes.

State the name of the ability described.

..... [1]

9 Each employee in a finance company has a computer and an electronic account.

(a) Each computer has an operating system. One function of the operating system is to manage memory.

Describe the role of the operating system in managing memory.

.....

.....

.....

.....

.....

..... [3]

(b) The finance company is concerned that a hacker may perform a brute-force attack to gain access to an employee's account.

(i) Describe how the hacker would perform the brute-force attack.

.....

.....

.....

..... [2]

(ii) Give **three** cyber security solutions that could be used to help prevent a brute-force attack from being successful.

1 .....

2 .....

3 .....

[3]

(c) The company uses a digital currency to purchase a new car.

(i) State what is meant by a digital currency.

.....

..... [1]

(ii) The digital currency uses a process that involves a digital ledger. The ledger has time stamped transactions that cannot be altered.

Give the name of this process.

..... [1]

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