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COMPUTER SCIENCE **0478/12**

Paper 1 Computer Systems **February/March 2026**

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. Do **not** use correction fluid or tape.
- 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 **16** pages.

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1 **(a)** Tick (✓) **one** box to show which statement about data storage is correct.

A One bit equals four nibbles. ☐

B One byte equals 16 bits. ☐

C One exbibyte (EiB) equals 1024 × 1024 tebibytes (TiB). ☐

D One mebibyte (MiB) equals 1024 × 1024 gibibytes (GiB). ☐

[1]

(b) An image file has a resolution of 1024 pixels high × 1024 pixels wide. The colour depth is two bytes.

Calculate the file size of the image. Give the answer in MiB. Show your working.

working space

.....

.....

.....

.....

file size of image ..... MiB

[2]

2 A user accesses a website using a web browser.

(a) Two functions of a web browser are to provide an address bar and to store cookies.

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

1 .....

.....

2 .....

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3 .....

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[3]

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(b) The user enters a uniform resource locator (URL) into the address bar of the web browser.

(i) The URL is converted into an internet protocol (IP) address.

Describe the purpose of an IP address.

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..... [1]

(ii) Explain how a URL is converted to an IP address.

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..... [3]

(c) The website stores cookies on the user's computer.

(i) State what is meant by a cookie.

.....

..... [1]

(ii) Give **one** example of how a website can use a session cookie and **one** example of how a website can use a persistent cookie.

Each example must be different.

session cookie .....

.....

persistent cookie .....

.....

[2]

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3 A drone is used to search for lost animals. The drone is a flying device that can be autonomous or operated using a remote control.



(a) The drone is a robot.

Give **two** characteristics of the drone that identify it as a robot.

1 .....

.....

2 .....

..... [2]

(b) The drone has a built-in system to stop it from crashing into objects, for example a tree. The system uses sensors and a microprocessor.

(i) Identify **one** sensor that could be built into the drone to detect if it is near an object.

..... [1]

(ii) State what is meant by a microprocessor.

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..... [1]

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(iii) Explain how the sensor and microprocessor work together to stop the drone crashing into an object.

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..... [4]

(c) The drone has a digital camera that records a video while the drone is flying.

The drone can be connected to a computer using a universal serial bus (USB) interface to transfer the video recorded by the digital camera.

(i) State what is meant by a USB interface.

.....

..... [1]

(ii) Explain how a USB interface is used to transmit data.

.....

.....

.....

..... [2]

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4 Draw and annotate a diagram or diagrams to show:

- the contents and structure of a data packet
- how a data packet is transmitted across a network.

[4]

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5 A student stores their schoolwork on secondary storage devices. They store their schoolwork on their home computer and on cloud storage.

(a) Give **two** characteristics of secondary storage.

1 .....

.....

2 .....

.....

[2]

(b) The home computer has a magnetic storage device, and the cloud storage uses solid-state (flash memory) storage.

Complete the description of how magnetic hard disk drives and solid-state drives (SSD) read data.

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

control	electromagnetic field	flow	loss
NOR gates	opened	pits and lands	platters
ports	remove	sectors	XOR gates

A hard disk has several platters. Each platter is split into tracks and ..... . To read data, the read/write head moves over the platters to the position where data starts. The ..... indicates if the data is a 1 or a 0.

A solid-state drive uses NAND gates or ..... . It is made of transistors that work as floating gates and ..... gates. The gates control the ..... of electrons to memory cells.

[5]

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(c) **(i)** State what is meant by cloud storage.

.....

..... [1]

(ii) Explain the advantages to the student of storing their data on cloud storage instead of storing the data locally on their home computer.

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..... [2]

(iii) Explain the advantages to the student of storing their data locally on their home computer instead of using cloud storage.

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..... [2]

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6 **(a)** Convert the denary number 150 into an 8-bit binary number.

..... [1]

working space

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(b) Convert the hexadecimal number F08 into a 12-bit binary number.

..... [1]

working space

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(c) Give the 8-bit binary value after a logical binary shift left of two places is performed on the binary number 00110101.

..... [1]

working space

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(d) Convert the two's complement binary integer 01110101 into denary.

..... [1]

working space

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(e) Add the **two** binary integers using binary addition and give your answer in binary. Show all your working.

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

[3]

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7 Data is transmitted between a computer and a printer using a wired connection. The computer transmits the data to the printer. The printer transmits data and interrupts to the computer.

(a) State whether the method of transmission should be serial or parallel. Justify your choice.

method of transmission .....

justification .....

.....

.....

.....

[2]

(b) State whether the method of transmission should be simplex, half-duplex or full-duplex. Justify your answer.

method of transmission .....

justification .....

.....

.....

.....

[2]

(c) The transmitted data may contain an error.

(i) Give **one** way in which an error can occur during data transmission.

.....

..... [1]

(ii) The computer and printer agree to use automatic repeat query (ARQ).

Explain how ARQ using negative acknowledgement is used to establish that data is received without error.

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..... [3]

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8 A computer has system software and application software.

(a) Explain how system software is different to application software.

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..... [2]

(b) One type of system software is an operating system. One function of an operating system is to manage peripherals.

Describe the operating system function managing peripherals.

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..... [2]

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(c) Complete the table by giving **two** examples of software security solutions and explain how each protects a computer against threats.

security solution	explanation
....	....
....	....

[6]

(d) Define the terms firmware and operating system.

firmware .....

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operating system .....

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[2]

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9 A programmer is writing a program using an integrated development environment (IDE).

(a) The program will take data from bar codes as input.

A bar code includes a check digit.

Explain how the check digit is used to check for errors in data entry.

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..... [3]

(b) The programmer is using a high-level language to write the program.

(i) Describe what is meant by a high-level language.

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..... [2]

(ii) The programmer uses a compiler during the development of the program.

Describe the benefits of using a compiler when developing the program.

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..... [3]

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