Cambridge Assessment International Education

MEM

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

7938936449

COMPUTER SCIENCE **0478/11**

Paper 1 Computer Systems **May/June 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.

This document has **12** pages. Any blank pages are indicated.

[Turn over

1 A student has a portable tablet computer.

(a) Identify **two** input devices that could be built into the portable tablet computer.

1 .....

2 .....

[2]

(b) Identify **one** output device that could be built into the portable tablet computer.

..... [1]

(c) Identify **one** type of storage device that could be built into the portable tablet computer.

..... [1]

2 Hypertext markup language (HTML) colour codes can be represented as hexadecimal.

(a) Tick (✓) **one** box to show which statement about the hexadecimal number system is incorrect.

A It uses the values 0 to 9 and A to F. ☐

B It can be used as a shorter representation of binary. ☐

C It is a base 10 system. ☐

D It can be used to represent error codes. ☐

[1]

(b) Denary numbers can be converted to hexadecimal.

Convert the **three** denary numbers to hexadecimal.

20 .....

32 .....

165 .....

[3]

Working space

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3 The binary number 10100011 is stored in random access memory (RAM).

A logical left shift of **three** places is performed on the binary number.

(a) Give the 8-bit binary number that will be stored after the shift has taken place.

..... [1]

(b) Tick (✓) **one** box to show which statement about a logical left shift of **two** places is correct.

A It would divide the binary number by 2. ☐

B It would multiply the binary number by 2. ☐

C It would divide the binary number by 4. ☐

D It would multiply the binary number by 4. ☐

[1]

(c) 10100011 can be stored as a two's complement integer.

Convert the two's complement integer 10100011 to denary. Show all your working.

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..... [2]

(d) The binary number is measured as a byte because it has 8 bits.

State how many bytes there are in a kibibyte (KiB).

..... [1]

4 Data packets are transmitted across a network from one computer to another computer.

(a) Describe the structure of a data packet.

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..... [3]

(b) Packet switching is used to transmit the data packets across the network.

Identify the device that controls which path is taken by each data packet.

..... [1]

(c) Serial data transmission is used to transmit the data packets across the network.

Explain why serial data transmission is used to transmit the data packets.

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..... [3]

5 A computer uses both random access memory (RAM) and secondary storage.

(a) State the purpose of secondary storage.

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..... [1]

(b) One type of secondary storage is optical.

Circle **three** examples of optical storage.

read only memory (ROM) secure digital (SD) card compact disk (CD)

hard disk drive (HDD) digital versatile disk (DVD)

Blu-ray disk universal serial bus (USB) drive solid-state drive (SSD)

[3]

(c) Explain why a computer needs RAM.

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..... [3]

(d) The computer processes instructions using the fetch–decode–execute (FDE) cycle.

Draw and annotate a diagram to show the process of the **fetch** stage of the FDE cycle.

[4]

6 A computer needs firmware and system software to operate.

(a) State the purpose of firmware.

.....

..... [1]

(b) Give **one** example of firmware.

..... [1]

(c) Give **two** examples of system software.

1 .....

2 .....
[2]

7 Data is encrypted to keep it safe during transmission.

Complete the paragraph about asymmetric encryption.

Use the terms from the list.

Some of the terms in the list will **not** be used. You should only use a term once.

asymmetric certificate cipher text

decrypted encrypted parallel key plain text private key

protected public key serial key symmetric

..... is encrypted into ..... using a ..... . The encrypted data is then transmitted from the sender to the receiver. The encrypted data is then decrypted using a ..... . [4]

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8 A farmer uses an automated robot to plant seeds in the field.

(a) State what is meant by the robot being automated.

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..... [1]

(b) Give **three** characteristics of a robot.

1 .....

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2 .....

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3 .....

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[3]

(c) The robot plants seeds and stops when it reaches a fence. It then turns and continues planting seeds. The robot uses sensors and a microprocessor to know when it reaches a fence.

Explain how the robot uses sensors and a microprocessor to know it has reached a fence.

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..... [6]

(d) Give **two** advantages of the farmer using an automated robot to plant seeds.

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2 .....

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[2]

(e) Give **two** disadvantages of the farmer using an automated robot to plant seeds.

1 .....

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2 .....

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[2]

(f) The robot is adapted to have machine learning capabilities.

Explain how this will improve the robot.

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..... [2]

[Turn over

9 A company owner has installed a new network. Data is correct before it is transmitted across the network.

The company owner is concerned that data might have errors after transmission.

(a) Explain how the data might have errors after transmission.

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..... [3]

(b) The company owner decides to introduce an error detection system to check the data for errors after transmission.

The error detection system uses an odd parity check and a positive automatic repeat query (ARQ).

(i) Describe how the error detection system operates to check for errors.

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..... [8]

(ii) Give **two** other error detection methods that could be used.

1 .....

2 .....
[2]

(c) The company owner also installs a firewall to help protect the network from hackers and malware.

(i) Explain how the firewall operates to help protect the network.

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..... [5]

(ii) Give **two** examples of malware that the firewall can help protect the network from.

1 .....

2 .....
[2]

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