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CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

2368982008

COMPUTER SCIENCE **0478/13**

Paper 1 Computer Systems **October/November 2023**

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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1 A mobile telephone has built-in input and output devices.

(a) Give **two** examples of an input device that would be built into a mobile telephone.

1 .....

2 .....
[2]

(b) Give **one** example of an output device that would be built into a mobile telephone.

..... [1]

(c) The data storage in the mobile telephone can be measured using different units of measurement.

(i) State how many bits are equal to a byte.

..... [1]

(ii) State how many kibibytes (KiB) equal a mebibyte (MiB).

..... [1]

(d) The mobile telephone has an operating system.

Describe the purpose of the operating system.

.....

.....

.....

.....

.....

..... [3]

2 Humans use a denary number system and computers use a binary number system.

(a) Explain what is meant by a binary number system.

.....

.....

.....

..... [2]

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(b) Convert the denary numbers 14, 59 and 234 to binary.

14 .....

59 .....

234 .....
[3]

Working space

.....

.....

.....

.....

(c) Convert the denary numbers 9, 26 and 65 to hexadecimal.

9 .....

26 .....

65 .....
[3]

Working space

.....

.....

.....

.....

(d) Convert the positive denary number 123 to 8-bit binary using two's complement.

Show all your working.

.....

.....

.....

..... [2]

(e) Add the binary values 00110011 and 01111000 using binary addition.

Give your answer in binary. Show all your working.

.....

.....

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.....

.....

.....

.....

..... [3]

3 A computer has a central processing unit (CPU).

(a) Circle **three** components that are built into the CPU.

accumulator (ACC) control unit (CU) graphics card

hard disk drive (HDD) motherboard program counter (PC)

random access memory (RAM) read only memory (ROM)

[3]

(b) The CPU has cache.

Explain the purpose of the cache.

.....

.....

.....

..... [2]

(c) The CPU has a component that regulates the number of fetch–decode–execute cycles the CPU can perform in a second.

State the name of this component.

..... [1]

(d) The CPU has a component that carries out all calculations and logical operations.

State the name of this component.

..... [1]

4 An employee uses a web browser on their computer.

(a) Describe the main purpose of a web browser.

.....

.....

.....

..... [2]

(b) The employee wants his payment details to be automatically filled in when he buys products using the internet.

Identify the function of a web browser that could be used for this purpose.

..... [1]

(c) The employee wants to be able to quickly access websites that he regularly uses.

Identify the function of a web browser that could be used for this purpose.

..... [1]

(d) The web browser uses the secure socket layer (SSL) protocol to transmit personal data securely over the internet.

State how the SSL protocol secures the data for transmission.

.....

..... [1]

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5 Errors can occur when data is transmitted.

(a) Give **one** reason an error may occur when data is transmitted.

.....

..... [1]

(b) Some error detection methods use a calculated value to check for errors.

Tick (✓) **one** box to show which error detection method does **not** use a calculated value to check for errors.

A Check digit ☐

B Checksum ☐

C Echo check ☐

D Parity check ☐

[1]

(c) An automatic repeat request (ARQ) can be used to make sure that data is received free of errors. It can use a positive or negative acknowledgement method to do this.

Explain how an ARQ operates using a positive acknowledgement method.

.....

.....

.....

.....

.....

.....

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.....

.....

..... [5]

6 A company uses cloud storage to store its data.

(a) Tick (✓) **one** box to show which is **not** a characteristic of cloud storage.

A Data is accessed through a network ☐

B Data is stored locally ☐

C Data is stored remotely ☐

D Physical servers are used to store the data ☐

[1]

(b) Explain **two** advantages for the owners of the company of storing its data in cloud storage.

1 .....

.....

.....

.....

2 .....

.....

.....

.....

[4]

(c) Explain **one** disadvantage to employees of the company storing data in the cloud.

.....

.....

.....

..... [2]

7 A photographer takes an image with a digital camera. The photographer sets the resolution and colour depth for the image.

(a) State what is meant by the image resolution.

.....

..... [1]

(b) State what is meant by the image colour depth.

.....

..... [1]

(c) Give **one** benefit of increasing the colour depth of the image.

.....

..... [1]

(d) The photographer compresses the image using a method that permanently reduces the colour depth and resolution of the image.

Identify which compression method the photographer uses.

..... [1]

(e) One benefit for compressing the image is to reduce the storage space it uses.

Give **two** other benefits of compressing the image.

1 .....

.....

2 .....

.....

[2]

8 Draw and annotate a diagram to represent the role of a router.

[4]

9 A computer has secondary storage.

(a) The table contains statements about secondary storage.

Complete the table by writing the type of secondary storage that applies to each statement. Some types of secondary storage may apply to more than one statement.

Type of secondary storage	Statement
.....	data is stored using pits and lands
.....	data is stored using control gates and floating gates
.....	data is stored using electromagnets
.....	data is stored using a laser
.....	data is stored on a platter that is divided into tracks and sectors

[5]

(b) Explain **two** differences between primary storage and secondary storage.

1 .....

.....

.....

.....

2 .....

.....

.....

.....

[4]

10 A car repair garage uses an expert system.

(a) Complete the description about the operation of the expert system.

Use the terms from the list. Some of the terms in the list will **not** be used.

inference engine interface knowledge base

machine learning mechanical engine output device

question base rule base

An expert system has a ..... that contains a list of facts. The ..... applies the ..... to the ..... to reach a diagnosis for the repair of the car. The user provides data to the system using an ..... .

[5]

(b) The expert system has machine learning capabilities.

Describe what is meant by machine learning capabilities.

.....

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..... [4]

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