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6036475505

COMPUTER SCIENCE **0478/11**

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.

This document has **12** pages.

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[Turn over

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

(a) Tick (✓) **one** box to show which of these is **not** a unit of measurement for a file.

A bit ☐

B bot ☐

C nibble ☐

D byte ☐

[1]

(b) The size of a file can be reduced by compressing it.

(i) Give **two** types of compression that can be used to reduce the size of a file.

1 .....

2 .....

[2]

(ii) Give **three** benefits of reducing the size of a file for storage and transmission.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

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2 A student has a smartphone.

(a) Identify **two** input devices that can be built into the smartphone.

1 .....

2 .....
[2]

(b) Identify **two** output devices that can be built into the smartphone.

1 .....

2 .....
[2]

(c) The smartphone contains secondary storage.

(i) Explain the purpose of the secondary storage in the smartphone.

.....

.....

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..... [2]

(ii) Identify the most suitable type of secondary storage for the smartphone.

Explain your choice.

Secondary storage type .....

Explanation .....

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[4]

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3 A user enters text into a computer system, using a keyboard.

An American standard code for information interchange (ASCII) character set is used to convert the text to binary.

(a) Identify **one** other character set that could be used to convert the text to binary.

..... [1]

(b) The character 'A' is represented by the denary ASCII number 65.

The character 'm' is represented by the denary ASCII number 109.

(i) Convert the **two** denary ASCII numbers to binary.

65 .....

109 .....

[2]

Working space

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(ii) Convert the **two** denary ASCII numbers to hexadecimal.

65 .....

109 .....

[2]

Working space

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(c) The character 'y' is represented by the binary ASCII number 01111001.

(i) Convert the binary ASCII number to denary.

..... [1]

Working space

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(ii) Convert the binary ASCII number to hexadecimal.

..... [1]

Working space

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(iii) A logical right shift of two places is performed on the binary ASCII number 01111001.

Give the binary number after the logical right shift of **two** places is performed.

..... [1]

Working space

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(d) The character ‘T’ is represented by the binary ASCII number 01010100.

The character ‘t’ is represented by the binary ASCII number 01110100.

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

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..... [3]

4 A company decides to create a network for its devices.

All the company devices are within a single room.

The employees will need to use their devices to send data to each other and share files.

The company decides to send data across the network using packet switching.

(a) An employee sends an email to another employee. The email is broken down into packets.

Describe the structure of a packet of data for the email.

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..... [4]

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(b) The company decides to use parallel full-duplex data transmission to send the data across the network.

(i) Explain the reasons why the company have chosen this method of data transmission.

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..... [4]

(ii) Give **two** drawbacks of the company using this method of data transmission.

1 .....

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2 .....

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[2]

(iii) Give **one** other method of data transmission the company could have chosen.

..... [1]

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5 A central processing unit (CPU) performs the fetch–decode–execute (FDE) cycle.

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

1 .....

2 .....
[2]

(b) Describe what happens at the decode stage of the cycle.

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..... [3]

(c) Give **one** register in the CPU that is used in the execute stage of the cycle.

..... [1]

(d) Buses are used in the CPU to transmit data through the FDE cycle.

Circle **three** buses that are used in the CPU.

fetch	address	register	execute
data	decode	calculation	
central	value	binary	control

[3]

(e) A user changes their CPU from one with a dual core and a clock speed of 2.4 GHz to one with a dual core and a clock speed of 3.5 GHz.

Explain the effect this change will have on the performance of the CPU.

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..... [2]

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6 A computer programmer uses assembly language to create a computer program for an embedded system in a washing machine.

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

.....

..... [1]

(b) Give the name of the translator that will be used for the program.

..... [1]

(c) The washing machine needs to display error codes on a small screen if there is a problem with the washing machine.

The error codes are stored as binary. The binary numbers are too long to be displayed on the washing machine.

State how the error codes could be reduced in length to be displayed on the screen.

..... [1]

(d) Give **one** benefit to the programmer of using assembly language to write the program.

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..... [1]

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(e) The programmer uses an integrated development environment (IDE) to write the program.

A built-in translator to convert the program into machine code is one way that the IDE helps the computer programmer.

Describe **three** other ways the IDE can help the programmer.

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..... [6]

7 A computer has an operating system.

(a) The operating system provides several functions.

(i) Tick (✓) **one** box to show which of these is **not** a function of the operating system.

A managing files ☐

B providing an interface ☐

C handling interrupts ☐

D loading the bootstrap ☐

[1]

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(ii) Identify **one** other function of an operating system.

Describe the purpose of this function.

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..... [2]

(b) Give the name of the set of instructions that are provided to the operating system to allow it to run.

..... [1]

8 Draw and annotate a diagram to show how a payment transaction is made using digital currency and blockchain.

[4]

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9 A doctor's surgery has an expert system that helps diagnose the illnesses of its patients.

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

Use the terms from the list.

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

artificial binary central processing unit (CPU) data

inference engine interface knowledge base primary storage

process real read only memory (ROM) rule base

An expert system is a type of ..... intelligence. The doctor will type data about the symptoms of the illness into the ..... .

The ..... will decide which questions to ask the doctor. It will do this by linking the facts in the ..... to the ..... .

The ..... will decide on a diagnosis and this will be output on the ..... .

[7]

(b) The expert system has the ability to automatically adapt its own processes and data.

Give the name of this ability.

..... [1]

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