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4558298068

COMPUTER SCIENCE **0478/12**

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. Any blank pages are indicated.

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[Turn over

1 Different types of software can be run on a computer.

(a) State what is meant by software.

.....

..... [1]

(b) Utility software is one type of software that can be run on a computer.

Tick (✓) **one** box to show which software is an example of utility software.

A spreadsheet ☐

B anti-virus ☐

C web browser ☐

D database ☐

[1]

(c) Identify the type of software that manages inputs and outputs for the computer.

..... [1]

2 Data storage can be measured using different units of measurement.

(a) Identify the name of the smallest unit of measurement of data.

..... [1]

(b) State how many nibbles there are in 2 bytes.

..... [1]

(c) A 10 second sound effect is recorded for a movie.

It is recorded with a sample rate of 22,016 Hz and a sample resolution of 8 bits.

Calculate the file size of the sound effect in kibibytes (KiB). Show all your working.

.....

.....

.....

.....

.....

.....

Answer ..... KiB

[3]

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(d) The sound effect file is compressed for storage.

(i) State what is meant by file compression.

.....

..... [1]

(ii) Give **one** benefit of compressing the file for storage.

.....

..... [1]

3 A user enters data that is hexadecimal into a computer system. The data is converted to binary to be processed by the computer.

(a) (i) Give **one** similarity between hexadecimal and binary.

.....

..... [1]

(ii) Give **two** differences between hexadecimal and binary.

1 .....

.....

2 .....

.....

[2]

(b) Data that is denary can also be converted to binary.

Give the binary number for each of the **three** denary numbers.

15 .....

180 .....

235 .....

[3]

Working space

.....

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(c) Denary numbers can also be converted to hexadecimal.

Give the hexadecimal number for each of the **three** denary numbers.

14 .....

100 .....

250 .....

[3]

Working space

.....

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.....

.....

(d) A binary integer that is stored in a register in the computer has a logical left shift performed on it.

(i) Describe the process of the logical left shift that is performed on the binary integer.

.....

.....

.....

..... [2]

(ii) State what effect this will have on the binary integer.

.....

..... [1]

(e) A negative binary integer needs to be stored in a register in the computer.

Give the name of the number system that can be used to represent negative binary integers.

..... [1]

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4 A student has a smartwatch.

(a) The smartwatch has built-in input and output devices.

Identify **two** input devices that can be built into the smartwatch.

1 .....

2 .....

[2]

(b) Identify **one** output device that can be built into the smartwatch.

..... [1]

(c) The smartwatch has read only memory (ROM).

Explain why the smartwatch needs ROM.

.....

.....

.....

..... [2]

(d) The smartwatch uses a text message application that receives data from cloud storage.

(i) Describe what is meant by cloud storage.

.....

.....

.....

..... [2]

(ii) Explain **two** benefits of the application using cloud storage.

1 .....

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.....

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2 .....

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[4]

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(e) The smartwatch only displays the time and text messages.

A student incorrectly describes this smartwatch as a general-purpose computer.

Explain why the student's description is incorrect.

.....

.....

.....

..... [2]

5 A barcode scanning system uses a check digit to check for errors in data on input.

(a) Explain how the barcode scanning system operates to check for errors.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) After a barcode is scanned, data is sent to a stock control system to update the stock value stored for that product.

The data is sent to the stock control system using serial simplex data transmission.

(i) Explain how the data is sent using serial simplex data transmission.

.....

.....

.....

.....

.....

..... [3]

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(ii) Explain why serial simplex is the most appropriate method of data transmission for this purpose.

.....

.....

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..... [3]

(iii) The data is checked for errors after it has been transmitted to the stock control system.

Give **two** error detection methods that could be used for this purpose.

1 .....

2 .....

[2]

6 The table contains names and descriptions of components in a central processing unit (CPU).

Complete the table by giving the missing component names and descriptions.

Component name	Description
.....	sends signals to manage the flow of data through the CPU
program counter	....
.....	stores the address of the data that is about to be fetched from random access memory (RAM) into the CPU
.....	transmits data between the RAM and the CPU
accumulator	....
.....	stores an instruction when it is being decoded

[6]

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7 A student enters the uniform resource locator (URL) for a web page into their tablet computer.

(a) State what is meant by a URL.

.....

..... [1]

(b) Identify **two** different parts of a URL.

1 .....

2 .....

[2]

(c) The student enters the URL into a piece of software that then displays the web page.

Identify the name of this software.

..... [1]

(d) Draw and annotate a diagram to show how the web page is located and retrieved to be displayed on the student's tablet computer.

[5]

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(e) The data for the web page is transmitted using the secure socket layer (SSL) protocol.

Complete the paragraph about the SSL protocol.

Use only terms from the list.

Not all terms need to be used. Some terms may be used more than once.

encrypted file server hypertext markup language (HTML)

hypertext transfer protocol (HTTP) operating system search engine

unencrypted URL web browser web server

The ..... asks the .....

to identify itself. The ..... sends back its digital

certificate. The ..... authenticates the digital certificate.

If it is authentic, ... data transmission begins.

[5]

8 A robot vacuum cleaner uses sensors to navigate around obstacles in a room.

(a) Tick (✓) **one** box to show which sensor would be the most suitable for this purpose.

A proximity ☐

B flow ☐

C pressure ☐

D level ☐

[1]

(b) An expert system can be used to diagnose an error with a robot vacuum cleaner.

Circle **three** components that are part of an expert system.

knowledge base operating system firewall

server printer actuator inference engine

rule base encryption

[3]

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(c) Explain how the robot vacuum cleaner can make use of machine learning.

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..... [3]

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