Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

COMPUTER SCIENCE **2210/01**

Paper 1 Computer Systems **For examination from 2023**

SPECIMEN PAPER **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.

1 A school network has several computers.

Each computer in the network has a media access control (MAC) address.

Hexadecimal is used for MAC addresses.

Part of a MAC address is given.

97–5C–E1

Each pair of digits is stored as binary in an 8-bit register.

(a) Complete the binary register for these two pairs of digits.

97 | | | | | | | | |
---|---|---|---|---|---|---|---|

5C | | | | | | | | |
---|---|---|---|---|---|---|---|

[4]

(b) Describe what is meant by a MAC address.

....

....

....

....

....

....

....

.... [4]

(c) Give **two other** uses of hexadecimal in computer science.

1 ....

2 .... [2]

(d) Another value is stored as binary in a register.

0	1	0	1	0	0	1	0

  (i) A logical left shift of two places is performed on the binary value.

  Complete the binary register to show its contents after this logical left shift.

[1]

  (ii) State **one** effect this logical shift has on the binary value.

  ....

  .... [1]

(e) Negative **denary** numbers can also be represented as binary using two's complement.

Complete the binary register for the denary value −54.

You must show all your working.

Working space ....

....

....

....

Register:

[2]

2 A company has a website that is stored on a web server.

(a) The website data is broken down into packets to be transmitted to a user.

Describe the structure of a data packet.

....

....

....

....

....

....

....

.... [4]

(b) The website hosts videos that users can stream. The company uploads new videos to the website.

(i) The videos are compressed before they are uploaded to the website.

Tick (✓) **one** box to show which statement is a benefit of compressing the videos.

A Data is encrypted. ☐

B Duration of each video will be reduced. ☐

C Less storage space on the web server is required. ☐

D More bandwidth is required when viewing the videos. ☐

[1]

(ii) Give **two** methods of compression that could be used to compress the videos.

1 ....

2 .... [2]

(iii) The company uses parallel half-duplex data transmission to transmit the data for the new videos to the web server.

Explain why parallel half-duplex data transmission is the most appropriate method.

....

....

....

....

....

....

....

.... [4]

(c) The company is concerned about a distributed denial of service (DDoS) attack.

(i) Describe what is meant by a DDoS attack.

....

....

....

....

....

....

....

.... [4]

(ii) Suggest **one** security device that can be used to help prevent a DDoS attack.

.... [1]

3 **(a)** A web server has an internet protocol (IP) address.

(i) Give **three** characteristics of an IP address.

1 ....

2 ....

3 .... [3]

(ii) Identify the network component that uses the IP address to send data only to its correct destination.

.... [1]

(b) The website has a uniform resource locator (URL).

An example of a URL is given.

https://www.cambridgeassessment.org.uk/index.html

Complete the table to identify the name of each section of the URL.

URL section	Name
https	
cambridgeassessment.org.uk	
/index.html	

[3]

4 A computer has a Von Neumann architechure.

(a) Circle **three** components that are part of the central processing unit (CPU) in this computer.

accumulator (ACC)   hard disk drive (HDD)   memory address register (MAR)

program counter (PC)   random access memory (RAM)

read only memory (ROM)   sensor   sold state drive (SSD)

[3]

(b) Describe the purpose of the control unit (CU) within this computer.

....

....

....

.... [2]

(c) The computer has a single core CPU.

(i) State **one** purpose of a core in a CPU.

....

.... [1]

(ii) The computer is upgraded to a dual core CPU.

Explain how the upgrade can affect the performance of the computer.

....

....

....

.... [2]

(d) The computer uses a bootstrap.

Tick (✓) **one** box to show the part of a computer of which the bootstrap is an example.

A application software ☐

B firmware ☐

C hard disk drive ☐

D MAC address ☐

[1]

5 A programmer uses a high-level language to create a computer program.

(a) (i) Identify **two** advantages to the programmer of using a high-level language instead of a low-level language.

1 ....

2 .... [2]

(ii) Suggest **one** disadvantage to the programmer of using a high-level language instead of a low-level language.

.... [1]

(b) The programmer uses an integrated development environment (IDE) when creating the computer program.

State what is meant by an IDE.

....

.... [1]

6 Robots are used in a factory to build cars.

(a) One characteristic of a robot is its mechanical structure.

State **two other** characteristics of a robot.

1 ....

2 .... [2]

(b) Suggest **two** advantages of using robots, instead of humans, to build cars in the factory.

1 ....

2 .... [2]

7 The Unicode character set is used to represent text that is typed into a computer.

(a) Describe what is meant by a character set.

....

....

....

.... [2]

(b) One disadvantage of using the Unicode character set, instead of the ASCII character set, is that the text stored takes up more storage space.

Give **one** reason why it takes up more storage space.

....

.... [1]

8   (a) Draw a diagram to represent how virtual memory is created and used.

[4]

(b) A student is using software to create 3D models. This process often requires the use of virtual memory.

Explain why virtual memory is needed for this process.

....

....

....

....

....

.... [3]

9 Complete the sentences about symmetric 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.

algorithm	cipher	copied	delete	key	plain

private	public	standard	stolen	understood	unreadable

The data before encryption is known as .... text.

To scramble the data, an encryption ...., which is a type

of ...., is used.

The data after encryption is known as .... text.

Encryption prevents the data from being .... by a hacker.   [5]

10 An art gallery uses secure socket layer (SSL) to provide a secure connection when selling art on its website.

Describe the process of SSL and explain how it provides a secure connection.

....

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....

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....

....

....

.... [6]

12

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