



# Cambridge IGCSE™

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**COMPUTER SCIENCE**

**0478/01**

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.

<b>97</b>							
<b>5C</b>							

[4]

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

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..... [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 .....

.....

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.....

**Register:**

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[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.

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..... [4]

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

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

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..... [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 architecture.

(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.

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..... [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.

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.....

.....

..... [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.

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..... [3]



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