

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Monday 16 May 2022 – Afternoon

GCSE (9–1) Computer Science

J277/01 Computer Systems

**Time allowed: 1 hour 30 minutes
plus your additional time allowance**

**DO NOT USE:
a calculator**

Please write clearly in black ink.

Centre number

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Candidate number

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First name(s) _____

Last name _____

READ INSTRUCTIONS OVERLEAF



INSTRUCTIONS

Use black ink. You can use an HB pencil, but only for graphs and diagrams.

Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.

Answer ALL the questions.

INFORMATION

The total mark for this paper is 80.

The marks for each question are shown in brackets [].

Quality of extended response will be assessed in questions marked with an asterisk (*).

ADVICE

Read each question carefully before you start your answer.

BLANK PAGE

Answer ALL the questions.

1 Computers represent data in binary form.

(a) Tick (✓) ONE box in each row to identify the binary unit equivalent of each of the given file sizes. [4]

File size	2 megabytes	2 petabytes	2 kilobytes	2 bytes	2 gigabytes
2000 bytes					
2000 terabytes					
16 bits					
4 nibbles					

- (b) Convert the denary number 221 into 8 bit binary.
Show your working.**

[2]

- (c) Convert the hexadecimal number 2F into denary.
Show your working.**

[2]

- (d) Convert the binary number 10110000 into
hexadecimal.**

[1]

- (e) Identify how many unique values can be
represented by 4 bits.**

[1]

- (f) Perform a binary shift of 3 places right on the binary number 10001110.

_____ [1]

2 Complete the table by writing the missing definition or name of each of the common CPU components and registers. [4]

CPU component or register	Definition
	Stores the address of the next instruction to be fetched from memory. Increments during each fetch-execute cycle.
CU (Control Unit)	
	Stores the address of the data to be fetched from or the address where the data is to be stored.
	Performs mathematical calculations and logical operations.

3 A library has a LAN (Local Area Network).

- (a) The LAN allows access by both wired and wireless devices.**

Users have reported that the network sometimes runs very slowly.

- (i) Explain why the number of devices using the network at the same time can affect the performance of the network.**

[3]

- (ii) Identify ONE other factor that can affect the performance of the network.**

[1]

(b) Users can access websites from the library computers.

Complete the description of accessing websites using the given list of terms. Not all terms will be used. [7]

0

1

127

128

255

256

Colon

Domain Name Server

Embedded systems

File server

Full stop

Hyphen

Internet protocol

MAC address

Router

Uniform Resource Locator

Web server

Clients

A website is hosted on a _____ .

The computers that access the websites are called _____ .

The user enters the _____ into a web browser. The web browser sends a request to the _____ for the matching IP (Internet Protocol) address. If found the IP address is returned. A request is then sent to this IP address.

An IPv4 address is made of 4 groups of digits. Each group can be between the denary values _____ and _____ .

The groups of digits are separated by a _____ .

- (c) The wired connection is an Ethernet connection.
Ethernet is considered a standard.

Explain why Ethernet is a standard.

[2]

- (d) The network has several routers.

Identify THREE tasks carried out by a router.

1

2

3

[3]

- (e) The library does not use encryption when data is transmitted through the network.**

Give TWO reasons why the library should use encryption.

1 _____

2 _____

[2]

- (f) Protocols are used to transmit data through the network and over the internet.**

Identify ONE protocol that can be used to perform each of the following tasks:

Send an email _____

Access a website securely _____

[2]

Discuss the positive and negative uses of AI by social networking websites including:

Ethical issues

Privacy issues [8]

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

[illegible]

5 A software development company wants to protect their computer systems and data from unauthorised access.

(a) Identify TWO methods of physical security that the company could use to protect their computer systems.

1 _____

2 _____

[2]

(b) Identify AND describe TWO software-based security methods that the company can use to protect their computer systems and data.

Method 1 _____

Description _____

Method 2 _____

Description _____

[6]

(c) Tick (✓) ONE box on each row to identify the legislation that would cover each of the given events. [5]

Event	The Data Protection Act (2018)	Computer Misuse Act (1990)	Copyright Designs and Patents Act (1988)
A company transmits personal data to another company without the individual's permission.			
A school accidentally publishes their students' addresses on the school website.			
The interface for a piece of software is replicated by a rival company.			
A user leaves a computer logged on and another person leaves them a message on their desktop.			
A student guesses their teacher's password and accesses their computer account.			

6 A student is creating a range of documents for a school project.

(a) The student records a podcast about computer science.

(i) Describe how an analogue sound wave is converted into digital form.

[3]

- (ii) Tick (✓) ONE OR MORE boxes on each row to identify the effect(s) that each change will have on the sound file. [3]

Change	File size increases	File size decreases	Accuracy increases	Accuracy decreases
Duration changes from 10 minutes to 20 minutes				
Sample rate changes from 44 kilohertz to 8 kilohertz				
Bit depth changes from 8 bits to 16 bits				

(b) The student writes a report about volcanoes.

(i) The computer stores text using the ASCII character set.

Part of the ASCII character set is shown:

Character	ASCII denary code
M	77
N	78
O	79
P	80
Q	81

Identify the character that will be represented by the ASCII denary code 84.

_____ **[1]**

(ii) Identify a second character set.

_____ **[1]**

(c) The student takes a photograph of their science experiment. The image file includes metadata.

Identify THREE pieces of metadata that is often stored with an image.

1 _____

2 _____

3 _____

[3]

(d) The student compresses all their documents before emailing them to their teacher.

(i) Give TWO benefits of compressing the data before it is emailed.

1 _____

2 _____

[2]

(ii) Explain why lossy compression may NOT be appropriate to compress all of the student's files.

[2]

7 A smart television allows the user to search the Internet and watch videos online.

(a) The smart television has both RAM and ROM.

(i) State the difference between RAM and ROM.

_____ **[1]**

(ii) Give TWO examples of data that the smart television could store in RAM.

1 _____

2 _____

[2]

(b) The smart television has secondary storage.

(i) State, using an example, why the smart television needs secondary storage.

[2]

(ii) Identify ONE appropriate type of secondary storage for the smart television. Justify your choice.

Secondary storage type _____

Justification _____

[4]

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).

[illegible]

[illegible]

[illegible]

