Oxford Cambridge and RSA

Monday 12 May 2025 – Afternoon

GCSE (9–1) Computer Science

J277/01 Computer Systems

Time allowed: 1 hour 30 minutes

Do not use:
- a calculator

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number | | | | | | Candidate number | | | | |

First name(s) _____

Last name _____

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 question marked with an asterisk (*).
- This document has **16** pages.

ADVICE
- Read each question carefully before you start your answer.

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1 A student is creating a presentation containing images and sound.

(a) One of the files is an audio recording.

Complete the description of how a computer stores sound. Fill in the gaps using the given list of terms. Not all terms will be used.

analogue	colour depth	higher	repeated	smaller
binary	digital	lower	sample rate	unique
bit depth	height	measuring	sampling	
byte	hertz	recording	seconds	

An ..... sound wave needs to be converted into a digital sound wave.

Sound ..... is when the amplitude of the sound wave is measured at set intervals.

The ..... is the number of times a second the sound wave is measured. This is given in Hertz.

Each amplitude is given a ..... binary number. The number of bits allocated to each sample is the ..... .

The ..... the number of bits, the wider the number of amplitudes can be measured.

[6]

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(b) The student creates 10 bitmap images using a computer.

Each image has a colour depth of 8-bits and a resolution of 800 × 500 pixels.

(i) Define the term pixel.

.....

..... **[1]**

(ii) Calculate the total file size of the 10 images in kilobytes.

Show your working out.

.....

.....

.....

File size: ..... kilobytes

[2]

(iii) State the minimum number of bits that will be needed to represent 240 different colours.

..... **[1]**

(c) The student wants to use a secondary storage device to move their files to their home computer.

Identify whether the student should use an optical or solid-state type of secondary storage device. Justify your choice.

Optical or solid-state .....

Justification .....

.....

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..... **[4]**

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2 A computer has an operating system.

(a) Tick (✓) **one** box on each row to identify the operating system function that will manage each task.

Operating system function	Memory management	Peripheral management	User management	File management
Multitasking				
Renaming a folder				
Creation of user accounts				
Installation of a printer driver				
Transfer of data to and from RAM				

[5]

(b) A computer also has utility software.

(i) State the purpose of utility software in a computer.

.....

..... **[1]**

(ii) Explain the purpose **and** function of encryption software.

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..... **[3]**

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3* A company designs and builds tablet computers. The company wants to reduce the cost of manufacturing their tablet computers. The company also decides to stop releasing software updates for their older tablet computers. This means customers will need to change their devices more often.

Discuss the impact of these decisions on the company and the customers.

Include in your answer:
- ethical issues
- environmental issues
- benefits and drawbacks. **[8]**

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4 A youth centre is creating a network with 20 computers in a single building that will be connected in a Local Area Network (LAN).

(a) Identify **two** reasons why this network will be a LAN and not a Wide Area Network (WAN).

1 .....

.....

2 .....

.....

[2]

(b) The network design connects the computers in a mesh topology.

(i) Describe what is meant by a mesh topology.

.....

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..... **[2]**

(ii) Describe **one** benefit **and one** drawback of the network using a mesh topology instead of a star topology.

Benefit .....

.....

.....

.....

Drawback .....

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.....

[4]

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(c) The network design originally only had wired connections. The design is updated to include wireless connections via Wi-Fi.

(i) Explain the benefits to the youth centre of also providing Wi-Fi connections.

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..... **[3]**

(ii) The decision to use wired and/or wireless connections can affect the performance of the network.

Complete the table by explaining how each factor can affect the performance of a network.

Factor	How it affects performance
Bandwidth	....
Number of users accessing the network at the same time	....

[4]

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(d) The youth centre is going to store data about users and events using cloud storage.

Describe the drawbacks to the youth centre of storing the data on the cloud.

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..... **[5]**

(e) Users will have access to the internet.

(i) Identify **one** device that will be required to allow the LAN to connect to the internet.

..... **[1]**

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(ii) The computers will be allocated an IPv4 address.

Tick (✓) **one** box on each row to identify if the IPv4 address is valid **or** invalid.

IPv4 address	Valid (✓)	Invalid (✓)
192.154.21.2		
258.0.0.3		
56.1.2.66.1		
251.58.3.7		

[4]

(iii) When a user wants to access a website they enter the URL into the address bar of a web browser.

Describe the steps that take place to convert the URL into the website's IP address.

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..... **[4]**

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(f) Identify **one** piece of legislation that the youth centre will need to follow when storing users' data **and** describe the steps they need to take to meet the requirements of this legislation.

Legislation .....

Steps the youth centre needs to follow .....

.....

.....

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.....

.....

[4]

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5

(a) Tick (✓) **one** box to identify the quantity of megabytes that is the same as 2 terabytes.

- [ ] 2000 MB
- [ ] 20 000 MB
- [ ] 200 000 MB
- [ ] 2 000 000 MB

[1]

(b) Each row in the table contains a number that is written as a denary value, 8-bit binary value and a 2-digit hexadecimal value. Some values are missing.

Complete the table by writing in the missing value for each number.

Denary	8-bit binary	2-digit hexadecimal
38		26
	01001110	4E
156	10011100	
215		D7

[4]

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(c) Complete the binary addition of these two 8-bit binary numbers.

Show your working out.

$$\begin{array}{r} 0\ 1\ 1\ 1\ 0\ 0\ 1\ 1 \\ +\ 0\ 0\ 1\ 1\ 0\ 1\ 0\ 0 \\ \hline \end{array}$$

[2]

(d) Tick (✓) **one** box to identify the result of a 2-place right binary shift on the binary number 01110111.

☐ 00011101

☐ 11101110

☐ 00111011

☐ 11011100

[1]

(e) Describe the binary shift that can be used to multiply any number by 8.

.....

..... **[2]**

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6 A computer uses the ASCII character set.

Part of the ASCII character set is shown here:

Character	Binary code
K	01001011
L	01001100
M	01001101
N	01001110

(a) Write the binary code to represent the word POP using ASCII.

.....

.....

.....

..... **[2]**

(b) A new computer is being built.

Identify **one** benefit and **one** drawback of the computer using Unicode instead of ASCII.

Benefit .....

.....

Drawback .....

.....

[2]

(c) The computer's CPU contains registers.

Complete the table by identifying **two** registers **and** state the purpose of each register.

Register	Purpose
.....	....
.....	....

[2]

END OF QUESTION PAPER

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EXTRA ANSWER SPACE

If you need extra space use this lined page. You must write the question numbers clearly in the margin.

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