



Oxford Cambridge and RSA

Monday 15 November 2021 – Afternoon

GCSE (9–1) Computer Science

J276/01 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

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Candidate number

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First name(s)

Last name

INSTRUCTIONS

- Use black ink.
- 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 written communication will be assessed in questions marked with an asterisk (*).
- This document has **12** pages.

ADVICE

- Read each question carefully before you start your answer.

1 A computer system has a 2.5 GHz processor and 5 GB of RAM.

- (a) Complete the paragraph about memory by writing the missing terms in the spaces, using the words provided.

cache	data	hard drive	instructions	changed	closing
operator	primary	random	read	secondary	start-up
translator	memory stick	virtual	write		

ROM stands for Read only memory. This stores the Start-up instructions for a computer and cannot be Changed.

RAM stands for Random access memory. This stores the instructions and data that are currently being used. If the computer does not have enough RAM to run a process it can make use of virtual memory.

RAM and ROM are both examples of Primary memory. Memory located close to the processor that allows faster access than from RAM is called Cache memory. [8]

- (b) (i) State the purpose of a CPU.

Process data

Executes commands [1]

- (ii) State what is meant by a single core 2.5 GHz processor.

it means the computer only has one processor

it runs 2.5 billion FDE cycles per second

[2]

- (c) Von Neumann architecture includes registers.

Identify **two** registers used in Von Neumann architecture.

1 Pc - program counter

2 Accumulator

[2]

- 2 Layla uses her computer to create educational games.

Layla makes use of system software.

- (a) One type of system software is the operating system.

Identify and describe **two** functions of an operating system.

Function 1 **user interface, allows the user to input data, it also outputs data to the user**

Description

.....

.....

.....

Function 2 **file management, user management, stores data to the RAM**

Description

.....

.....

.....

[6]

- (b) Layla also uses utility system software.

- (i) State the purpose of utility system software.

maintains tasks/it performs housekeeping

.....

..... [1]

- (ii) Layla uses a backup utility. She performs both full and incremental backups.

Explain the reasons why Layla performs both full and incremental backups.

A full backup will copy every file and all data

.....

Incremental backup only copies files/data that have changed

.....

incremental backup can be done once a full backup has been completed

.....

.....

.....

.....

.....

..... [3]

- (c) When Layla has finished her educational game, she is going to release it as open source.

Give **one** benefit and **one** drawback of Layla releasing her game as open source.

Benefit Layla will get more users or gamers to explore it

.....

Drawback someone can decide to copy Layla's game and
use it selfish or illegal reasons

.....

[2]

- 3 A technology company brings out new, updated devices twice a year.

- (a) Describe the environmental impacts of the company bringing out new devices twice a year.

.....

.....

.....

..... [2]

- (b) Describe the cultural impacts of the company bringing out new devices twice a year.

.....

.....

.....

..... [2]

- 4* A school asks its students to bring in their own electronic devices (e.g. tablets, laptops, mobile phones) to use in lessons instead of purchasing new equipment.

Discuss the issues surrounding students bringing their own devices. Include in your discussion:

- ethical issues
- legal issues
- privacy issues.

Legal Issues:

Students could use their electronic devices to cheat during tests or exams, which in most cases, (they could get persecuted)

Some student could visit illegal sites or perform illegal transaction which is against the law

Students got decide to hack or breach school firewalls or security gateways which result in a cyberattack causing the school to shut down or face legal consequences

[8]

- 5 A program is being created to convert the data capacity of a storage device into a different measure.

The function, `calculate()`, takes the measurement (e.g. gigabytes) and the number (e.g. 2) as two parameters. It then returns the value in bits. The function returns `-1` if an invalid measurement was entered.

Complete the function `calculate`

```
function calculate(....., number)

    if measurement == "gigabytes" then

        value = number * 1024 * 1024 * 1024 * 8

    elseif measurement == "....." then

        value = number * 1024 * 1024 * 8

    elseif measurement == "....." then

        value = number * 1024 * 8

    elseif measure == "bytes" then

        value = number * .....

    else

        .....

    endif

    return .....

endfunction
```

[6]

- 6 Charlie has purchased a new tablet computer. The tablet has an internal secondary storage device.

(a) Describe what the internal secondary storage device will store.

Softwares/programs

Files/data

Operating systems

[2]

(b) The storage device is a solid state device.

(i) Give **three** benefits of the tablet having a solid state device instead of a magnetic device.

1 Uses less power

Portable and small in size

2 makes less noises

Runs Cooler

3 Durable/lasts longer

[3]

(ii) Give **two** drawbacks of the tablet having a solid state device instead of a magnetic device.

1 more expensive

2 Has smaller capacity (in storage size)

[2]

7 A university has buildings in two sites that are 5 miles apart.

(a) Describe the difference between a LAN and a WAN.

.....

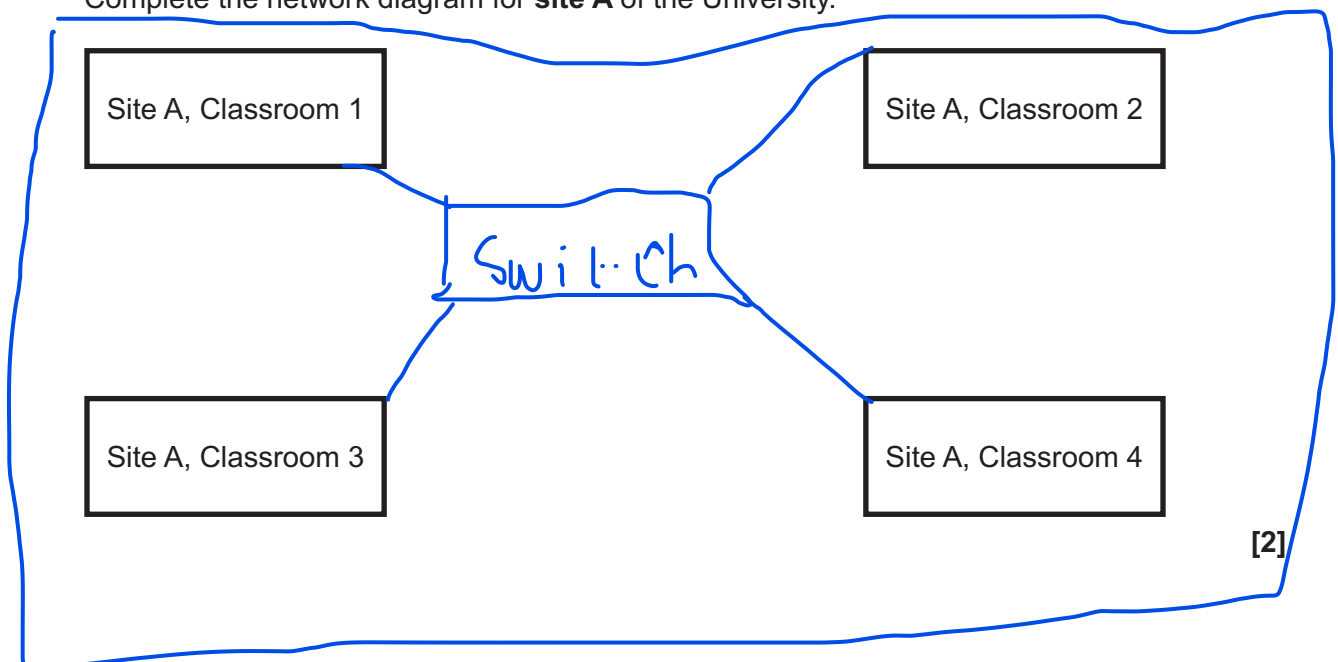
.....

.....

..... [2]

(b) Site A has 4 classrooms. Site B has 2 classrooms. The network on each site between the classrooms is a star topology using a switch. The two sites are connected over the Internet.

Complete the network diagram for **site A** of the University.



(c) Site B has a higher network performance than site A.

(i) Explain how each of the following can contribute to the performance of a network.

Wifi frequency 5GHZ frequency has a shorter range so access may be limited. It carries data per second more than a 2.4GHZ

Interference Slows down the flow of traffic.
objects like walls, can block signals

Number of concurrent users makes the bandwidth split (which can make it slow), each users will have less bandwidth

Type of network traffic Large files/videos will take up more bandwidth, resulting in a slow connection

[4]

(ii) Identify **one** other factor that can contribute to the performance of a network.

Distance

Connection type - wired or wireless

[1]

(iii) The data transmitted between the two sites uses packet switching. Data is transmitted from a computer in site A to a computer in site B.

Describe how packet switching can be used when sending data from one site to the other.

Data can be split into packets

Packets are sent in different routes

Packets are sent individually

The receiving device waits for all packets to be sent

[4]

(d) The university want to protect their data against threats when connected to the Internet.

- (i) Describe the threat malware can pose to the university's network and give a prevention method that the university can use.

Description

.....

.....

.....

Prevention

.....

[3]

- (ii) Describe the threat a brute force attack can pose to the university's network and give a prevention method that the university can use.

Description

.....

.....

.....

Prevention

.....

[3]

(e) Data transmitted over the network uses different protocols.

Tick **one** box in each row to identify whether the protocol is related to email, transferring files or accessing websites.

Protocol	Email	Transferring files	Accessing websites
POP			
FTP			
SMTP			
HTTPS			

[4]

- (f) The building is considering the implementation of a virtual network.

Describe what is meant by a virtual network.

.....

.....

.....

..... [2]

- 8 Identify the legislation that relates to the following scenarios:

A programmer wants to protect their work from being copied or distributed.

.....

A person logs into a computer without permission by guessing the password.

.....

A person makes a request to view financial information held by a public authority.

.....

A hacker gains access to a company's files over a network without permission.

.....

A company collects data that it does not need about its customers.

.....

[5]

END OF QUESTION PAPER

This image shows a blank sheet of white paper designed for writing. It features a series of evenly spaced horizontal blue lines across its entire width. A single vertical blue line runs down the left side, creating a narrow margin. The paper is otherwise completely empty, with no text or markings.

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