



SURNAME: Jones

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12 Pages

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, turn over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

1	Student Number	2405039
2	Title of Examination Paper	Computer Architecture and operating Systems
3	Module Code	ACCA4022
4	Date and Time of Examination	12-05-2025 9am-11am
5	Examination Venue	1Q310
6	Seat Number	67
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
1	22
2	10
3	8
4	12
Total	52

(Gweler yr ochr arall am y fersiwn Cymraeg)

a)

128	64	32	16	8	4	2	1

i. 62 $\rightarrow$ = 0100 0010 $\checkmark$

ii. 125 $\rightarrow$ = 1000 0011 $\times$

b)

i. 10011001 = 128 + 16 + 8 + 1
= 153 $\checkmark$

ii. 11110 $\rightarrow$ $\times$
= 32 + 16 + 8 + 4 + 2
= 62 $\times$

c)

i. 2F = 0010 1111 $\checkmark$

ii. 36 = 0011 0110 $\checkmark$

d)

i. C3 $\xrightarrow{\text{to binary}}$ 1100 0011 $\xrightarrow{\text{to dec}}$ = 128 + 64 + 2 + 1
= 195 $\checkmark$

ii. 66 $\xrightarrow{\text{to binary}}$ 0110 0110 $\xrightarrow{\text{to dec}}$ = 64 + 32 + 4 + 2
= 102 $\checkmark$

e)

5 bit number = 2^5 = $2 \times 2 \times 2 \times 2 \times 2$
= 32 $\checkmark$

32 different values can be represented with a 5 bit number.

f)

i. 4000×3000 ✓

$= 12,000,000 \text{ pixels}$

$$12,000,000 \times 3 = 36,000,000 / 1,000,000 = 36 \text{ megapixels}$$

(RGB)

1 1

ii. 36 MB as .BMP

$\text{JPG} = 36 / 10$

$= 3.6 \text{ MB as a JPG file}$ ✓

3 3

g)

$80 \text{ Mb/s} = 8 \text{ MB/s}$ ✗

$36 \text{ MB} / 8 \text{ MB} = 4.5 \text{ seconds}$

It would approximately take 4.5 seconds to download the file at this speed.

a)

i. CPU - The CPU (controlled processing unit) is responsible for managing and controlling all of the processes that are executed within a computer system. In this diagram, it communicates by sending and retrieving data from the control and data buses.

Memory - The memory works by storing and managing random access memory. This memory acts as fast temporary volatile storage.

Input and output - This is where the external devices connected to the system are managed. Devices such as keyboards, speakers and hard disks are in full communication with the buses.

Control bus - This is the bus that has full communication with all of the previous units, this means that it works to control processes with all three units.

Address bus - This bus retrieves data from the CPU and input/output such as processes and functions, where data is stored in memory and also communicates back with the input/output unit.

Data bus - This bus controls the flow of data between the units to ensure full communication between them.

a)

ii. In this example, the text inputted from the keyboard will originate from the input/output unit and handled in the data bus. The CPU will then handle this data by storing the text in the system's memory. Furthermore, as there is no permanent storage unit displayed in this system, there must be a hard disk used as an input/output device, meaning that this text will be permanently saved here.

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a)

i. Typical data capacity ~~or~~ could be 64MB to 256MB

ii. A typical rotating hard drive could have any where from 8GB to 64GB of space.

iii. An SSD could have anywhere from 128GB to 1000 2TB.

b)

i. 64 to 128 MB/s.

ii. 256 to 512 MB/s.

iii. 4 to 8 GB/s.

c)

i. Raid 0 would make use of these two drives by using one drive as a working drive to read/write data, and the other as a backup. This means that only 3TB are used in total as useable storage. This is great if one drive fails or gets lost as one is there as a backup. However, it can be expensive to buy 6TB worth of storage to only use 3TB.

ii. Raid 1 makes use of both drives to write/read data at the same time. It does this by splitting the data up equally between the two devices. This can be beneficial as this configuration allows us to make use of the full 6TB from both drives. However, if one drive fails or gets lost, then all of the data becomes meaningless without both drives.

- a) For the purpose of this workstation, I think that a core i5 or core i7 will be suitable. This is because these processing units are capable of working with large amounts of data without being too expensive. For instance, a core i3 wouldn't be fast enough and a core i9 would be overkill and too expensive.
- b) In terms of RAM, I think that 16GB would be enough. However, due to how resource-demanding video editing can be, it would be understandable if 32GB is chosen instead. This would depend on the remaining budget.
- c) I think that a typical SSD would suffice for this computer. This is because a SSD is capable of storing several TB of data which would be enough.
- d) With input and output, I think that it would be important to be flexible. This means that a healthy number of ports and features would be essential. This is because devices such as, keyboards, mice, headphones, speakers, monitors may be required. I think that USB 5 ports would be overkill and not necessary, meaning that USB 3 would be fine.
- e) The graphics card in this scenario would have to provide efficient rendering when working with 4K. It would also have to be able to load and run high quality video without any performance issues.

f) The software that could be used could be any capable video editing software that is able to edit, manipulate, enhance videos such as the Adobe applications.

details?

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