

Complete, fold and seal
(see note 2 below)

FORENAME(S): Logan

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold 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.**

[illegible]

7	Number of Answer Books handed in	
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(Gweler yr ochr arall am y fersiwn Cymraeg)

out of 50

30%

- Q1. 1.1
- ① 1.1.1 Control Unit is the system that controls the whole unit when it begins to run ✓
- ② 1.1.2 Interrupts - Interrupts happen when there is a break in collecting information ✓
- 1.1.3 Memory hierarchy - where memory is stored. ✓
- 1.1.4 DMA - DATA Memory access ✓
- 1.1.5 PWM - ✗

1.2

① High-level programming language is the language that computers read, Machine language is the language that we put into the machine and assembly language is the language that the computer outputs. -1

1.3 CISC and RISC are two different architectures which allow the computer to give instructions and data. CISC is used for workplace computers whereas RISC is used for mobile phones.

missing design philosophy discussion but overall is correct.

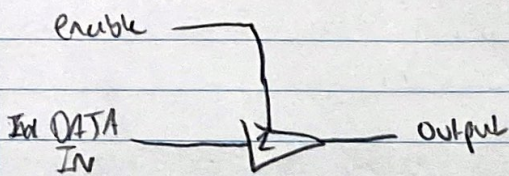
1.4 Stack is where the information starts coming in and then is read from top to bottom. Whereas queue, first set of information comes in and then that is the first to leave. Stack however the first information to come in is the last to leave. ✓

Q1
10/15

1.5

active 'High' tri-state buffer

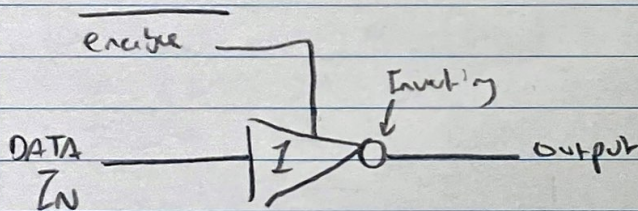
(4)



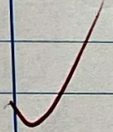
enable	IN	out
0	0	Hi-Z
0	1	Hi-Z
1	0	0
1	1	1



active 'Low' inverting tri-state buffer



enable	IN	out
0	0	1
0	1	0
1	0	Hi-Z
1	1	Hi-Z



Q2.

Q2

2.5/10

1. Where the memory is stored X
2. Converts memory into binary X
- ① 3. Reads inputs and sends outputs. ✓
4. Reads the voltage coming into the system X
- ① 0.5 5. Converts voltage from ~~analog~~ A to D, ✓
and D to A.

6. Reads the frequency of the system X clock signal ✓

7. Gets instructions from the system X

① 0.5 8. Communicates to other parts of the system ✓

9. Controls what the system does, reads information from

10. Sends output signals to the ports. ✓ X

① 0.5 9. Reads information from the I/O ports. ✓

Q3.

Q3.

1/10

3.1

- Input
- Output
- Pull X
- Push
- information

3.2 I²C interfaces read information quicker than SPI interfaces, however SPI interfaces are quicker to send off the information to other peripheral devices. X

- a) The CPU will continue to service the request and once ~~that~~ ^{the} first I/O is complete it will then move its focus to the second I/O interrupt. ~~XXX~~
- ① b) No ✓
- c) it isn't a problem as it will continue to work as it is meant to with no other problems occurring X

Q4.

Q4

4.1
0.5

Amdahl's law states that to work out the overall efficiency of a computer system you must know the speed ~~x~~ on which the computer runs at?

05/5

4.2

$$\frac{1}{1 + \frac{1}{3}} \times \frac{1}{3}$$

4.3.

processor upgrade 50% faster for 10,000
or
Disk drive 50% faster for 7,000

70% time running on CPU
30% time waiting

As the CPU is running for the most amount of time to me it would be better to make the processor faster to decrease the time taken for the CPU to process the information.

The percentage of time running on the CPU will decrease this is shown here

$$70 = 100\%$$

50% increase

$$50\% \text{ of } 70 = 35$$

$$30 + 17.5 = 47.5\%$$

47.5% time waiting.

$$35 : 2 = 17.5$$

$$70 - 17.5 = 52.5\%$$

So the CPU will now be running for 52.5% of the time and the time waiting will increase to 47.5%.

Q5.

Q5
1/10

5.1 USB Shows for ~~user~~ ~~store~~
- user stick device X

5.2 ~~Input~~, frequency, bandwidth, ~~wavelength~~ ^{electrical impulses}, Microwaves X

5.3. USB 1.0 - 5mb/s
USB 2.0 - 12mb/s
USB 3.0 - 24g/s X
USB 3.1 - 36g/s²

5.4 Step 1.
- the USB is lined up with the correct pins. X

Step 2 - data gets transferred from USB to where it is plugged into X

Step 3 - ^{electrical} signals are then sent from the USB stick to make sure everything is transferred over X

Step 4 - USB will then have transferred all data to the computer using the electrical signals X

① Step 5 - the host system will have ~~all~~ ^{the} information and ~~data~~ data that is needed ready?