

SURNAME: Price

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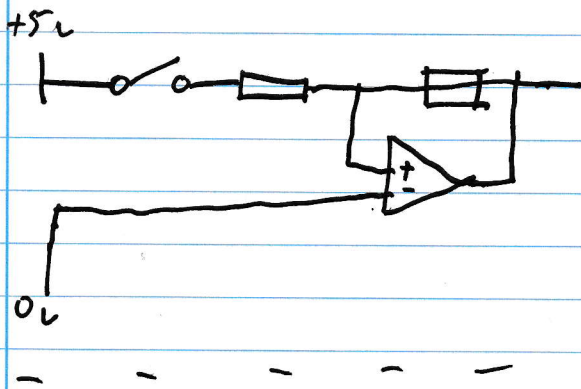
12 Pages

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

List the numbers of the questions you have attempted	Office Use
1	5 $\frac{1}{2}$
2	4 $\frac{1}{2}$
3	3
4	7
5	4
6	0
	24
Total	48 $\frac{1}{2}$

- (a) RETURN: pulls the microcontroller out of a subroutine back to the main loop of code. $1\frac{1}{2}$ $1\frac{1}{2}$
- (b) SLEEP: Makes the microcontroller sleep a set number of cycles until called upon again to do computation. $1\frac{1}{2}$ $\frac{1}{2}$
- (c) ADDLW: Is the addition of a literal value, usually in binary, to the working register of the microcontroller. $1\frac{1}{2}$ $1\frac{1}{2}$
- (d) BCF f, b: Is bit carried forward from the f register to the b register. 1 0
- (e) DECF: Is the function to decrement by one within the f register for whatever value is defined. 2 2

2)



To the left is a Schmitt trigger, this can be used to negate the problem of switch bouncing. It works by setting threshold values of

voltage to represent high or low. This means that the system can handle unexpected drops and rises without changing the output from the button.

- Schmitt triggers are simpler and add resilience in a system.

2) .. Second method is adding a capacitor to the button/switch,

• Makes a fine delay to the switch so isn't suitable of highly rapid or time precise applications.

• Cheap and cost effective in a system.

• It works by extending the time of the switch and not dropping to 0v. The graph looks like this:



• It extends the time to high and prevents bouncing.

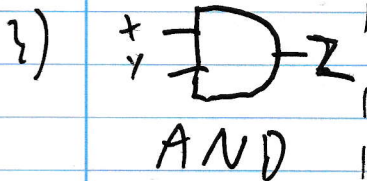
• Extremely simple to implement and construct.

Diagram?

2 1/2

2 1/2

4 1/2



X	Y	Z
0	0	0
0	1	0
1	0	0
1	1	1

3

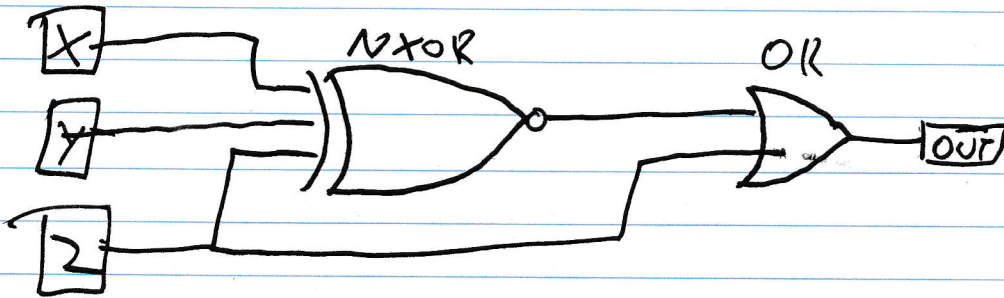
3

4) a

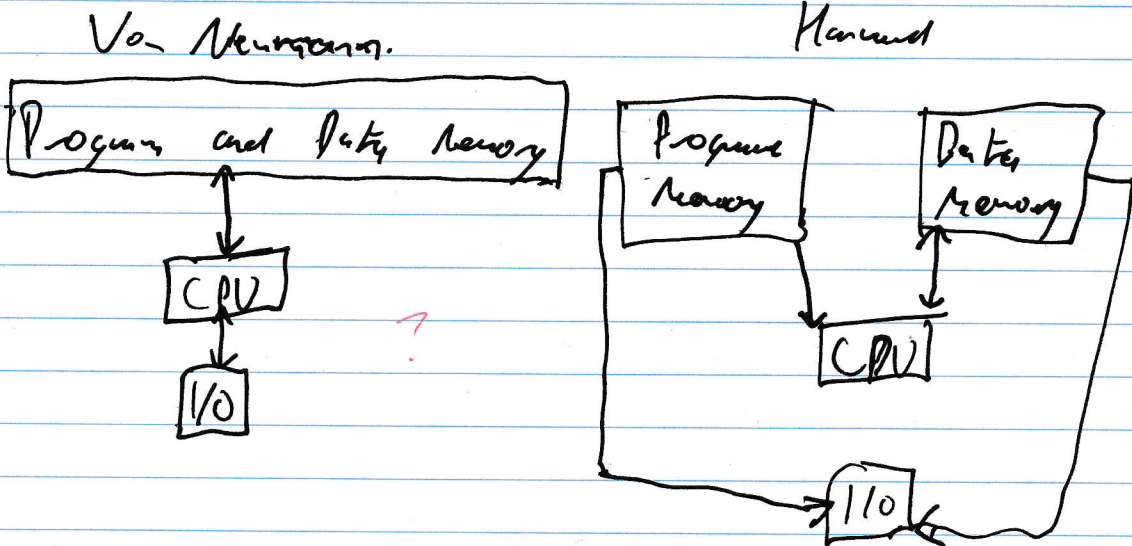
X	Y	Z*	NOT	NOR	XOR	AND	OUT
0	0	0	1	1	0	0	0
0	0	1	1	0	1	1	1
0	1	0	1	0	1	0	0
1	0	0	0	1	1	0	0
1	1	0	0	0	0	0	0
0	1	1	1	0	1	1	1
1	0	1	0	0	0	0	0
1	1	1	0	0	0	0	0

* Z is the bottom input looking at the diagram.
X is at the top and Y in the middle.

4b)



5)



- Harvard architecture is more efficient when compared to Von Neumann and doesn't face the Von Neumann bottleneck of not enough data bandwidth.

5) Von Neumann is far cheaper and easier to implement when compared to Harvard. and has

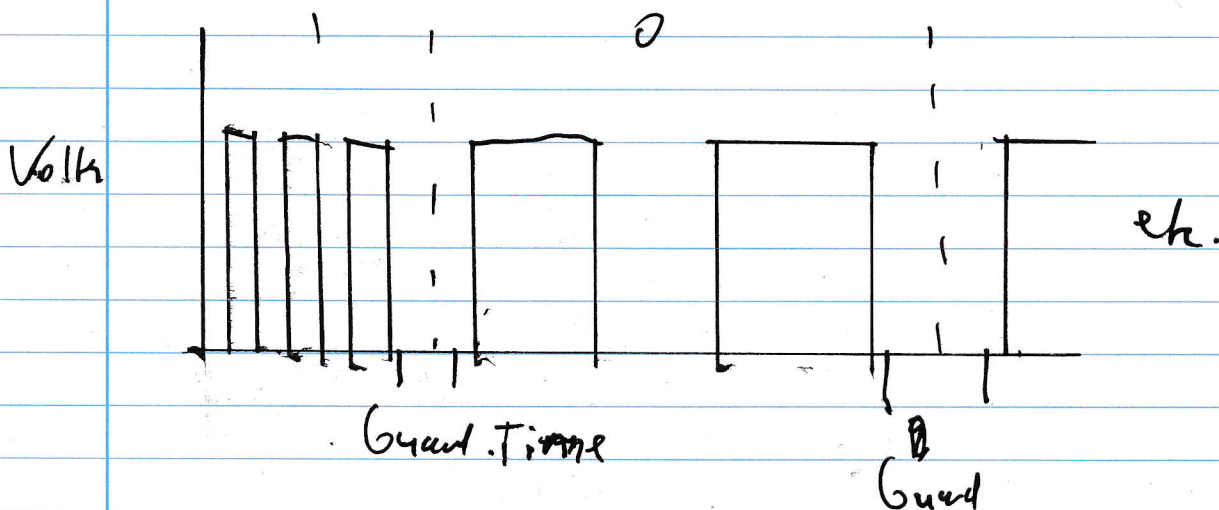
6) The simple principle is by changing the frequency of the prom signals it allows the micro controller to encode data. ?

~~For example having set frequencies for different~~

for example by having 2 set frequencies the prom module can change between these 2 frequencies.

One frequency being a 1 and the other being a 0.

By allowing time between changes for the system to align. It means the bit stream is stable and intact.



By implementing a guard it means the system doesn't get confused which bit is which.

The diagram shows slow lower frequency prom is a 0 and higher frequency is a 1.

- The only limit of the system is how quickly you can change between frequencies and the power set.

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