



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

Complete, fold and seal
(see note 2 below)

SURNAME: Garin

FORENAME(S): James

Examination Answer Books

12 Pages

Instructions to Candidates

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 will 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	2311745
2	Title of Examination Paper	Micro Penetration and Interfaces
3	Module Code	ACPA4004
4	Date and Time of Examination	8/1/25 9:00
5	Examination Venue	rm 310
6	Seat Number	21
7	Number of Answer Books handed in	1

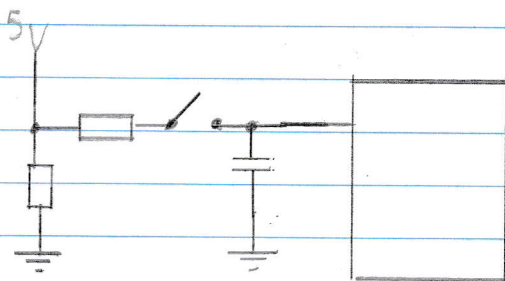
List the numbers of the questions you have attempted	Office Use
1	10
2	9
3	3
4	10
5	8
6	4
	44
Total	88

10
9
3
10
8
4
44

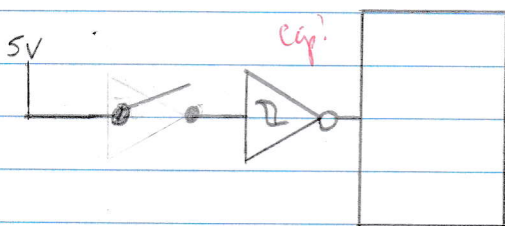
1)

- a) RETURN - Leave a function/procedure and start executing from where the function was originally called. ✓
- b) SLEEP - The processor turns off all most of its features, entering a low power mode. It can then be powered up again via an ~~external~~ interrupt, typically external (RAO?). ✓
- c) ADDLW - Add Literal to Working Register. The operand for this instruction is a constant (1, 2, 3 etc) that is added to the working register.
eg. $W = W + 1$ for ADDLW 1 ✓
- d) BCF - Bit Clear File. ~~For the given bit~~ the specified bit in the given file is set to 0.
; file 32 contains 0x80
bcf 32, 7
; file ~~32~~ 32 contains 0x00 ✓
- e) DECF - Decrement File. The value in the file is decreased by 1. It is then either stored in the working register, or back in the file, depending on the operand. ✓

2) A

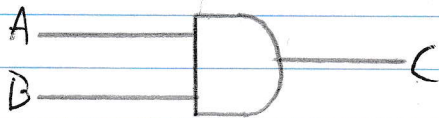


IN A the capacitor filters out all the high frequency voltage changes that would occur due to switch bouncing. ✓



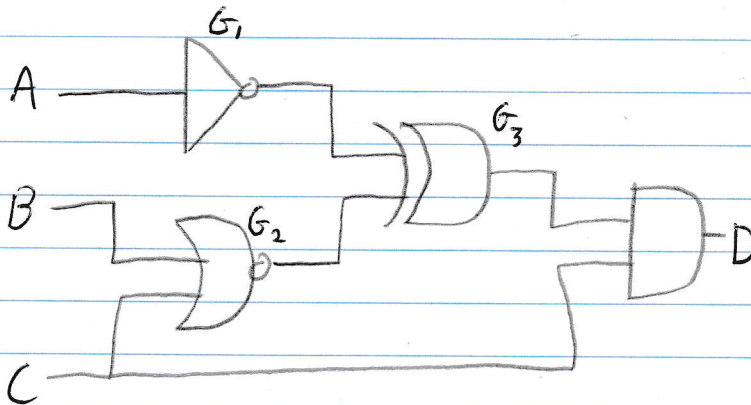
The Schmitt trigger converts an input signal into one with sharp a square wave. This action filters out the switch bouncing. ✓

3)



A	B	C
0	0	0
1	0	0
0	1	0
1	1	1

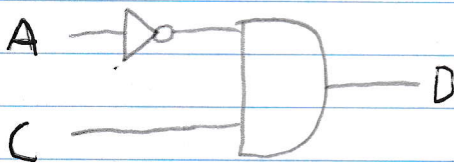
4) a)



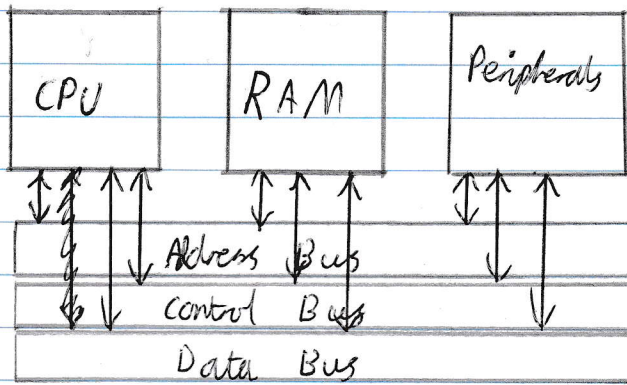
NOR
001
100
010
110

A	B	C	G ₁	G ₂	G ₃	D
0	0	0	1	1	0	0
1	0	0	0	1	1	0
0	1	0	1	0	1	0
1	1	0	0	0	0	0
0	0	1	1	0	1	1
1	0	1	0	0	0	0
0	1	1	1	0	1	1
1	1	1	0	0	0	0

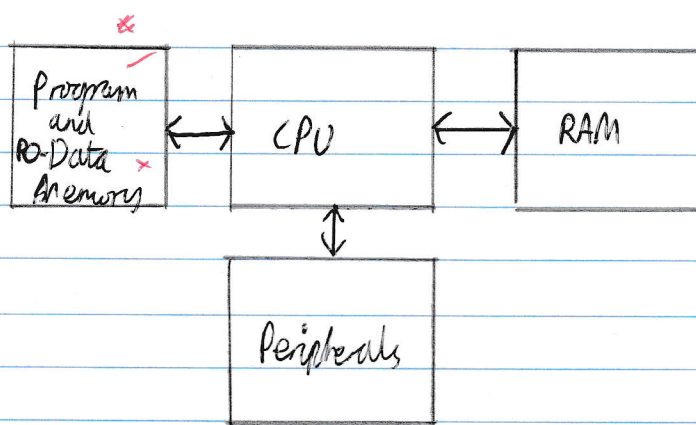
b) Simplified :



5)



Harvard



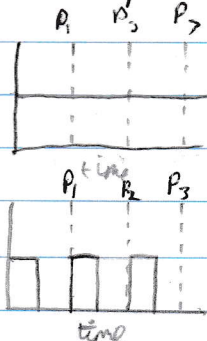
Von Neumann allows the RAM and Peripherals to be easily ~~changed~~ replaced by others by simply mapping each one into the bus, allowing for greater ~~modularity~~ modularity.

Harvard uses multiple buses, one for each item. This allows for greater throughput of data, increasing processing speed.

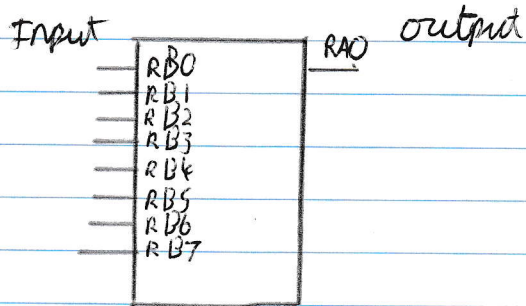
- 6) PWM has a period and a duty cycle. For each period, a percentage of that time (the duty cycle) is spent with the output high. Across this period the ^{average} voltage will be equal to the duty cycle multiplied by the input voltage.

100% with 5V input
average: $1 \times 5 = 5V$

50% with 5V input
average: $0.5 \times 5 = 2.5V$



6 cont)



Using the diagram above, the digital value comes in on Port B, and the period is 2550s then the ~~duty cycle~~ digital input value becomes the time the output must spend high

eg input = 255

$$\frac{255}{255} = 1 \quad \text{QED duty cycle} = 100\% \quad \text{average voltage} = 5V$$

NA

eg input = 127

$$\frac{127}{255} \approx 0.5 \quad \text{QED duty cycle} \approx 50\% \quad \text{average voltage} \approx 2.5V$$

this then controls the output pin