



Complete, fold and seal
(see note 2 below)

SURNAME:

~~XXXXXXXXXX~~
T

FORENAME(S):

Sarah

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 the paper over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners will not accept answers written in cursive 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	2322728
2	Title of Examination Paper	Micros Peripherals and interfaces
3	Module Code	ACDA 4004
4	Date and Time of Examination	07/01/25 9:00 am
5	Examination Venue	
6	Seat Number	20
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
1	9 1/2
2	9
3	3
4	7
5	8
6	2
	38 1/2
	+ 2
Total	77 1/2

9 1/2
9
3
7
8
2
38 1/2

1) a) Return from subroutine - Return back to the
subroutine listed to next command

1 1/2
1 1/2

b) Sleep - go into standby mode - Oscillator off, watchdog timer reset, microcontroller goes to standby

2
2

c) Add LW - Add ~~the~~ literal to W - Add the literal value to the W register and store in the W reg.

2
2

d) BCF F, b - Bit clear F - clear bit 'b' to 0 ~~store~~ in the F register and store in F.

2
2

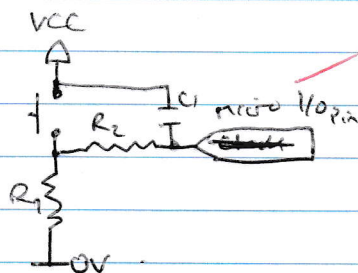
e) DecF - Decrement F - Decrement the F register by 1.

2
2

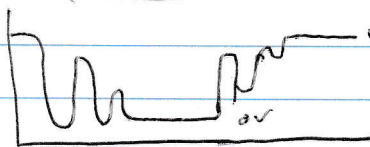
2) 2 ways of reducing switch bounce:

9 1/2

using RC circuit:

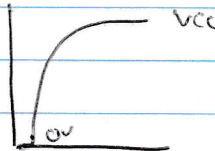


Before:



The RC circuit discharges the capacitor ~~to 0V~~ when the button is pressed and prevents the switch from trying to bounce.

After:



This circuit has a pull down resistor, however this can also be made ~~as~~ with the button to ground and a pull up resistor.

using a Schmitt trigger:



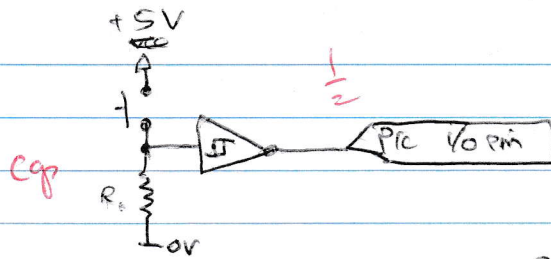
Some logic gates have Schmitt triggers

Before trigger:



After trigger:





When the button is pressed, the ~~pic~~ ^{PIC V0 pin} is pulled high through the button through the Schmitt trigger. The Schmitt trigger reduces the debounce from the button.

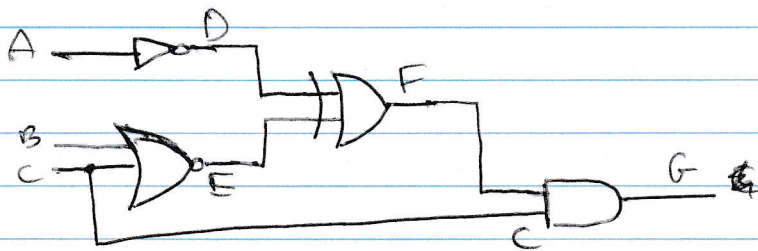
3) AND gate



A	B	F
0	0	0
0	1	0
1	0	0
1	1	1

$$A \cdot B = F$$

4)



OR	
0	0
0	1
1	0
1	1

NOR	XOR
00	1
01	0
10	0
11	0

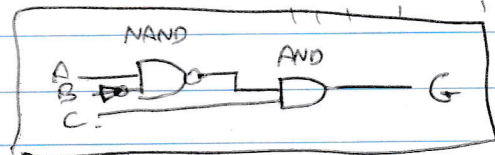
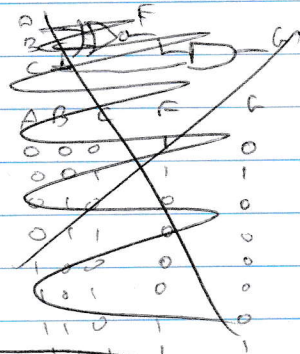
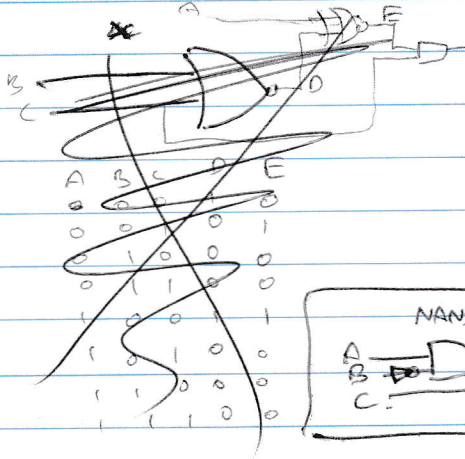
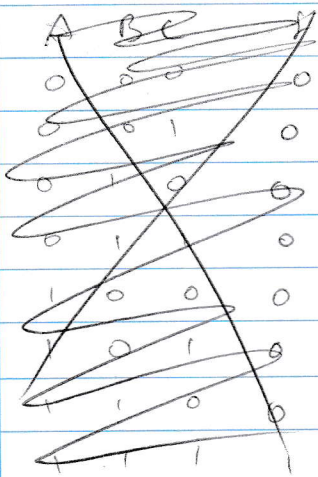
A	B	C	D	E	F	G
0	0	0	1	1	0	0
0	0	1	1	0	1	1
0	1	0	1	0	1	0
0	1	1	1	0	1	1
1	0	0	0	1	1	0
1	0	1	0	0	0	0
1	1	0	0	0	0	0
1	1	1	0	0	0	0

F	C	G
0	0	0
0	1	1
1	0	0
1	0	0
1	1	0
1	1	0
1	1	0
1	1	0

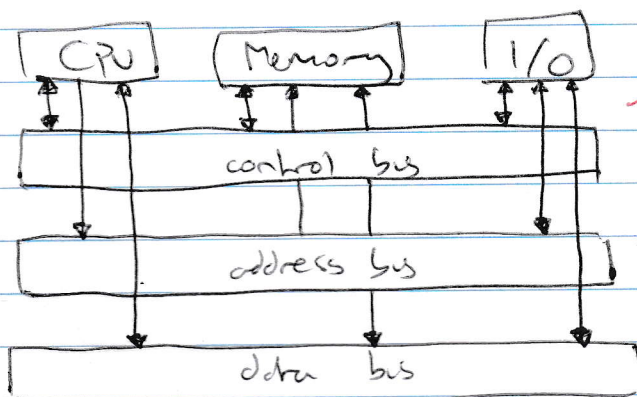
- 5) Inspecting the truth table, the final result of G is equivalent to :

F	C	G
0	0	0
0	1	0
1	0	0
1	1	1

which means the logic circuit is an AND gate.



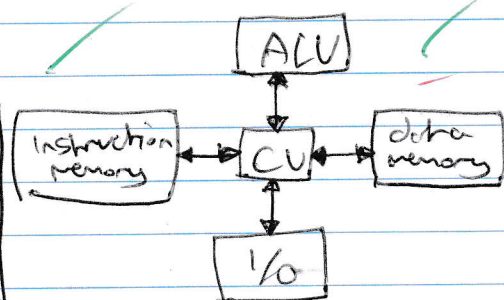
- 5) Von Neumann :



advantage!

- cheaper compared to ~~the~~ Harvard

- Harvard :



advantage!

- Only ~~one~~ ^{one} clock cycle is required ~~to~~ ^{for} ~~each~~ instruction

6) PWM: Pulse width modulation

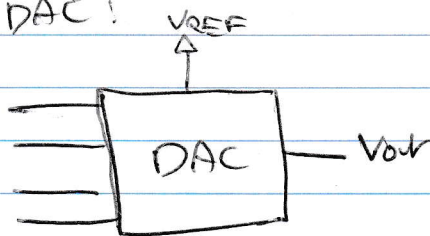
e.g. 30% duty cycle



e.g. 70% duty cycle



DAC!

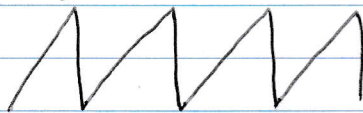


$$\text{resolution} = \frac{V_{\text{out max}}}{(2^n - 1)}$$

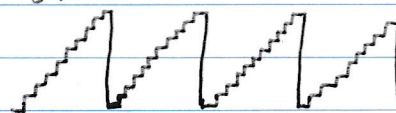
A DAC converts a ^{digital} ~~analog~~ to an analog ~~voltage~~ voltage

e.g. a sawtooth ~~analog~~ ^{digital} wave ~~to~~ ^{vs} ~~analog~~ ^{analog}:

Analogue:



Digital:



This could be done on the microcontroller ~~the~~ output by adjusting the duty cycle so that the output is 'stepping', similar to the digital wave above, creating a ~~a~~ DAC. a finer resolution will give a straighter line which could be used as an analogue wave form. ~~it would be~~

e.g.

PWM about pin!

fine resolution steps!

used as an analogue input

