



Complete, fold and seal
(see note 2 below)

SURNAME: Lloyd

FORENAME(S): Samuel

Jay

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 flap and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can enter in 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	2110666
2	Title of Examination Paper	Micros peripherals and interfaces
3	Module Code	ACDA4004
4	Date and Time of Examination	12/05/23
5	Examination Venue	109
6	Seat Number	
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
1	9 ✓
2	4 ✓
3	6 ✓
4	4 ✓
5	8 ✓
6	8 ✓
7	8 ✓
Total	47

$47 \div 2 = 96\%$
 94%

Skoyd

1

A – BSF – Bit set F – This is used to set the value to the bit held in F.

B – BTFSC – Bit Test F, Skip if 0 – This is used to test the value of the bit held in f, if 0 will skip the following command.

C – ANDLW – AND literal and working – This is used as an and gate with the inputs being literal and working.

D – MOVWF – Move working to F – this is using to move the value held in Working to f.

E – INCF – Increment F – this is used to increment the value held in F, meaning $F = F + 1$.

2

Completed on workbook page 1.

3

A ramp ADC functions by comparing the output to the input, if the output is equal or above the input binary counter adds 1 bit to the output and then tests again, the full cycle is explained bellow.

This is done by the binary counter outputting 0 to start then the DAC will convert this back to an analogue output to compare this voltage to the analogue input using a comparator. If this voltage is to lower than the analogue input the comparator will still output high. This output is then sent to a AND gate where the other input is a clock, meaning this will only carry on the clock cycle, once this clock is high the output is sent to the binary counter which will then add 1 binary digit to its output. Then this is again converted back using the DAC and the cycle will continue until the DAC will output an analogue value the is equal to or above the voltage of the analogue input. This will then prevent any more addition at the counter and the digital output is set.

This process will function on the speed on the clock input to it. There is also a reset on the binary counter so between uses this needs to be set high to set the counter back to 0. The advantages of this method are that it is cheap as requires little components, but it is normally a slower method than that off a Successive Approximator or a Flash.

4

Completed on workbook page 1.

5

Completed on workbook page 2.

Shayel

6

Drawing on workbook page 3.

In the drawing you can see a resistor, a MOSFET, a relay, a diode, the supply and the PIC. The PIC is used to control the MOSFET. When the PIC outputs low, the MOSFET will act as a off switch meaning nothing will pass through the relay. When the PIC outputs high the MOSFET is then an on switch meaning that the voltage can pass through, and the relay will be powered. The MOSFET is used as it allows the pic to control the 48V without having to contact it, this then protects the pic from damage from the high voltage. The resistor then prevents the pic from damaging the MOSFET. The diode is used to prevent high voltages from the relay from damaging the MOSFET.

7

Drawing on workbook page 3.

Control bus – The control bus can be accessed and access: CPU, memory and Input/output. This is used to start instructions and carry them out.

Address bus – The address bus can access and be accessed by the Input/output. Can only be accessed by the CPU, and only access the memory, meaning the CPU uses it to access the data needed in the memory. This is used to assign address to data and when looking for an address in memory it is the way of finding the data at the set address. The larger the width of the address bus means that more data can be stored in memory as this means there are more permutations possible, this may slow down finding the data if the processing speed cannot match up.

Data bus - The data bus can be accessed and access: CPU, memory and Input/output. This is used to move data from one location to another, an example would be when data is input it can be stored in the memory or taken straight to the CPU to run a process on it. The larger the width of the data bus the more information can be passed meaning more data resolution can be kept if this is being lost.

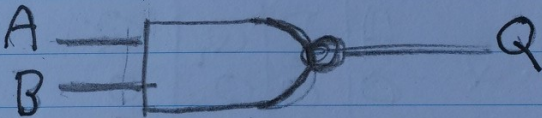
2) 10 bit
 $2^{10} = 1024 \text{ bits}$

max input = 2.5 V
 $= 2.5 \times 10^3 \text{ mV}$

$$\frac{2.5 \times 10^3}{1024} = 2.441 \text{ mV}$$

4

4)



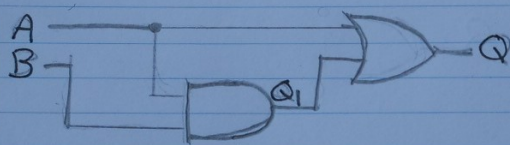
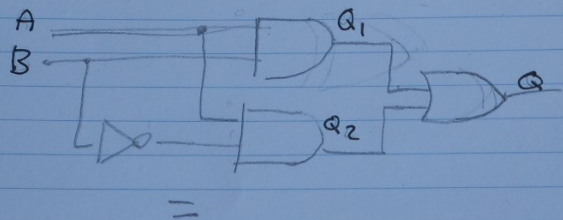
A	B	Q
0	0	1
0	1	1
1	0	1
1	1	0

4

②

5)

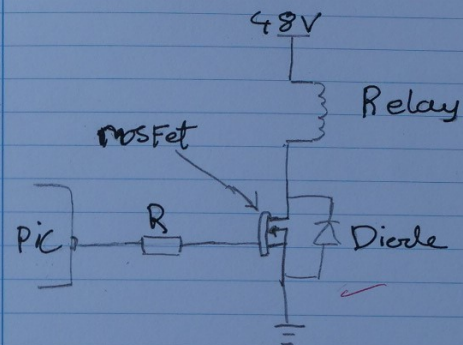
A	B	Q ₁	Q ₂	Q
0	0	0	0	0
0	1	0	0	0
1	0	0	1	1
1	1	1	0	1



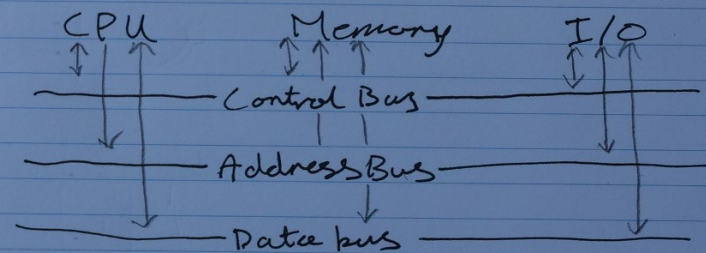
A	B	Q ₁	Q
0	0	0	0
0	1	0	0
1	0	0	1
1	1	1	1

8

6)



7)



8