[illegible]

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.**

1	Student Number	2307227
2	Title of Examination Paper	Electronics I
3	Module Code	ACDB5002
4	Date and Time of Examination	07/05/2024
5	Examination Venue	
6	Seat Number	
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
Q1	34
Q2	20
Q3	35
Total	89 / 100

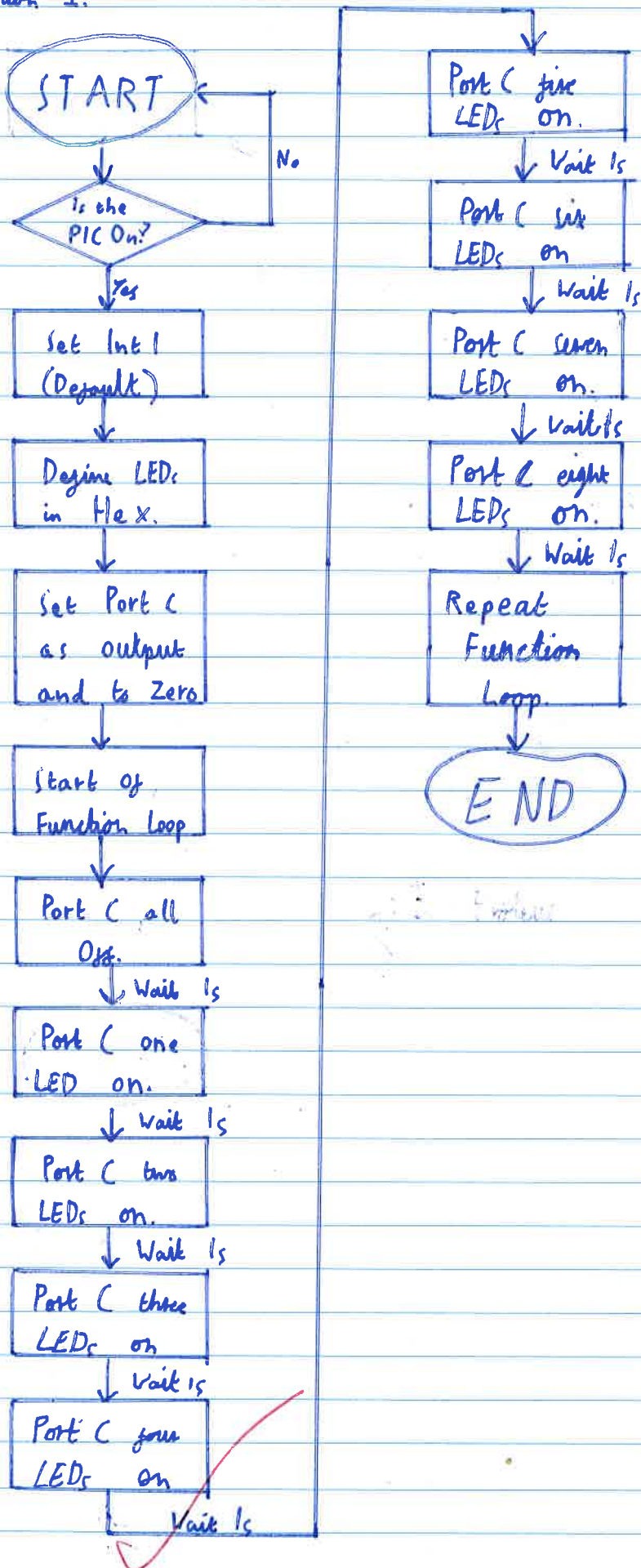
(Gweler yr ochr arall am y fersiwn Cymraeg)

$\frac{89}{100}$

$$\begin{array}{r} 121 \\ 14 \overline{) 1684} \\ \underline{140} \\ 284 \\ \underline{280} \\ 44 \end{array}$$

Question 1.

a)



Question 1

b) In Proteus simulation software

c)

int i;

```
unsigned LED [9] = {0x00, 0x01, 0x03, 0x07, 0x0F, 0x1F, 0x3F, 0x7F, 0xFF};
```

```
void main () {
```

```
    TRISC = 0;
```

```
    PORTC = 0;
```

```
    while (1)
```

```
    {
```

```
        PORTC = 0x00;
```

```
        delay_ms (1000);
```

```
        PORTC = 0x01;
```

```
        delay_ms (1000);
```

```
        PORTC = 0x03;
```

```
        delay_ms (1000);
```

```
        PORTC = 0x07;
```

```
        delay_ms (1000);
```

```
        PORTC = 0x0F;
```

```
        delay_ms (1000);
```

```
        PORTC = 0x1F;
```

```
        delay_ms (1000);
```

```
        PORTC = 0x3F;
```

```
        delay_ms (1000);
```

```
        PORTC = 0x7F;
```

```
        delay_ms (1000);
```

```
        PORTC = 0xFF;
```

```
        delay_ms (1000);
```

```
    }
```

```
}
```

Structure
optimization
working

Circuit design

d) In Proteus simulation software.

1

4

3

5

2

34
40

9

5

34
40

Question 2.

a) The circuit shown is a night light sensor, the basic description is that when the light in the room gets too low, the LED comes on.

The amount of light is detected by an Light Dependent Resistor, where the resistance decreases as light increases.

As the resistance changes, the voltage going to the Op Amp changes, resulting in the Op Amp switching states.

The Op Amp compares the voltages seen at terminals 2 and 3. If the voltage at terminal 2 is higher than 3, terminal 1 will go to earth (terminal 4). * If the voltage at terminal 3 is higher than 2, terminal 1 will be connected to terminal 8, not allowing for a potential difference so the LED will be off.

* As terminal 4 is connected to earth the led has a potential difference so turns on.

A P.O.T. is used to control the sensitivity of the night light sensor, by altering the resistance, the voltage seen at the Op Amp terminal can be manipulated i.e. if you want the LED to come on when it is pitch black only.

b) On Proteus, Simulation software.

Simulation

15

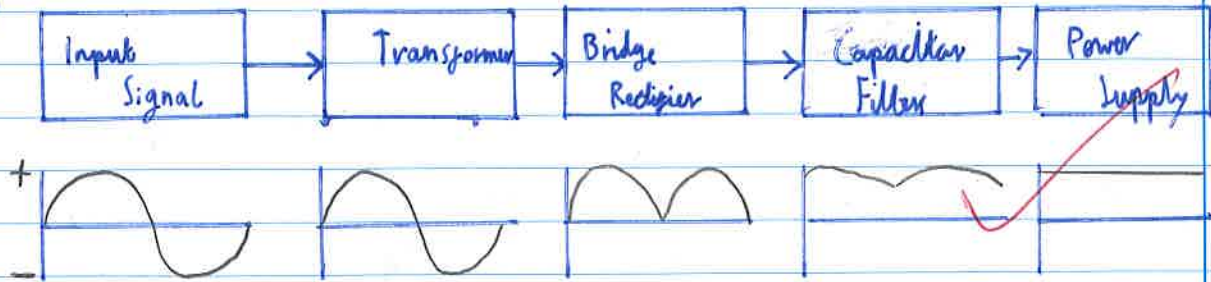
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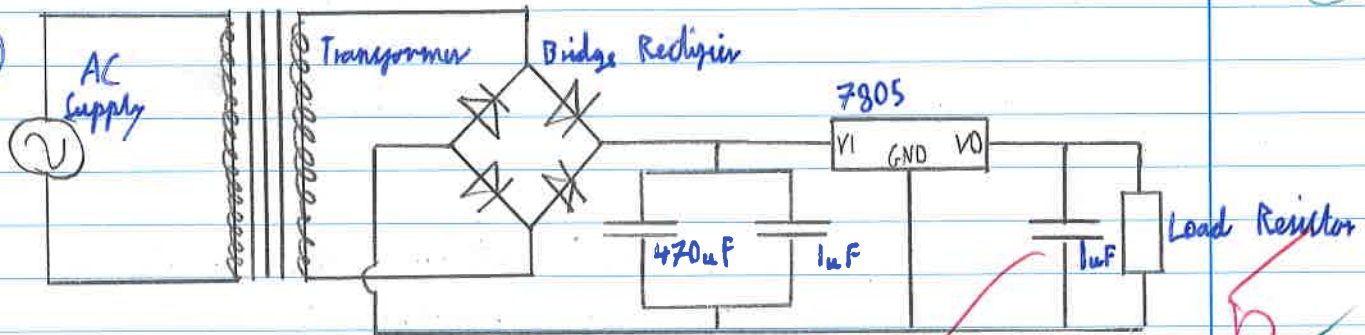
20
20

Question 3.

a)



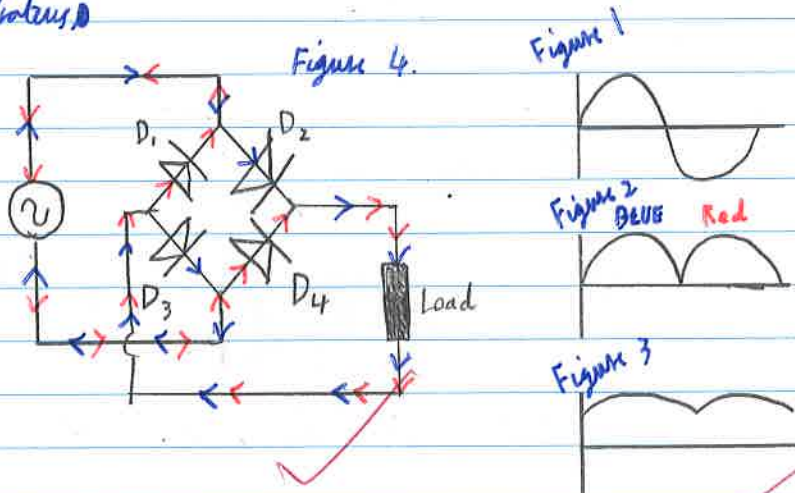
b)



c) On Proteus.

d) On Proteus.

ii a)



A Full Wave Rectifier commonly uses four diodes in order to turn AC into DC. On the positive AC cycle, diodes D2 and D3 allow electron flow (forward bias conditions), and diodes D1 and D4 work in reverse bias. During the negative AC half cycle, diodes D4 and D1 allow electron flow, diodes D2 and D3 do not. This means that the load or the output is only seeing current flow in one direction. Normally capacitors are used to smooth the output waveform.

Figure 1 shows the Input Waveform

Figure 2 shows the Waveform after Rectification.

Figure 3 shows the Waveform if Capacitors were added.

Figure 4 shows a circuit diagram, in blue the positive AC half cycle current direction. In red the negative AC half cycle current direction.

Circuit design
Oscilloscope simulation

14

5

35
40

35
40

