COAL_A_p200165_R11_12

Introduction:

In Lab No 11 and 12 we have a physical lab in which we have interacted with hardware by using our assembly code. We have coded for Atmega328P. Atmega328p is a single chip micro controller created by Atmel.

Atmega328 has **28 pins** in total. It has 3 Ports in total which are named as Port B, Port C and Port D.

The **Proteus** is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

You can draw any type of circuit on Proteus and you do not need to purchase all expensive gates for your circuit. It is great for beginners because working with physical circuits is risky and also this step is expensive.
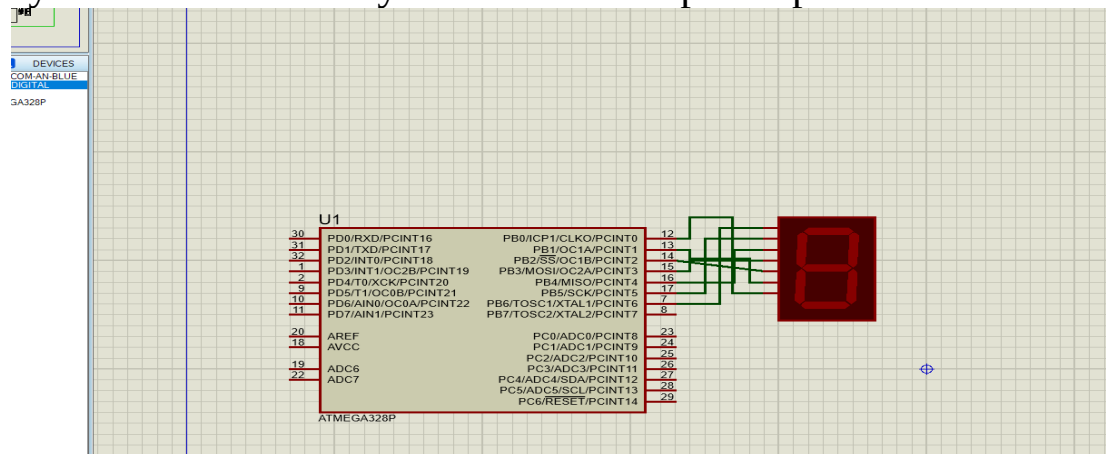
Code:

```
1  .INCLUDE"M328pDEF.INC"
2  .ORG 0
3
4              LDI R16, HIGH (RAMEND)
5              OUT SPH, R16
6              LDI R16, LOW (RAMEND)
7              OUT SPL, R16
8
9              LDI R19, 0xFF
10             OUT DDRB,R19
11 START:
12             LDI R20, 0x7E
13             OUT PORTB,R20
14             RCALL DELAY
15
16             LDI R21, 0x30
17             OUT PORTB,R21
18             RCALL DELAY
19
20             LDI R22, 0x6D
21             OUT PORTB,R22
22             RCALL DELAY
23
24             LDI R23, 0x79
25             OUT PORTB,R23
26             RCALL DELAY
27
28             LDI R24, 0x33
29             OUT PORTB,R24
30             RCALL DELAY
31
32             LDI R25, 0x5B
33             OUT PORTB,R25
34             RCALL DELAY
35
```

```
32              LDI R25, 0x5B
33              OUT PORTB,R25
34              RCALL DELAY
35
36              LDI R26, 0x5F
37              OUT PORTB,R26
38              RCALL DELAY
39
40              LDI R27, 0x70
41              OUT PORTB,R27
42              RCALL DELAY
43
44              LDI R28, 0x7F
45              OUT PORTB,R28
46              RCALL DELAY
47
48
49              LDI R30, 0x7B
50              OUT PORTB,R30
51              RCALL DELAY
52
53              JMP START
54
55 DELAY:
56              LDI R16, 0xFF
57 AGAIN3:       LDI R17, 0xFF
58 AGAIN2:       LDI R18, 0x5
59 AGAIN1:       DEC R18
60              BRNE AGAIN1
61              DEC R17
62              BRNE AGAIN2
63              DEC R16
64              BRNE AGAIN3
65              RET
66
```

First of all we included the Library for which we are going to code. Like in our case we are going to code for ATMEGA328P so we included M328pDEF.Inc Library.
Then we have instruction that is "LDI" that means **Load data in** and it takes two operands. We gave loaded HIGH ramend in R16 and then putted that value in SPH stack pointer high after that we have loaded LOW ramend in R19 and moved that to SPL stack pointer.

Then our program starts, So first of all what Is over logic? We are going to produce 0 to 9 counting on the 7 segment display. Here is the 7 segment display.
Diagram shows that If we want to display 0 then we have to provide 0 voltage to G LED and others A, B, C, D, E, F will be provided high voltage then zero will be displayed on 7 segment display.
Same if we want to display 1 then we have to on LED B and C and others will be provided 0 voltage.
Also I have given DDRB high voltage(ff) that mean this port will be treated as output port. Now all PB0 to PB7 all pins will be treated as output pins they will produce output.
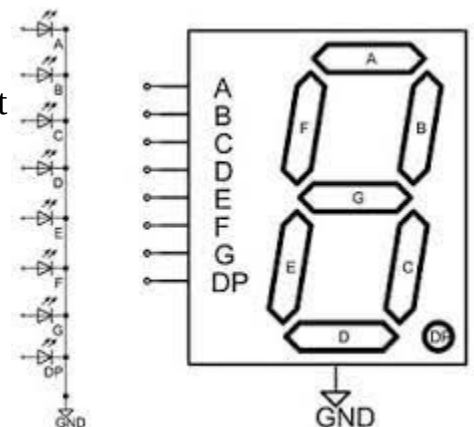
Once I have written all this the light blinking is so fast so I have to make the Subroutine for delay so that light blinking can be seen.

Once all this done I have assembled my code there is no error In the code and hex file Is generated successfully and I have provided that hex file to the ATmega328p chip and once I have connected my 8 output pins (PB0 to PB7) to 7-segment we will see output from 0 to 7 on 7-Segment display.
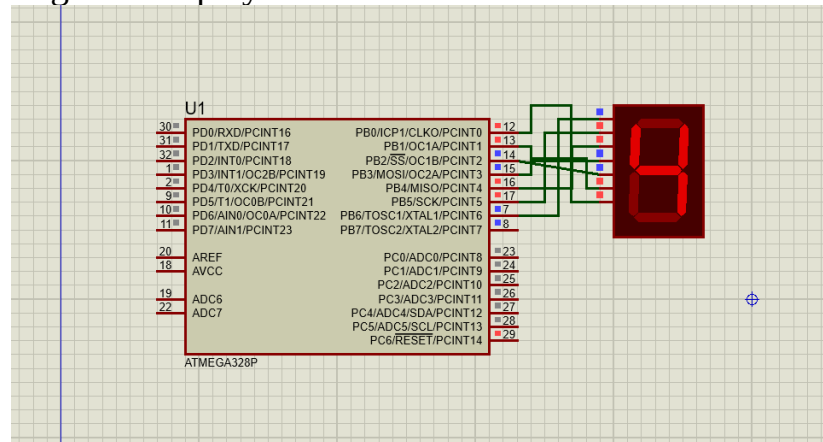
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