Solutions for Pre-Lab Quizzes

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Pre-lab Quiz 2 (Monday Batch)

Q1) In the *sample_led.asm* file given in this lab. What is delay introduced by the DELAY1 loop ? Give your answer in number of machine cycles.

Answer :

```
        MOV R1, #0FFH
        MOV R2, #0FFH
DELAY1:
        NOP                 (1 Machine Cycle)
        DJNZ R1, DELAY1     (2 Machine Cycles)
        DJNZ R2, DELAY1     (2 Machine Cycles)
```

Here for the first run of the inner loop, R1 will be decremented from FFH to 00H so, that loop will be run for
(1 + 2) * 255 then it will go to DJNZ R2,.... so the first run of the outer loop will take
(1 + 2) * 255 + 2 cycles.
For the next runs R1 will be decremented **from 00H to FFH to 00H** and the inner loop will take,
(1 + 2) * 256 + 2 cycles. The outer loop will run this for the remaining 254 cycles, i.e., until R2 = 0H.

Hence we have: (1 + 2) * 255 + 2 + ((1 + 2) * 256 + 2) * 254 = 1,96,347 machine cycles

Q-2) Consider a 8051 system with a clock of 24MHz. How much time does the ADD instruction take to execute ? Give your answer in micro-seconds. (i.e., if it is 0.11 micro-seconds, enter 0.11 as your response)

Answer:

ADD instruction will take 1 machine-cycle and as you know 1 machine-cycle is 12 clock cycles. So the delay will be **1/24 * 12 micro secs = 0.5 us.**

Pre-lab Quiz 2 (Tuesday Batch)

Q-1) Find how many cycles of delay will be generated by the following code. The Value of R1 and R2 are X and Y respectively.

Delay :

```
NOP
DJNZ R1, Delay
DJNZ R2, Delay
```

Answer:

Refer to Q-1 solution for Monday Batch quiz. Values for R1 and R2 were different for each student. Hence, your answer will depend on those values.

Q-2) What will be the content of the accumulator (A) after the execution of the following instruction? Initially A is assigned X.

```
CJNE A, #10H, Label1
```

Answer:

CJNE **does not change** the content of Accumulator. A value will **remain same** after the execution.

Pre-lab Quiz 3 (Monday Batch)

Q-1) Consider the following case which LEDs will be on? (LEDs are connected on board via P1.7 to P1.4)
the code snippet is as follows.

```
MOV R0, #81H
MOV @R0, #0BH
MOV A, #0FFH
XRL A, 81H
SWAP A
MOV P1, A
```

(some of the special function register addresses : port0 - 80H, port1 - 90H, acc - E0H, PSW - D0H, SP - 81H)
Your answer should be in the form of 'x.y' to mean 'Px.y' where 'x', 'y' are integers. (If your answer is P1.4 then you should write 1.4)

Answer:

```
MOV R0, #81H      ; R0 = 81H
MOV @R0, #0BH     ; [81H] = 0BH
MOV A, #0FFH      ; A = 0FFH
XRL A, 81H        ; A = A xor [81H] , here we have used direct addressing so SP
                    value will be used (which is 07H on reset) and  A = F8H
SWAP A            ; A = 8FH
MOV P1, A         ; P1 = 8FH
```

So, P1.7 Led will be on.

Pre-lab Quiz 3 (Tuesday Batch)

Q-1) Consider the following case which LEDs will be on? (LEDs are connected on board via P1.7 to P1.4). The code snippet is as follows.

```
MOV R0, #81H
MOV @R0, #0BH
MOV A, #0FFH
XRL A, 81H
SWAP A
MOV R1, #90H
MOV @R1, A
```

(some of the special function register addresses : port0 - 80H, port1 - 90H, acc - E0H, PSW - D0H, SP - 81H)

Answer:

```
MOV R0, #81H        ; R0 = 81H
MOV @R0, #0BH       ; [81H] = 0BH
MOV A, #0FFH        ; A = FFH
XRL A, 81H          ; A = A xor [81H] , here we have used direct addressing so SP
                      value will be used which is 07H on reset.  A = F8H
SWAP A              ; A = 8FH
MOV R1, #90H        ; R1 = 90H
MOV @R1, A          ; [90H] = 8FH, Here note that we have transferred value using
                      Indirect addressing. So no value on port P1 .
```

So none of the leds will be on.

Pre-lab Quiz 4 (Monday Batch)

Q-1) What will be displayed on LCD after running the following code? Assume LCD is already initialized.

```
SEND_DATA:
mov   LCD_data,A     ; LCD_Data is data bus for LCD
      setb  LCD_rs    ; register select
      clr   LCD_rw    ; read/write
      clr  LCD_en     ; lcd-enable pin
      acall delay
      setb   LCD_en
      acall delay
      acall delay
      ret
MOV A, #30H
ACALL SEND_DATA
MOV A, #'4'
ACALL SEND_DATA
MOV A, #'0'
ACALL SEND_DATA
MOV A, #0
ACALL SEND_DATA
```

Answer Format: For '0' write 0 , for "00" write 00 and for "0400" write 0400 and respectively for other outputs.

Answer:

First thing to note down here is for sending data on LCD we need to give **high to low** transition on LCD_en pin. But in the given code it is given as **low to high** transition.

So, **First data won't be displayed** on LCD and from next it will be displayed.
And one more thing to note down here is **#'4' represents ascii value of 4.**
#0 is ascii value for **null character.**

So, Final Answer is 40 only. Those who have written 040 is wrong answer. It might be evaluated true on moodle because it ignores leading zeros.

Pre-lab Quiz 4 (Tuesday Batch)

Q-1) What will be displayed on LCD after running the following code? Assume LCD is already initialized. If needed assume all the required signals are zeroed initially.

```
SEND_DATA:
        mov LCD_data, A     ; LCD_Data is data bus for LCD
        cpl LCD_rs    ; register select
        clr LCD_rw     ; read/write
        clr LCD_en      ; lcd-enable pin
        acall delay
        setb LCD_en
        acall delay
        acall delay
        ret
MOV A, #39H
ACALL SEND_DATA
MOV A, #38H
ACALL SEND_DATA
MOV A, #'7'
ACALL SEND_DATA
MOV A, #01
ACALL SEND_DATA
```

Answer Format: For '9' write 9 , for "98" write 98 and for "987" write 987 and for no display write 0 and respectively for the other cases.

Answer:

First thing to note down here is for sending data on LCD we need to give **high to low** transition on LCD_en pin. But in the given code it is given as **low to high** transition. So, **First data won't be displayed** on LCD and from next it will be displayed.

Second thing is register select command is used as **cpl instead of setb** so every alternate character will be printed.

First send_data wont be displayed as mentioned in 1st point.
Second send_data will have LCD_rs value as 0 so taken as command and no display.
Third send_data will display 7 on the LCD.
Fourth send_data will be taken as command and it will clear LCD.
So, Answer will be 0