Ministry of Higher Education and Scientific Research
Badji Mokhtar Annaba University
Faculty of technology
Departement of electronics

Practical Work Mp & Mc

PW n° 6

PIC16F84 Microcontroller

LED light patterns

7 segment display

These practical sessions were developed for the Microprocessors and Microcontrollers lab module of L3 Automation, for the 2025/2026 academic year within the Department of Electronics Badji Mokhtar ANNABA University.

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Objective

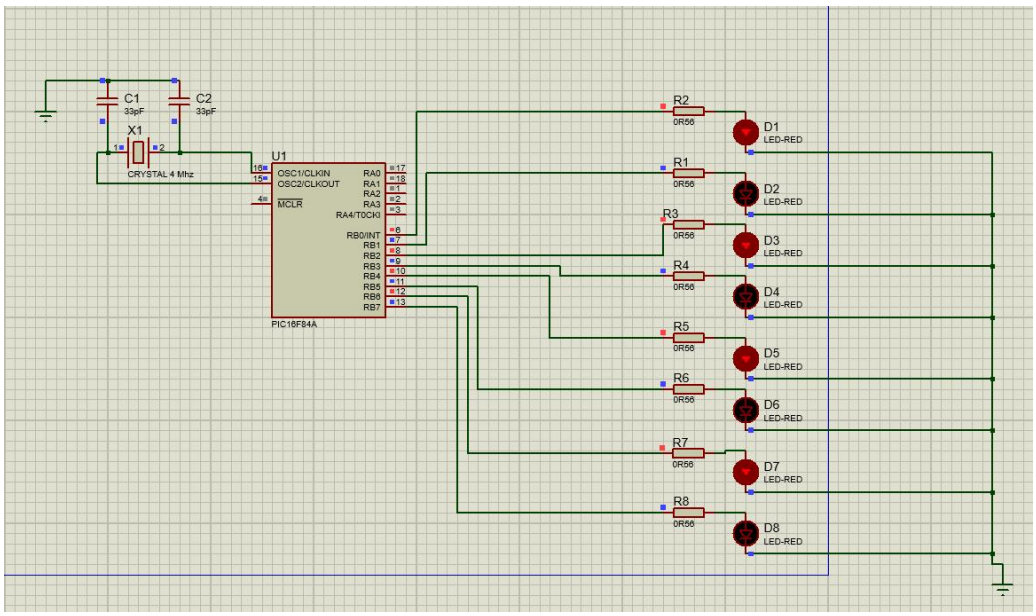
The main objective of this lab session is to use the functions of the MPLAB development environment and the PROTEUS simulation tool to program and test the PIC16F84 microcontroller (Input and Output) ; we focuses on two main applications:

- **LED light patterns:** Creating and controlling different lighting sequences using LEDs connected to the outputs of the PIC16F84.
- **7 segment display:** driving a 7-segment display to show numbers or characters using the microcontroller.

➢ Part 1 : LED light patterns

Program1 : with simple DELAY

```
LIST p=16F84A
#include <P16F84A.inc>
; TP Clignotement leds sur portB avc temporisation (boucle(compteur))
COUNT1 EQU H'0C'
COUNT2 EQU H'0D'
org 0x00
;Bank1------
BSF STATUS, RP0
CLRF TRISB
;Bank0------
BCF STATUS, RP0
;--------------------------------
; PORTB B'01010101'
MOVLW 0x55
MOVWF PORTB

LOOP
Call tempo
COMF PORTB
goto LOOP
;--------------------------------
tempo
MOVLW 0x03
MOVWF COUNT1
LOOP1
MOVLW 0xFF
MOVWF COUNT2
LOOP2
DECFSZ COUNT2, 1
GOTO LOOP2
DECFSZ COUNT1, 1
GOTO LOOP1
RETURN
END
```

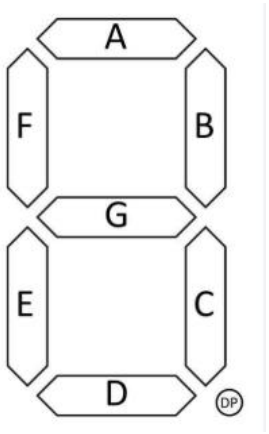


Program2 : with TMR0 DELAY:

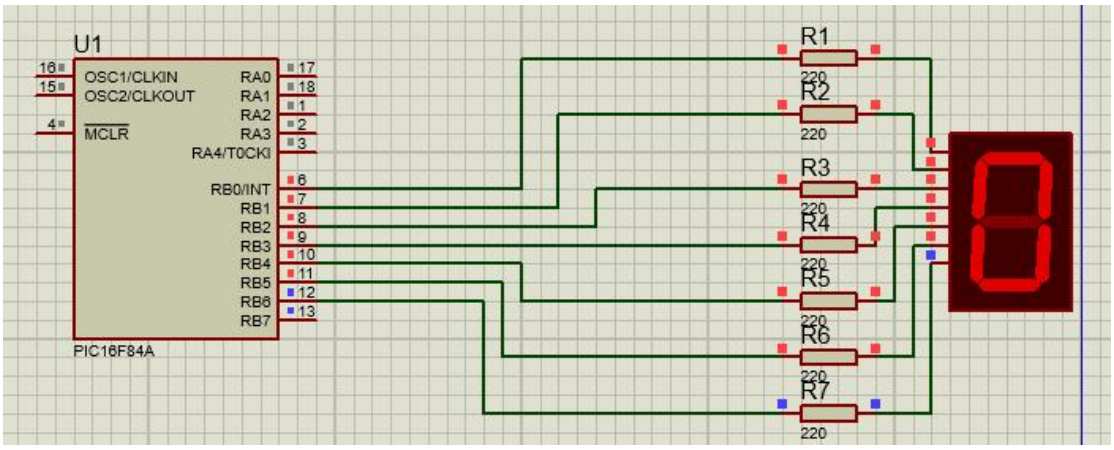
```
LIST p=16F84A
#include <P16F84A.inc>

;-----------------------------------------------------------
; TP : Clignotement LEDs sur PORTB avec temporisation TMR0
;-----------------------------------------------------------

ORG 0x00
;------------------------------
; Initialisation
;------------------------------
BSF     STATUS, RP0         ; Bank 1
CLRF    TRISB               ; PORTB en sortie
CLRF    OPTION_REG          ; Prescaler assigné au TMR0 (PS=1:2)
BCF     STATUS, RP0         ; Bank 0

MOVLW   0x55                ; 0101 0101
MOVWF   PORTB

;------------------------------
; BOUCLE PRINCIPALE
;------------------------------
LOOP
    CALL TEMPO_TMR0
    COMF PORTB,1            ; Inverse tous les bits de PORTB
    GOTO LOOP

;------------------------------
; Sous-programme : temporisation via TMR0
;------------------------------
; Overflow TMR0 => interruption non utilisée ici
; on attend simplement que l'overflow se produise
;------------------------------

TEMPO_TMR0
    CLRF TMR0               ; Reset compteur
WAIT_TMR0
    BTFSS INTCON, T0IF      ; T0IF=1 ? (Overflow)
    GOTO WAIT_TMR0
    BCF   INTCON, T0IF      ; Clear flag
    RETURN

END
```

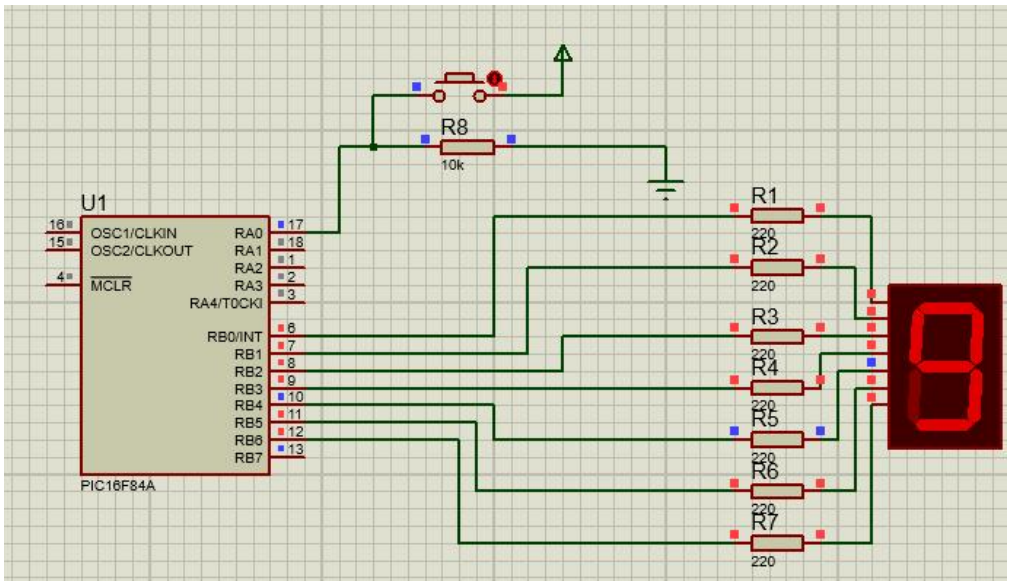
PART2:

7 segment display



Digit	Hex Code	Segments On (A–G)
0	3F	A B C D E F
1	06	B C
2	5B	A B D E G
3	4F	A B C D G
4	66	B C F G
5	6D	A C D F G
6	7D	A C D E F G
7	07	A B C
8	7F	A B C D E F G
9	6F	A B C D F G





- Using MPLAB, write an assembly program for the PIC16F84A that:

- ◆ Displays digits 0–9 on the 7-segment display with a push-button
- ◆ Increments the displayed digit each time the push-button is pressed.
- ◆ Includes Letters and Test the program using Proteus simulation