Microprocessor and microcontroller lab

Digital assignment 4

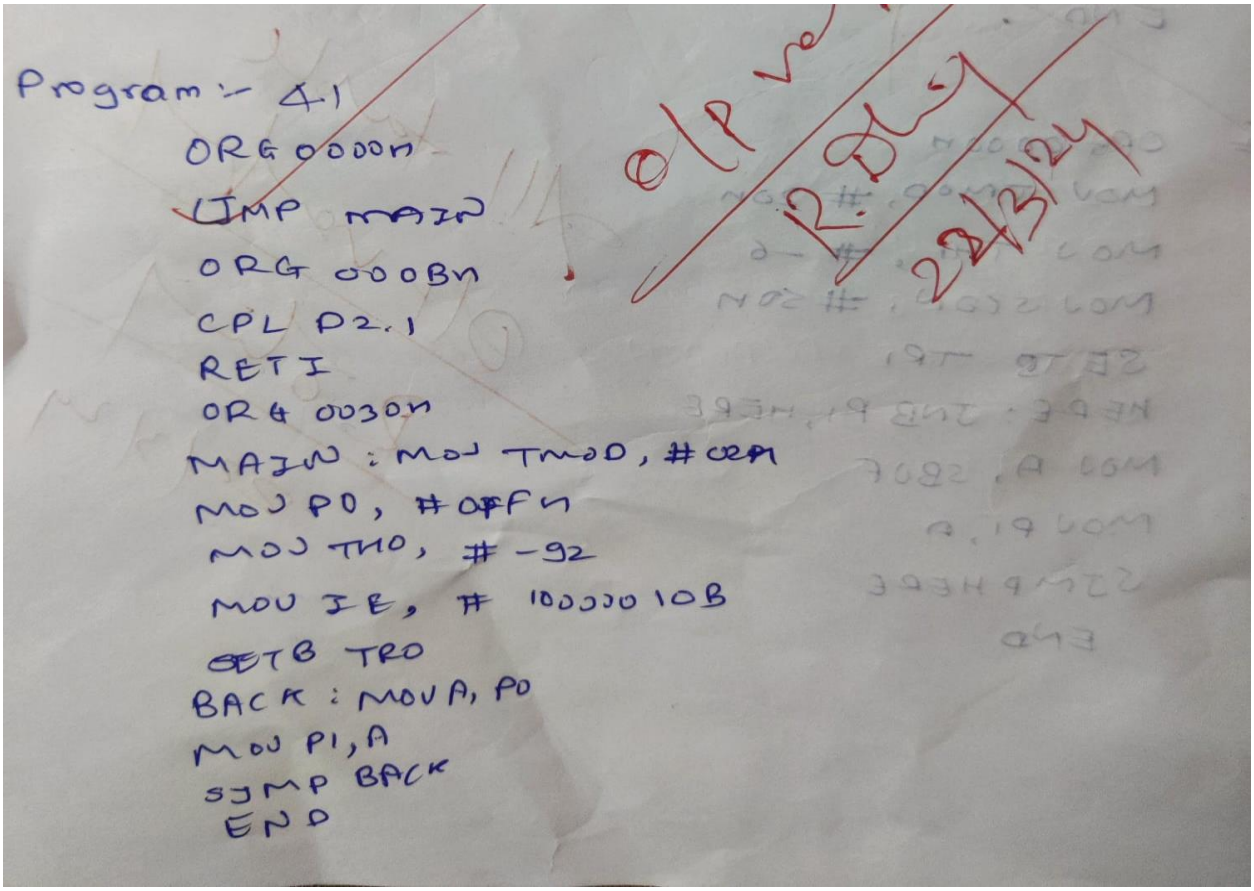
Q1: Witte an 8051 program to get data from port PO and send it to port P1continuously while an interrupt will do the following: Timar will toggle the P2.1 bit every 100 microseconds

Code:

```
ORG 0000H
LIMP MAIN            // Jump to main.
ORG 000BH            // timer 0 Interrupt vector label
CPL P2.1             //Toggle P2.1 pin
RETI                 //Return from ISR
ORG 0030H            // After Vector Table Space
MAIN: MOV TMOD #02H  //set Timer 0 in mode 2
MOV PO, ROFFH        // Set PD as I/P port
MOV THO, #-92
MOV IE, #100000108   //enable Timer O
SETB TRO             // Start the Timer
BACK: MOV A, PO      //Get data from PO.
MOV P1, A            //move data PD to P1
SIMP BACK            //Loop it unless interrupted
END
```

Conclusion:

The assembly program successfully transfers the name serially at a baud rate of 9600 with 8-bit data and one stop bit. The transmitted data can be observed in the serial window of the simulator.



```
Program :- 4.1
        ORG 0000H
        LJMP MAIN
        ORG 000BH
        CPL P2.1
        RETI
        ORG 0030H
MAIN :  MOV TMOD, #01H
        MOV P0, #0FFH
        MOV TH0, #-92
        MOV IE, #10000010B
        SETB TR0
BACK :  MOV A, P0
        MOV P1, A
        SJMP BACK
        END
```

Output:

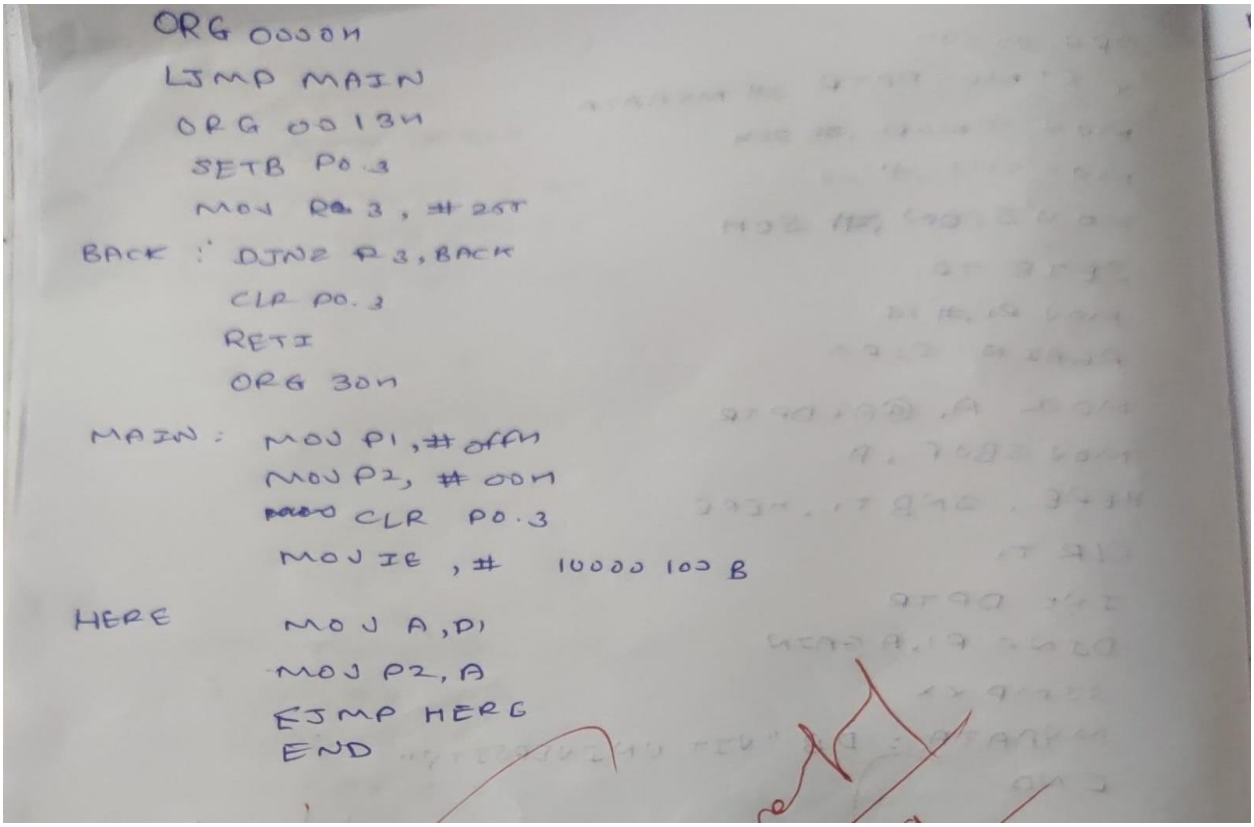
Q2: Write a program that continuously get 8-bit data from P1 and sends it to P2 while the INTI pin is connected to a switch which is normally high. Whenever it goes LOW, it should turn ON a LED. The LED is connected to P0.3 and is normally off. When it is turned ON, it should stay ON for fraction of second. As long as the switch is pressed LOW, the LED should stay ON.

Code:

```
ORG 0000H
LJMP MAIN          ;by-pass interrupt vector table ISR for INTI to turn on LED
ORG 0013H          ;INTI ISR
SETB P0.3          ;turn on LED
MOV R3,1255
BACK: DJNZ R3, BACK        ;keep LED on for a while
CLR P0.3           ; turn off the LED RETI return from ISR
                   ;MAIN program for initialization
ORG 30H
MAIN: MOV P1,#0FFH         ;P1 AS INPUT
MOV P2,#00H        ; P2 AS OUTPUT
CLR P0.3 LED:              ;OUTPUT
 HERE: MOV IE, #100001008  ;enable external INT 1
MOV A, P1
MOV P2,A
SJMP HERE          ;stay here until get interrupted
END
```

Conclusion:

The program continuously monitors the data from port P1 and sends it to port P2. When the INT1 pin, connected to a switch, goes low, indicating it's pressed, the LED connected to pin P0.3 turns on for a brief moment. The LED remains on as long as the switch is pressed.



```
        ORG 0000H
        LJMP MAIN
        ORG 0013H
        SETB P0.3
        MOV R3, #25T
BACK :  DJNZ R3, BACK
        CLR P0.3
        RETI
        ORG 30H
MAIN :  MOV P1, #0FFH
        MOV P2, #00H
        CLR P0.3
        MOV IE, #  10000 100 B
HERE    MOV A, P1
        MOV P2, A
        EJMP HERE
        END
```

Q3:

Code:

```
ORG 0000H
LUMP MAIN
ORG 03H
LJMP TIMER
ORG 30H
MAIN:
MOV P0, FOFFH
MOV P1, OOH
MOV THO, #-92
CLR P2.1
MOV IE, #818
LOOP:
MOV A, PO
MOV P1, A
SJMP LOOP
TIMER:
SETB P2.1
SETB TRO
HERE: JNB TEO, HERE
CLR TRO
CLR P2.1
RETI
```

Conclusion:

The program initializes ports P0 and P1, sets the timer TH0, and sets up interrupts. In the main loop, it continuously reads data from port P0 and sends it to port P1. Additionally, there's a timer interrupt that turns on a pin (P2.1) and waits until timer T0 overflows before turning it off.

Program 4.3

```
        ORG   0000H
        LJMP  MAIN

        ORG   03H
        LJMP  TIMER

        ORG   30H
MAIN:   MOV   P0, #0FFH
        MOV   P1, #008
        MOV   TH0, #-92
        CLR   P2.1
        MOV   IE, #81H

LOOP:   MOV   A, P0
        MOV   P1, A
        SJMP  LOOP

TIMER:  SETB  P2.1
        SETB  TR0
HERE:   JNB   TF0, HERE
        CLR   TR0
        CLR   P2.1
        RETI
```

O/P verified
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12/4/24

Q4: Write an 8051 program to get data from a single bit of P1.2 and send it to P1.7 continuously while an interrupt will do the following: A serial interrupt service routine will receive data from a PC and display it on P2 ports. 9600 BAUD RATE.

Code:

```
ORG 0000H
LJMP MAIN
ORG 0023H          ; ----serial interrupt vector table
LJMP SERIAL
ORG 0030H                ;--  after vector table space
MAIN:SETB P1.2           ;   --   P1.2 made as input pin
MOV TMOD,#20H            ; --  timer 1 mode 2
MOV TH1,#-3              ;-- set baud rate 9600
MOV SCON ,#50H           ; -- one stop bit
MOV IE,#10010000B  ; -- serial int. enabled. SETB
TR1                ;-- Timer 1 stared.
BACK:MOV C,P1.2
MOV P1.7,C
SJMP BACK
SERIAL:JB TI,TRANS
MOV A,SBUF
MOV P2,A
CLR RI
RETI
TRANS:CLR TI
RETI
END
```

Conclusion:

The 8051 program continuously reads data from bit P1.2 and sends it to bit P1.7. Meanwhile, a serial interrupt service routine receives data from a PC and displays it on port P2. The baud rate for serial communication is set to 9600.

Program 4.4

```
ORG 0000H
LJMP MAIN
ORG 0023H
LJMP SERIL
ORG 0030H
MAIN: SETB P1.2
  MOV TMOD, #20H
  MOV TH1, #-3
  MOV SCON, #50H
  MOV IE, #10010000B
  SETB TR1
  BACK: MOV C, P1.2
  MOV P1.7, C
  SJMP BACK
  SERIAL: JB TI, TRANS
  MOV A, SBUF
  MOV A, SBUF
  MOV P2, A
  CLR RI
  RETI
TRANS: CLR TI
  RETI
  END
```

12/4/24