微算機原理及應用 (ET3403302)

Microcomputer Principles and Applications

Instructor: Y. H., Lin

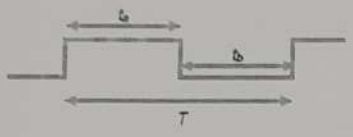
Midterm

2023/11/1

Score (得分): 69/47 Student ID (學號): B11102123 Name (姓名): 陳柏辰

Examination Time (考試時間): 100 minutes

A. Fill Questions (填充題): 60% (3 points for a space)

1. 

Duty cycle = $\frac{t_a}{T} \cdot 100\%$

2. Please write the full name of the following abbreviations(請寫出下列縮寫的全名):

(a) ISR: interrupt status register

(b) UART: universal asynchronous received transcived

(c) SFR: special function register

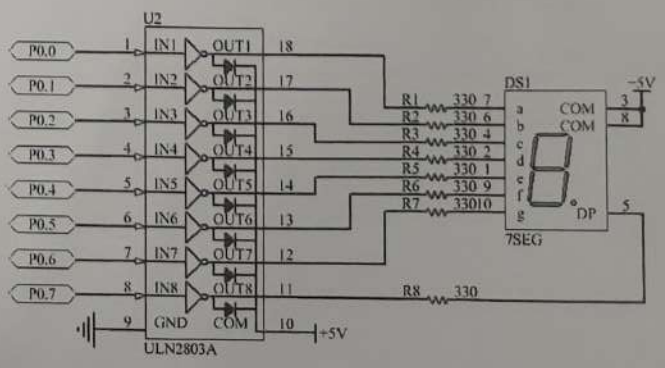
(d) bps: bits per second

3. The CPU takes a certain number of clock cycles to execute an instruction. In the 8051 family, these clock cycles are referred to as crystal frquency /12 = machine cycle.

4. We have 4 bytes of data: 25H, 62H, 3FH, and 52H, please caulculate the checksum byte. E8H

5. The low level signal at the INT pin must be removed before the execution of the last instruction of the ISR, RETI; otherwise, another interrupt will be generated.

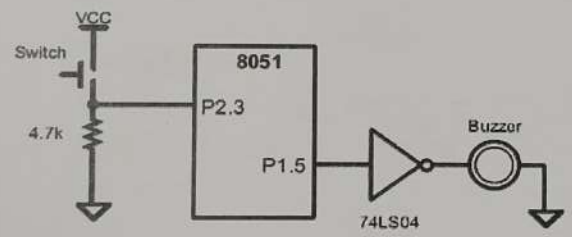
6. The output of the seven-segment display is controlled by Port0 of AT89S51. Please complete the following program to make the seven-segment display count from 0 to 9 and cycle.

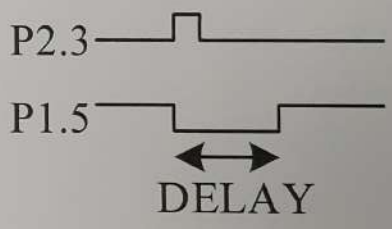


```
        ORG     0
START:  MOV     R0, #0
        MOV DPTR, TABLE1
LOOP:   MOV     A, R0
        MOVC A, @A+DPTR
        MOV     P0, A
        INC R0
        CALL    DELAY
        CJNE R0, #10, LOOP
        JMP     START
```

```
TABLE1: DB 00111111B;
        DB 00000110B;
        DB 0101 1011 B;
        DB 0100 1111 B;
        DB 01100110B;
        DB 01101101B;
        DB 01111100B;
        DB 00000111B;
        DB 01111111B;
        DB 01100111B;
        END
```

7. Assume that P2.3 is an input and represent the condition of a door. If it goes high, it means that the door is open. Monitor the bit continuously. Whenever it goes high, send a low-to-high to port P1.5 to turn on a buzzer. (a) Please finish this assembly code. (b) Calculating the time delay of DELAY function, which is 200.603 ms. (Please use the software de-bounce method when pressing and releasing the switch and use the DELAY subroutine.)





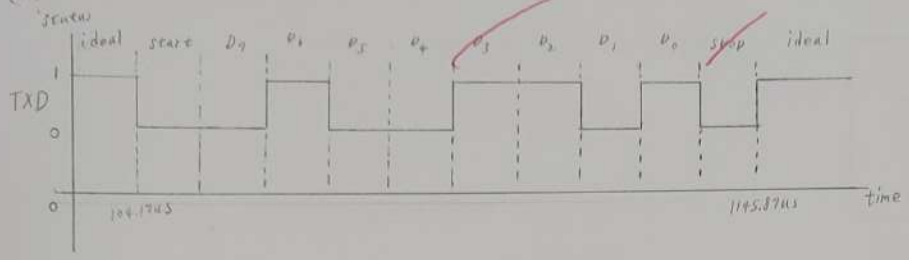

```
        ORG     0
        SETB    P2.3
        SETB    P1.5
START:  JNB P2.3, START
        CALL DELAY
        JNB P2.3, $
        CLR     P1.5
        CALL    DELAY
        SETB    P1.5
DEBOUN2:
        JB P2.3, DEBOUN2
        CALL DELAY
        JB P2.3, $
        JMP     START
        END
```

```
DELAY :                         ;Run Time
        MOV     R2, #200        ;1us
AGAIN : MOV     R3, #250        ;1us
HERE :  NOP                     ;1us
        NOP                     ;1us
        DJNZ    R3, HERE        ;2us
        DJNZ    R2, AGAIN       ;2us
        RET                     ;2us
```

B. Questions and Answers (問答題): 40%

1. (10%) (a) Please draw a waveform of 8051 asynchronous serial data communication on TxD with 1 start bit, 8-bit data, 1 stop bit, no parity bit, assume the data is 01001101(2) and the time is 104.17us/bit. Please label the voltage and time clearly. (b) Please calculate the value of baud rate?

(a)



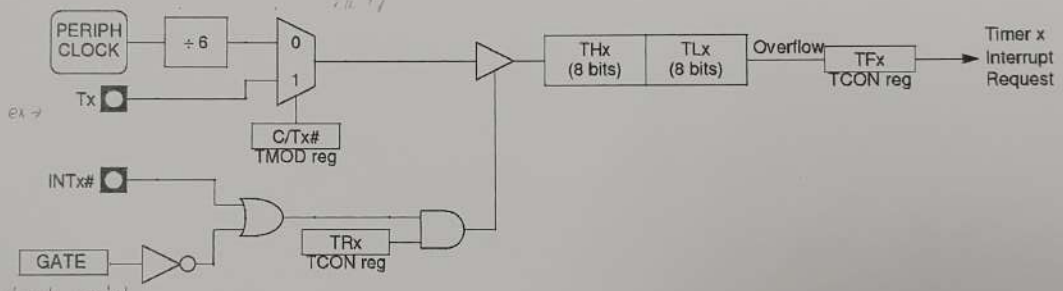
(b)

104.17us per bit

baud rate : $\frac{1s}{104.17us}$ = how much bit per second

$\frac{1}{104.17} \cdot 10^6 =$ ___

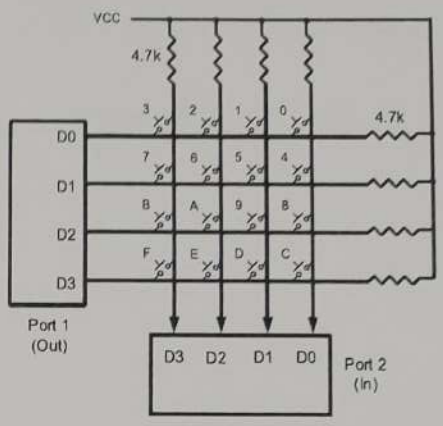
2. (10%) There is an 8051 timer shown as below. Please explain how to measure the period of an external input signal and draw out the flow chart.



measure external signal period

用固定時間計算

3. (10%) There is a 4×4 keypad shown as below. Please explain how to use the scanning method to judge the button and draw out the flow chart. The 8051 outputs the scan code to port 1 and reads the result back on port 2.



掃描方式確定鍵值

當 port 1 = 1110, port 2 根據讀值判斷出按下的按鍵

port 2 = 1110, 代表按下0

port 2 = 1101, 代表按下1

port 2 = 1011, 代表按下2

port 2 = 0111, 代表按下3

port 2 = 1111, 代表沒有按下按鍵

+3

+1

鍵值 = port 1 當次掃描 x port 2 讀值位置 -1

start

4. (10%) If the Interrupt Vector of INT1 is 0013(Hex). Please describe the processing flow of the INT1 interrupt, including the relationship for Main, Interrupt source, ISR and Interrupt Vector.

中斷INT1觸發 → IE1 = 1 → CPU接受中斷 →

→ 將暫存器值放入堆疊 → 由現在程式位址跳至中斷程式位址 13H

→ IE1 = 0 → 執行中斷程式至 RETI → 由堆疊回復暫存器值

→ 跳回至原先程式位址 → 繼續執行程式

```
org 0
org 13H  //INT1
ANL A,B
RETI
org 200H  //main
```

+8