

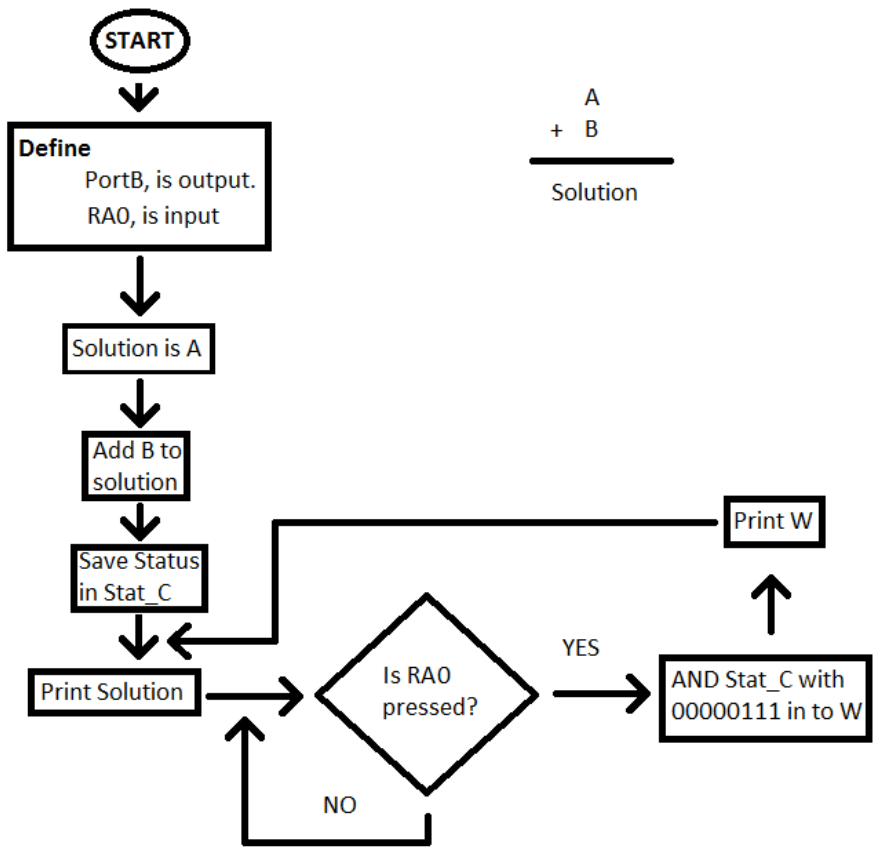
MECE 336 – WEEK 8 LABORATORY – SOLUTIONS

Problem 13

a. 154 + 72 :

$$\begin{array}{r} (154)_{10} \\ + (72)_{10} \\ \hline (226)_{10} \end{array} \rightarrow \begin{array}{r} (10011010)_2 \\ + (01001000)_2 \\ \hline (11100010)_2 \end{array} \begin{array}{l} C : 0 \text{ (There is no carry at 7}^{\text{th}} \text{ bit)} \\ DC : 1 \text{ (There is carry between 3}^{\text{rd}} \text{ \& 4}^{\text{th}} \text{ bits)} \\ Z : 0 \text{ (Result is not zero)} \end{array}$$

b. Flow-Chart



Code

```
LIST P=16F84A;
INCLUDE "P16F84A.INC";
__CONFIG
_CP_OFF&_WDT_OFF&_XT_OSC;
ORG 0;
;-----
STAT_C      EQU 0X0E
SOL         EQU 0X0F
CLRF PORTB;
CLRF PORTA;
;-----
BSF STATUS, RP0;
CLRF TRISB;
CLRF TRISA;
BSF TRISA,0;
BCF STATUS, RP0;
;-----MainProgram-----
MOVLW .154;
MOVWF SOL
MOVLW .72
ADDWF SOL,1
MOVF STATUS,1
MOVWF STAT_C

LOOP
MOVF SOL
MOVWF PORTB

PRESS
BTFSS PORTA,0; skip if RA0 = 1
GOTO PRESS

MOVF STAT_C
ANDLW B'00000111'
MOVWF PORTB

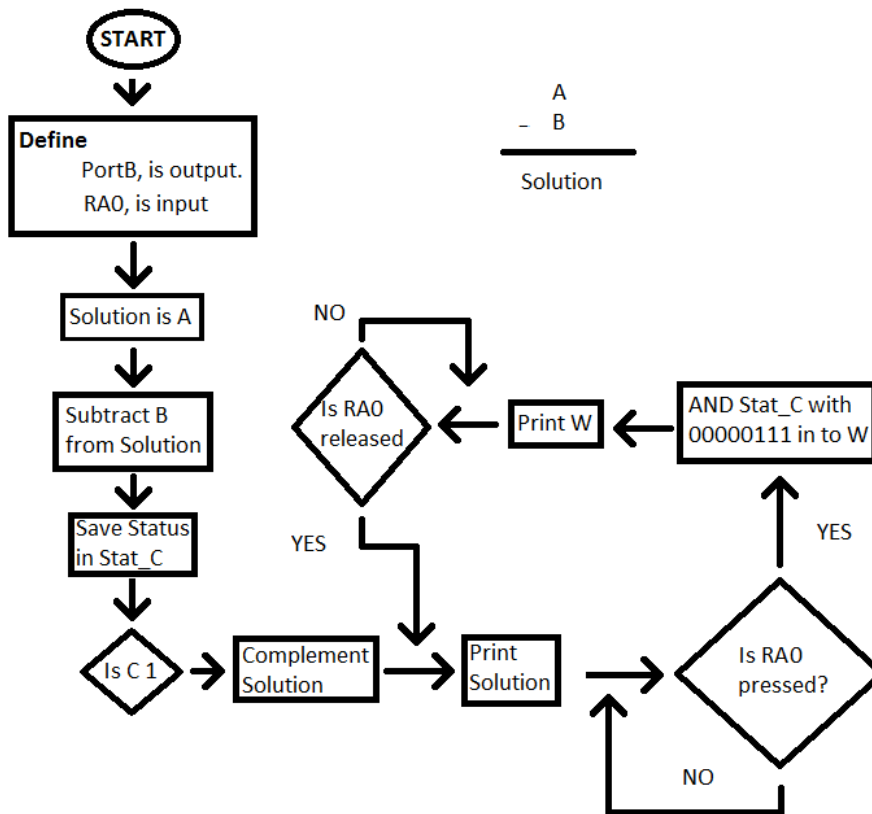
RELEASE; wait button release
BTFSC PORTA,0;
GOTO RELEASE;
;-----
END;
```

Problem 14

a. 44 - 120 :

$$\begin{array}{r} (44)_{10} \\ - (120)_{10} \\ \hline (-76)_{10} \end{array} \begin{array}{l} \rightarrow \\ \\ \leftarrow \end{array} \begin{array}{r} (10011010)_2 \\ - (01001000)_2 \\ \hline (11100010)_2 \end{array} \begin{array}{l} C : 0 \text{ (There is no carry at 7}^{\text{th}} \text{ bit)} \\ DC : 1 \text{ (There is carry between 3}^{\text{rd}} \text{ \& 4}^{\text{th}} \text{ bits)} \\ Z : 0 \text{ (Result is not zero)} \end{array}$$

b. Flow-Chart



Code

```

LIST P=16F84A;
INCLUDE "P16F84A.INC";
__CONFIG
_CP_OFF&_WDT_OFF&_XT_OSC;
ORG 0;
;-----SumConsts-----
STAT_C EQU 0X0E
SOL EQU 0X0F
CLRF PORTB;
CLRF PORTA;
;-----
BSF STATUS, RP0;
CLRF TRISB;
CLRF TRISA;
BSF TRISA,0;
BCF STATUS, RP0;
;-----MainProgram-----
MOVLW .154;
MOVWF SOL
MOVLW .72
SUBWF SOL,1
MOVF STATUS,1
MOVWF STAT_C
BTFSS STAT_C,0; If Negative
COMF SOL,1
  
```

```

LOOP
MOVF SOL
MOVWF PORTB

PRESS
BTFSS PORTA,0; skip if RA0 = 1
GOTO PRESS

MOVF STAT_C
ANDLW B'00000111'
MOVWF PORTB

RELEASE; Wait button
release
BTFSC PORTA,0;
GOTO RELEASE;
GOTO LOOP
;-----
END;
  
```