Ex.No. 9

Program(s) to demonstrate 1's and 2's Compliment, BCD to Hexadecimal and Hexadecimal to BCD conversion operation using 8051.

9.1 Introduction:

The purpose of this experiment is to obtain the 1's and 2's Compliment, BCD to Hexadecimal and vice versa of a given data using 8051 micro controller trainer kit.

9.2 Hardware Requirement:

The 8051 Microcontroller kit, Power supply.

9.3 Program Logic:

Binary ***coded decimal (BCD) is a system of writing numerals that assigns a four-digit binary code to each digit 0 through 9 in a decimal (base-10) numeral.*** The hexadecimal number system (also called base-16) is a number system that uses 16 unique symbols to represent a particular value. Those symbols are 0-9 and A-F.

BCD number to be converted is brought to the accumulator. Mask the lower order nibble using ANL instruction and swap their nibbles using SWAP instruction. Store the resultant value in any registors. Then multiply the result with 10 Decimal. Mask the higher order nibble and the result is added with the result obtained from above multiplication. Finally, the result is stored in memory .

The hexadecimal number system (also called base-16) is a number system that uses 16 unique symbols to represent a particular value. Those symbols are 0-9 and A-F. In this program, the hex number is converted to its equivalent BCD number. The hex number to be converted is brought to the accumulator and is divided by 100 D i.e 64 . DIV instruction of 8051 is used in this program. The remainder is now divided by 10 D. Swap the quotient and add the result with remainder obtained from above division. Finally, the result is stored in memory .

9.4 Program:

1's and 2's Compliment

MEMORY ADDRESS	LABEL	MNEMONICS	OP CODE
		MOV A, #data	
		CPL A	
		MOV DPTR, #4500H	
		MOVX @DPTR, A	
		INC A	
		INC DPTR	
		MOVX @DPTR, A	
	LOOP	SJMP LOOP	

BCD to HEXADECIMAL:

MEMORY ADDRESS	LABEL	MNEMONICS	OP CODE	COMMENTS
		MOV DPTR,#**4600**		
		MOVX A,@DPTR		
		MOV R5,A		
		ANL A,#F0		
		SWAP A		
		MOV R1,A		
		MOV A,R5		
		ANL A,#0F		
		MOV R2,A		
		MOV A,R1		
		MOV B,#0A		

		MUL AB		
		ADD A,R2		
		INC DPTR		
		MOVX @DPTR,A		
	HERE	SJMP **HERE**		

Hexadecimal to BCD

MEMORY ADDRESS	**LABEL**	**MNEMONICS**	**OP CODE**	**COMMENTS**
		MOV DPTR,#**4600**		
		MOVX A,@DPTR		
		MOV B,#64		
		DIV AB		
		INC DPTR		
		MOVX @DPTR,A		
		MOV A,B		
		MOV B,#0A		
		DIV AB		
		SWAP A		
		ADD A,B		
		INC DPTR		
		MOVX @DPTR,A		
	HERE	SJMP **HERE**		

9.5 Pre-Lab Questions:

1. Write the features of 8051 Microcontroller.
2. What is the purpose of EA, PSEN and ALE in 8051?
3. Which ports of the 8051 require the connection of external pull-up resistors in order to be used for I/O? Show the drawing for the connection.
4. Which register bank is used if we alter RS0 and RS1 of the PSW by the following two instructions? SetB PSW.3 SetB PSW.4

9.6 Post-Lab Questions:

1. What is the difference between SJMP, LJMP and AJMP?
2. Show the status of CY,AC, and P flags after the execution of following instructions

   MOV A, # 9CH

   ADD A, # 64H

3. The above lab experiment program simulate using edsim51 software