Experiment No - 3

Aim: (A) Write an assembly language program to add two 16-bit numbers stored in memory with carry in 8085 simulator. Store result in the memory

(B) Write an assembly language program to subtract two 8-bit numbers stored in memory location 2050 H and 2051 H with borrow using 8085 simulator. Store your result on memory location 2052

Date: 12/02/2025

Competency and Practical Skills: Logic building, Programming and Analyzing

Relevant CO: CO3

Objectives: (a) To recall data transfer and arithmetic instructions of 8085 microprocessor
(b) To use data transfer and arithmetic instructions in programs.
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Equipment/Instruments: 8085 microprocessor kit / 8085 Simulator

Program:

A. Program to add two 16-bit numbers stored in memory with carry in 8085 simulator. Store result in the memory

Input : (2000H) : 11H
(2001H) : 12H
(2002H) : 13H
(2003H) : 14H

Output : (2020H) : 24H
(2021H) : 26H

Address	Label	Mnemonics	Hex Code	Comments
0000		LHLD 2000	2A	;Load H and L registers
0001			00	
0002			20	
0003		XCHG	EB	; Exchange contents of HL and DE register pairs
0004		LHLD 2002	2A	; Load H and L registers
0005			02	
0006			20	
0007		MVI C,00	0E	; Clear register C
0008			00	

Address	Label	Mnemonics	Hexcode	Comments
0009		DAD D	19	; Add contents of DE pair with contents of HL pair
000A		JNC result	D2	; Go to result if CY = 0
000B			12	
000C			00	
000D		INR C	0C	; Increment of register C
000E		MOV A, C	79	;Transfer data from register C to accumulator
000F		STA 2025	32	;Store data from accumulator to memory address
0010			25	
0011			20	
0012	result:	SHLD 2020	22	; Store contents of registers H and L to memory address
0013			20	
0014			20	
0015		HLT	76	; End of the program

B. Program to subtract two 8-bit numbers stored in memory location 2050 H and 2051 H with borrow using 8085 simulator. Store your result on memory location 2052

Input :   (2050H) : 18H
(2051H) : 12H

Output :   (2055H) : 06H

Address	Label	Mnemonics	Hexcode	Comments
0000		LXI H,2050	21	; Load HL pair with memory address
0001			50	
0002			20	
0003		MOV A,M	7E	; Transfer data from memory to accumulator
0004		INX H	23	; Increment of HL pair
0005		SBB M	9E	;Subtract data of memory from accumulator
0006		STA 2055	32	; Store data from accumulator to memory address
0007			55	
0008			20	
0009		HLT	76	; End of the program

Observations: It is observed that the structure of assembly language programs and format of mnemonics understood properly. Data transfer and arithmetic instructions are effectively implemented to perform addition and subtraction operations.

Conclusion: Using data transfer and arithmetic instructions, assembly language programs for 16-bit addition and 8-bit subtraction are successfully performed.

Quiz:

1. **What is data transfer instructions?**

    It is an instruction used to move data between registers, memory, and I/O ports without modifying the data (e.g., MOV, MVI, LXI, LHLD, SHLD).

2. **What is the function of LHLD instruction?**

    LHLD loads a 16-bit number from a specified memory location into the HL register pair.

3. **What operation is performed by XCHG instruction?**

    XCHG exchanges the contents of the HL and DE register pairs.

Suggested Reference:

8085 – Microprocessor architecture, programming and interfacing by Ramesh S. Goankar, 5th edition, prentice hall publication.

References used by the students:

Rubric wise marks obtained:

Rubrics	Knowledge (2)		Problem Recognition (2)		Logic Building (2)		Completeness and accuracy (2)		Ethics (2)		Total
	Good (2)	Average (1)	Good (2)	Average (1)	Good (2)	Average (1)	Good (2)	Average (1)	Good (2)	Average (1)	
Marks											

Experiment No - 4

Aim: (A) Write an assembly language program to multiply two 8-bit numbers stored in memory by bit rotation method using 8085 simulator. Store result in the memory

(B) Write an assembly language program to find the minimum of two 8-bit numbers stored in the memory location 2050H and 2051H using 8085 simulator. Store the result in 2052H

Date: 19/02/2025

Competency and Practical Skills: Logic building, Programming and Analyzing

Relevant CO: CO3

Objectives: (a) To recall data transfer and arithmetic instructions of 8085 microprocessor
(b) To use data transfer and arithmetic instructions in programs.
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Equipment/Instruments: 8085 microprocessor kit / 8085 Simulator

Program:

A. Program to multiply two 8-bit numbers stored in memory by bit rotation method using 8085 simulator. Store result in the memory

Input :

(2050H) : 07H
(2051H) : 02H

Output :

(2060H) : 0EH ; 07H $\times$ 02H = 0EH (7 $\times$ 2 = 14 in decimal)

Address	Label	Mnemonics	Hex Code	Comments
0000		LXI H, 2050H	21 50 20	Load memory address of first number
0003		MOV B, M	46	Move first number into B
0004		INX H	23	Move to next memory location
0005		MOV C, M	4E	Move second number into C
0006		MVI A, 00H	3E 00	Initialize A (result) to 0
0008	LOOP:	RRC	0F	Rotate C right
0009		JNC SKIP	D2 0D 00	If LSB = 0, skip addition

000C		ADD B	80	Add B to A if LSB = 1
000D	SKIP:	DCR C	0D	Decrement C
000E		JNZ LOOP	C2 08 00	Repeat if C $\neq$ 0
0011		STA 2060H	32 60 20	Store result at 2060H
0014		HLT	76	Halt program

B. **Program to find the minimum of two 8-bit numbers stored in the memory location 2050H and 2051H using 8085 simulator. Store the result in 2052H**

Input :

(2050H) : 15H
(2051H) : 20H

Output :

(2052H) : 15H ; Minimum of (15H, 20H) is 15H

Address	Label	Mnemonics	Hex Code	Comments
0000		LXI H, 2050H	21 50 20	Load memory address of first number
0003		MOV A, M	7E	Move first number into A
0004		INX H	23	Increment HL to point to second number
0005		CMP M	BE	Compare A with second number
0006		JC STORE	DA 09 00	If A < M, jump to store A
0009		MOV A, M	7E	Else, move second number to A
000A	STORE:	STA 2052H	32 52 20	Store minimum value at 2052H
000D		HLT	76	Halt program

Observations:

Bitwise rotation and comparison instructions were successfully implemented for multiplication and minimum value identification in the 8085 assembly language.

Conclusion:

Using arithmetic and logical operations, multiplication and comparison programs were successfully executed.

Quiz:

1. **What is bit manipulation?**
   o Bit manipulation refers to performing operations on individual bits of a number, such as shifting, masking, or toggling bits.
2. **What is the use of rotate instruction?**
   o Rotate instructions shift bits left or right, cycling the carry bit to perform bitwise operations efficiently.
3. **What is the use of compare instruction?**
   o CMP compares two values by subtracting them without storing the result and sets flags accordingly.

Suggested Reference:

8085 – Microprocessor architecture, programming and interfacing by Ramesh S. Goankar, 5ᵗʰ edition, prentice hall publication.

References used by the students:

Rubric wise marks obtained:

Rubrics	Knowledge (2)		Problem Recognition (2)		Logic Building (2)		Completeness and accuracy (2)		Ethics (2)		Total
	Good (2)	Average (1)	Good (2)	Average (1)	Good (2)	Average (1)	Good (2)	Average (1)	Good (2)	Average (1)	
Marks											