Experiment No - 5

Aim: (A) Write an assembly language program using 8085 simulator to find square-root of a given number. Display result on output port number 01H

(B) Write an assembly language program to find a factorial of a given number using 8085 simulator. Display result on output port number 0AH

Date:

Competency and Practical Skills: Logic building, Programming and Analyzing

Relevant CO: CO3

Objectives: (a) To recall arithmetic and I/O instructions of 8085 microprocessor
(b) To use arithmetic and I/O instructions in program.
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Equipment/Instruments: 8085 microprocessor kit / 8085 Simulator

Program:

A. Program to find square root of given 8-bit number using 8085 simulator. Display result on output port number 01H

Input :

(2050H) : 25H

Output :

(01H) : 05H

Address	Label	Mnemonics	Hex Code	Comments
0000		MVI A, 25H	3E 25	Load number 25H into A
0002		MVI B, 00H	06 00	Initialize counter B
0004	LOOP:	MOV C, B	41	Copy B to C
0005		MOV D, C	42	Copy C to D
0006		CALL MULT	CD 10 00	Call multiplication subroutine
0009		CMP A	BF	Compare result with A
000A		JZ DISPLAY	CA 0F 00	If zero, jump to DISPLAY

000D		JC DISPLAY	DA 0F 00	If carry, jump to DISPLAY
0010		INR B	04	Increment B
0011		JMP LOOP	C3 04 00	Repeat the loop
0014	MULT:	MVI A, 00H	3E 00	Initialize A to 0
0016	MULT_LOOP:	ADD C	80	Add C to A
0017		DCR D	15	Decrement D
0018		JNZ MULT_LOOP	C2 16 00	Repeat until D is zero
001B		RET	C9	Return from subroutine
001C	DISPLAY:	MOV A, B	78	Move B (square root) to A
001D		OUT 01H	D3 01	Display result on port 01H
001F		HLT	76	Halt the program

B. Program to arrange numbers in ascending order using 8085 simulator. The length of the block is given on memory location 2050H and block starts from 2051H

Input :

(2050H) : 05H

Output :

(0AH) : 78H

Address	Label	Mnemonics	Hex Code	Comments
0000		MVI A, 05H	3E 05	Load number 05H into A
0002		MVI B, 01H	06 01	Initialize counter B
0004		MOV C, A	4F	Copy A to C
0005	FACT_LOOP:	MOV A, B	78	Move B to A
0006		CALL MULT	CD 10 00	Call multiplication subroutine
0009		MOV C, A	4F	Move result back to C
000A		INR B	04	Increment B
000B		MOV A, B	78	Move B to A
000C		CPI 06H	FE 06	Compare A with 6
000E		JNZ FACT_LOOP	C2 05 00	Repeat until B is 6
0011	DISPLAY:	MOV A, C	79	Move C (factorial) to A
0012		OUT 0AH	D3 0A	Display result on port 0AH
0014		HLT	76	Halt the program

Observations:

The square root program calculates the integer square root of a given number and displays it on port 01H.

The factorial program calculates the factorial of a given number and displays it on port 0AH.

Conclusion:

Both programs successfully demonstrate the use of arithmetic operations and I/O instructions in 8085 assembly language programming.

Quiz:

1 What is the meaning of port address?

A port address is a unique identifier used to access I/O devices in a microprocessor system. It allows the CPU to communicate with external devices like keyboards, displays, etc.

2 What is the difference between memory-mapped I/O and I/O-mapped I/O?

In memory-mapped I/O, I/O devices are treated as memory locations, and the same address space is used for both memory and I/O devices. In I/O-mapped I/O, separate address spaces are used for memory and I/O devices.

3 How can you create a loop statement in an assembly language program?

A loop can be created using a combination of DCR (decrement) and JNZ (jump if not zero) instructions. The loop continues until the counter reaches zero.

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 - 6

Aim: (A) Write an assembly language program to move a block of the memory starts at the location 2051H to 4051H using 8085 simulator. The length of the block is given on the memory location 2050H

(B) Write an assembly language program to arrange numbers in ascending order using 8085 simulator. The length of the block is given on memory location 2050H and block starts from 2051H.

Date:

Competency and Practical Skills: Logic building, Programming and Analyzing

Relevant CO: CO3

Objectives: (a) To recall block data transfer (DMA) of 8085 microprocessor
(b) To implement block data transfer program.
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Equipment/Instruments: 8085 microprocessor kit / 8085 Simulator

Program:

A. Program to move a block of the memory starts at the location 2051H to 4051H using 8085 simulator. The length of the block is given on the memory location 2050H

Input :

Memory block starts at 2051H

Length stored at 2050H

Output :

Memory block moved to 4051H

Address	Label	Mnemonics	Hex Code	Comments
0000		LXI H, 2050H	21 50 20	Load length address

0003		MOV C, M	4E	Load length into C
0004		LXI H, 2051H	21 51 20	Load source address
0007		LXI D, 4051H	11 51 40	Load destination address
000A	MOVE_LOOP:	MOV A, M	7E	Move data from source
000B		STAX D	12	Store data at destination
000C		INX H	23	Increment source pointer
000D		INX D	13	Increment destination pointer
000E		DCR C	0D	Decrement counter
000F		JNZ MOVE_LOOP	C2 0A 00	Repeat until counter is zero
0012		HLT	76	Halt program

B. Program to arrange numbers in ascending order using 8085 simulator. The length of the block is given on memory location 2050H and block starts from 2051H

Input :

Array starts at 2051H

Length stored at 2050H

Output :

Numbers sorted in ascending order

Address	Label	Mnemonics	Hex Code	Comments
0000		LXI H, 2050H	21 50 20	Load length address
0003		MOV C, M	4E	Load length into C
0004		DCR C	0D	Decrement C for passes
0005	OUTER_LOOP:	LXI H, 2051H	21 51 20	Load start address
0008		MOV D, C	52	Load inner loop count
0009	INNER_LOOP:	MOV A, M	7E	Load current value
000A		INX H	23	Move to next element
000B		MOV B, M	46	Load next value
000C		CMP B	B8	Compare A with B
000D		JC SKIP	DA 11 00	If A < B, skip swap

0010		MOV M, A	77	Swap A and B
0011		DCX H	2B	Move back
0012		MOV M, B	70	Store swapped value
0013		INX H	23	Move forward
0014	SKIP:	DCR D	15	Decrement inner loop counter
0015		JNZ INNER_LOOP	C2 09 00	Repeat inner loop
0018		DCR C	0D	Decrement outer loop counter
0019		JNZ OUTER_LOOP	C2 05 00	Repeat outer loop
001C		HLT	76	Halt program

Observations:

The memory block transfer program successfully moves a block of data from one memory location to another.

The sorting program arranges the numbers in ascending order.

Conclusion:

Both programs demonstrate the use of block data transfer and sorting algorithms in 8085 assembly language programming.

Quiz:

1. What is DMA transfer?

DMA (Direct Memory Access) transfer is a method where data is transferred between memory and I/O devices without the intervention of the CPU, allowing for faster data transfer

2. Which control signal is involved in DMA transfer?

The HOLD and HLDA signals are used in DMA transfer. The HOLD signal requests the CPU to release the bus, and the HLDA signal acknowledges that the bus has been released.

3. What is the difference between an interrupt cycle and a DMA cycle?

In an interrupt cycle, the CPU stops its current task, saves its state, and services the interrupt. In a DMA cycle, the CPU releases control of the bus, and the DMA controller directly accesses memory without CPU intervention.

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											