MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR (M.P.) -474005

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DEPARTMENT OF CSE and IT

PRACTICLE FILE

MICROPROCESSOR AND INTERFACING

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SUBMITTED TO:

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3	Write an assembly language program to move data block starting at location ‘X’ to location ‘Y’ with overlap using 8085/8086 instruction set.		
4	Write an assembly language program to arrange set of 8-bit numbers starting at location in ASCENDING/DESCENDING order. Display the stored vector in address data field using 8085/8086 instruction set.		
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10	Write an assembly language program to convert given hexadecimal number into its equivalent BCD number using 8085/8086 instruction set.		
11	Write an assembly language program to convert given ASCII character into its equivalent hexadecimal number using 8085/8086 instruction set.		

Experiment No. 1

AIM: Write an assembly language program to perform the subtraction of two 8-bitnumber using 8085/8086 instruction set.

Instruments Required: 1. 8085/8086 Microprocessor Kit

2. +5V Power supply

Theory: In microprocessor 8085, the Sub instruction used 2s complement method for subtraction.Whwn the firest operand is larger ,the result will be positive.It will not enable the carry flag after completing the subtraction.

Algorithm

1. Load 00 in a register C (for borrow)
2. Load two 8-bit number from memory into registers
3. Move one number to accumulator
4. Subtract the second number with accumulator
5. If borrow is not equal to 1, go to step 7
6. Increment register for borrow by 1
7. Store accumulator content in memory
8. Move content of register into accumulator
9. Store content of accumulator in other memory location
10. Stop

PROGRAM

Labels	***Memory Address***	***Machine Codes/ OPCODE***	***Mnemonics***	***Comments***
START	0000	0E	MVI C,00	
	0002	2A	LHLD 2500	
	0005	7C	MOV A,H	
	0006	95	SUB L	
	0007	D2	JNC 200B	

	000A	0C	INR C	
	000B	32	STA 2502	
	000E	79	MOV A,C	
	000F	32	STA 2503	
	0012	76	HLT	
END	2503	01		

Experimental Results

Input DATA		**RESULT**	
Memory location	Data	Memory location	Data
2500	**03**	2502	**01**
2501	**04**	2503	01

Conclusion: Thus the program to subtract two 8-bit number was executed

Precautions:

1. Properly connect the 8085 microprocessor kit with power supply terminals.
2. Switch on the power supply after checking connections
3. Handle the Trainer kit carefully.

Experiment No. 2:

AIM:- Write an assembly language program to move data block starting at location ‘X’ to location ‘Y’ without overlap using 8085/8086 instruction set.

Instruments Required: 1. 8085/8086 Microprocessor Kit

2. +5V Power supply

Theory: The non-overlapping block movement is relatively an easy task. Here the block is starting at position X, we have to move it to position Y. The location Y is far away from X. So Y > X + block size.In this program, the data are stored at location 2000H, and we will place it 2010H. The block size is stored at location 2000H.We are loading the source address into HL pair, and destination address into DE register pair. We are simply taking the data from the source and placing it at the destination.

Algorithm:

1. Store the starting address of both blocks in 2 different register pairs
2. Now exchange the contents at the addresses in both register pairs
3. Increment the values of both register pairs
4. Decrements count by 1
5. If count is not equal to 0 repeat steps 3 to 5

6.

PROGRAM:

Labels	***Memory Address***	***Machine Codes/ OPCODE***	***Mnemonics***	***Comments***
PROG	2000	16	MVI D, 06	
	2001	06		
	2002	21	LXI H,F100	
	2003	00		
	2004	F1		
	2005	01	LXI H,B200	
	2006	00		
	2007	F2		
UP	2008	7E	MOV A,M	
	2009	02	STAX B	
	200A	23	INX H	
	200B	03	INX B	
	200C	15	DCR D	
	200D	C2	JNZ UP	
	200E	08		
	200F	20		
END	2010	2F	RST 1	

Experimental Results:

Input DATA		**RESULT**	
Memory location	Data	Memory location	Data
F100	**AA**	F200	**AA**
F101	**BB**	F201	BB

Conclusion: Thus the program to move data without overlap was executed

Precautions:

1. Properly connect the 8085 microprocessor kit with power supply terminals.
2. Switch on the power supply after checking connections
3. Handle the Trainer kit carefully.

Experiment No. 3:

AIM:- Write an assembly language program to move data block starting at location 'X' to location 'Y' with overlap using 8085/8086 instruction set.

Instruments Required: 1. 8085/8086 Microprocessor Kit

2. +5V Power supply

ALGORITRHM:

1. The overlapping block movement is tricky; we need to use some special tricks to move a block in overlapping address locations. Here the block is starting at position X, we have to move it to position Y.
2. The location Y is inside the block. So Y < X + block size.
3. In this program, the data are stored at location 8010H, and we will place it 8014H. The block size is stored at location 8000H.
4. To move a block into some overlapping locations, we will start from the end element of the block. So at first the last element of the block is moved, then the previous bytes are moved.

PROGRAM:

ADDRESS	LABELS	MNEMONICS	HEXCODE	COMMENTS
F000		LXI H,8000	21,00,80	
F001				
F002				
F003		MOV C,M	4E	
F004		MVI B,00	06	
F005			00	
F006		LXI H,8010	21	
F007			10	
F008			80	
F009		LXI D,8014	11	
F00A			14	
F00B			80	

F00C		DAD B	09	
F00D		DCX H	2B	
F00E		XCHG	EB	
F00F		DAD B	09	
F010		DCX H	2B	
F011		XCHG	EB	
F012	LOOP	MOV A,M	7E	
F013		STAX D	12	
F014		DCX D	1B	
F015		DCX H	2B	
F016		DCR C	0D	
F017		JNZ LOOP	C2	
F018			12	
F019			F0	
F01A		HLT	76	

Experimental Results

Input DATA		**RESULT**	
Memory location	Data	Memory location	Data
8000	**05**	8000	**05**
8014	**15**	8018	15

Conclusion:

So the program to move data with overlapping was executed.

Precautions:

1. Properly connect the 8085 microprocessor kit with power supply terminals.
2. Switch on the power supply after checking connections
3. Handle the Trainer kit carefully.

Experiment No. 4:

AIM:-Write an assembly language program to arrange set of 8-bit numbers starting at location in ASCENDING/DESCENDING order. Display the stored vector in address data field using 8085/8086 instruction set.

Instruments Required: 1. 8085/8086 Microprocessor Kit

2. +5V Power supply

Theory: An 8 bit data is arrange in sorted form or in ascending order by using various assembly language and registers. Set the memory location at 2000H

ALGORITHM:

1. Load data from offset 500 to register CL (for count).
2. Travel from starting memory location to last and compare two numbers if first number is greater than second number then swap them.
3. First pass fix the position for last number.
4. Decrease the count by 1.
5. Again travel from starting memory location to (last-1, by help of count) and compare two numbers if first number is greater than second number then swap them.
6. Second pass fix the position for last two numbers.
7. Repeate.

PROGRAM:

Memory Address	***Labels***	***Mnemonics***	***Machine Codes/ OPCODE***	***Comments***
2000		LDA F100	3A	

2001			00	
2002			F1	
2003		DCR A	3D	
2004		MOV C,A	4F	
2005		MOV B,C	41	
2006		LXI H,F200	21	
2007			00	
2008			F2	
2009	UP	MOV A,M	7E	
200A		INX H	23	
200B		CMP M	BE	
200C		JC DOWN	DA	
200D			14	
200E			20	
200F		MOV D,M	56	
2010		MOV M,A	77	
2011		DCX H	2B	
2012		MOV M,D	72	
2013		INX H	23	
2014	DOWN	DCR B	05	
2015		JNZ UP	C2	
2016			09	
2017			20	
2018		DCR C	0D	
2019		JNZ	C2	

		2005		
201A			05	
201B			20	
201C	RESULT	RST 1	CF	

Experimental Results :

At memory location F100 we take count of 4.

Input DATA		**RESULT**	
Memory location	Data	Memory location	Data
F200	**DD**	F200	AA
F201	**CC**	F201	BB
F202	**BB**	F202	CC
F203	**AA**	F203	DD

Conclusion:

We successfully arrange data in ascending order .

Precautions:

1. Properly connect the 8085 microprocessor kit with power supply terminals.
2. Switch on the power supply after checking connections
3. Handle the Trainer kit carefully.

EXPERIMENT 5:-

AIM: Write an assembly language program to perform the multiplication of two 8-bit numbers using 8085/8086 instruction set

Instruments Required: 1. 8085/8086 Microprocessor Kit

2. +5V Power supply

Theory:

Here we study the multiplication of 8 bit number .

ALOGRITHM:

1) Start the program by loading HL register pair with address of memory location.

2) Move the data to a register (B register).

3) Get the second data and load into Accumulator.

4) Add the two register contents.

5) Check for carry.

6) Increment the value of carry.

7) Check whether repeated addition is over and store the value of product and carry

in memory location.

8) Terminate the program.

PROGRAM:

MEMORY	LABELS	MNEMONIC	OPCODE	COMMENTS

ADDRESS		S		
2000		LHLD 2501	2A	
2001			01	
2002			25	
2003		XCHG	EB	
2004		LDA 2503	3A	
2005			03	
2006			25	
2007		LXI H, 0000	21	
2008			00	
2009			00	
200A		MVI C,08	0E	
200B			08	
200C	LOOP	DAD H	29	
200D		RAL	17	
200E		JNC AHEAD	D2	
200F			12	
2010			20	
2011		DAD D	19	
2012	AHEAD	DCR C	0D	
2013		JNZ LOOP	C2	
2014			0C	
2015			20	
2016		SHLD 2504	22	
2017			04	
2018			25	
2019		HLT	76	

Experimental Results :

At memory location F100 we take count of 4.

Input		RESULT	

DATA			
Memory location	Data	Memory location	Data
2001	**84 H**	2004	58
2003	**56 H**	2005	2C

Conclusion:

We successfully studied the multpliction of number.

Precautions:

1. Properly connect the 8085 microprocessor kit with power supply terminals.
2. Switch on the power supply after checking connections
3. Handle the Trainer kit carefully.

EXPERIMENT 6

AIM: Write an assembly language program to perform the division of two 8-bit numbers using 8085/8086 instruction set.

Instruments Required: 1. 8085/8086 Microprocessor Kit

2. +5V Power supply

ALGORITHM:

1) Start the program by loading HL register pair with address of memory location.

2) Move the data to a register(B register).

3) Get the second data and load into Accumulator.

4) Compare the two numbers to check for carry.

5) Subtract the two numbers.

6) Increment the value of carry .

7) Check whether repeated subtraction is over and store the value of product and

carry in memory location.

8) Terminate the program.

PROGRAM:

MEMORY ADRESS	LABELS	MNEMONICS	OPCODE	COMMENTS
2000		LHLD 2501	2A	
2001			01	
2002			25	
2003		LDA 2503	3A	
2004			03	
2005			25	
2006		MOV B,A	47	
2007		MVI C,08	0E	
2008			08	
2009	LOOP	DAD H	29	
200A		MOV A,H	7C	
200B		SUB B	90	
200C		JC AHEAD	DA	
200D			11	
200E			20	

200F		MOV H,A	67	
2010		INR L	2C	
2011	AHEAD	DCR C	0D	
2012		JNZ LOOP	C2	
2013			09	
2014			20	
2015		SHLD 2504	22	
2016			04	
2017			25	
2018		HLT	76	

Experimental Results :

Input DATA		**RESULT**	
Memory location	Data	Memory location	Data
2001	**9BH**	2004	F2H
2002	**48H**	2005	07H
2003	**1AH**		

Conclusion:

_We successfully studied the Division of number.

Precautions:

- Properly connect the 8085 microprocessor kit with power supply terminals.
- Switch on the power supply after checking connections
- Handle the Trainer kit carefully.

EXPERIMENT 7

AIM:- Write an assembly language program to find the larger number in array of data using 8085/8086 instruction set.

Instruments Required:

1. 8085/8086 Microprocessor Kit
2. +5V Power supply

Algorithm –

1. We are taking first element of array in A
2. Comparing A with other elements of array, if A is smaller then store that element in A otherwise compare with next element
3. The value of A is the answer

PROGRAM:

MEMORY ADDRESS	LABEL	MNEMONICS	OPCODE	COMMENTS
2000		LXI H, 2050	21	
2001			50	
2002			20	
2003		MOV C,M	4E	
2004		DCR C	0D	
2005		INX H	23	
2006		MOV A,M	7E	

2007		INX H	23	
2008		CMP M	BE	
2009		JNC 200D	D2	
200A			0D	
200B			20	
200C		MOV A,M	7E	
200D		DCR C	0D	
200E		JNZ 2007	C2	
200F			07	
2010			20	
2011		STA 3050	32	
2012			50	
2013			30	
2014		HLT	76	

Experimental Results :

Input DATA		**RESULT**	
Memory location	Data	Memory location	Data
2001	**04H**	3050	55H
2002	**1AH**		
2003	**55H**		

Conclusion:

We successfully find the largest number .

Precautions:

1. Properly connect the 8085 microprocessor kit with power supply terminals.
2. Switch on the power supply after checking connections
3. Handle the Trainer kit carefully.

EXPERIMENT 9

AIM: Write an assembly language program to convert given hexadecimal number into its equivalent BCD number using 8085/8086 instruction set.

Instruments Required: 1. 8085/8086 Microprocessor Kit

2. +5V Power supply

THEORY:-

Here we convert the the binary number (hexadecimal) to the BCD format.

Binary-coded decimals are an easy way to represent decimal values, as each digit is represented by its own 4-bit binary sequence which only has 10 different combinations. By comparison, converting real binary representation to decimal requires arithmetic operations like multiplication and addition.

ALGORITHM:-

1. Here we are taking a number from the memory, and initializing it as a counter.
2. Now in each step of this counter we are incrementing the number by 1, and adjust the decimal value.
3. By this process we are finding the BCD value of binary number or hexadecimal number.
4. We can use INR instruction to increment the counter in this case but this instruction will not affect carry flag, so for that reason we have used ADI 10H

PROGRAM:-

#org F000H

#begin F000H

MEMORY ADDRESS	LABELS	MNEMONICS	HEXCODE	COMMENTS
F000		LXI H, 8000	21	
F001			00	
F002			80	
F003		MVI D,00	16	
F004			00	
F005		XRA A	AF	
F006		MOV C,M	4E	

F007	LOOP	ADI 01	C6	
F008			01	
F009		DAA	27	
F00A		JNC SKIP	D2	
F00B			0E	
F00C			F0	
F00D		INR D	14	
F00E	SKIP	DCR C	0D	
F00F		JNZ LOOP	C2	
F010			07	
F011			F0	
F012		MOV L,A	6F	
F013		MOV H,D	62	
F014		SHLD 8050	22	
F015			50	
F016			80	
F017		HLT	76	

Experimental Results :

Input DATA		**RESULT**	
Memory location	Data	Memory location	Data
8000	**34H**	8050	52H

Conclusion:

Here we successfully convert hexdecimal number to bcd .

Precautions:

1. Properly connect the 8085 microprocessor kit with power supply terminals.
2. Switch on the power supply after checking connections
3. Handle the Trainer kit carefully.

EXPERIMENT 10

AIM: Write an assembly language program to convert given hexadecimal number into its equivalent ASCII number using 8085/8086 instruction set.

Instruments Required: 1. 8085/8086 Microprocessor Kit

2. +5V Power supply

THEORY:-

The general way of converting ascii number from hexdecimal is

Each hexadecimal digit represents a value from zero to fifteen.

To get the ASCII code for a digit-value less than ten [0–9], just add 48 or 0x30 — which is the ASCII code for the digit “0”. This translates the decimal value into the corresponding ASCII character: 0 becomes ‘0’, 1 becomes ‘1’, . . . , 9 becomes ‘9′.

For digit-values of greater than nine, just add 64 or 0x40 (which is one less than the ASCII code for capital ‘A’), if you want to use the letters A, B, C, D, E, and F to represent digits with values of ten, eleven, twelve, thirteen, fourteen, and fifteen.

Algorithm:

1. Load the given data in accumulator and move to B register
2. Mask the most significant 4 bits(upper nibble) of the Hexa decimal number in accumulator.
3. Call subroutine to get ASCII of least significant 4 bits.
4. Store it in memory
5. Move B register to accumulator and mask the least significant 4 bits(lower nibble).
6. Rotate the upper and lower nibble position.
7. Call subroutine to get ASCII of upper nibble
8. Store it in memory
9. Terminate the program.

PROGRAM:

#org 2000H
#begin 2000H

MEMORY ADDRESS	LABELS	MNEOMONICS	OPCODE	COMMENTS
2000		LDA 2050	3A	
2001			50	
2002			20	
2003		MOV B,A	47	
2004		ANI 0F	E6	
2005			0F	
2006		CALL SUB1	CD	
2007			1A	
2008			20	
2009		STA 2051	32	
200A			51	

200B			20	
200C		MOV A,B	78	
200D		ANI F0	E6	
200E			F0	
200F		RLC	07	
2010		RLC	07	
2011		RLC	07	
2012		RLC	07	
2013		CALL SUB1	CD	
2014			1A	
2015			20	
2016		STA 2052	32	
2017			52	
2018			20	
2019		HLT	76	
201A	SUB1	CPI 0A	FE	
201B			0A	
201C		JC SKIP	DA	
201D			21	
201E			20	
201F		ADI 07	C6	
2020			07	
2021	SKIP	ADI 30	C6	
2022			30	
2023		RET	C9	

Experimental Results :

Input DATA		**RESULT**		
Memory location	Data	Memory location	Data	Comments
2050	**E4H**	2051	34	ASCII for E
		2052	45	ASCII for E

Conclusion:

Here we successfully convert hexdecimal number to bcd .

Precautions:

1. Properly connect the 8085 microprocessor kit with power supply terminals.
2. Switch on the power supply after checking connections
3. Handle the Trainer kit carefully.

EXPERIMENT:-11

AIM:- Write an assembly language program to convert given ASCII character into its equivalent hexadecimal number using 8085/8086 instruction set.

Instruments Required:

1. 8085/8086 Microprocessor Kit
2. +5V Power supply

Algorithm –

1. Input the content of 2050 in accumulator.
2. Subtract 30H from accumulator.
3. Compare the content of accumulator with 0AH.
4. If content of accumulator is less than 0A then goto step 6 else goto step 5.
5. Subtract 07H from accumulator.
6. Store content of accumulator to memory location 3050.
7. Terminate the program.

PROGRAM:-

#org 2000H

#begin 2000H

MEMORY ADDRESS	LABELS	MNEMONICS	OPCODE	COMMENTS
2000		LDA 2050	3A	
2001			50	
2002			20	
2003		SUI 30	D6	
2004			30	
2005		CPI 0A	FE	
2006			0A	
2007		JC 200D	DA	
2008			0D	
2009			20	
200A		SUI 07	D6	
200B			07	
200C		STA 3050	32	
200D			50	
200E			30	
200F		HLT	76	

Experimental Results :

Input DATA		**RESULT**		

Memory location	Data	Memory location	Data	Comments
2050	**31H**	3050	0BH	

Conclusion:

Here we successfully convert bcd number to hexadecimal .

Precautions:

1. Properly connect the 8085 microprocessor kit with power supply terminals.
2. Switch on the power supply after checking connections
3. Handle the Trainer kit carefully.