CSMSS's

Chh. Shahu College of Engineering,

Kanchanwadi, Chh. Sambhaji Nagar

Affiliated to

Dr. Babasaheb Ambedkar Technological University

Lab Manual

of

Microprocessor and Microcontroller (BTEEC502)

for

BTech EE Semester V

Department of Electrical Engineering

Class: BTech Electrical Engineering

Subject: Microprocessor and Microcontroller (BTEEC502)

Teaching Scheme
Practical: 02 hrs/week

Exam Scheme
Practical: 40 marks

List of Practical's

Practical No	Title
1	To Study of 8085 Microprocessor Trainer Kit used in Laboratory.
2	To write an assembly language program for adding two 8 bit number.
3	To write an assembly language program for adding two 16 bit number.
4	To write an assembly language program for Substation two 8 bit number.
5	To write an assembly language program for adding two 16 bit number.
6	To write an assembly language program to sort 'n' numbers in ascending order.
7	To write an assembly language program to sort 'n' numbers in descending order.
8	To write an assembly language program to make stepper motor run in forward and reverse direction
9	To Study of 8051 Microcontroller Trainer Kit used in Laboratory.
10	To write an assembly language program to transfer content of internal RAM to external RAM.
11	To write an assembly language program to for adding two 8 bit numbers.
12	To write an assembly language program to for subtracting two 8 bit numbers.
13	To write an assembly language program to for multiply and divide two numbers stored in internal RAM

Note:- Any 8 Practical's form above list of experiment

Experiment No.

	CSMSS's CHH. Shahu College of Engineering, Aurangabad	LABORATORY MANUAL
	Practical Experiment Instruction Sheet	
	EXPERIMENT TITLE: Study of Microprocessor Kit	

EXPERIMENT NO. : CSMSS/ECT/MPLAB/MP/01			
CLASS: TE	**DEPARTMENT:** ELECTRICAL ENGG.		
LABORATORY: MICROPROCESSORS AND MICROCONTROLLER LAB	**YEAR:** 2021-22	**PART:**I	**PAGE:**1

Experiment No. 1

Aim:- To Study of 8085 Microprocessor Kit used in laboratory.

Apparatus required:
8085 micro processor kit

General Description:
M85-0X LCD kit is a single board Microprocessor Training kit based on 8085 Microprocessor. It provides powerful monitor EPROM and user's RAM with battery backup. The kit has 101 IBM compatible PC keyboard and 20 x 2 LCD display for any data entry or display. This kit has line assemble feature so that one can enter the program in assembly language.

The Input/Output structure of MX85-0X LCD kit provides 48 programmable I/O lines using 2 ICs of 8255. It has got 16 bit 3 channel programmable Timer/Counter using 8253.

System Capabilities:

1. Examine the contents of any memory location.
2. Examine/Modify the contents of any of the Microprocessor internal registers.
3. Modify the contents of any of the RAM location.
4. Move a block of data from one location to another location.
5. Insert one or more instructions in the user program.
6. Delete one or more instructions from the user program.
7. Relocate a program written for some memory area to some other memory area.
8. Find out string of data lying at a particular address.
9. Fill the particular memory area with a constant.
10. Compare two blocks of memory.

11. Insert one or more data bytes in the user's program/data area.
12. Delete one or more data bytes from the user's program/data area.
13. Enter any program in a mnemonics form using Assembler.
14. Examine any program in a mnemonics as well as intel hex code using disassembler.
15. Execute a program at full clock speed.
16. Execute a program in single step i.e., instruction by instruction.
17. Print the content of any memory location.

Entering the program using assembler mode software as follows:

Step1: The kit is powered on and we get the display

8085 LCD TRAINER KIT

M85-0X _

Press 1

Step 2: Display changes to

A – ASSEMBLE MODE

C – DISASSEMBLE MODE

Press A

Step 3: Display changes to

RAM ADR:

Here enter the starting address of the program (example 2000)

Step 4: Now start entering the program. The address of instruction will be displayed automatically.

Example:

2000 MVI A 10

2002 MVI B 20

2004 ADD B

2005 RST 5

2006 END

Execute the program:

Step1: After entering the program, we get the display

8085 LCD TRAINER KIT

M85-0X _

Press G

Step 2: Display changes to

G0000:00

Here enter starting address of program that has to be executed (2000).

Press **DOT(.)**

Examine or Modify the contents of register:

Step1: After execution of the program, we get the display

8085 LCD TRAINER KIT

M85-0X _

Press R

Press 'Register Identifier' (The Register Identifier table is given below)

Register Identifier	Register
A	Register A
B	Register B
C	Register C
D	Register D
E	Register E
F	Flag byte
I	Interrupt Mask
H	Register H
L	Register L
S	Stack Point MSB & LSB
P	Program Counter MSB & LSB

Step 2: Display changes to

A= 04 –

Here enter the data you want to store or press Enter for next register.

Press **.**

Examine or Modify the contents of register:

Step1: After execution of the program, we get the display

8085 LCD TRAINER KIT

M85-0X _

Press M

Step 2: Display changes to

M

Here enter the address of memory location (2500)

Step 3: Display changes to

2500 45 –

Here enter the data you want to store or press Enter for next location.

At last press **.**

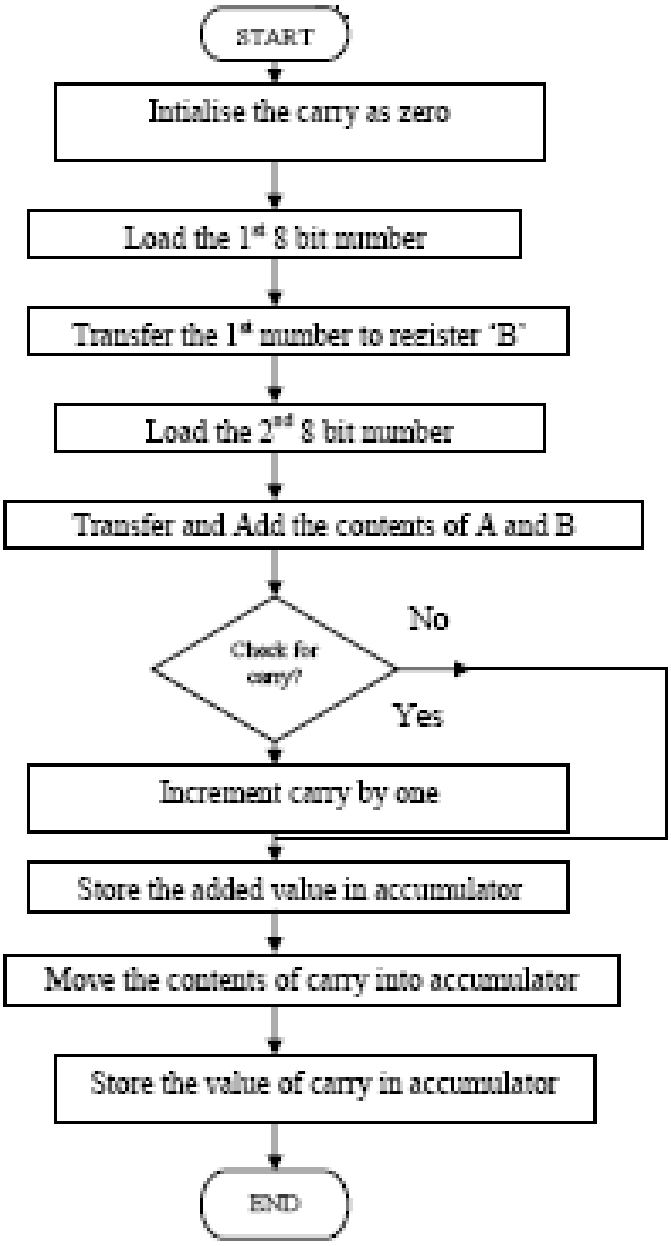
	CSMSS's CHH. Shahu College of Engineering, Aurangabad	LABORATORY MANUAL
	Practical Experiment Instruction Sheet	
	EXPERIMENT TITLE: Adding two 8 bit numbers	
EXPERIMENT NO. : CSMSS/EE/MPLAB/MP/02		
CLASS: TE	**DEPARTMENT:** ELECTRICAL ENGG.	
LABORATORY: MICROPROCESSORS AND MICROCONTROLLER LAB	**YEAR:** 2021-22	**PART:**I	**PAGE:**1

Experiment No. 2

Aim:- To write an assembly language for adding two 8 bit numbers

Apparatus required:
8085 micro processor kit

Algorithm:
Step 1 : Start the microprocessor
Step 2 : Initialize the carry as 'Zero'
Step 3 : Load the first 8 bit data into the accumulator
Step 4 : Copy the contents of accumulator into the register 'B'
Step 5 : Load the second 8 bit data into the accumulator.
Step 6 : Add the 2 - 8 bit data and check for carry.
Step 7 : Jump on if no carry
Step 8 : Increment carry if there is
Step 9 : Store the added request in accumulator
Step 10 : More the carry value to accumulator
Step 11 : Store the carry value in accumulator
Step 12 : Stop the program execution.



Prepared By : Mr. N.N. Nikam	Approved By : Prof. A. N. Mudiraj

Address	Label	Mnemonics	Machine code	Comments
2000		LXI H 2501	21,01,25	Get address of 1st number in H-L pair
2003		MOV A,M	7E	1ST no in accumulator
2004		INX H	23	Increment content of H-L pair
2005		ADD M	86	Add 1st and 2nd numbers
2006		STA 2503	32,03,25	Store sum in 2503 H
2007		RST 5	EF	Stop
		END		

Input :-

Input Address	Value
2501	49
2502	56

Output :-

Output Address	Value
2503	9F

Result:

The assembly language program for 8 bit addition of two numbers was executed successfully by using 8085 microprocessor kit.

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Experiment No. 3

Aim:
To write an assembly language program for adding two 16 bit numbers

Apparatus required:
8085 micro processor kit

Algorithm:
Step 1 : Start the microprocessor
Step 2 : Get the 1st 8 bit in 'C' register (LSB) and 2nd 8 bit in 'H' register (MSB) of 16 bit number.
Step 3 : Save the 1st 16 bit in 'DE' register pair
Step 4 : Similarly get the 2nd 16 bit number and store it in 'HL' register pair.
Step 5 : Get the lower byte of 1st number into 'L' register
Step 6 : Add it with lower byte of 2nd number
Step 7 : tore the result in 'L' register
Step 8 : Get the higher byte of 1st number into accumulator
Step 9 : Add it with higher byte of 2nd number and carry of the lower bit addition.
Step 10 : Store the result in 'H' register
Step 11 : Store 16 bit addition value in 'HL' register pair
Step 12 : Stop program execution

EXPERIMENT TITLE: Subtracting two 8 bit numbers

	Label	Mnemonics	Hex code	Comments
2000		MVI C 00	OE, 00	C = 00H
2002		LHLD 2501	2A, (01, 25)	HL - 1ST NO
2005		XCHG	EB	HL – DE
2006		LHLD 2503	2A (03, 25)	HL – 2ND NO
2009		DAD D	19	Double Addition DE + HL
200A		JNC 200E	D2 (0E, 20)	If Cy = 0, Go to 200E
200D		INR C	0C	C = C + 01
200E	AHEAD	SHLD 2505	22 (05, 25)	HL – 2505 (Sum)
2011		MOV A,C	79	Cy – A
2012		STA 2507	32 (07, 25)	Cy – 2507
2015		RST 5	EF	Stop Execution
		END		

Input
Without carry:-

Input Address	Value
2501	98 H
2502	5B H
2503	4C H
2504	8E H

Output :-

Output Address	Value
2505	E4 (Sum)
2506	E9 (Sum)
2507	00 (Carry)

Input
With carry:-

Input Address	Value
2501	45 H
2502	A6 H
2503	23 H
2504	9B H

Output :-

Output Address	Value
2505	68 (Sum)
2506	41 (Sum)
2507	01 (Carry)

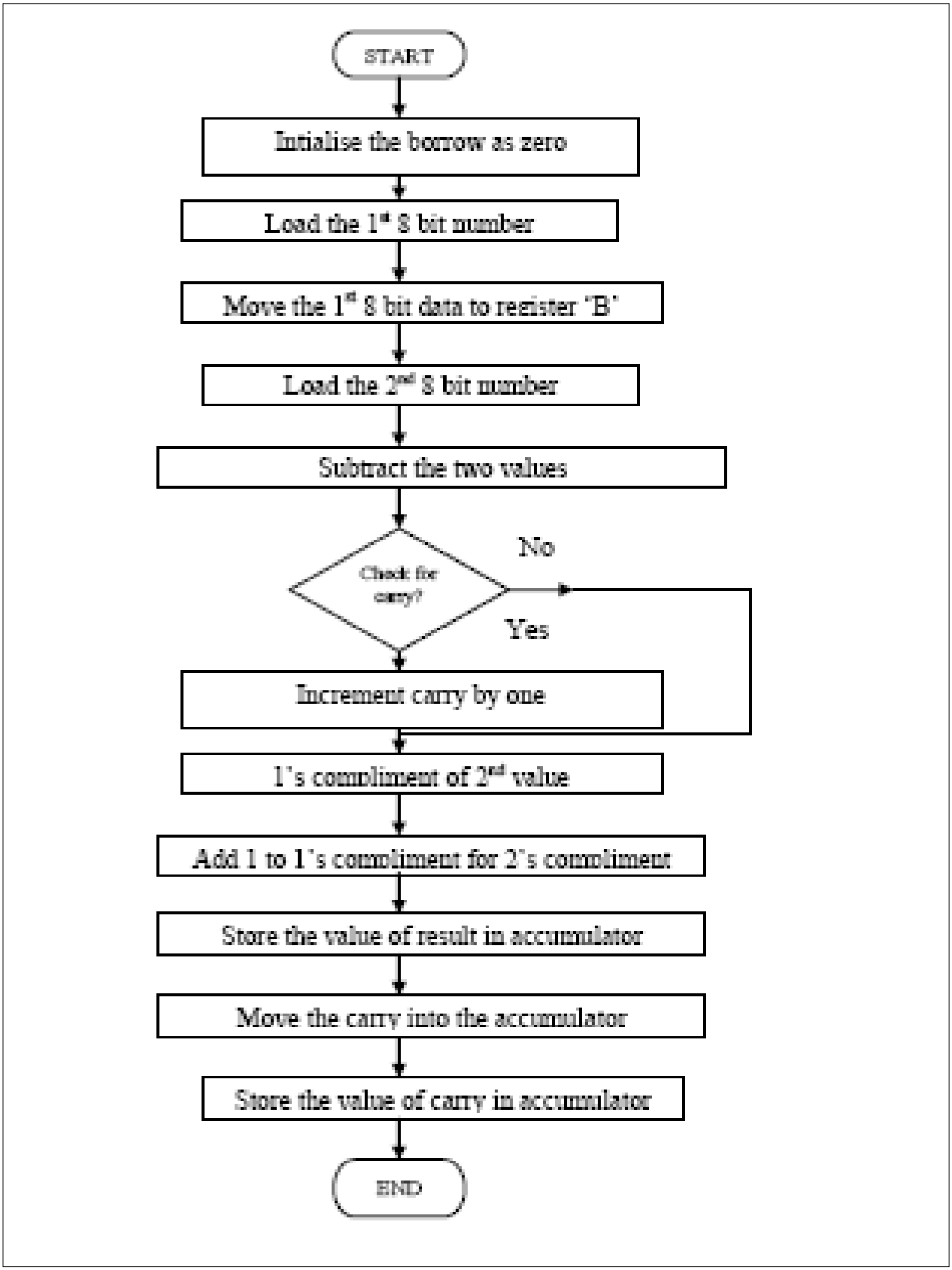
Result:
The assembly language program for addition of two 16 bit numbers was executed using

Experiment No. 4

Aim:- To write an assembly language for subtracting two 8 bit numbers

Apparatus required:
8085 micro processor kit

Algorithm:
Step 1 : Start the microprocessor
Step 2 : Intialize the carry as 'Zero'
Step 3 : Load the first 8 bit data into the accumulator
Step 4 : Copy the contents of contents into the register 'B'
Step 5 : Load the second 8 bit data into the accumulator.
Step 6 : Subtract the 2 8 bit datas and check for borrow.
Step 7 : Jump on if no borrow
Step 8 : Increment borrow if there is
Step 9 : 2's compliment of accumulator is found out
Step 10 : Store the result in the accumulator
Step 11 : More the borrow value from 'c' to accumulator
Step 12 : Store the borrow value in the accumulator
Step 13 : Stop program execution



Prepared By : Mr. N.N. Nikam	Approved By : Prof. A. N. Mudiraj

Address	Label	Mnemonics	Machine code	Comments
2000		LXI H 2501	21,01,25	Get address of 1st number in H-L pair
2003		MOV A,M	7E	1ST number in accumulator
2004		INX H	23	Content of H-L pair increases from 2501 to 2502 H
2005		SUB M	96	1ST NUMBER – 2ND NUMBER
2006		INX H	23	CONTENT OF H-L PAIR BECOMS 2503 H
2007		MOV M,A	77	STORE RESULT IN 2503 H
2008		RST 5	EF	HALT
		END		

Input :-

Input Address	DATA
2501	49 H
2502	32 H

Output :-

Output Address	DATA
2503	17 H

Input :-

Input Address	DATA
2501	F8 H
2502	9B H

Output :-

Output Address	DATA
2503	5D H

Result:
The assembly language program subtraction of two 8 bit numbers was executed successfully by using 8085 microprocessor kit.

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	Practical Experiment Instruction Sheet	
	EXPERIMENT TITLE: Subtracting two 16 bit numbers	

EXPERIMENT NO. : CSMSS/EE/MPLAB/MP/05

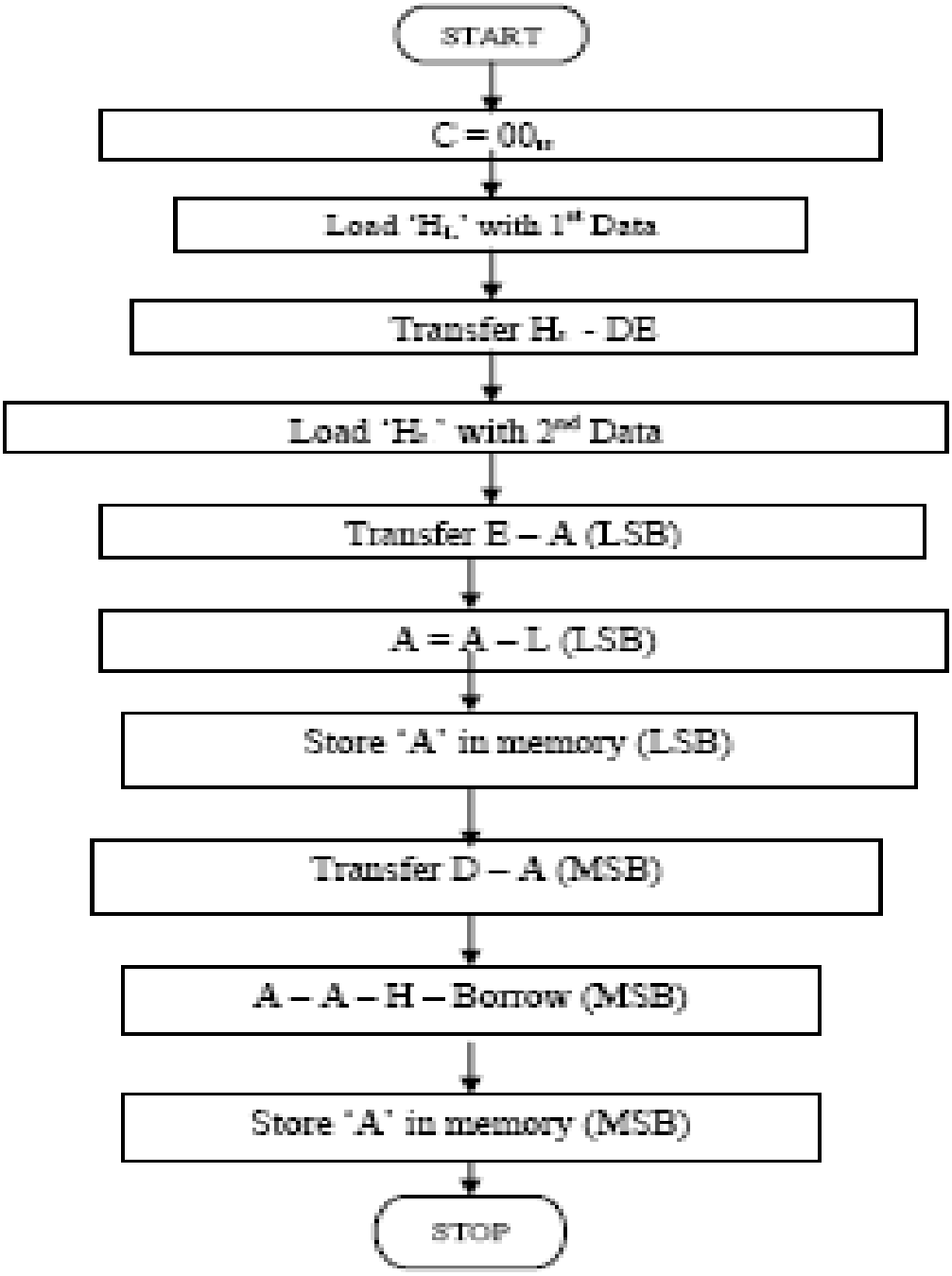
CLASS: TE	**DEPARTMENT:** ELECTRICAL ENGG.		
LABORATORY: MICROPROCESSORS AND MICROCONTROLLER LAB	**YEAR:** 2021-22	**PART:**I	**PAGE:**10

Experiment No. 5

Aim:- To write an assembly language for subtracting two 16 bit numbers

Apparatus required:
8085 micro processor kit

Algorithm:
Step 1 : Start the microprocessor
Step 2 : Get the 1st 16 bit in 'HL' register pair
Step 3 : Save the 1st 16 bit in 'DE' register pair
Step 4 : Get the 2nd 16 bit number in 'HL' register pair
Step 5 : Get the lower byte of 1st number
Step 6 : Get the subtracted value of 2nd number of lower byte by subtracting it with lower byte of 1st number
Step 7 : Store the result in 'L' register
Step 8 : Get the higher byte of 2nd number
Step 9 : Subtract the higher byte of 1st number from 2nd number with borrow
Step 10 : Store the result in 'HL' register
Step 11 : Stop the program execution


START
C = 00H
Load 'HL' with 1st Data
Transfer HL - DE
Load 'HL' with 2nd Data
Transfer E – A (LSB)
A = A – L (LSB)
Store 'A' in memory (LSB)
Transfer D – A (MSB)
A – A – H – Borrow (MSB)
Store 'A' in memory (MSB)
STOP

Address	Label	Mnemonics	Hex code	Comments
2000		MVI C 00	OE, 00	C = 00H
2002		LHLD 2501	2A, (01, 25)	HL – 1st No
2005		XCHG	EB	HL – DE
2006		LHLD 2503	2A, (02, 25)	HL – 2nd No
2009		MOV A,E	7B	LSB of '1' to 'A'
200A		SUB L	95	A = A – L
200B		STA 2505	32 (04, 25)	A - Memory
200E		MOV A,D	7A	MSB of 1 to A
200F		SBB H	9C	A = A – H
2010		STA 2506	32 (05, 25)	A – Memory
2013		RST 5	EF	Stop the program execution
		END		

Input

Without borrow:-	Input Address	Value
	2501	07
	2502	08
	2503	05
	2504	06

Output :-	Output Address	Value
	2505	02
	2506	02

Result:

The assembly language program subtraction of two 16 bit numbers was executed successfully by using 8085 microprocessor kit.

	CSMSS's CHH. Shahu College of Engineering, Aurangabad	LABORATORY MANUAL
	Practical Experiment Instruction Sheet	
	EXPERIMENT TITLE: Ascending Order	

EXPERIMENT NO. : CSMSS/EE/MPLAB/MP/06

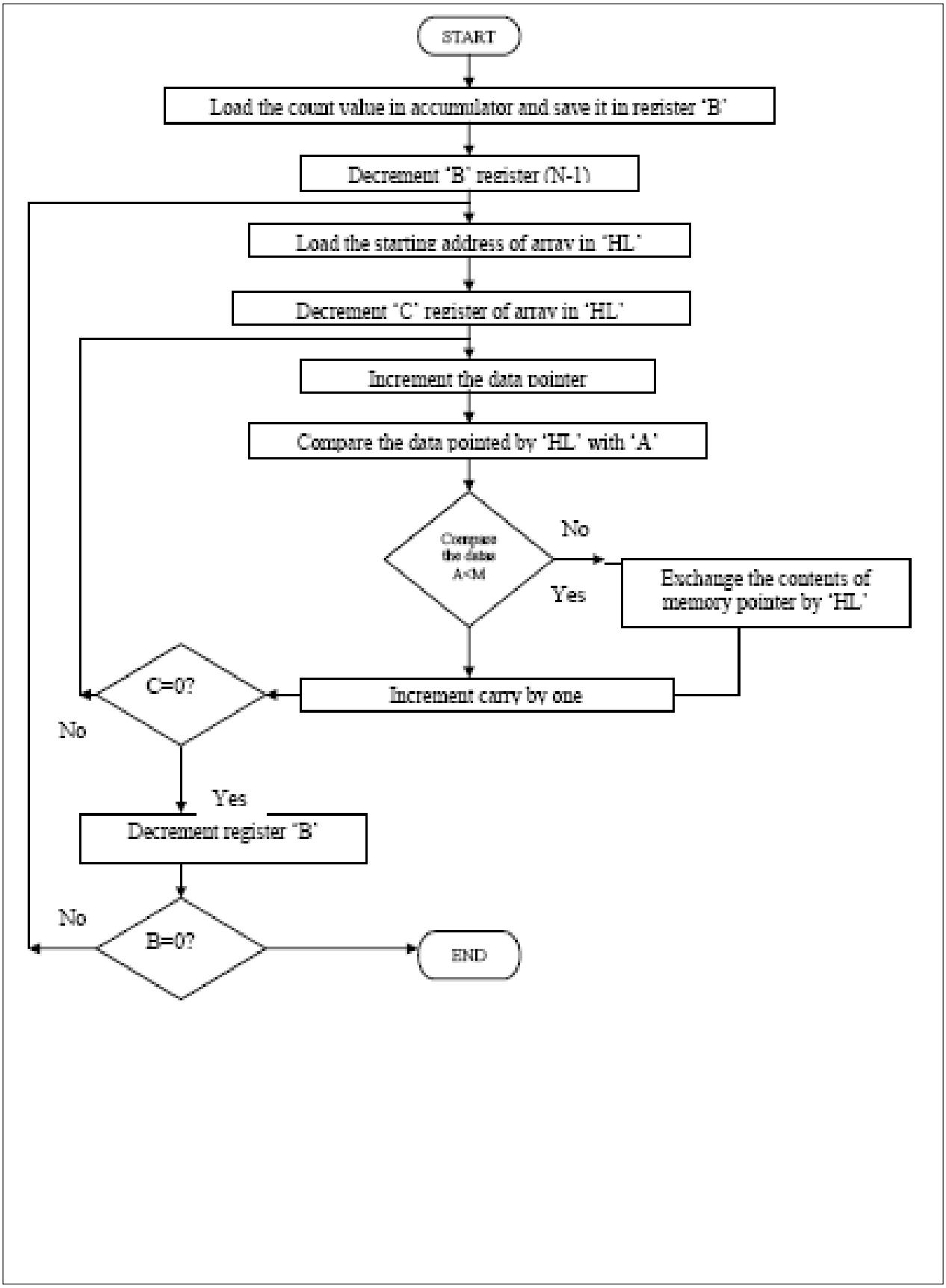
CLASS: TE	**DEPARTMENT:** ELECTRICAL ENGG.		
LABORATORY: MICROPROCESSORS AND MICROCONTROLLER LAB	**YEAR:** 2021-22	**PART:**II	**PAGE:**19

Experiment No. 6

Aim:- To write a program to sort given 'n' numbers in ascending order

Apparatus required:
8085 micro processor kit

Algorithm:
Step 1 : Start the microprocessor
Step 2 : Accumulator is loaded with number of values to sorted and it is saved
Step 3 : Decrement 8 register (N-1) Repetitions)
Step 4 : Set 'HL' register pair as data array
Step 5 : Set 'C' register as counter for (N-1) repetitions
Step 6 : Load a data of the array in accumulator
Step 7 : Compare the data pointed in 'HL' pair
Step 8 : If the value of accumulator is smaller than memory, then jump to step 10.
Step 9 : Otherwise exchange the contents of 'HL' pair and accumulator
Step 10 : Decrement 'C' register, if the of 'C' is not zero go to step 6
Step 11 : Decrement 'B' register, if value of 'B' is not zero, go step 3
Step 12 : Stop the program execution



Prepared By : Mr. N.N. Nikam	Approved By : Prof. A. N. Mudiraj

Address	Label	Mnemonics	Hex code	Comments
2100		LDA 2000	3A, 00,20	Load the number of values
2103		MOV B,A	47	Move it ‘B’ register
2104		DCR B	05	For (N-1) comparisons
2105	Loop 3	LXI H, 2000	21, 00,20	Set the pointer for array
2108		MOV C,M	4E	Count for (N-1) comparisons
2109		DCR C	0D	For (N-1) comparisons
210A		INX H	23	Increment pointer
210B	Loop 2	MOV A,M	7E	Get one data in array ‘A’
210C		INX H	23	Increment pointer
210D		CMP M	BE	Compare next with accumulator
210E		JC 2116	DA, 16, 21	If content less memory go ahead
2111		MOV D,M	56	If it is greater than interchange it
2112		MOV M,A	77	Memory content
2113		DCX H	2B	Exchange the content of memory pointed by ‘HL’ by previous location
2114		MOV M,D	72	One in by ‘HL’ and previous location
2115		INX H	23	Increment pointer
2116	Loop 1	DCR C	0D	Decrement ‘C’ register
2117		JNZ 210B	C2, 0B, 21	Repeat until ‘C’ is zero
211A		DCR B	05	Decrement in ‘B’ values
211B		JNZ 2105	C2, 05, 21	Repeat till ‘B’ is zero
211E		RST 5	EF	Stop the program execution
		END		

Input

Input Address	Value
2000	04
2001	AB
2002	BC
2003	01
2004	0A

Output :-

Output Address	Value
2000	04
2001	01
2002	0A
2003	AB
2004	BC

Result: The assembly language program for sorting numbers in ascending order was executed by microprocessor kit.

	CSMSS's CHH. Shahu College of Engineering, Aurangabad	LABORATORY MANUAL
	Practical Experiment Instruction Sheet	
	EXPERIMENT TITLE: Descending Order	

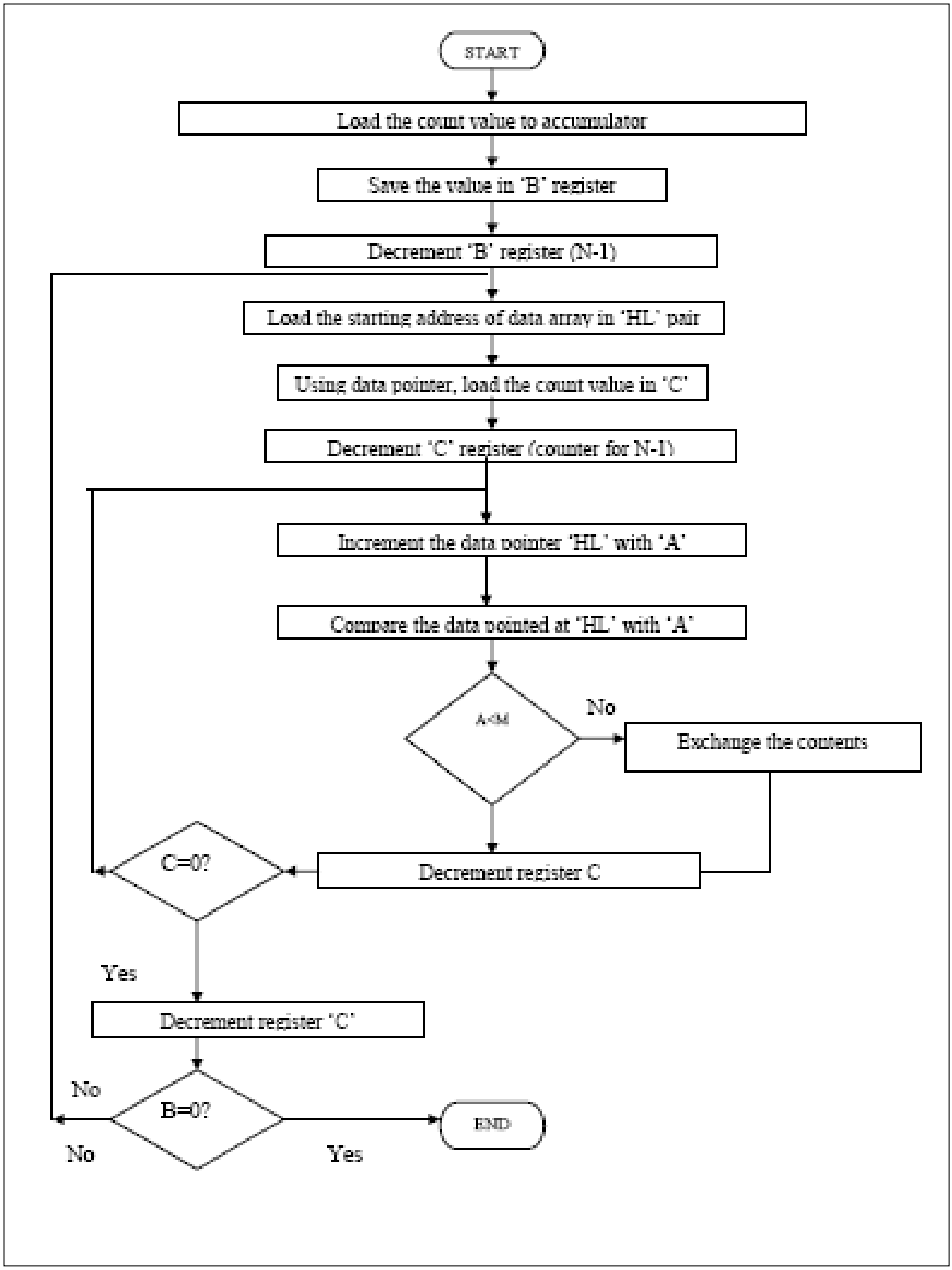
EXPERIMENT NO. : CSMSS/EE/MPLAB/MP/07			
CLASS: TE	**DEPARTMENT:** ELECTRICAL ENGG.		
LABORATORY: MICROPROCESSORS AND MICROCONTROLLER LAB	**YEAR:** 2021-22	**PART:**I	**PAGE:**22

Experiment No. 7

Aim:- To write a program to sort given 'n' numbers in descending order

Apparatus required:
8085 micro processor kit

Algorithm:
Step 1 : Start the microprocessor
Step 2 : Load the number of values into accumulator and save the number of values in register 'B'
Step 3 : Decrement register 'B' for (N-1) Repetitions
Step 4 : Set 'HL' register pair as data array address pointer and load the data of array in accumulator
Step 5 : Set 'C' register as counter for (N-1) repetitions
Step 6 : Increment 'HL' pair (data address pointer)
Step 7 : Compare the data pointed by 'HL' with accumulator
Step 8 : If the value of accumulator is larger than memory, then jump to step 10, otherwise next step.
Step 9 : Exchange the contents of memory pointed by 'HL' and accumulator
Step 10 : Decrement 'C' register, if the of 'C' is not zero go to step 6, otherwise next step.
Step 11 : Decrement 'B' register, if 'B' is not zero, go step 3, otherwise next step.
Step 12 : Stop the program execution



Prepared By : Mr. N.N. Nikam	Approved By : Prof. A. N. Mudiraj

Address	Label	Mnemonics	Hex code	Comments
2100		LDA 4500	3A, 00,20	Load the number of values in accumulator
2103		MOV B,A	47	Move it to 'B' register
2104		DCR B	05	For (N-1) comparisons
2105	Loop 3	LXI H, 4500	21, 00,20	Set the pointer for array
2108		MOV C,M	4E	Count for (N-1) comparisons
2109		DCR C	0D	For (N-1) comparisons
210A		INX H	23	Increment pointer
210B	Loop 2	MOV A,M	7E	Get one data from array
210C		INX H	23	Increment pointer
210D		CMP M	BE	Compare next with number
210E		ICE, 2116	D2, 16,21	If content 'A' is greater than content of 'HL' pair
2111		MOV D,M	56	If it is greater than interchange the datas
2112		MOV M,A	77	Accumulator to memory value
2113		DCX H	2B	Decrement memory pointer
2114		MOV M,D	72	Move the old to 'HL' and previous location
2115		INX H	23	Increment pointer
2116	Loop 1	DCR C	0D	Decrement 'C' register
2117		JNZ 210B	C2, 0B, 21	Repeat till 'C' is zero
211A		DCR B	05	Decrement in 'B' values
211B		JNZ 2105	C2, 05, 21	Jump to loop till the value of 'B' be
211E		RST 5	EF	Stop the program execution
		END		

Input

Input Address	Value
2000	04
2001	AB
2002	BC
2003	01
2004	0A

Output :-

Output Address	Value
2000	04
2001	BC
2002	AB
2003	0A
2004	01

Result:

The assembly language program for sorting numbers in descending order was executed by microprocessor kit.

	CSMSS's CHH. Shahu College of Engineering, Aurangabad	LABORATORY MANUAL
	Practical Experiment Instruction Sheet	
	EXPERIMENT TITLE: Speed control of Stepper Motor	

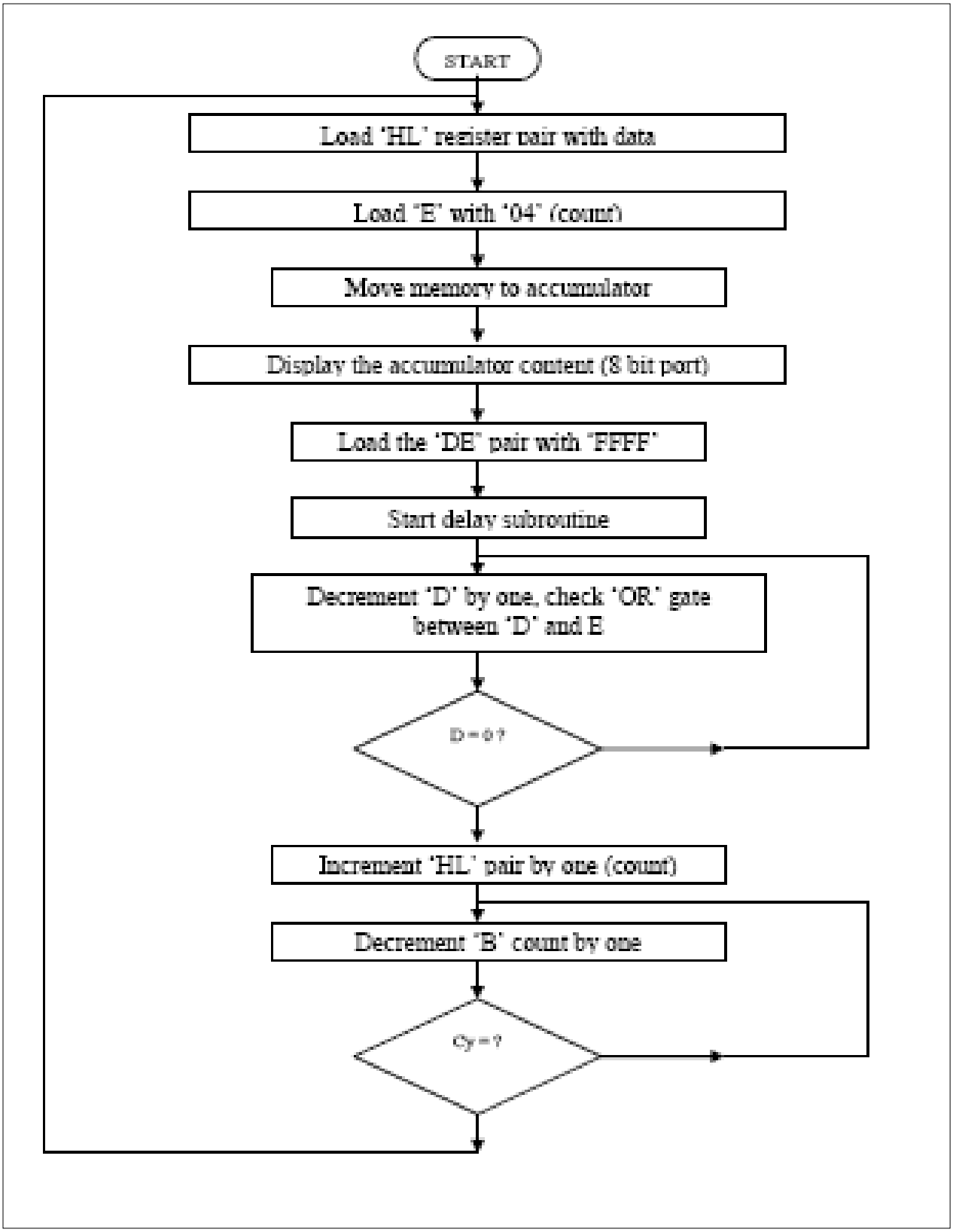
EXPERIMENT NO. : CSMSS/EE/MPLAB/MM/08			
CLASS: TE	**DEPARTMENT:** ELECTRICAL ENGG.		
LABORATORY: MICROPROCESSORS AND MICROCONTROLLER LAB	**YEAR:** 2021-22	**PART:**I	**PAGE:**25

Experiment No. 8

Aim:- To write an assembly program to make the stepper motor run in forward and reverse direction.

Apparatus required:
8085 micro processor kit

Algorithm:
Step 1 : Load the 'HL' pair wit value from table
Step 2 : Move it to 'B' register for setting the counter
Step 3 : Move the memory value to accumulator and display it by control word
Step 4 : Load 'DE' register pair with FFFF for starting delay subroutine
Step 5 : Run the delay loop control D-register becomes zero.
Step 6 : Increment 'H' address for next value from table
Step 7 : Jump on no zero
Step 8 : When B = 0, go to start and restart the program



Prepared By : Mr. N.N. Nikam	Approved By : Prof. A. N. Mudiraj

Address	Label	Mnemonics	Hex code	Comments
2100	Start	LXI 211A	21,1A,41	Load the 'HL' with data
2103		MVI B 04	06,04	B = 04
2105	Repeat	MOV A,M	7E	Memory value to 'A'
2106		OUT	C0	Display it
2108		LXI 0303	D,03,03	Load 'DE' with FFFF
210B		Delay	NOP	Start delay loop
210C		DCX D	1B	Decrement DE by 1
210D		MOV A,E	7B	Move 'E' to 'A'
210E		ORA D	B2	Check De = 0 or not
210F		JNZ DELAY	C2, 0B, 21	Jump on zero
2112		INX H	23	Increment HL by 1
2113		DCR B	05	Decrement B by 1
2114		JNZ Repeat	C2, 05, 21	Jump on no zero
2117		JMP START	C3, 00, 21	Jump to start
		END		

Input

Input Address	Value
211A	0A
211B	06
211C	05
211D	09

Reverse Direction :-

Output Address	Value
211A	09
211B	05
211C	06
211D	0A

Result:

Thus, an assembly language program to control of stepper motor was written using 8085 microprocessor kit.

	CSMSS's CHH. Shahu College of Engineering, Aurangabad	LABORATORY MANUAL
	Practical Experiment Instruction Sheet	
	EXPERIMENT TITLE: Study of Microcontroller Programming Kit	

EXPERIMENT NO. : CSMSS/EE/MCLAB/MC/09			
CLASS: TE	**DEPARTMENT:** ELECTRICAL ENGG.		
LABORATORY: MICROPROCESSORS AND MICROCONTROLLER LAB	**YEAR:** 2021-22	**PART:**I	**PAGE:**1

Experiment No. 9

Aim:- To Study of 8051Microcontroller Kit used in laboratory.

Apparatus required:
8051 microcontroller kit

General Description:

XPO 8051 series micro trainer kit is double board Microcontroller Training kit based on 8051 Microcontroller. It consist of top board called as MB or mother board and piggyback called as MPU connected under it.

The MPU consist of 8- bit microcontroller IC two or three PAL's to implement memory and IO address space decoder logic. Tow EPROM (27512) containing monitor program.

The MB consist of Two PPI (8255) One PTC (8253) One USART (8251) with one RS232 port. One RTC (58167) provides powerful monitor EPROM and user's RAM. The kit has 101 IBM compatible PC keyboard and 16 x 2 LCD display for any data entry or display. This kit has line assemble feature so that one can enter the program in assembly language.

System Capabilities:

11. Examine the contents of any memory location.
12. Examine/Modify the contents of any of the Microcontroller internal registers.
13. Modify the contents of any of the RAM location.
14. Move a block of data from one location to another location.
15. Insert one or more instructions in the user program.
16. Delete one or more instructions from the user program.
17. Relocate a program written for some memory area to some other memory area.
18. Find out string of data lying at a particular address.
19. Fill the particular memory area with a constant.

18. Insert one or more data bytes in the user's program/data area.
19. Delete one or more data bytes from the user's program/data area.
20. Enter any program in a mnemonics form using Assembler.
21. Examine any program in a mnemonics as well as intel hex code using disassembler.
22. Execute a program at full clock speed.
23. Execute a program in single step i.e., instruction by instruction.
24. Print the content of any memory location.

Entering the program using assembler mode software as follows:

Step1: The kit is powered on and we get the display

ANSHUMAN

Now it is in command mode.

Press **E**

Step 2: Display changes to

A – ASSEMBLE MODE

C – DISASSEMBLE MODE

Press **A**

Step 3: Display changes to

ADR:

6000

Here we can change the starting address. Enter the starting address of the program (example **ORG 6150H**)

Step 4: Now start entering the program. The address of instruction will be displayed Automatically

Example:

Address	Mnemonics
6000	MOV A,#20H
6002	MOV 0F0H,#21H
6005	ADD A,0F0H
600B	RET

Execute the program:

Step	Press Key	Display	Description
1	**Esc**	**COMMAND=**	Come to command mode.
2	**G**	**GO TO?**	Use Goto command to execute program
3	**CR (ENTER)**	**BRUST**	Use go to burst mode.
4	**CR (ENTER)**	**ADDR**	Asks program address.
Here enter starting address of program that has to be executed (Ex 6000).			
5	**CR (ENTER)**	**WAIT DONE**	Program executed.

Examine or modify the contents of registers:

Result: Thus we have studied the 8051 microcontroller programming kit.To perform assembly programming and execution.

	CSMSS's CHH. Shahu College of Engineering, Aurangabad	LABORATORY MANUAL
	Practical Experiment Instruction Sheet	
	EXPERIMENT TITLE: Transfer Data From Internal RAM To External RAM Location	
EXPERIMENT NO. : CSMSS/EE/MC LAB/MC/10		
CLASS: TE	**DEPARTMENT:** ELECTRICAL ENGG.	
LABORATORY: MICROPROCESSORS AND MICROCONTROLLER LAB	**YEAR:** 2021-22	**PART:**I / **PAGE:**1

Experiment No. 10

Aim:- To write an assembly language program to transfer content of internal RAM to external RAM

Apparatus required:
8051 micro controller kit

Algorithm:
Step 1 : start the 8051 microcontroller kit.
Step 2 : initialize External data memory pointer
Step 3 : Copy the content of address 20 H to Acc.
Step 4 : Copy the content of Acc. To external data pointer pointed by DPTR
Step 5 : Increment DPTR by one
Step 6 : Copy the content of address 21 H to Acc.
Step 7 : Copy the content of Acc. To external data pointer pointed by DPTR
Step 8 : Increment DPTR by one
Step 9 : Copy the content of address 22 H to Acc.
Step 10 : Copy the content of Acc. To external data pointer pointed by DPTR
Step 11 : Increment DPTR by one
Step 12 : Copy the content of address 23 H to Acc.
Step 13 : Copy the content of Acc. To external data pointer pointed by DPTR

Address	Label	Mnemonics	Machine code	Comments
7000		MOV DPTR,#7400 H	90,74,00	External data memory pointer
7003		MOV A,20 H	E5,20	Copy the content of address 20 H to Acc.
7005		MOVX @DPTR,A	F0	Copy the content of Acc. To external data pointer pointed by DPTR
7006		INC DPTR	A3	Increment DPTR by one
7007		MOV A,21 H	E5,21	Copy the content of address 21 H to Acc.
7009		MOVX @DPTR,A	F0	Copy the content of Acc. To external data pointer pointed by DPTR
700A		INC DPTR	A3	Increment DPTR by one
700B		MOV A,22 H	E5,22	Copy the content of address 22 H to Acc.
700D		MOVX @DPTR,A	F0	Copy the content of Acc. To external data pointer pointed by DPTR
700E		INC DPTR	A3	Increment DPTR by one
700F		MOV A,23 H	E5,23	Copy the content of address 23 H to Acc.
7011		MOVX @DPTR,A	F0	Copy the content of Acc. To external data pointer pointed by DPTR
7012		RET	22	

Input :-

Address	Data
20	
21	
23	
24	

Output :-

Address	Data
7400	
7401	
7402	
7403	

Result: The assembly language program to transfer content of internal RAM to external RAM was executed successfully by using 8051 microcontroller kit.

	CSMSS's CHH. Shahu College of Engineering, Aurangabad	LABORATORY MANUAL
	Practical Experiment Instruction Sheet	
	EXPERIMENT TITLE: Adding two 8 bit numbers	

EXPERIMENT NO. : CSMSS/EE/MCLAB/MC/11

CLASS: TE	**DEPARTMENT:** ELELECTRICAL ENGG.		
LABORATORY: MICROPROCESSORS AND MICROCONTROLLER LAB	**YEAR:** 2021-22	**PART:**I	**PAGE:**3

Experiment No.11

Aim:
To write an assembly language program for adding two 8 bit numbers

A) With carry **B) without carry**.

Apparatus required:
8085 micro processor kit

Algorithm:

A) Addition of 8 bit no with carry.

Step 1 : External data memory pointer
Step 2 : Load the content in Acc. pointed by DPTR
Step 3 : Increment DPTR by one
Step 4 : Copy the content of Acc. to R0
Step 5 : Load the content in Acc. pointed by DPTR
Step 6 : Add the content of Acc. And R0 , store result in Acc.
Step 7 : Increment DPTR by one
Step 8 : Store result in external RAM

Address	Label	Mnemonics	Hex code	Comments
7000		MOV DPTR,#7400 H	90,74,00	External data memory pointer
7003		MOVX A,@DPTR	E0	Load the content in Acc. pointed by DPTR
7004		INC DPTR	A3	Increment DPTR by one
7005		MOV R0,A	F8	Copy the content of Acc. to R0
7006		MOVX A,@DPTR	E0	Load the content in Acc. pointed by DPTR
7007		ADD A,R0	28	Add the content of Acc. And R0 , store result in Acc.
7008		INC DPTR	A3	Increment DPTR by one
7009		MOVX @DPTR,A	F0	Store result in external RAM
700A		RET	22	

Input :-

Address	Data
7400	
7401	

Output :-

Address	Data
7402	

B) Addition of 8 bit no with carry.

Step 1 : Clear the content of internal RAM address 31 H
Step 2 : Copy the content of address 20 H to Acc.
Step 3 : Add the content of Acc. And internal RAM location 21 H store the result in Acc.
Step 4 : Store LSB of result
Step 5 : Clear Acc. Register
Step 6 : MSB of result
Step 7 : Store MSB of result

Address	Label	Mnemonics	Hex code	Comments
7000		MOV 31,#00H	75,31,00	Clear the content of internal RAM address 31 H
7003		MOV A,20H	E5,20	Copy the content of address 20 H to Acc.
7005		ADD A,21H	25,21	Add the content of Acc. And internal RAM location 21 H store the result in Acc.
7007		MOV 30H,A	F5,30	Store LSB of result.
7009		MOV A,#00H	74,00	Clear Acc. Register
700B		ADDC A,31H	35,31	MSB of result
700D		MOV 31,A	F5,31	Store MSB of result
700F		RET	22	

Input :-

Address	Data
20	
21	

Output :-

Address	Data
30 (LSB)	
31 (MSB)	

Result: The assembly language program for addition of two 8 b1it numbers was executed using 8051 microcontroller kit.

	CSMSS's CHH. Shahu College of Engineering, Aurangabad	LABORATORY MANUAL
	Practical Experiment Instruction Sheet	
	EXPERIMENT TITLE: Subtracting two 8 bit numbers	

EXPERIMENT NO. : CSMSS/EE/MCLAB/MC/12

CLASS: TE	**DEPARTMENT:** ELECTRICAL ENGG.		
LABORATORY: MICROPROCESSORS AND MICROCONTROLLER LAB	**YEAR:** 2021-22	**PART:**I	**PAGE:**7

Experiment No. 12

Aim:- To write an assembly language for subtracting two 8 bit numbers

A) Data is stored in external RAM location.

B) Data is stored in internal RAM location.

Apparatus required:
8051 microcontroller kit

Algorithm:

A) Data is stored in external RAM location.

Step 1 : Clear Carry
Step 2 : External memory data pointer
Step 3 : Load data in Acc.
Step 4 : Increment DPTR by one
Step 5 : Copy the content of Acc. to R0
Step 6 : Load the data in Acc.
Step 7 : (A)-(R0)-(CF)=A
Step 8 : Increment DPTR by one
Step 9 : Store result

Address	Label	Mnemonics	Hex code	Comments
7000		MOV 0D0H,#00H	75,D0,00	Clear Carry
7003		MOV DPTR,#7400 H	90,74,00	External memory data pointer
7006		MOVX A,@DPTR	E0	Load data in Acc.
7007		INC DPTR	A3	Increment DPTR by one
7008		MOV R0,A	F8	Copy the content of Acc. to R0
7009		MOVX A,@DPTR	E0	Load the data in Acc.
700A		SUBB A,R0	98	(A)-(R0)-(CF)=A
700B		INC DPTR	A3	Increment DPTR by one
700C		MOVX @DPTR,A	F0	Store result
700D		RET	22	

Input :-

Address	Data
7400	
7401	

Output :-

Address	Data
7402	

B) Data is stored in internal RAM location.

Step 1 : Clear Carry
Step 2 : Load data in Acc.
Step 3: (A)-(21H)-(CF)=A
Step 4 : Store result

Address	Label	Mnemonics	Hex code	Comments
7000		MOV 0D0H,#00H	75,D0,00	Clear Carry
7003		MOV A,20 H	E5,20	Load data in Acc.
7005		SUBB A,21 H	95,21	(A)-(21H)-(CF)=A
7007		MOV 22H,A	F5,22	Store result
7009		RET	22	

Input :-

Address	Data
20	
21	

Output :-

Address	Data
22	

Result:

The assembly language program subtraction of two 8 bit numbers was executed successfully by using 8051 microcontroller kit.

Experiment No. 13(A)

Aim:-A) To write an assembly language for multiply two numbers stored in internal RAM

Apparatus required:
8051 microcontroller kit

Algorithm:
Step 1 : Load data in Acc.
Step 2 : load data in B
Step 3 : A×B (multiply)
Step 4 : store LSB of result
Step 5 : Store MSB of result

Address	Label	Mnemonics	Hex code	Comments
7000		MOV A,15H	E5,15	Load data in Acc.
7002		MOV 0F0H,22H	85,22,F0	load data in B
7005		MUL AB	A4	A×B (multiply)
7006		MOV 23,A	F5,23	store LSB of result
7008		MOV 24H,0F0H	85,F0,24	Store MSB of result
700B		RET	22	

Input :-

Address	Data
15	
22	

Output :-

Address	Data
23	
24	

Result:

The assembly language program assembly language for multiply two numbers stored in internal RAM was executed successfully by using 8051 microcontroller kit.

Experiment No. 13(B)

Aim:- To write an assembly language for Divide two numbers stored in internal RAM.

Apparatus required:
8051 microcontroller kit

Algorithm:
Step 1 : Load data in Acc.
Step 2 : load data in B
Step 3 : Divide A by B
Step 4 : store quotient
Step 5 : Store reminder

Address	Label	Mnemonics	Hex code	Comments
7000		MOV A,20H	E5,20	Load data in Acc.
7002		MOV 0F0H,21H	85,21,F0	load data in B
7005		DIV AB	84	Divide A by B
7006		MOV 22,A	F5,22	store quotient
7008		MOV 23H,0F0H	85,F0,23	Store reminder
700B		RET	22	

Input :-

Address	Data
20	
21	

Output :-

Address	Data
22(quotient)	
23(reminder)	

Result:

The assembly language program assembly language for divide two numbers stored in internal RAM was executed successfully by using 8051 microcontroller kit.