Date

Expt. No. Page No. 1 1 1

List Of EXPERIMENT

1. To Study 8085 microprocessor System
2. Write a programming 8085 microprocessor for Decimal, Hexadecimal addition and substration of two numbers.
3. Write program using 8085 microprocessor for addition and Substraction of two BCD numbers.
4. To Perform multiplication and division of two 8-bit number using 8085.
5. To find the largest and smallest number binary array of data using 8085 instruction asset.
6. To Write a program to arrange an array of data in ascending and descending order.
7. To Convert given hexadecimal number into it sequivalent ASCII numbers and vice versa using 8085 instructions set.

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8. To Perform interfacing of Rom chip to 8085.

9. To Perform interfacing of 8055 PPI.

10. To interface 8253 programmable interval times to 8085 and verify the Operations of 8253 in six different modes.

Teacher's Signature :

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Expt. No. Page No. 3

EXPERIMENT No.-01

Aim :- Study of 8085 - Microprocessor System.

Apparatus :- 8085 microprocessor kit.

Theory :- 8085 is pronounced as "eighty-eighty-five" microprocessor. It is an 8-bit microprocessor designed by inter in 1977 using NMOS technology.

It has following conifiguration -

- 8 bit data bus
- 16-bit address, bus, which can address 64-KB
- A 16-bit program counter
- A 16-bit stack pointer
- Six 8-bit registers arranged in pairs : BC, DE, HL.
- Requires +5V supply to operate at 3:2 MHz single phase clock.

Accumulator :- It is 8-bit register used to perform arithmetic logical, I/o & Load/Store Operations. It is connected to internal data bus & ALU.

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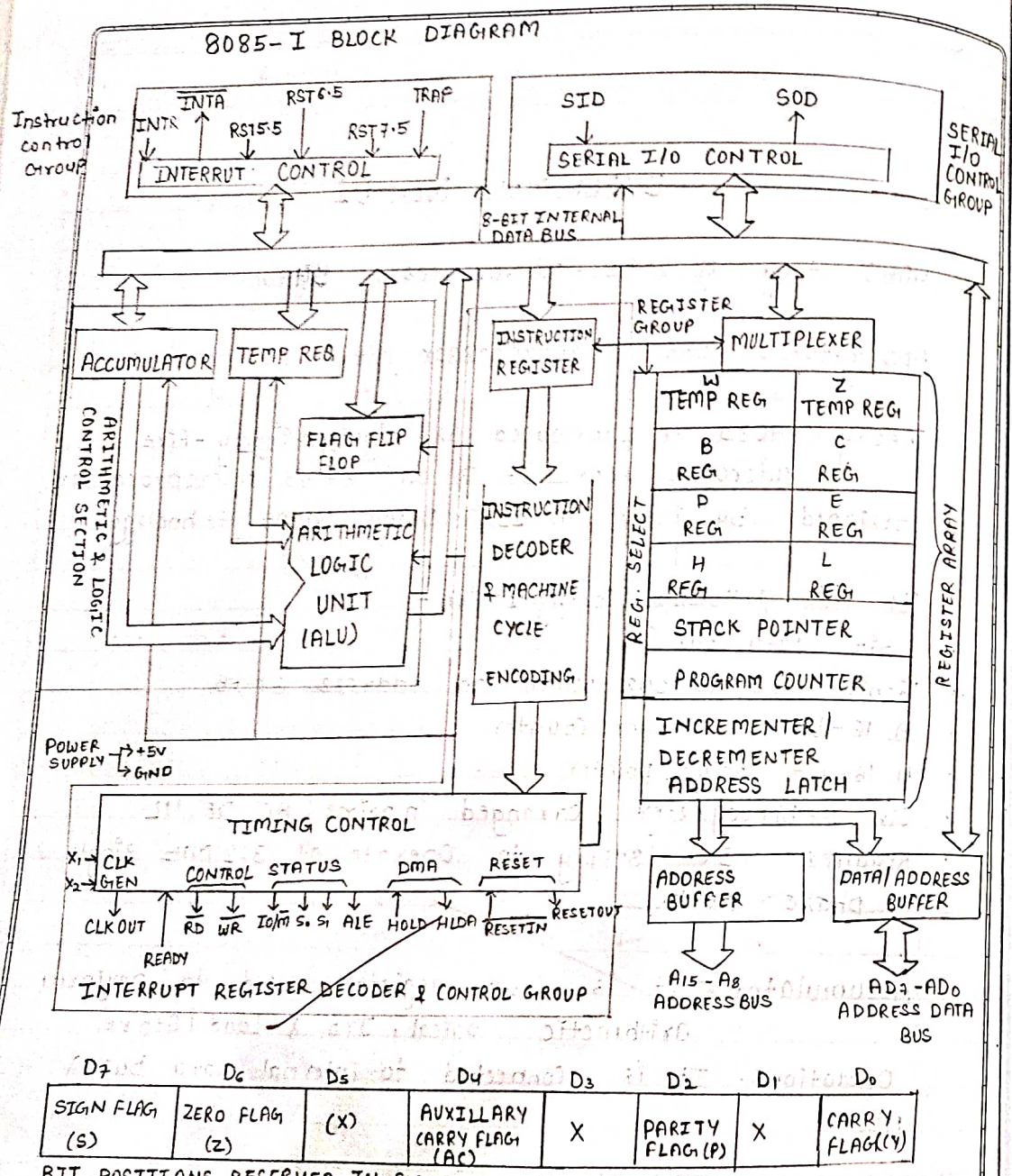
8085-I BLOCK DIAGRAM



D7	D6	D5	D4	D3	D2	D1	D0
SIGN FLAG (S)	ZERO FLAG (Z)	(X)	AUXILLARY CARRY FLAG (AC)	X	PARITY FLAG (P)	X	CARRY FLAG (CY)

BIT POSITIONS RESERVED IN FLAG REGISTER

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Arithmetic And Logic Unit :- As the name suggest it performs arithmetic and logical operations like addition, substraction AND, OR, etc on 8-bit data.

General Purpose Register :- There are 6 general purpose registers in 8085 processor, B, C, D, E, H, & L. Each register can hold 8-bit data.

Program Counter :- It is a 16-bit register used to store the memory address location of the next instruction to be executed microprocessor increment the program whenever an instruction is being executed, so that the program counter points to the memory address of the next instruction that is going.

Stack Pointer :- It is also a 16-bit register works like stack, which is always incremented / decremented by 2 during Push and Pop operations.

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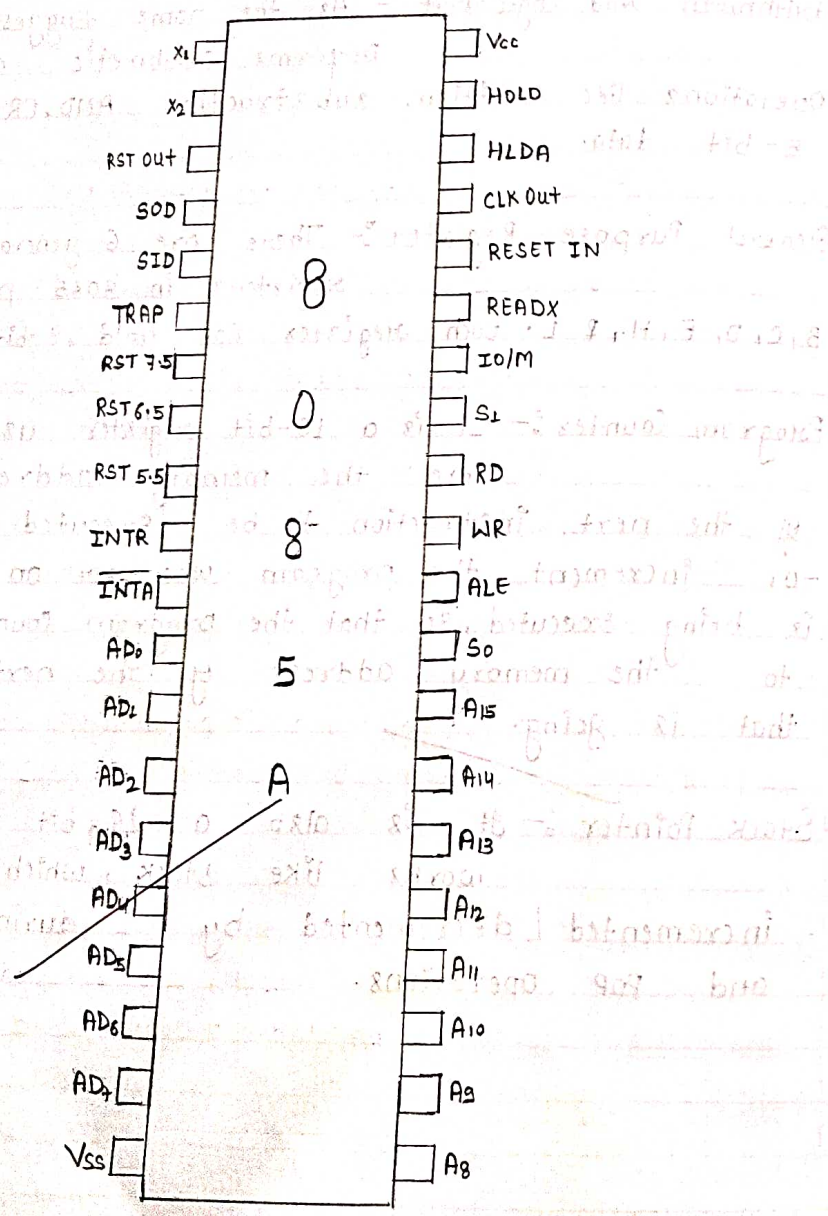
PIN Diagram



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Temporary register :- It is an 8-bit register, which holds the temporary data of arithmetic and logical operation.

Flag register :- It is an 8-bit register having five 1-bit flip-flop which holds either 0 or 1 depending upon the result stored in accumulator.

There are the set of 5 flip-flop.

→ Sign (S)
→ Zero (Z)
→ Auxilary carry (AC)
→ Parity (P)
→ Carry (C)

Instruction Register And decoder

It is an 8-bit register when an instruction is fetched from memory then it is stored in the instruction register. Instruction decoder decodes the information present in the instruction register.

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Timing And Control Unit

It provide timing and control signal to the microprocessor to perform Operation following are the timing and control signals, which control External and internal circuits.

Control signals : Ready, 'RD', 'WR', ALE.

Status Signals : S_0, S_1, IO/M

DMA signals : HOLD, HLDA

RESET Signals : Reset in, Reset Out.

Interrupt Control :- It Controls the interrupt during a process. When a microprocessor is Executing a main program and whenever an interrupt Occurs, the microprocessor shifts the Control from the main program to Process the incoming request.

INTR, 7.5 RST, 6.5 RST, 5.5 RST, TRAP

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Address Buffer And Address Data Buffer

The Content Stored in the Stack Pointer and Program Counter is loaded into the address buffer and address - data buffer to Communicate with the CPU. The memory and I/O chips are connected to these buses, the CPU can Exchange the desired data with the memory and I/O chips.

The Pins of 8085 microprocessor classified into seven Address bus.

A15 - A8, it Carries the most significant 8-bits of memory / IO address.

Data Bus :- AD7 - AD0, it Carries the least significant 8-bit address and data bus.

Control And Status Signals

These are used to identify the nature of operation There are 3 Control signal and 3 status signals.

Three Control Signals are RD, WR & ALE.

RD :- This signal indicates that the selected IO or memory device is to be read and it ready for accepting data available on the data bus.

WR :- This signal indicates that the selected data on the data bus is to be written into selected memory or IO location.

ALE :- It is a positive going pulse generated when a new operation is started by microprocessor when the pulse goes high, it indicates address when the PULSE goes down it indicates data.

Clock Signals :- There are 3 clock signals, i.e X[X_1, X_2, CLKout]

X_1, X_2 : A Crystal (RC, LC, N/W) is connected at these two pins and is used to set frequency of the internal clock generated. This frequency is internally divided by 2.

CLK Out :- This signal is used as the system clock for device connected with microprocessor.

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Interrupts & Externally Signals :- Interrupts are the signal generated by microprocessor to perform task.

INTA: It is an interupt acknowledge signal.

Reset In: Reset Program Count to zero.

Reset Out: Reset All connected device

Ready: Ready to send or recive data.

HOLD: Another master is requesting the use of address and data bus.

HLDA (Hold Acknowledge): It indicates that the CPU has received the Hold request and it will relinquish the bus in next clock cycle.

Serial I/O Signals :- There are 2 special signal i.e SID & SOD there signal are used for serial Communication.

SOD-The Output SOD is set/reset as specified by SIm

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STD - The data on this line is loaded into accumulator whenever a pin instruction is executed.

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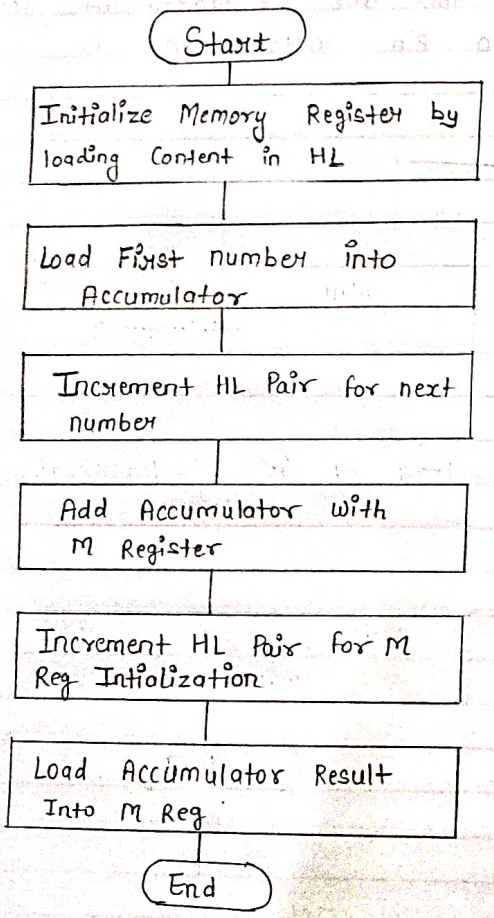
Flow Chart :- Addition of two 8 bit hexadecimal no. using 8085 microprocessor



Date

Expt. No. 2(A) Page No. 11

EXPERIMENT. No. - 02

Aim :- Write a program using 8085 microprocessor for decimal, hexadecimal, addition and subtraction of two numbers.

Program for addition of two 8-bit Hexadecimal Numbers

Memory Address	Instruction Mnemonics	Operands	Comments
2000 H	LXI	H 2400H	Get the address of 1st no. in HL register pair
2003H	MOV	A, M	Move no. into accumulator
2004H	INX	H	HL register pair points the address 2401 H.
2005H	ADD	M	Add the second no. with the Contents of A & result store into A.
2006 H	INX	H	HL Points to 2402H
2007 H	MOV	M, A	Store result in 2402 H
2009 H	HLT		Stop

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Date

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Inputs:

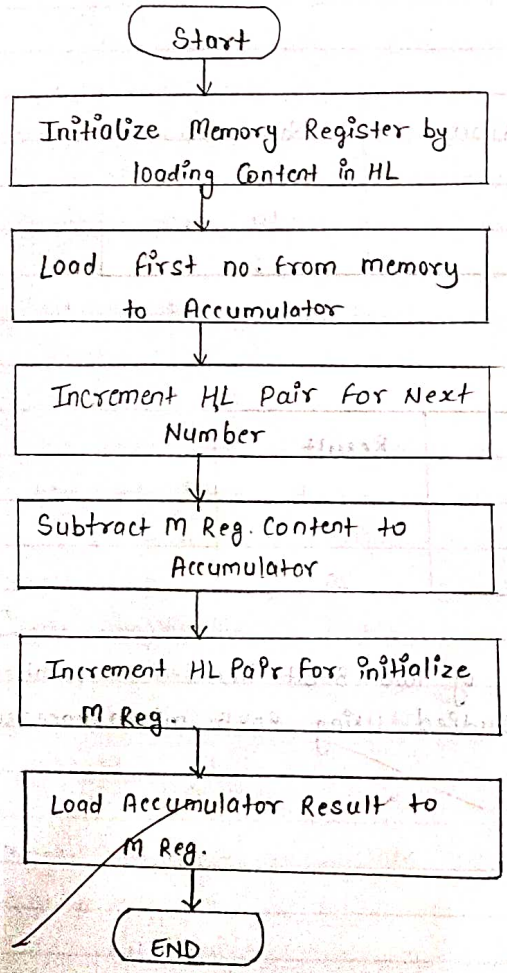
Memory location	Numbers
2400	10
2401	10

Output:

Memory location	Result
2402	20

Result:- Addition of two 8-bit hexadecimal numbers has been studied using 8085 microprocessor kit.

Teacher's Signature : Sivarama
14/02/23



Date 14/02/23

Expt. No. 2. (B) Page No. 13

Program for Subtraction Of Two 8-bit Hexadecimal Numbers:

Memory Address	Instruction Mnemonics	Operands	Comments
2000H	LXI	H, 2400H	Get the address of 1st no. in HL register pair
2003H	MOV	A, M	Move no. into Accumulator
2004H	INX	H	HL register pair points the address 2401H
2005H	SBB	M	Subtract the second no. from the first Number
2006H	INX	H	HL Points to 2402H
2007H	MOV	M, A	Store result in 2402H
2008H			
2009H	HLT		Stop

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INPUTS:

Memory Location	Numbers
2400	50
2401	80

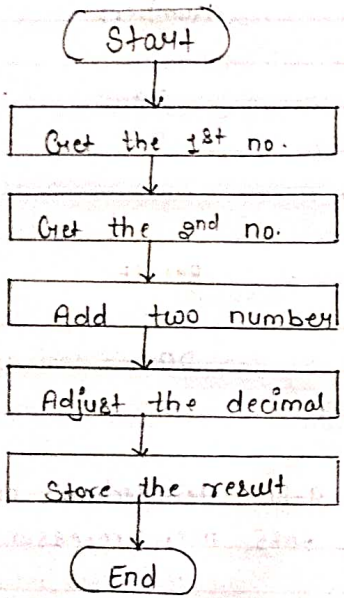
Outputs:

Memory location	Result
2402	D0

Result:

Subtraction of two 8-bit Hexadecimal numbers has been studied using 8085 microprocessor kit.

Teacher's Signature : Sreejarema 14/02/25



Flow chart of two 8 bit BCD number for Addition

Date

Expt. No. 3(A) Page No. 15

EXPERIMENT. NO.- 03(A)

Aim :- Write a program using 8085 microprocessor for addition of two BCD numbers.

Program for Addition of Two 8 Bit BCD Numbers:

Memory Address	Instruction Mnemonics	Operands	Comments
2000	LXI	H, 3000H	Get the first no.
2003	MOV	A, M	Move the no. to Accumulator
2004	INX	H	Get the second no.
2005	ADD	M	Add the two nos.
2006	DAA		Get a valid BCD no.
2007	INX	H	Increment the HL register pair.
2008	MOV	M, A	Move the result to next memory location.
2009	HLT		Stop

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Inputs:

Memory Location	Numbers
3000	25
3001	15

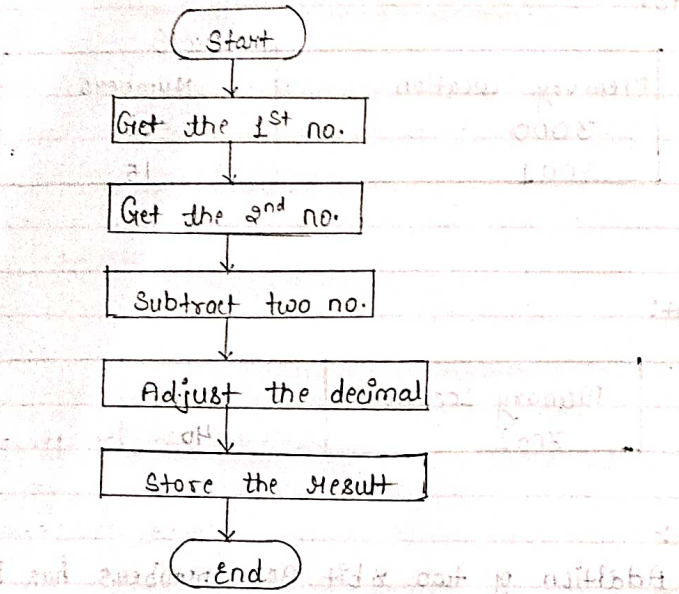
Output:

Memory Location	Result
3002	40

Result:-

Addition of two 8 bit BCD numbers has been performed using 8085 microprocessor kit.

Teacher's Signature : Swaminee 2/02/23



Flow Chart for Subtraction of two BCD Number

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EXPERIMENT No. 3(b)

Aim :- Write a program using 8085 microprocessor for subtraction of two BCD numbers.

Memory Address	Instruction Mnemonics	Operands	Comments
2000 H	LXI	H, 2401 H	Get the address of 2nd no. in HL register pair.
	MOV	A, M	
2003 H	MVI	A, 99H	Move no. 99 into Accumulator
2005 H	SUB	M	Subtract content of HL register pair points address 2401H from 99.
2006 H	INR	A	Increment the content of A

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2007 H	DCX	H	Decrease the content of HL pair.
2008 H	ADD	M	Add the two no.
2009 H	DAA		Decimal adjust accumulator
200A H	STA	2402 H	Store the result
200D H	HLT		Stop

Input :

Memory location	Numbers
2400 H	5
2401 H	3

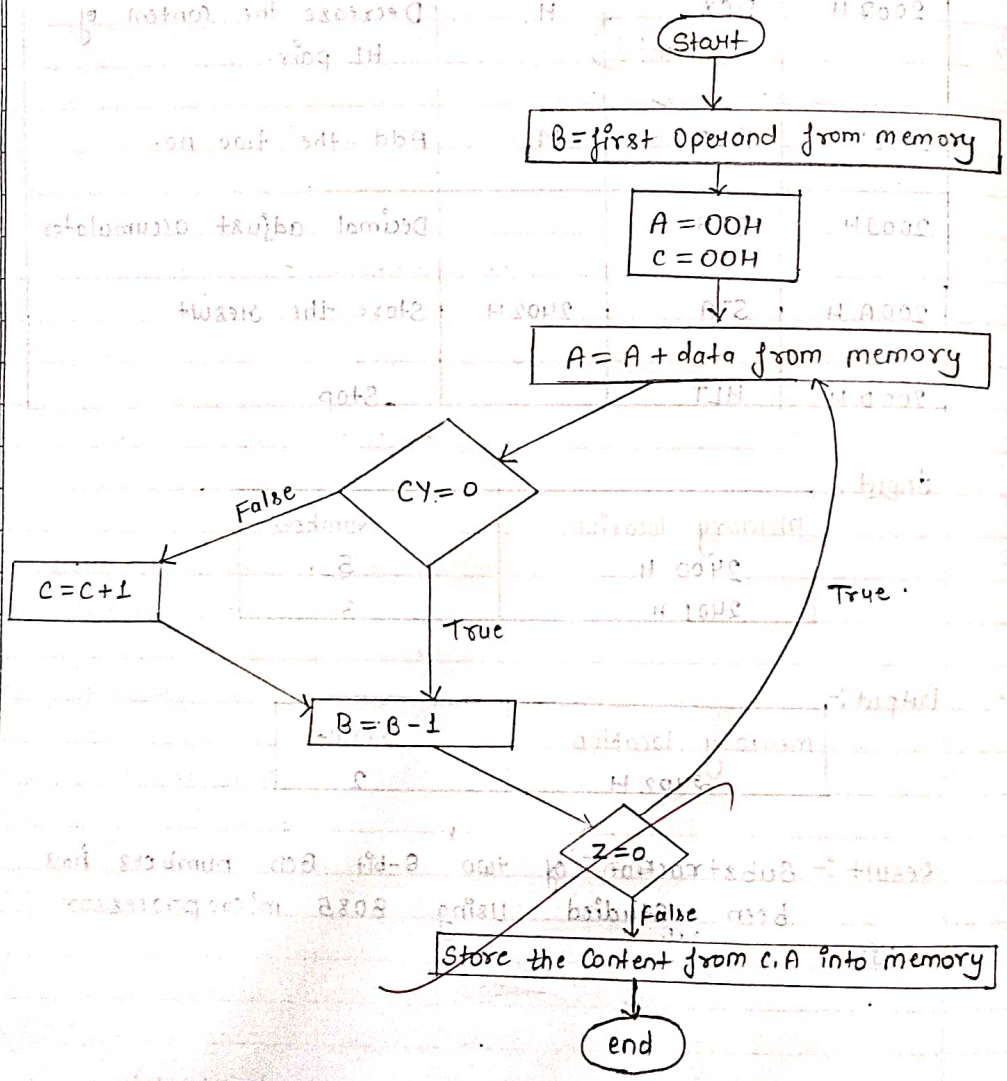
Output :-

memory location	Result
2402 H	2

Result :- Subtraction of two 8-bit BCD numbers has been studied using 8085 microprocessor kit.

Teacher's Signature : Swarnima 21/03/22

Flow chart for multiplication of Two 8-bit Numbers



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EXPERIMENT No. - 4(A)

Aim:- To perform multiplication of two 8-bit numbers Using 8085.

Program for multiplication of Two 8-bit numbers.

Memory Address	Instruction Mnemonics	Operands	Comments
2000H	LXI	H, 3000H	load first operand address.
2003H	MOV	B, M	Store first operand to B
2004H	INX	H	Increase HL pair
2005H	XRA	A	Clear accumulator
2006H	MOV	C, A	Store 00H at register C
Loop(2007H)	ADD	M	Add memory element with Acc
2008	JNC	SKIP	When Carry flag is 0, skip next task.

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200B H	INR	C	Increase C when Carry is 1.
SKIP (200C)	DCR	B	Decrease B register
200D H	JNZ	LOOP	Jump to loop when Z flag is not 1.
2010H	INX	H	Load Destination address
2011H	MOV	M, C	Store C reg. content into memory
2012H	INX	H	Increase HL Pair
2013H	MOV	M, C A	Store Acc. content to memory
2014H	HLT		Terminate the program

INPUTS:

Memory Location	Numbers
3000H	4
3001H	2

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Output:

Memory location	Result
3003H	8

Result :- Multiplication of two 8-bit numbers has been performed using 8085 microprocessor kit.

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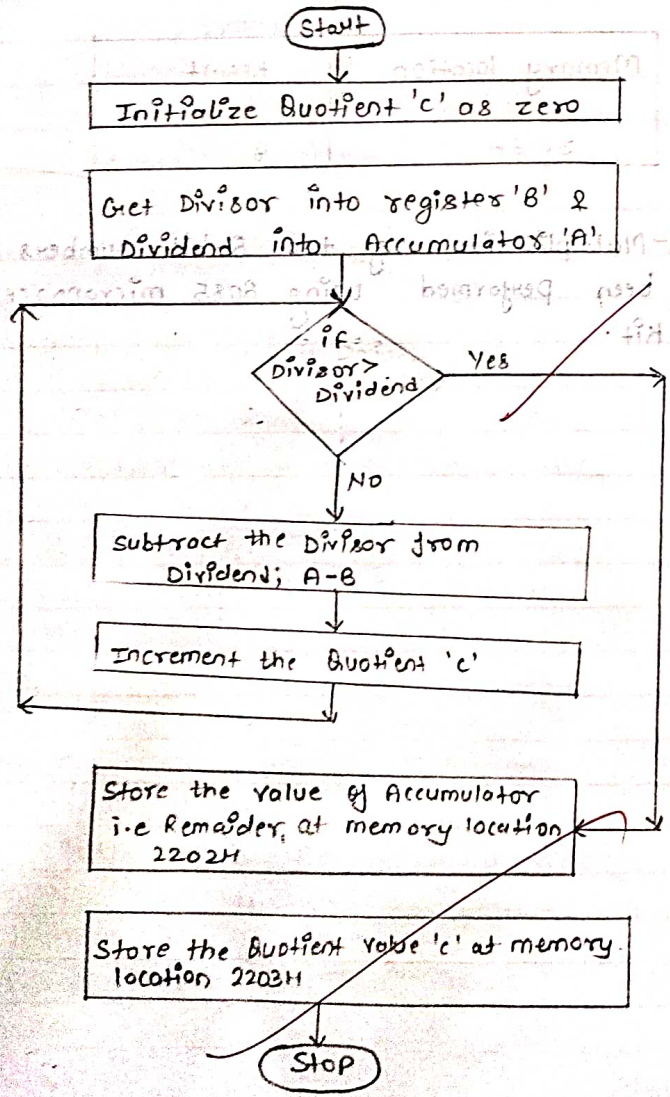
FLOW CHART FOR DIVISION



Date

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EXPERIMENT No. - 4(B)

Aim :- To perform division of two 8 bit No. using 8085.

Program for Division

Memory Address	Label	Instructions		Comments
		Mnemonics	Operands	
2000 H		MVI	C, 00H	Initialize Quotient as zero.
2002 H		LDA	2200 H	Get Divisor into Accumulator
2005 H		MOV	B, A	Copy the divisor into register 'B'
2006 H		LDA	2201 H	Get the Dividend from the memory location 2201 H
2009 H	Loop1	CMP	B	Compare two Values, by doing A-B. if A>B; CY=0, Z=0

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				if A < B ; CY = 1 , Z = 0 (Carry will generate) if A = B ; CY = 0 , Z = 1 {NO carry will generate but Zero flag will set}.
200A		JC	2012H	Jump on 2012H (Loop 2) if Divisor 'B' is greater than Dividend 'A'; B > A
200D		SUB	B	Subtract the Divisor from Dividend; A - B
200E		INR	C	Increment the Quotient 'C'
200F		JMP	2009 H	Jump to loop 1 till the value of Dividend becomes Zero.
2012	LOOP 2	STA	2202 H	Store the value of Accumu -lator i.e Remainder at memory location 2202H
2015		MOV	A, C	Move the value of Quotient 'C' into Accumulator

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2016H		STA	2203H	Store the Quotient Value at memory location 2203H
2019H		RST	5	Stop the program
201A		END		

INPUTS :-

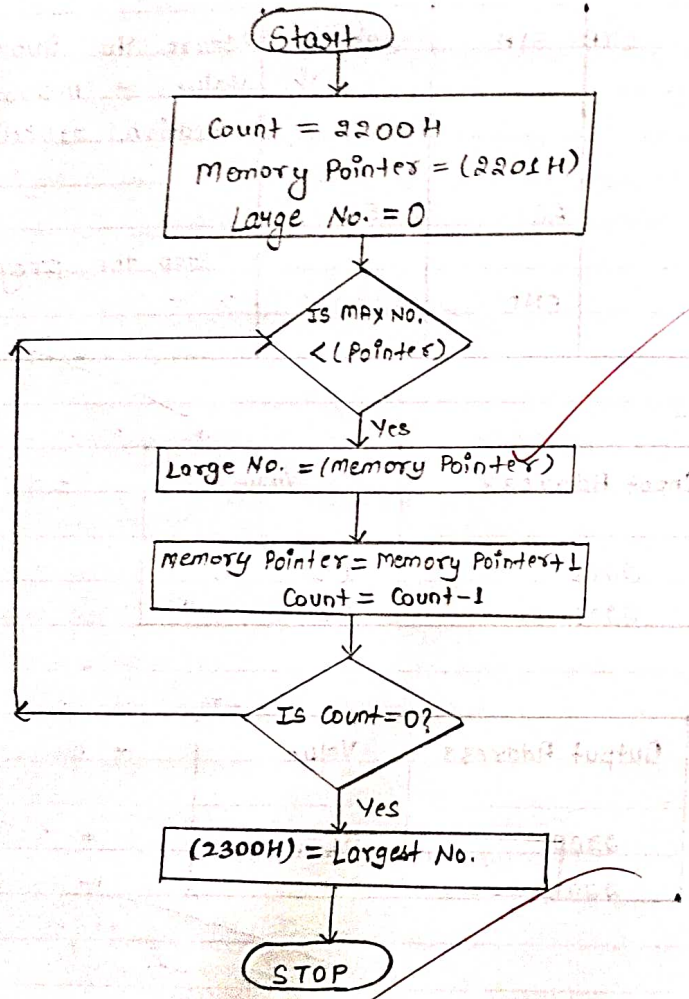
Input Address	Value
2200	02
2201	09

Output :

Output Address	Value
2202	01
2203	04

Result :- Division of two 8-bit numbers has been executed using 8085 microprocessor kit.

Teacher's Signature : 19/4/23



FLOW CHART FOR LARGEST NUMBER

Date

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EXPERIMENT No. – 5 (A)

Aim:- Write a program to find the largest number in an array of data using 8085 instruction.

Program for Largest Number

Memory Location	Instructions		Comments
	Mnemonics	Operands	
2000H	LDA	2200H	Load accu. 'A' with the Counter value = no. of integers present into a data array.
2003H	MOV	C, A	Move the Counter value of 'A' into 'C'
2004H	XRA	A	XOR the contents of Acc. with itself; Clear the contents of Accumulator.

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	2005H	LXI	H, 2201H	Set the memory pointer into HL pair reg. to location 2201H
	2008H	CMP	M	Compare the contents of Acc. 'A' with the contents of Memory 'M'; Compare 'A' with data of 2201H
	2009H	JNC	200DH	Jump to 200DH if ('A' > Contents of 'M')
	200CH	MOV	A, M	Move the contents of 'M' into 'A'.
	200DH	INX	H	Increment HL pair by one.
	200EH	DCR	C	Decrement the counter Value 'C' by one.
	200FH	JNZ	2008H	Jump on 2008H if counter Value 'c' is non-zero.
	2012H	STA	2300H	Store the contents of 'A' i.e Largest No. into memory location 2300H
	2015H	RST	5	END of program
	2016H	END		

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INPUTS:-

Input Address	Value
2200	Count = 04 (No. of integers present in the Data Array)
2201	34H
2202	A9H
2203	78H
2204	56H

DATA ARRAY

Outputs:

Output Address	Value
2300	Largest No. = A9H

Result:- Finding the largest number from an array of data integer has been executed successfully by using 8085 microprocessor kit

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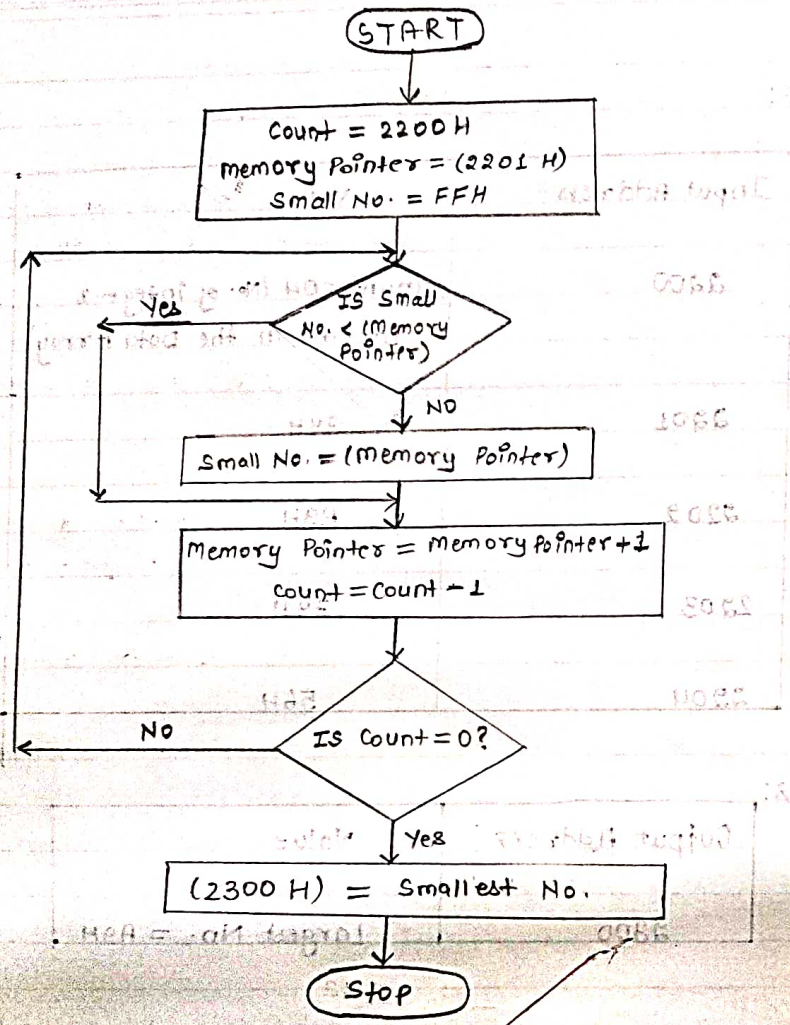

FLOW CHART FOR SMALLEST NUMBER

Date

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EXPERIMENT - 5(B)

Aim :- Write a program to find the smallest number in an array of data using 8085 instruction set.

Program For Smallest Number:

Memory Location	Instructions		Comments
	Mnemonics	Operands	
2000H	LDA	2200H	Load Accumulator 'A' with the counter value = no. of integers present into a data array
2003H	MOV	C, A	Move the counter value of 'A' into 'C'
2004H	MVI	A, FFH	Move the Highest possible 8-bit no. into Acc.', A = FFH
2006H	LXI	H, 2201H	Set the memory pointer into HL pair reg. to

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			location 2201H
2009H	CMP	M	Compare the contents of Accumulator 'A' with the contents of memory 'M'; Compare 'A' with data of 2201H, CY flag will set when A<'M'
200AH	JC	200EH	Jump to 200EH if ('A' < contents of 'M')
200DH	MOV	A, M	Move the contents of 'M' into 'A'
200EH	INX	H	Increment HL pair by one
200FH	DCR	C	Decrement the counter value 'C' by one
2010H	JNZ	2009H	Jump on 2009H if Counter value 'C' is non-zero
2013H	STA	2300H	Store the contents of 'A' i.e Smallest No. into memory location 2300H

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2016H	RST	5	END of program
2017H	END		

INPUTS :-

Input Address	Value	
2200	Count = 04H	
2201	34H	DATA ARRAY
2202	A9H	
2203	78H	
2204	56H	

Outputs:

Output Address	Value
2300	Smallest No. = 34H

Result :- Finding the smallest no. from an array of data integer has been executed successfully by using 8085 microprocessor kit.

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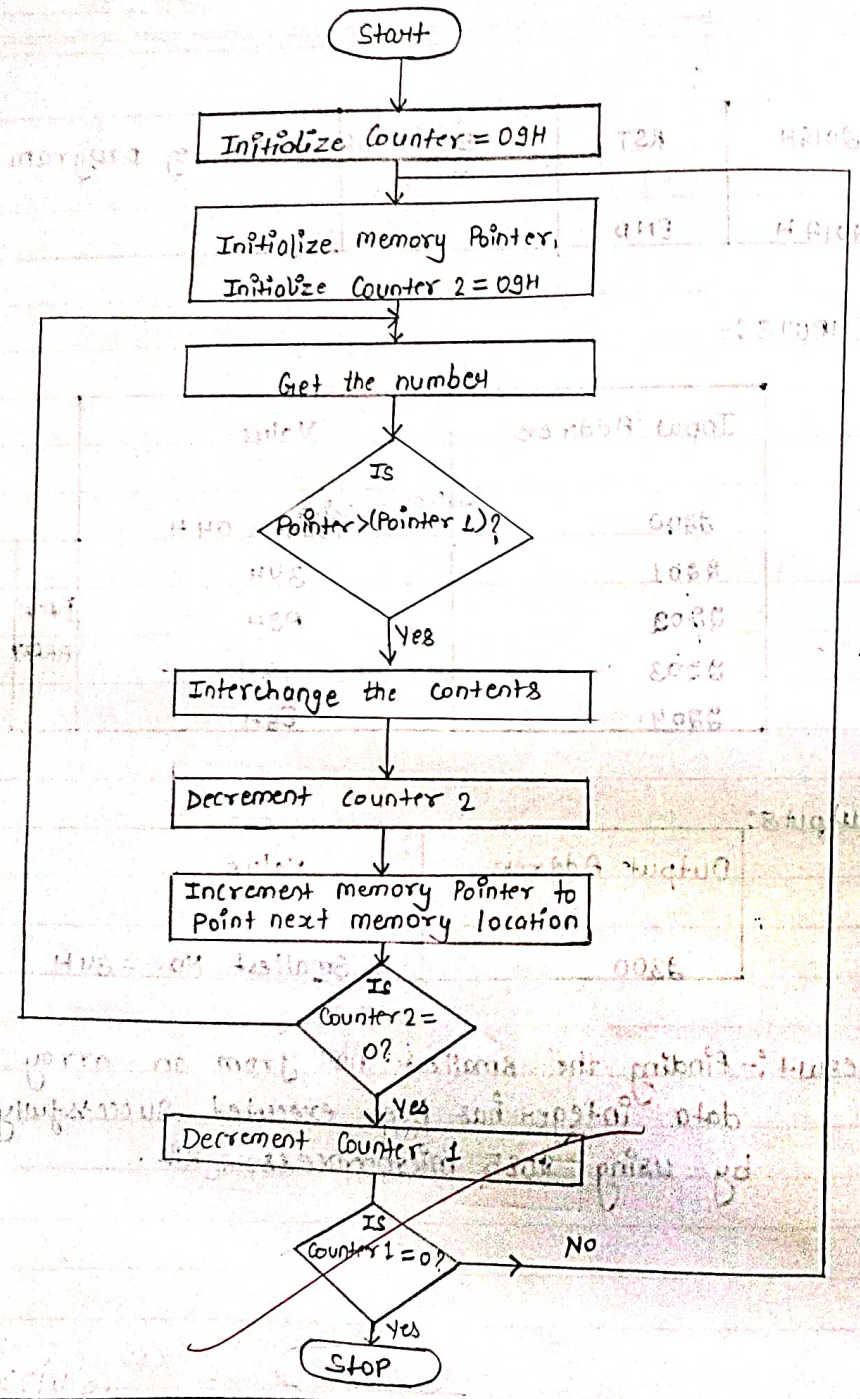
FLOW CHART FOR ASCENDING ORDER



Date 25/04/23

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EXPERIMENT - 6(A)

Aim:- Write a program to arrange an array of data in Ascending order Using 8085 instruction set.

Program for Ascending Order :

Memory Location	Instruction Mnemonics	Operands	Comments
2000	MVI	B, 04H	Initialize Counter to 04.
2002 / Start	LXI	H, 2200H	M = (HL) = 2200
2005	MVI	C, 04H	C = 04
2007 / BACK	MOV	A, M	A = Contents of M
2008	INX	H	Increment HL pair register to one; HL = 2201
2009	CMP	M	Compare the Contents of Accumulator 'A' with the Contents of Memory 'M'; Compare 'A' with data

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			If 2201 H, CY Flag will set when A<'m'
200A	JC	2015/SKip	Jump on 2015/SKip if CY flag is set.
200D	JZ	2015/SKIP	Jump on 2015/SKIP if Z flag is set
2010	MOV	D, M	Copy the contents of M into D Register
2011	MOV	M, A	Copy the contents of A to M
2012	DCX	H	Decrement HL pair register by 1
2013	MOV	M, D	Copy the contents of D to M
2014	INX	H	Increment HL register pair by 1
2015/SKIP	DCR	C	Decrement C by 1
2016	JNZ	2007/BACK	Jump on 2007/BACK if Z flag is reset i.e. Z=0
2019	DCR	B	Decrement B Reg. by 1

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201A	JNZ	2002 / START	Jump on 2002 / START if Z flag is reset i.e. Z=0
201D	RST	5	
201E	END		END of Program

INPUTS:

Input Address	Value	
2200	Count = 04 H (No. of integers present in the data array)	
2201	34 H	DATA ARRAY
2202	78H	
2204	56H	

Outputs:

Memory Address	Value	
2201	34H	Ascending DATA ARRAY
2202	56H	
2203	78H	
2204	A9H	

Result:- Given array of numbers is sorted successfully in ascending order using 8085 microprocessor kit.

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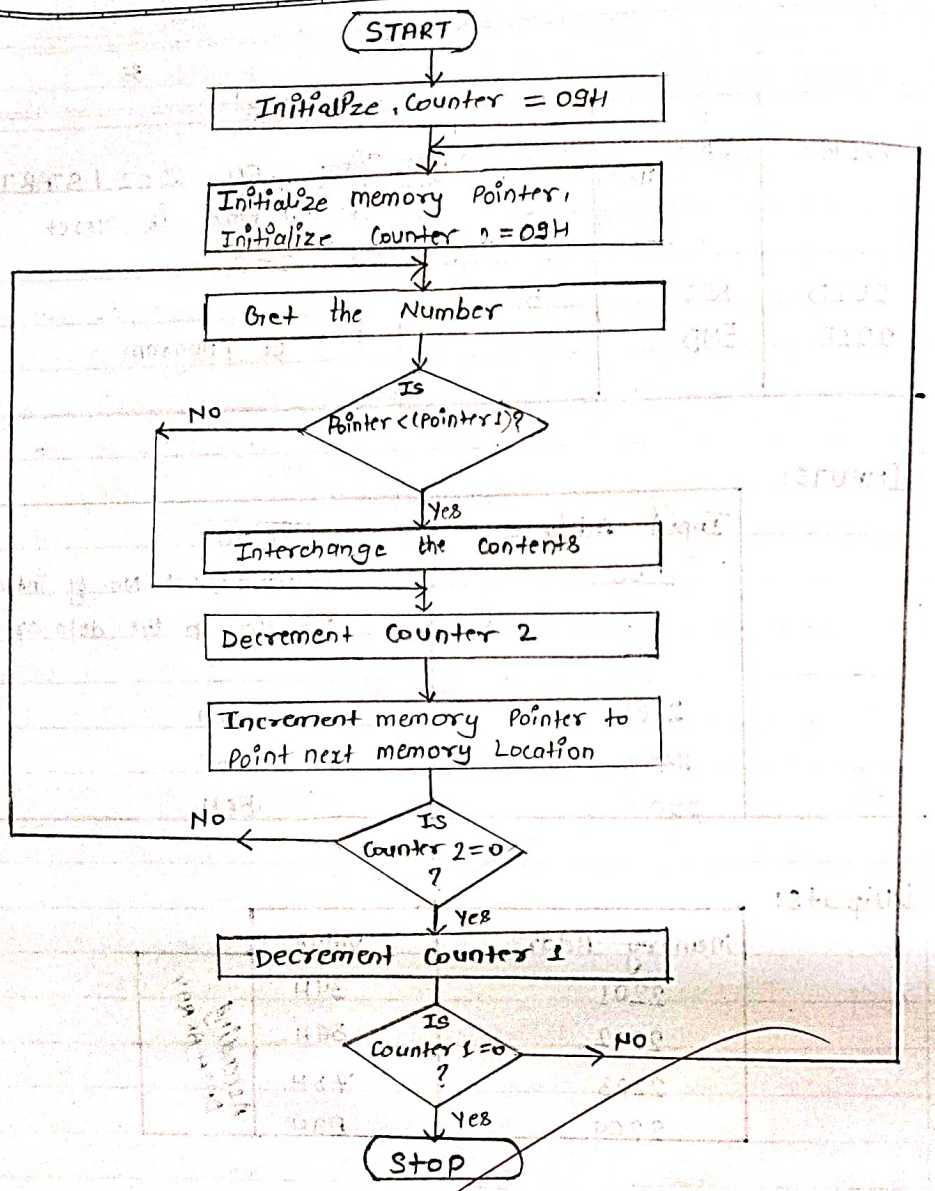

FLOW CHART FOR DESCENDING ORDER

Date 25/04/23

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EXPERIMENT-6(B)

Aim :- Write a program to arrange an array of data in descending order using 8085 Instruction Set.

Program for Descending Order :-

Memory location	Instruction	
	Mnemonics	Operands
2000	MVI	B, 04H
2002/START	LXI	H, 2200H
2005	MVI	C, 04H
2007/BACK	MOV	A, M
2008	INX	H
2009	CMP	M
200A	JNC	2015/SKIP
200D	JZ	2015/SKIP
2010	MOV	D, M
2011	MOV	M, A
2012	DCX	H
2013	MOV	M, D
2014	INX	H
2015/SKIP	DCR	C
2016	JNZ	2007/BACK
2019	DCR	B
201A	JNZ	2002/START

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201D	RST	5	
201E	END		

Inputs:

Input Address	Value	
2200	Count = 04 (No. of int. present in data array	
2201	34H	
2202	A9H	
2203	78H	DATA ARRAY
2204	56H	

Outputs:

Memory Address	Value	
2201	A9H	Descending DATA ARRAY
2202	78H	
2203	56H	
2204	34H	

Result :- Given array of numbers is sorted successfully in descending order using 8085 microprocessor kit.

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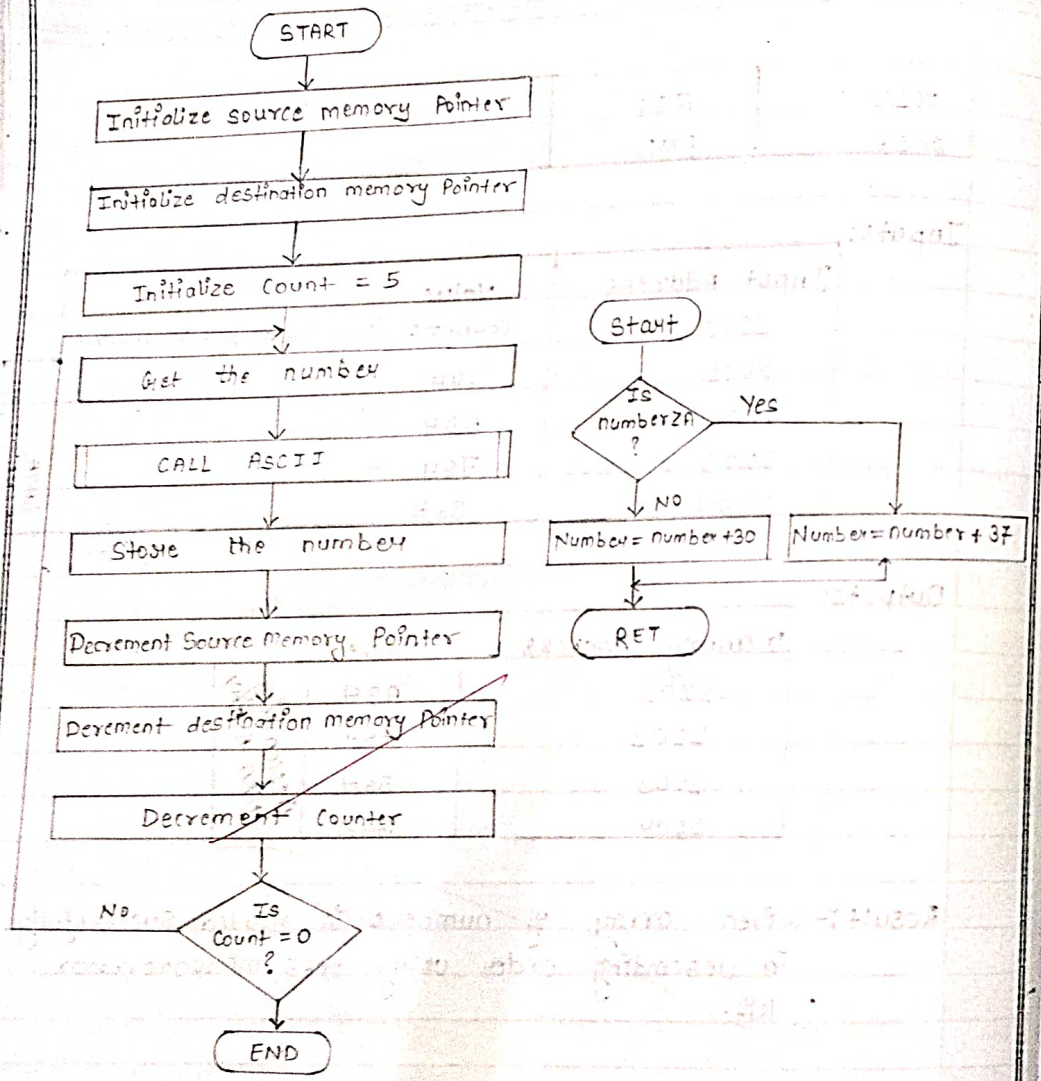

FLOW CHART FOR HEXADECIMAL TO ASCII CONVERSION

Date 25/04/23

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EXPERIMENT - 7(A)

Aim:- Write a program to convert hexadecimal number to its equivalent ASCII Number

Program For Hexadecimal To ASCII Conversion

Memory Location	Instruction	
	Mnemonics	Operands
3000	LXI	SP, 9700
3003	LXI	H, 8000
3006	LXI	D, 9200
3009	MOV	A, M
300A	MOV	B, A
300B	RRC	
300C	RRC	
300D	RRC	
300E	RRC	
300F	CALL	HEXTOASCII
30 12	STAX	D
3013	INX	D
3014	MOV	A, B
3015	CALL	HEXTOASCII
3018	STAX	D
3019	RST	5
301A	END	

Teacher's Signature : _____

Date

Expt. No.

SUBROUTINE FOR HEXTOASCII:

Memory Location	Instruction	
	Mnemonics	Operands
2400H	ANI	0F
2402	CPI	0A
2404	JC	NEXT
2407	ADI	37
2409	JMP	LAST
NEXT:	ADI	30
LAST:	RET	

INPUTS:

Input Address	Value
2000	B2H

OUTPUTS:

Memory Address	Value
2200	42H
2201	32H

Result:- Given hexadecimal number is converted to its equivalent ASCII number using 8085 microprocessor kit.

Teacher's Signature : Swarnima

25/04/23

Date 25/04/23

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EXPERIMENT - 7(B)

Aim :- Write a program to convert ASCII number to its equivalent hexadecimal number.

Program For ASCII TO HEXADECIMAL CONVERSION:

Memory Location	Instruction	
	Mnemonics	Operands
2000	LXI	H, 3000H
2003	LXI	D, 3050H
2006	MOV	A, M
2007	CALL	ASCIITO.
200A	STAX	D
200B	RST	5
200C	END	

SUBROUTINE FOR ASCIITOHEX:

Memory Location	Instruction	
	Mnemonics	Operands
2400H	CPI	40H
2402	JNC	NEXT
2405	SUI	30H
2407	CPI	0AH
2409	JC	LAST

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NEXT:	SUI	3711
LAST:	RET	

INPUTS:

INPUT Address	Value
3000	3211

OUTPUTS:

Memory Address	Value
3050	0211

RESULT:- Given ASCII number is converted to its equivalent hexadecimal number using 8085 microprocessor Kit.

Teacher's Signature : 11/04/21

Date 02/08/23

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EXPERIMENT - 8

Aim :- To perform interfacing of RAM chip to 8085. Write an assembly language program using 8085 microprocessor kit to test RAM by writing all 1's and reading it back and later writing all 0's. In case of any error, it is indicated by writing 01H at memory address 2300).

Program:

Memory Location	Instruction	
	Mnemonics	Operands
2000/BACK	LXI	H, 2100H
2003	MVI	M, FFH
2005	MOV	A, M
2006	CPI	FFH
2008	JNZ	2014/ERROR
200B	INX	H
200C	MVI	M, 00H
200E	MOV	A, M
200F	CPI	00H
2011	JZ	2000/BACK
2014/ERROR	MVI	A, 01H
2016	STA	2300H
2019	RST	5
201A	END	

Teacher's Signature : _____

Date

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Result :- Interfacing of Ram chip to 8085 is done successfully.

Teacher's Signature : Sucharitha 07/05/22

Date 02/05/23

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EXPERIMENT - 9

Aim :- Write a program to perform interfacing of 8255 PPI.

Program for Interfacing of 8255 PPI:

Memory Location	Instruction Mnemonics	Operands
3000	MVI	A, 80H
3002	OUT	43H
3004	MVI	A, ABH
3006	OUT	40H
3008	OUT	41H
300A	OUT	42H
300C	CALL	2020
300F	MVI	A, 55H
3011	OUT	40H
3013	OUT	41H
3015	OUT	42H
3017	CALL	2020
301A	JMP	2004
301D	RST	5
301E	END	

Teacher's Signature : _____

Date

Expt. No.

Delay Subroutine :

Memory Location	Instruction Mnemonics	Operands
2020 H	LXI	D, 0000H
2023	CALL	03A6
2026	RET	

Result :- Result is observed on the LED's as written in program using 8085 microprocessor and 8255 PPI Kit.

Teacher's Signature : 22/08/23