

Lab 3

Ex.No.3.Program to demonstrate decision making and looping operation.

3.1 Introduction:

The purpose of this experiment is to learn about the general purpose registers, instruction sets, addressing modes and logical operators of 8086 by sorting the sequence of numbers from the array stored in a memory location into ascending and descending series.

3.2 Hardware Requirement:

The 8086 Microprocessor kit, Power Supply.

3.3 Program Logic:

To arrange the given numbers in ascending and descending order, the bubble sorting method is used. Initially the first number of the series is compared with the second one. If the first number is greater than second, exchange their positions in the series otherwise leave the position unchanged. Then compare the second number in the recent form of the series with third and repeat the exchange part that you are carried out for the first and second number, and for all the remaining number of the series. Repeat this procedure for complete series (n-1) times. After n-1 iterations you will get the largest number at the end of the series. Again, start from the first number of the series. Repeat the same procedure right from the first element to the last element. After n-2 iteration you will get the second highest number at the last but one place in the series. Repeat this till the complete series is arranged in ascending order.

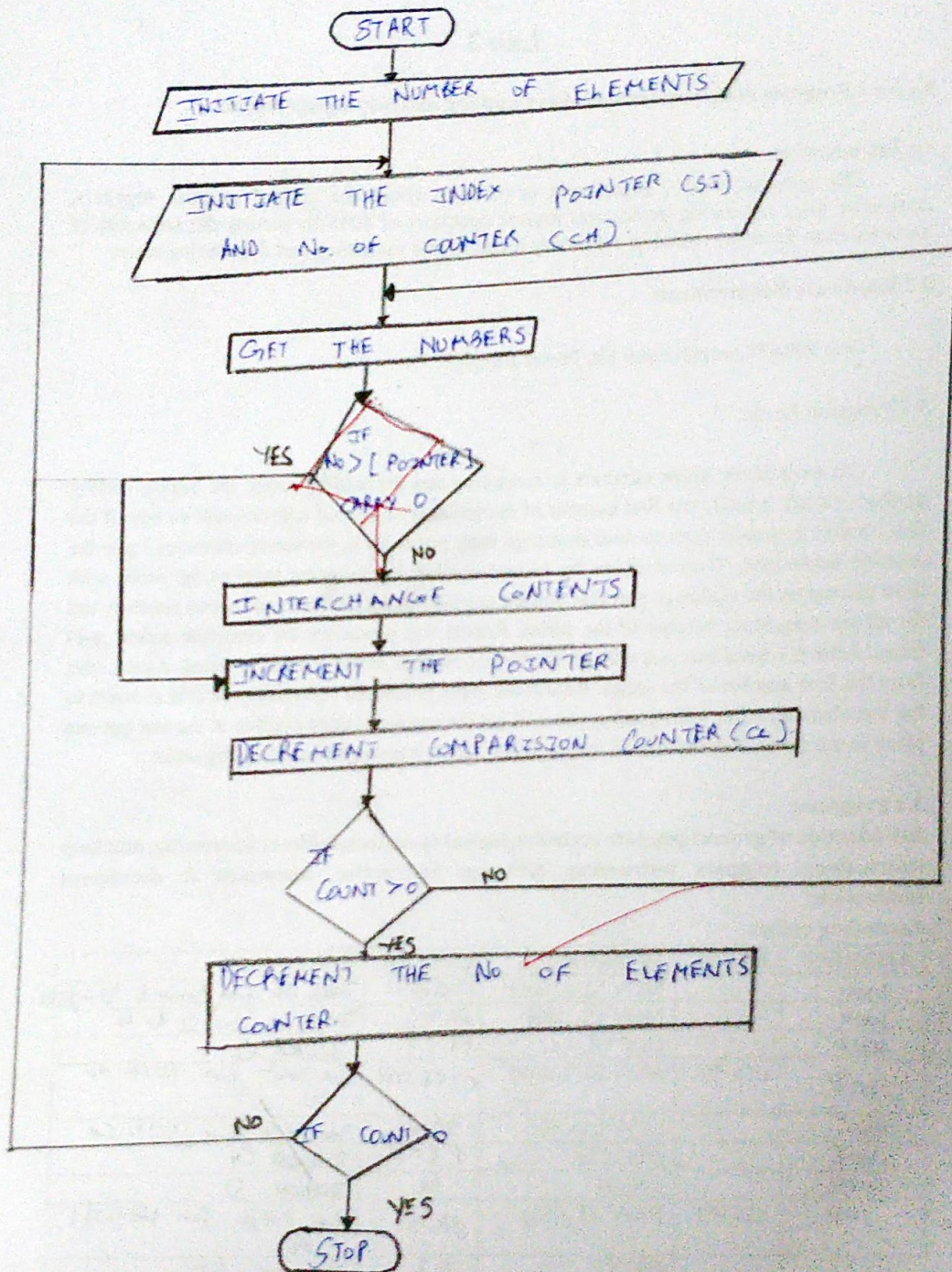
3.4 Program:

Introduction of general-purpose registers, logical operators, indirect addressing, and loop instructions, compare instruction, exchange instruction, increment & decrement instruction:

Ascending order:

ADDRESS	LABEL	MNEMONICS	OPCODE	COMMENTS
1000		MOV SI, 1200H	C7 C6 00 12	Transfer Data from 1200H to SI register
1004		MOV CL, [SI]	8A 0C	Transfer Data from SI to CL
1006		DEC CL	FE C9	Decrement CL
1008	LOOP3	MOV SI, 1200H	C7 C6 00 12	Data Transfer from 1200H to SI
100C		MOV CH, [SI]	8A 2C	Data Transfer from [SI] to CH
100E		DEC CH	FE CD	Decrement CH
1010		INC SI	46	Increment SI
1011	LOOP2	MOV AL, [SI]	8A 04	Data Transfer from [SI] to AL
1013		INC SI	46	Increment SI
1014		CMP AL, [SI]	3A 04	Compare Data in [SI] and AL
1016		JC LOOP1	72 FF	Jump to 1010

Ascending order.



1018		XCHG AL, [SI]	8604	Exchange Data from SI
101A		XCHG [SI-1], AL	8644 FF	Exchange Data
101D	LOOP1	DEC CH	FEC9	Decrement CH
101F		JNZ LOOP2	75F0	Jump to 1002
1021		DEC CL	FEC9	Decrement CL
1023		JNZ LOOP3	75F0	Jump to 1008
102E		HLT	F4	Terminate the Program

Descending order:

ADDRESS	LABEL	MNEMONICS	OPCODE	COMMENTS
1000		MOV SI, 1200H	C7160012	Data Transfer from (1200H) to SI
1004		MOV CL, [SI]	8A0C	Data Transfer from [SI] to CL
1006		DEC CL	FEC9	Decrement CL
1008	LOOP3	MOV SI, 1200H	C7160012	Data Transfer (1200H) to SI
100C		MOV CH, [SI]	FA2C	Data Transfer from [SI] to CH
100E		DEC CH	FEC9	Decrement CH
1010		INC SI	46	Incrment SI
1011	LOOP2	MOV AL, [SI]	8A04	Data Transfer from [SI] to AL
1013		INC SI	46	Incrment SI
1014		CMP AL, [SI]	3A04	Compare AL and [SI]
1016		JNC LOOP1	7305	Jump to 1010
1018		XCHG AL, [SI]	8604	Exchange Data in [SI] and AL
101A		XCHG [SI-1], AL	8644 FF	Exchange Data
101D	LOOP1	DEC CH	FEC9	Decrement CH
101F		JNZ LOOP2	75F6	Jump to 1010
1021		DEC CL	FEC9	Decrement CL
1023		JNZ LOOP3	75B3	Jump to 1008
102E		HLT	F4	Terminate the Program

3.5 Pre-Lab Questions:

1. What are the flags modified while executing XCHG instruction?
2. List the addressing modes used in this program.
3. What is the purpose of AAA instruction?
4. List the type of jump instruction that are used in this program.

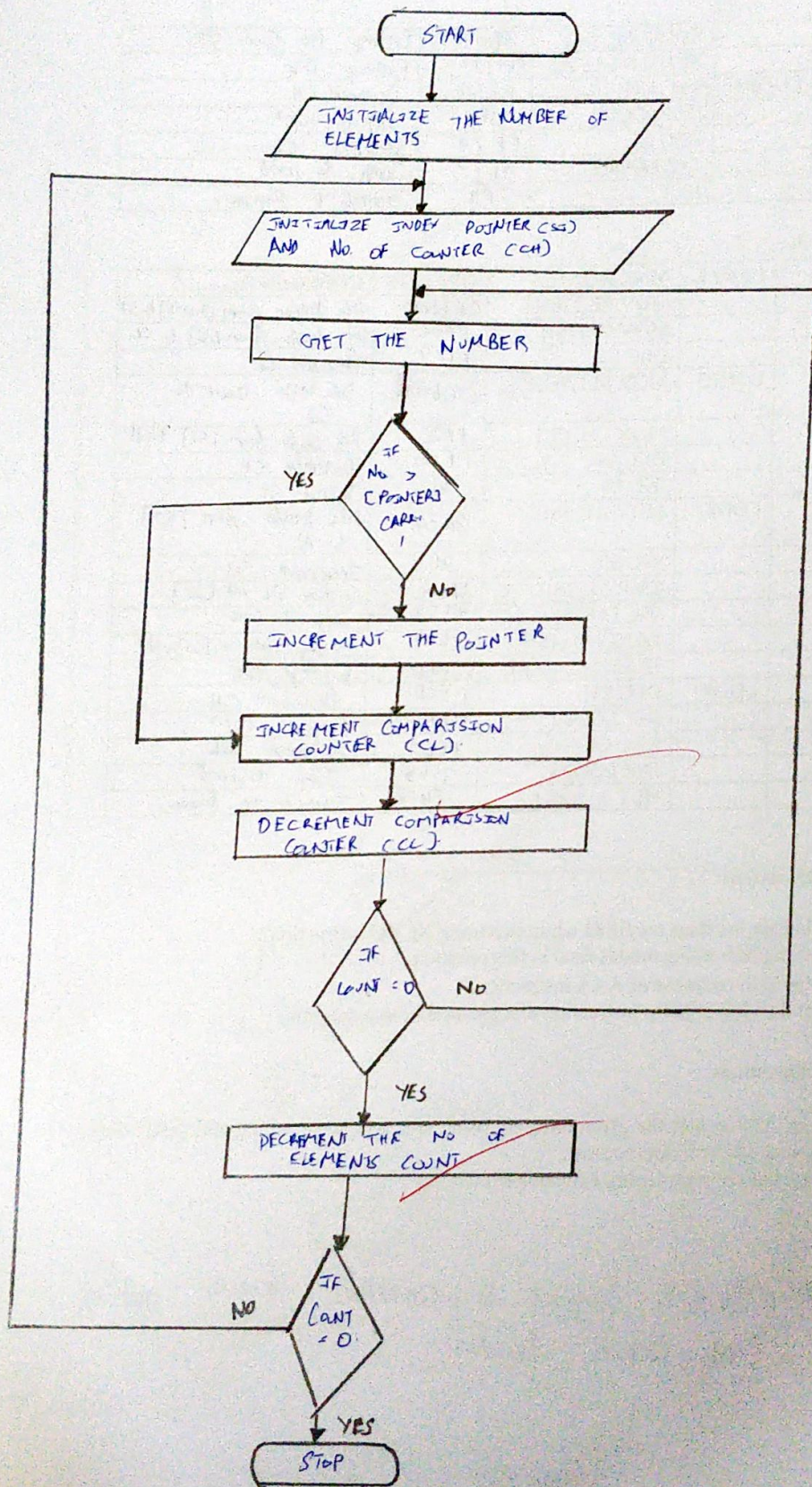
3.6 Post-Lab Questions:

1. Write an ALP to sort the given array of 16-bit numbers in ascending and descending order using 8086 microprocessor.
2. Simulate the programs using emulator 8086.

Result:

Verified program to demonstrate decision making and looping operation.

Descending order:



Microprocessor and Microcontroller Lab
Experiment 3 Decision Making and Looping Operation

I Pre-lab

1. What are the flags modified while executing XCHG instruction?

Soln. In general, each time the processor executes an instruction the flags are altered to reflect the result but while executing XCHG instruction, no flag is modified.

2. List the addressing modes used in this program?

Soln. The addressing modes used in this program is register indirect mode (MOV AX, CS), indexed mode [DEI SI], and register modes.

3. What is the use of AAA instruction?

Soln. AAA instruction is only useful when it follows an ADD instruction that adds 2 BCD values. It stores a byte result in the register.

4. List the type of jump instruction that are used in this program.

Soln. There are 3 types of jump instructions used in the program.

(1) JC - Jump Carry

(2) JNC - Jump No Carry

(3) JNZ - Jump No Zero

II Post-Lab

1. Write an ALP to sort the given array of 16 bit nos in ascending and descending order while using 8086 microprocessor.

Soln.

Ascending

MOV SI, 1200H
MOV CL, [SI]
DEC CL

loop 3

MOV SI, 1200H
MOV CH, [SI]

DEC CH

JNC SI

MOV AX, [SI], loop 2

JNC SI

JNC SI

CMP AX, [SI]

JC loop 1

XCHG AX, [SI]

XCHG [SI-2], AX

loop 1

DEC CH

JNZ loop 2

DEC CL

JNZ loop 3

HLT.

Descending

MOV SI, 1200H

MOV CL, [SI]

DEC CL

loop 3

MOV SI, 1200H

MOV CH, [SI]

DEC CH

JNC SI

MOV AX, [SI], loop 2

JNC SI

JNC SI

CMP AX, [SI]

JNC loop 1

XCHG AX, [SI]

loop 1

DEC CH

JNZ loop 2

DEC CL

JNZ loop 3

HLT.