Lab # 8

# OBJECTive

Explain Arithmetic group of instructions (Add, Subtract, Multiply and Divide).

# Theory

**Arithmetic Instructions:**

These instructions are used to perform various mathematical operations like Addition, Subtraction, Multiplication and Division.

**ADDITION INSTRUCTIONS:**

* ADD (Addition)

Eg : ADD AX, BX

AX + BX →AX

* ADC (Add with carry)

Eg : ADC AX, BX

AX + BX + CF →AX

* Instructions ADD and ADC affect flags OF, SF, ZF, AF, PF and CF
* INC (Increment)

Increment specified byte or specified word by 1

**Example:**

1. Perform 3 + 8

MOV AL, 3

ADD AL, 8

1. Perform 1234 + 5678

MOV AX, 1234

ADD AX, 5678

1. Perform 12345678 + 9ABCDEF0

MOV AX, 1234

MOV BX, 5678

MOV CX, 9ABC

MOV DX, DEF0

ADD BX, DX

ADC AX, CX

ADC AX, BX

# Subtraction Instructions:

* SUB (Subtract)

Eg: SUB AX, BX

AX – BX →AX

* SBB (Subtract with borrow)

Eg : SBB AX, BX

AX – BX – CF →AX

* Instructions SUB and SBB affect flags OF, SF, ZF, AF, PF and CF
* DEC (Decrement)

Decrement specified byte or word by 1

**Example**

1. Perform 12H– 3H

MOV AL, 12

SUB AL, 3

1. Perform 1FFFH- 999H

MOV AX, 1FFF

SUB AX, 999

1. Perform 99887766H– 55443322H

MOV AX, 9988

MOV BX, 7766

MOV CX, 5544

MOV DX, 3322

SUB BX, DX

SBB AX, CX

SBB AX, BX

1. Perform arithmetic operations in assembly language

.model small

.stack 100h

.code

mainproc

mov ah,01h

int 21h

sub al,30h

mov bl,al

mov ah,01h

int 21h

sub al,30h

addbl,al

add bl,30h

mov ah,02h

movdl,bl

int 21h

mov ah,4ch

int 21h

mainendp

end main

# Multiplication Instructions

MUL (Unsigned multiplication)

Eg1 : MUL BL

AL \* BL →AX

Eg2 : MUL BX

AX \* BX →DX : AX

**DIVISION INSTRUCTION**

A single operand is supplied (register or memory operand), which is assumed to be the divisor. Instruction formats: DIV r/m8

DIV r/m16

DIV r/m32

**EXERCISE:**

1. The instruction that is used to transfer the data from source operand to destination operand is  
   a)datacopy/transferinstruction  
   b)branchinstruction  
   c)arithmetic/logicalinstruction  
   d) string instruction
2. The instruction that adds immediate data/contents of memory location specified in an instruction/register to the contents of another register/memory location is  
   a) SUB  
   b) ADD  
   c) MUL  
   d) DIV
3. The instruction, MOV AX, 0005H belongs to the address mode  
   a) register  
   b) direct  
   c) immediate  
   d) register relative
4. Write a program that take two integers as input and display sum of the integers.

Output will look like as follows:

Input First Integer: 3

Input Second Integer: 2

Sum of Integers: 5

# Home Assignment

Write a program that takes two inputs and perform multiplication & division using emu 8086 & debug tool. If code will not execute in any of these tools then give valid justification of your code.

Note: (Give proper screenshots of your code).