

**SIR SYED UNIVERSITY OF ENGINEERING & TECHNOLOGY  
COMPUTER SCIENCE & INFORMATION TECHNOLOGY DEPARTMENT**

**SPRING 2021**

**MICROPROCESSOR & ASSEMBLY LANGUAGE (CS-330)**

**ASSIGNMENT # 01**

Semester: 5<sup>th</sup>  
Due Date: 22<sup>th</sup> March, 2021

Batch: 2019  
Max Marks: 10

**Instruction:**

- Attempt all questions in a sequence.

Name: Munib ul Hassan  
Roll No: CS19-037  
Section: "A"

1- Answer the following questions:

(a) How many nibbles are 16 bits?

**Ans:** There is 4 nibbles in 16bits

(b) How many bytes are 32 bits?

**Ans:** There is 4 bytes in 32bits

(c) If a word is defined as 16 bits, how many words is a 64-bit data item?

**Ans:** if 1 word is defined as 16 bits wo 4 words is defined as 64 bits.

(d) If a computer has a 32-bit data bus. What is the largest number that can be carried into the CPU at a time?

**Ans:** 4GB

(e) Regarding address bus, data bus and control bus, which is unidirectional and which is bidirectional?

**Ans:** the address bus is used to specify a physical address in the memory while the data bus is used to transmit data among components in both directions. Therefore, the address bus is unidirectional while the data bus is bidirectional.

(f) Which section of CPU is responsible for performing addition?

**Ans:** The ALU performs the addition and puts the result in the accumulator.

2- Add the following hex values.

(a) 2CH + 3FH

**Ans:**

6BH

(b) F34H + 5D6H

**Ans:**

150AH

(c) 20000H + 12FFH

**Ans:**

212FFH

- (d) FFFFH + 2222H

**Ans:**

12221H

- 3- Subtract the following hex values.

- (a) 24FH – 129H

**Ans:**

126

- (b) FE9H – 5CCH

**Ans:**

A1D

- (c) 2FFFFH – FFFFFH

**Ans:**

-D0000

- (d) 9FF25 – 4DD99H

**Ans:**

5218C

- 4- Which of the following instructions cannot be coded in 8086 Assembly language? Give reason why not, if any.

- (a) MOV AX, 27

Valid

- (b) MOV AL, 97F

Invalid: 97F exceed AL can hold

- (c) MOV DS, 9BF2

Invalid: can't move immediate number to segment register

- (d) MOV CX, 397

Valid

- (e) MOV SI, 9516

Valid

- (f) MOV CS, 3490

Invalid: Same as c

- (g) MOV DS, BX

Valid

- (h) MOV BX, CS

Valid

- (i) MOV CH, AX

Invalid: source and destination register should match

- (j) MOV AX, 23FB9

Invalid: 23FB9 exceed AX range

(k) MOV CS, BH

Invalid: Same as i

(l) MOV AX, DL

Invalid: Same as

5- If CS = 3499H and IP = 2500H, find:

(a) The logical address:

3499 : 2500

(b) The physical address

Physical address = (segment. Add \* 10H) + offset address

= 3499 \* 10H + 2500H

= 00036E90H

(c) The lower and upper ranges of code segment

Lower range = (3499 \* 10H) + 0000

= 34990H

Upper range = (3499 \* 10H) + FFFF

= 34990 + FFFF

= 4498F

6- If DS = 1298H and offset is 3FB9H, find:

(a) The physical address

1298 : 3FB9

(b) The logical address of the data being fetched

Physical address = (segment. Add \* 10H) + offset address

= 1298 \* 10H + 3FB9H

= 16939H

(c) The lower and upper range addresses of the data segment

Lower range = (1298 \* 10H) + 0000

= 12980H

Upper range = (1298 \* 10H) + FFFF

= 12980 + FFFF

= 2297F

7- If an instruction that needs to be fetched is in physical memory location 389F2H and CS = 2700H, does the code segment range include it or not? If not, what value should be assigned to CS if the IP must equal 1282?

Ans:

Lower range of CS (code segment) = (2700H \* 10H) + 0000

= 27000

Upper range of CS (code segment) = (2700H \* 10H) + FFFF

= 27000 + FFFF

= 36FFF

Code segment does not include this range.

Physical address = (segment. Add \* 10H) + offset address

389F2H = Segment . Add \* 10H + 1282

389F2H – 1292 = Segment . Add \* 10H

37760 = Segment . Add \* 10H

37760 / 10 = Segment . Add

**Segment . Add = 3776H**

8- If SS = 2000H and SP = 4578H, find:

(a) The physical address

Physical address = (segment. Add \* 10H) + offset address

Physical address = 2000H \* 10H + 4578H

Physical address = 20000 + 4578H

Physical address = 24578H

(b) The logical address

2000 : 4578

(c) The lower range of stack segment

Lower range of CS (code segment) = (2000H \* 10H) + 0000  
= 20000

(d) The upper range of stack segment

Upper range of CS (code segment) = (2000H \* 10H) + FFFF  
= 20000 + FFFF  
= 2FFFF

9- The following registers are used as offsets. Assuming that the default segment is used to get the logical address, give the segment register associated with each offset.

(a) BP      **Stack segment**

(b) DI      **Extra segment register**

(c) SI      **DS data segment register**

(d) IP      **Code Segment register**

(e) SP      **Stack segment register**

(f) BX      **DS data segment register**

10- Find the status of all conditional flags for the following operations:

(a) MOV AH, 9FH

ADD AH, 61H

(b) MOV BL, 23H

ADD BL, 97H

(c) MOV DX, 10FFH

ADD DX,1

Ans:

a.  $9F + 61$

$$\begin{array}{r} 100011111 \\ + 01100001 \\ \hline 100000000 \end{array}$$

OF = 0      SF = 0      ZF = 1      AF = 1      PF = 1      CF = 1

b.  $23 + 97$

$$\begin{array}{r} 00100011 \\ + 10010111 \\ \hline 10111010 \end{array}$$

OF = 0      SF = 1      ZF = 0      AF = 0      PF = 1      CF = 0

c.  $10FF + 1$

$$\begin{array}{r} 0001000011111111 \\ + 1 \\ \hline 0001000100000000 \end{array}$$

OF = 0      SF = 0      ZF = 0      AF = 1      PF = 1      CF = 0

11- Assume that the registers have the following values (all in hex) and that CS = 1000, DS = 2000, SS = 3000, SI = 4000, DI = 5000, BX = 6080, BP = 7000, AX = 25FF, CX = 8791 and DX = 1299. Calculate the physical address of the memory where the operand is stored and the contents of the memory locations in each of the following addressing examples:

- (a) MOV [SI], AL
- (b) MOV [SI+BX+8], AH
- (c) MOV [BX], AX
- (d) MOV [DI+6], BX
- (e) MOV [3600], AX
- (f) MOV [BP]+200, AX

Ans:

a. Physical address =  $(DS * 10H) + SI$   
 $= 2000 * 10 + 4000$   
 $= 24000$

24000 contains FF

b. Physical address =  $(DS * 10H) + SI + BX + 8$   
 $= 2000 * 10 + 4000 + 6080 + 8$   
 $= 30088$

30088 contains 25

c. Physical address =  $(DS * 10H) + BX$   
 $= 2000 * 10 + 6080$   
 $= 26080$

26080 contains FF and 26081 contains 25

d. Physical address =  $(DS * 10H) + DI + 6$   
 $= 2000 * 10 + 5000 + 6$   
 $= 25006$

25006 contains 80 and 25007 contains 60

e. Physical address =  $(DS * 10H) + 3600$   
=  $2000 * 10 + 3600$   
= 23600  
23600 contains FF and 23601 contains 25

f. Physical address =  $(SS * 10H) + BP + 200$   
=  $3000 * 10 + 7000 + 200$   
= 37200  
37200 contains FF and 37201 contains 25

12- Give the addressing mode for each of the following commands:

- |                          |                               |
|--------------------------|-------------------------------|
| (a) MOV AX, DS           | <b>Register</b>               |
| (b) MOV CX, [3000]       | <b>Direct Addressing</b>      |
| (c) MOV [BP]+6, AL       | <b>Based relative</b>         |
| (d) MOV BX, 5678H        | <b>Immediate</b>              |
| (e) MOV AL, [BX]         | <b>Register Indirect</b>      |
| (f) MOV [DI], BX         | <b>Register Indirect</b>      |
| (g) MOV DX, [BX][DI]+200 | <b>Based Indexed Relative</b> |
| (h) MOV [2348], DX       | <b>Direct</b>                 |
| (i) MOV [BX+SI+50], AH   | <b>Based Indexed Relative</b> |
| (j) MOV [SI+60], AL      | <b>Indexed Relative</b>       |