CSE341

Theory ASSIGNMENT- 1

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Section: 5

Answer to the ques. No: 1

Physical address: 33330H

Offset: 1111H

So, base address:

$$\begin{array}{r} 33330 \\ -\ 1111 \\ \hline 3221F \end{array}$$

So base address is 3221FH

but this not a valid segment number as it is not divisible by 10H.

We have to round it to nearest 'zero'. Which is 32220H.

So, the segment number = 3222

Highest address in that segment:

$$\begin{array}{r} 32220 \\ +\ FFFF \\ \hline 4221F \end{array} \longrightarrow (3222 \times 10_h)$$

So, Highest address in that segment: 4221F

Ans. to the ques. No: 2

(a)
$$\begin{array}{r} 91AB0 \quad (91AB \times 10_h) \\ (+)\ 234D \\ \hline 93DFD \end{array}$$

base address = 91ABh
offset = 234Dh

Physical address = 93DFDH

(b)
$$\begin{array}{r} AA100 \quad (AA10 \times 10_h) \\ (+)1863 \\ \hline AB963 \end{array}$$

base address: AA10h
offset: 1863h

Physical address = AB963 H

(c) Physical address can have 3 different logical address if there is overlapping segmentation.

3 different logical addresses:

1. 6000 : 1110
2. 6040 : 0D10
3. 6100 : 0110

[segment : offset]

The physical address of above 3 logical address is:

$(6000 \times 10) + 1110$

$= 61110$ (This physical address is same for the other two logical address as well) (Ans)

Ans. to the ques. No:3

(a)

AX contains EEEE h

BX " BBBB h

ADD AX, BX:

AX = AX + BX

```
  1110 1110 1110 1110   (EEEE)h
(+) 1011 1011 1011 1011 (BBBB)h
-----------------------
 11010 1010 1010 1001
```

SF: 1; Because the MSB is 1 (of answer)

PF: 1; There are even number of 1's in the answer.

ZF: 0; There are 8 1's present in the answer. In outher words, the answer is not '0', so, ZF = 0.

CF: 1; After adding 2-16 bits we got a 17 bit answer. There is a carry bit.

OF: 0; We have a carry ifoward from 15th bit to 16th bit, also a carry forward from 16th bit to 17th bit at the same time. So, OF = 0.

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(b)

AX contains 8000h

BX " 1234h

ADD AX, BX;

AX = AX + BX

So,

$$\begin{array}{rl} & 1000\,0000\,0000\,0000 \quad (8000)_h \\ (+) & 0001\,0010\,0011\,0100 \quad (1234)_h \\ \hline & 1001\,0010\,0011\,0100 \end{array}$$

SF: 1; The MSB is 1 (of answer)

PF: 1; There are even number of 1's in the answer.

ZF: 0; The answer is not zero. So, ZF = 0

CF: 0; The answer has no carry

OF: 0; There is no carry forward from 15th to 16th bit also

There " " " " " 16th & 17th "

So, there is no overflow.

Ans. to the ques. No: 4

Given,

DS = AB12h

SS = 2567h

CS = 29C1h

Instruction: ADD Ax , [10h]

Address location:

For DS → (AB120 + 0010)

= AB130

For SS → (25670 + 0010)

= 25680

For CS → (29C10 + 0010)

= 29C20

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Answer to the ques. No: 5

(a)

FFFEFh

Smallest segment address:

$$\begin{array}{r} FFFEF \\ -\ FFFF \\ \hline EFFF0 \end{array}$$

[FFFF → Highest possible offset]

logical address: EFFF:FFFF

2nd largest
~~Highest~~ segment address:

$$\begin{array}{r} FFFEF \\ -\ 0001 \\ \hline FFFEE \end{array}$$

The segment address is not valid as it is not divisible by 10_h

So, valid segment address would be FFFE0.

the offset would be 000F

So, the logical address: FFFE:000F

(b)

Given, 2h (Physical address)

Physical address: 00002h

Smallest segment address:

$$\begin{array}{r} 00002 \\ -FFFF \\ \hline \end{array}$$

We can not find the smallest segment address by going the substracting highest offset because it breaks the boundary of physical address '00000'.

So, smallest possible segment address is '00000'.

Now, the offset is: 0002

So, logical address = 0000 : 0002

2nd Largest segment address:

$$\begin{array}{r} 00002 \\ -0001 \\ \hline 00001 \end{array}$$

But the segment address is not divisible by 16. Hence, the segment address is not valid.

So, the segment address would be '00000'

And, Logical address: 0000 : 0002

(Ans)

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Ans. to the ques. No: 6

8086 has a address bus which is of 20 bit.

Now,

2^{20} = 1,048,576 bytes

= 1 Mbyte

That means the 8086 micro processor can address 1,048,576 bytes. So, we can store 1,048,576 bytes in the address bus. It is equivalent to 1MB. That is why 8086 supports a maximum of 1MB physical memory. This 1MB is divided into 16 segments.

To conclude, 8086 has 20-bit address bus. Thus, it can store 2^{20} = 1MB of physical addresses.

Ans. to the ques. No:-7

Capacity in Megabytes of the physical memory of microprocessor with a 28-bit address bus:

Now,

$2^{28} = 26,84,35,456$

Now, we know that

$2^{20} = 1$ Mbyte

$\Rightarrow 2^{28} = \frac{2^{28}}{2^{20}}$

$= 2^{28-20}$

$= 2^{8}$

$= 256$ Mbyte

So, 28-bit address bus will have the capacity of

256 Mbyte = 256 megabytes.

Also,
28-bit will have 7 Hex digits.

So, initial physical address = 0000000

last " " = FFFFFFF

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Ans. to the ques No: 8

(a)

Given,

898069 10h

⇒ 1000 100 1 1000 0000 0110 1001 0001 0000

Opcode = 100010 (mov)

D = 0 (Not destination)

W = 1 (word data)

MOD = 10 (16 bit displacement within memory)

Reg = 000 (AX)

R/M = 000 ([BX] + [SI] + D16

High = 10h
Low = 69h
] Displacement = 1069h

So, Instruction in assembly is:

Mov [BX] + [SI] + 1069h, AX

⇒ Mov [BX+SI+1069h], AX

(b)

MOV DI, [BP + 42h]

opcode = 100010

D = 1 (Destination to Register)

W = 1 (16 bit)

MOD = 01 (8 bit displacement within memory)

Reg = 111 (W=1 so DI)

R/M = 110

MOD = 01 so [BP + d8]

Displacement = 42h

= (01000010)h

So, Machine language:

1000 1011 0111 1110 0100 0010

B B 7 E 4 2

∴ Assembly Language → Machine language

MOV DI, [BP+42h] → 8B7E42h

(Ans)