



CSE341: Microprocessors
Department Of Computer Science and Engineering

Theory Assignment 01 Solution

1. If CS = 25H then find the second and second to last physical address of this segment?

=> Seg. Number x 10h + Offset Address = Phy. Address

Second Physical Address = 00250 + 0001 [as 0000 is the first possible offset, that makes 0001 the 2nd possible offset]
= 00251h

Second to last Physical Address = 00250 + FFFE [as FFFF is the highest possible offset, that makes FFFE the 2nd to last possible offset]
= 1024Eh

2. Suppose you want to design a Microwave and are in need of a processing unit. Would you choose to use a microprocessor or a microcontroller for this purpose? Explain with logic.

=> Microcontroller would be better for this purpose.

- Tasks are predefined
- Size and power consumption is also an issue
- Microwave does not need intensive processing

Later you may wish to build on these logic. This is an opinion based question so other points will also be acceptable.

3. "The data bus is bidirectional but the address bus is unidirectional"

Give your opinion on this statement.

=> Data bus is bidirectional, meaning that data can flow into the mpu from memory and I/O and also can flow outward from mpu into the memory and I/O.

But in case of addressing, only the mpu requires addressing something from the memory or I/O and not vice versa. The memory or I/O does not need to address an element which is in the mpu.

Then you can put a bit more emphasis on these points.

4. Suppose, A6BA1H is a particular physical location, and 1234 is the base address of that segment. So what should be the offset value to address this location? Show your workings.

=> Seg. Number x 10h + Offset Address = Phy. Address

1234 x 10h + Offset Address = A6BA1h

So, Offset Address = A6BA1 - 12340

= 94861h

[Here 94861 is a 20 bit offset address which is not possible for 8086, but that's not the point here. We just want to see whether you can find the offset or. Nevertheless, whether you notice it or not no marks will be deducted as long as you get the correct answer.]

5. Suppose you have a microprocessor which has 16MB of total physical memory. In this case what would be the size of the address bus?

=> 16 MB

= 16 x 1MB

= 16 x 2²⁰ Byte

= 2⁴ x 2²⁰ Byte

= 2²⁴ Byte

So, the size of the address bus should be 24 bits.

[Try to remember these conversion rates]

$2^{10} = 1\text{KB}$

$2^{20} = 1\text{MB}$

$2^{30} = 1\text{GB}$

$2^{40} = 1\text{TB}$

6. Suppose, 3BD15H is a particular physical location, and 1234 is the value of the offset. What should be the base address of the segment? Will there be any problems with this base address? Show your workings and give your opinion in this matter.

=> Seg. Number x 10h + Offset Address = Physical Address

Seg. Number x 10h + 1234 = 3BD15h

Seg. Number = (3BD15 - 1234) / 10h

= 3AAE1 / 10h

But here we can see that 3AAE1h is not a value than can be evenly divisible by 10h and we know that the starting address of a Segment in Hex must be evenly divisible by 10h or in case of Decimal it must be evenly divisible by 16.

So, this base address is an Invalid address.

7. Can a specific physical address have more than two logical addresses? Explain your opinion with examples.

=> For an Overlapping Segment, yes.

Suppose a memory location 00090h. So for this physical address, we will try to find more than 2 logical addresses.

For First Segment, **0000:0090, Seg. Number 0000, Offset Address 0090**

For Second Segment, **0003:0060, Seg. Number 0003, Offset Address 0060**

For Third Segment, **0008:0010, Seg. Number 0008, Offset Address 0010**

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8. Suppose CS = 1000H, DS = 2000H, ES= 3000H, SS = 4000H and SI= 1234H. In this case what is the physical address generated as the source of the given command: “mov ax, [si]”.

=> We know that SI basically holds the offset address of DS and ES, but as this is not a stack related instruction, we will use DS here. So DS gets more priority here.

So, $[DS \times 10h + SI]$
= $[20000 + 1234]$
= 21234h