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Question 1(4): Memory Contents:

Address	14005h	14004h	14003h	14002h	14001h	14000h	13F FEh	13F FDh	12006h	12005h	12004h	12003h
Data	80h	7Fh	FFh	01h	88h	1Ch	00h	50h	34h	12h	A5h	F0h

DS = 1200h, CS = 0A00h, SS = 8500h, ES = 1300h AX = 0000h, BX = 4000h, CX = 0002h, DX = FFFFh SI = 1000h, DI = 0003h, BP = 0FFDh

MOV AX, [DI+SI+1000h]

ADD AX, 0C01h

- a. What are the 5th smallest and 8th largest segment:offset pairs for the physical address accessed by MOV? [2.5]

physical address= DSx10+(1000+3+1000)
= 12000+2003h = **14003h**

Largest logical address =>

1st => 14000=> 1400:0003

2nd =>13FF:0013

3rd =>13FE:0023

4th =>13FD:0033

5th =>13FC:0043

6th =>13FB:0053

7th =>13FA:0063

8th =>13F9:0073

Smallest logical address =>

1st => 14003-FFFF=> 04004=>04010 => 0401:FFF3

2nd =>0402:FFE3

3rd =>0403:FFD3

4th =>0404:FFC3

5th =>0405:FFB3

PA=>14003

04050-> 0405:FFB3

04040->
 04030->
 04020->
 04010+FFF3 ->0401:FFF

b. Which flags are set after ADD? (AF, SF, CF, OF, PF) [1.5]
 14003h => Data =>7FFFh (as we need 16 bit data to store in AX)
 7FFF+0C01=
 0111 1111 1111 1111
 0000 1100 0000 0001

 1000 1100 0000 0000-> **AF=1 SF=1 CF=0 OF=1 PF=1**

Physical Address	15A00h	15A01h	18450h	18451h	1C234h	1C235h
Data	34h	12h	50h	03h	A0h	25h

Question 2(4): CS = 2000h DS = 1500h SS = 8000h BX = ???h SI = 0450h BP = 03DEh. **Instruction 1:** `JMP [BX+SI]` is executed. After this JMP, the CPU fetches the next instruction from physical address **20350h**. **Instruction 2:** At the new location, `JMP SS:[BP]` is executed. After this second JMP, the CPU fetches from physical address **203DEh**.

a. From Ins 1, physical address accessed was **18450h**, find the value of BX given that SI = 0450h. [2]

PA = DSx10 + (BX+SI)
 18450 = 15000 + BX + 0450
 BX = 18450 - 15450 = 3000h

b. After both JMPs execute, how much did the IP change in total from its original position (before first JMP) to its final position (after second JMP)? If the original IP was 0150h, what's the net change? [2]

Even though CS remains 2000h for both cases, the IP values are different: Physical Address = CS × 10h + IP

After first JMP: Physical = 20000h + 0350h = 20350h IP = 0350h

After second JMP: Physical = 20000h + 03DEh = 203DEh IP = 03DEh

the difference in IP values: **03DEh - 0350h = 008Eh**

Question 3(3): Identify the addressing mode

- (a) MOV SI, [SI] (register indirect) (b) MOV [BX+SI+80h], DI (base relative plus index) (c) IN 05h, AL (invalid)

Question 4(3): Machine code to instruction:

- a. 8B07 MOV AX, [BX]
 b. 898C7618 MOV [SI+1876h], CX
 c. 89FF MOV DI, DI

RM \ MOD	MOD					
	00	01	10	11	W = 0	W = 1
000	[BX] + [SI]	[BX] + [SI] + d8	[BX] + [SI] + d16	AL	AX	
001	[BX] + [DI]	[BX] + [DI] + d8	[BX] + [DI] + d16	CL	CX	
010	[BP] + [SI]	[BP] + [SI] + d8	[BP] + [SI] + d16	DL	DX	
011	[BP] + [DI]	[BP] + [DI] + d8	[BP] + [DI] + d16	BL	BX	
100	[SI]	[SI] + d8	[SI] + d16	AH	SP	
101	[DI]	[DI] + d8	[DI] + d16	CH	BP	
110	d16 (direct address)	[BP] + d8	[BP] + d16	DH	SI	
111	[BX]	[BX] + d8	[BX] + d16	BH	DI	