

CSE341 MICROPROCESSOR ASSIGNMENT 1,2

Instructions:

- Show all calculations and steps
- Use hexadecimal notation with 'h' suffix
- Box or circle your final answers

Q1. Given segment number = 2B45h and offset = 1A3Ch, calculate the physical address. Show all steps.

Q2. Physical Address = 3F2A0h, Offset = 1B50h
Calculate the segment register value.

Q3. A system has the following segment registers:

CS = 1000h, DS = 2000h, SS = 3000h, ES = 4000h

Calculate the physical addresses for:

- a) Next instruction at IP = 0500h
- b) Data at offset SI = 0300h
- c) Stack top at SP = FFFEh
- d) Extra data at DI = 0800h

Q4. Given physical address 25F60h, find THREE different valid segment:offset combinations.

Q5. Given: **DS = 1000h, SS = 1400h, BP = 0200h, SI = 0100h**
For the instruction: **MOV AX, [BP + SI + 50h]**

- a) Which segment register is used?
- b) Calculate the logical address
- c) Calculate the physical address
- d) If we change to **MOV AX, [SI + 50h]**, what changes?

Q6. Given the following segment registers:

Address	10601h	10801h	20601h	20803h	30605h	30601h
Data	12h	34h	56h	78h	10h	20h

Assume: CS = 3000h, DS = 2000h, BP = 1000h, BX = 0600h, SI = 0001h

- a) What data will be read by **MOV AL, [BX + SI]**?
- b) Calculate the physical address accessed
- c) Which segment was used?

Q7. Given: DS = 1000h, ES = 1080h, CS = 2000h

- a) Calculate the starting physical address of each segment
- b) Do DS and ES overlap? If yes, calculate the overlap range

Q8. A program accesses these physical addresses in sequence:

- 14500h
- 14505h
- 14510h

Given: CS = 1000h, DS = 1450h, SS = 2000h

Possible offset values are: 0000h, 0005h, 0010h, 0500h, 0505h, 0510h

- a) Which segment register was likely used?
- b) What were the offset values?

Q9. Suppose two hexadecimal numbers FFD3h and FF2Ah are to be added.

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MOV AX, FFD3h
MOV BX, FF2Ah
ADD AX, BX
```

Calculate the values of:

- a) AH after addition(Binary)
- b) CF (Carry Flag)
- c) AF (Auxiliary Flag)
- d) SF (Sign Flag)
- e) ZF (Zero Flag)

Q10. After executing an unknown ADD operation, the flags are:

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

The result in AX = 8A3Fh

- a) Was there a carry from bit 15?
- b) Is the result positive or negative (in signed interpretation)?

d) Give one possible pair of numbers that produces this result

Q11. Consider the instruction sequence:

MOV AX, 0F0Fh

MOV BX, 1010h

ADD AX, BX

Calculate:

- a) Final value of AX (in hex)
- b) CF, AF, ZF, SF, PF, OF flags

Q12.

After executing: ADD AX, BX

Known results:

- AX = 1234h (final value)
- CF = 0
- AF = 1
- OF = 0

Original AX = 0F28h

Calculate the original value of BX. Show your work.

Q13. Identify the addressing mode for each instruction:

- a) MOV AX, 1234h
- b) MOV AX, [1234h]
- c) MOV AX, [AX]
- d) MOV AX, [BX + SI]
- e) MOV AX, [BP + DI + 10h]
- f) MOV AX, BX
- g) IN AL, DX
- h) MOV [SI + 100h], [AX]

Also specify which segment register is used by default for each.

Q14. Given: DS = 3000h, SS = 4000h, BX = 0200h, BP = 0150h,
SI = 0050h, DI = 0030h

Calculate the physical address for each addressing mode:

- a) MOV AX, [BX]
- b) MOV AX, [BP]

- c) MOV AX, [SI]
- d) MOV AX, [BX + SI]
- e) MOV AX, [BP + DI + 20h]

Q15.

A memory access occurred at physical address 32450h

Given: DS = 3000h, SS = 3200h, BX = 0200h, BP = 0050h, SI = 0050h

Which of these instructions could have caused this access?

- a) MOV AX, [BX + SI]
- b) MOV AX, [BP + SI]
- c) MOV AX, [2450h]
- d) MOV AX, [BX + 2250h]

Show calculations for each possibility.

Q16.

Convert these machine codes to assembly instructions:

- a) 8B5475h
- b) 8BD0
- c) 88160080h

For each, also state:

- Instruction size (in bytes)
- Addressing mode used

Q17.

Convert these assembly instructions to machine code:

- a) MOV AX, 5678h
- b) MOV BX, AX
- c) MOV CX, [BX + 05h]
- d) ADD AX, BX
- e) MOV [1000h], AX

Show the complete machine code in hexadecimal.

Q18.

Given this machine code sequence:

Address | Machine Code

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0100h	B8 0A 00
0103h	BB 14 00
0106h	01 D8
0108h	A3 00 10

Show me how the instruction queue will handle these.