ECCE Department

Exam #1

Spring Semester (2004-2005)

Microprocessor Design Systems
EEN324

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Question1		10
Question2		25
Question3		10
Question4		15
Total		/60

Question 1. (10 points)

Answer True or False for each of the following statements (1 point each)

1. An instruction that has 2 machine cycles would require 2 clock cycles to complete	T	**F**
2. All registers in the 8085 are 8-bits	T	**F**
3. Memory stores information in Hexadecimal format.	T	**F**
4. The microprocessor (8085) is made up of a Control Unit, an Arithmetic and Logic Unit, and Registers.	**T**	F
5. Only one device can be connected to a unidirectional bus.	T	**F**
6. It is possible to have F130H as the first address of a 1K memory chip.	**T**	F
7. An 8-bit microprocessor (8085) has 8 address lines.	T	**F**
8. A register is very fast memory located inside the microprocessor.	**T**	F
9. A 2 Mega Byte memory chip has 21 address lines and 8 data lines.	**T**	F
10. ALL Arithmetic and Logic operations in the 8085 use the accumulator.	T	F
11. The Operating System is the first program to execute after startup and the last program to quit.	**T**	F

Question 2. (**25 points**)

An existing memory system has the memory map shown in Figure 1.

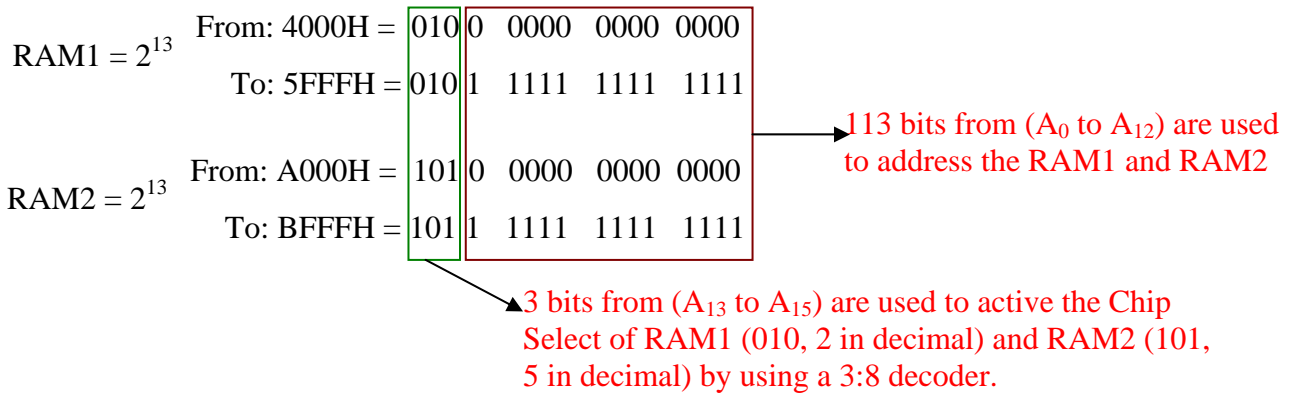|	
16 K RAM1	0000H 3FFFH
New RAM chip1	4000H 5FFFH
8 K RAM2	6000H 7FFFH
8 K RAM3	8000H 9FFFH
New RAM chip2	A000H BFFFH
16 K EPROM	C000H FFFFH
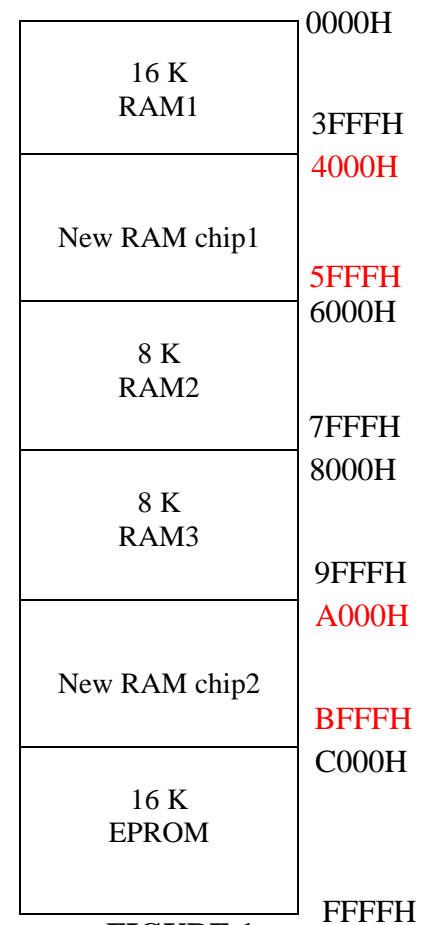
FIGURE 1

2.1 Determine the starting and ending addresses for each of the new memory chips. (**10 Points**)

$RAM1 = 2^{13} = 8K$ From: 4000H
                        To: 5FFFH

$RAM2 = 2^{13} = 8K$ From: A000H
                         To: BFFFH

2.2 Determine the combinations needed for the chip select of the new memory chips. (**7 Points**)

$RAM1 = 2^{13}$

From: 4000H = 010 0 0000 0000 0000
To: 5FFFH = 010 1 1111 1111 1111

$RAM2 = 2^{13}$

From: A000H = 101 0 0000 0000 0000
To: BFFFH = 101 1 1111 1111 1111

113 bits from (A_0 to A_{12}) are used to address the RAM1 and RAM2

3 bits from (A_{13} to A_{15}) are used to active the Chip Select of RAM1 (010, 2 in decimal) and RAM2 (101, 5 in decimal) by using a 3:8 decoder.

2.3 Draw the circuit.   (**8 Points**)
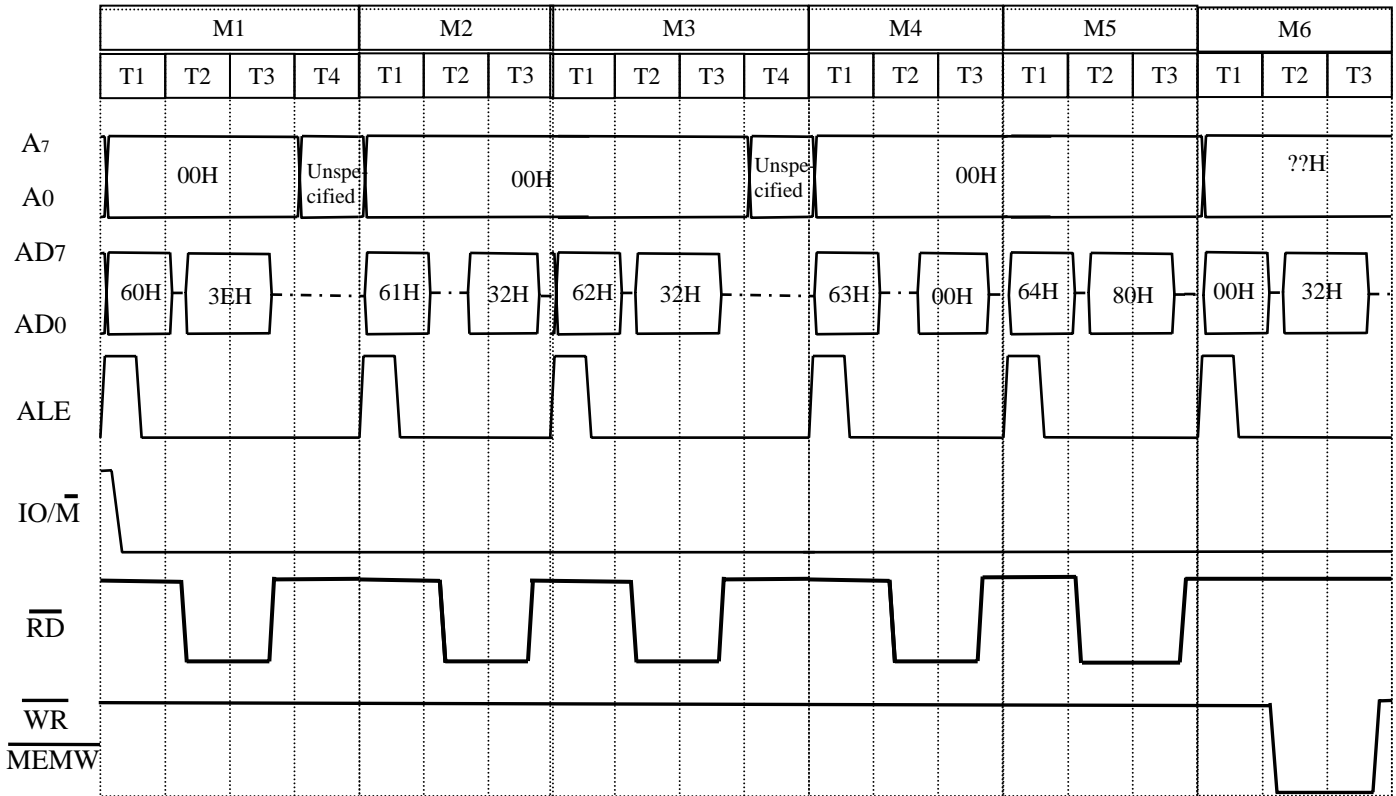   (you can use logic gates plus the decoder)
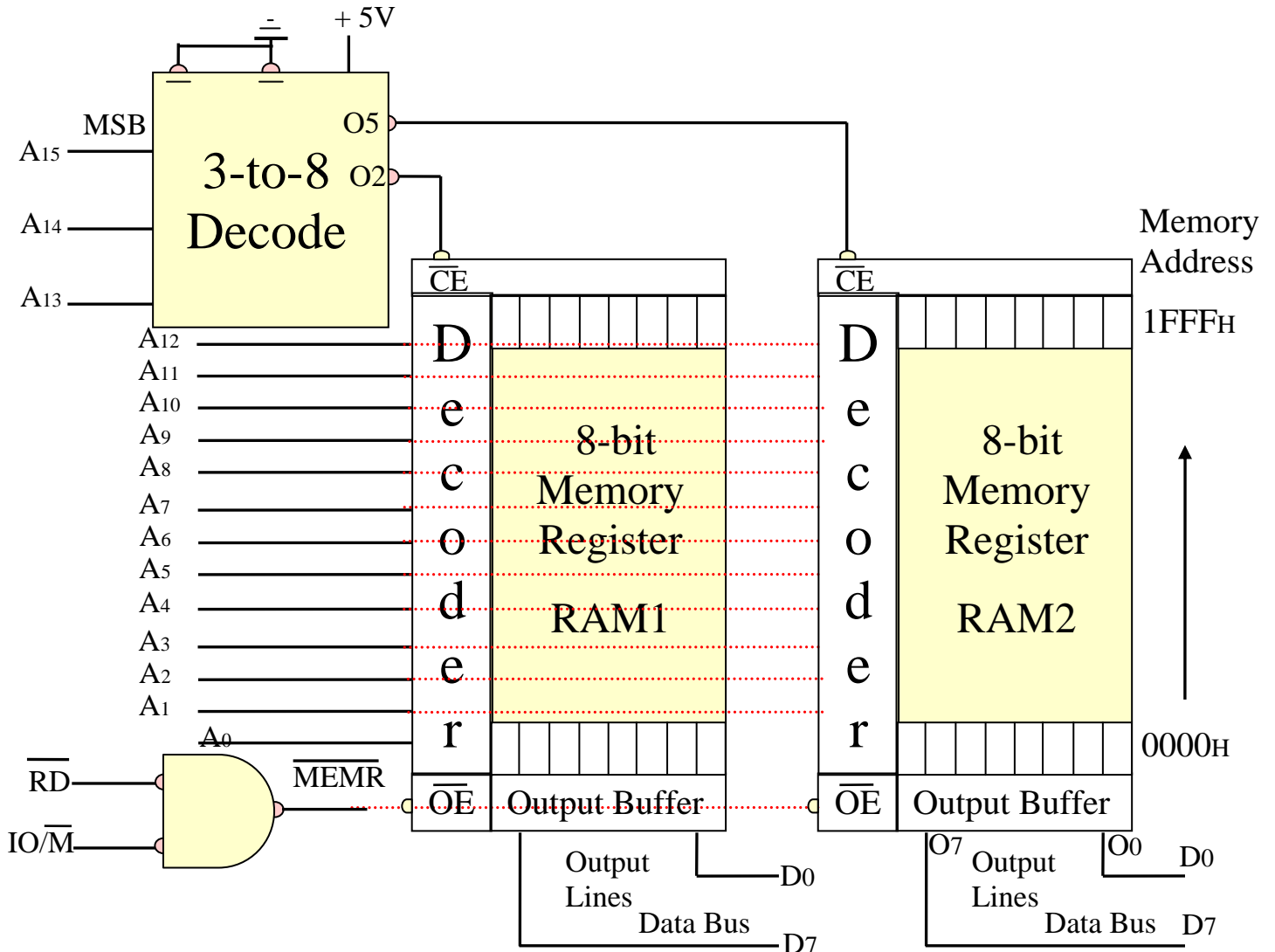
Question 3. (15 points)

Using the following timing diagram, find the instructions executed by the 8085 microprocessor.
And what is the address at the M6 machine cycle?
Refer to the following table to find the instructions, **not all are used**.

MVI A, 32
STA 8000

Hex. OpCode	Mnemonics	#T-States
00	NOP	4
32	STA	13
3E	MVI A,	7
60	MOV H,B	4
61	MOV H,C	4
62	MOV H,D	4
63	MOV H,E	4
64	MOV H,H	4
80	ADD B	4

Question 4. (**15 points**)

Design an I/O system for the 8085 microprocessor with the following characteristics:

- An input peripheral-mapped port with address 42H.

- An output memory-mapped port with address 4x3xH (x means don't care).

Assume that the device selection input for both ports is active low.

You are limited to the following chips (Max):

Chip type	Count
3:8 Decoder	1
Octal Latch gate	1
Octal D-Flip-Flop	1
4-inputs NAND gate	5
4-inputs OR gate	3
Inverter gate	6

Input PORT address	42:	xxxx	xxxx	0	100	0010
Output Memory address 4x3x:	0100	xxxx	0	011	xxxx