BITS Pilani Dubai Campus Microprocessors and Interfacing

(CS/EEE/ECE/INSTR F241)

TUTORIAL Module-5

1. Find the number of machine cycle and the type of operation required by the following instructions

I. MOV AX,[BX+1000H] MC:$8b870010_H$
II. MOV 40[EBX], EAX: MC: 6766 894340

III. MOV AX, [BX+SI+1000H] MC:8B800010

IV. MOV DH,[BX+DI+20H] MC:8A7120

IV. MOV AX,[EDI+2*ECX] MC:678B044F

V. MOV AX,CS:[DI+1000H] MC:2E 8B850010

VII.MOV 80[SI+8],CL MC:888C88

VIII. MOV [SI],CL MC:880C

2. What is the purpose of the multiplexed signal on the 8086 microprocessor?

3. Which bus connections on the 8086 microprocessor are typically demultiplexed?

4. If an 8086 processor is working at 5 MHz – how much time does 1 MEMR cycle take
i. If there no wait states
ii. If there is 2 wait state

5. Compute the time required by the 8086 Microprocessor to execute following Assembly instructions. Assume Microprocessor is running on clock frequency of 20MHz and no wait states are introduced.

MOV AX,[SI] MC:$8A04_H$

6. Compute the Number of Machine cycles required by the 8086 microprocessors to execute the following sets of instructions, when it runs with a clock of frequency 12MHz and no wait states are introduced

Assembly Instructions	Machine Instructions
MOV AH,09H	B409
UP: MOV AL,[SI]	8A04
INC SI	46
DEC AH	FECC
ZNZ UP	75F9

1. Find the number of machine cycle and the type of operation required by the following instructions

I. MOV AX,[BX+1000H] MC:$8b870010_H$

Inst Fetch=2 MEMR
Inst Exe=1 MEMR
Output=0
Total Machine cycle required is 3

I. MOV 40[EBX], EAX: MC: 6766 894340

Inst Fetch=3 MEMR
Inst Exe=0 MEMR
Output=2 MEMW
Total Machine cycle required is 5

II. MOV AX, [BX+SI+1000H] MC:8B800010

Inst Fetch=2 MEMR
Inst Exe=1 MEMR
Output=0 MEMW
Total Machine cycle required is 3

IV. MOV DH,[BX+DI+20H] MC:8A7120

Inst Fetch=2 MEMR
Inst Exe=1 MEMR
Output=0 MEMW
Total Machine cycle required is 3

III. MOV AX,[EDI+2*ECX] MC:678B044F

Inst Fetch=2 MEMR
Inst Exe=1 MEMR
Output=0 MEMW
Total Machine cycle required is 3

IV. MOV AX,CS:[DI+1000H] MC:2E 8B850010

Inst Fetch=3 MEMR
Inst Exe=1 MEMR
Output=0 MEMW
Total Machine cycle required is 4

VII.MOV 80[SI+8],CL MC:888C88

Inst Fetch=2 MEMR
Inst Exe=0 MEMR
Output=1 MEMW
Total Machine cycle required is 3

VIII. MOV [SI],CL MC:880C

Inst Fetch=1 MEMR
Inst Exe=0 MEMR
Output=1 MEMW
Total Machine cycle required is 2

2. What is the purpose of the multiplexed signal on the 8086 microprocessor?
ANS. I. Reduce the number of pins used in 8086.
II. Reduce the design complexity

3. Which bus connections on the 8086 microprocessor are typically demultiplexed?
ANS. AD0-AD15 , and 16/S3 to AD19/S6

4. If an 8086 processor is working at 5 MHz – how much time does 1 MEMR cycle take
i. If there no wait states
ii. If there is 2 wait state

Ans
i. MEMR – 0.2 s x 4 = 0.8 s
ii. MEMR with 1 wait state 0.2 s x(4+2) = 1.2 s