OPERAND INSTRUCTIONS

3.2.1Operand instructions involving R and R/M

MOV/XCHG		Data transfer
ADD/ADC/SUB/SBB	R	Arithmetic
AND/OR/XOR/TEST/CMP	R/M	Logical

11 instructions x 2^{10}= 11264 opcodes

MOV instruction already discussed- see Instruction template

In data transfer instructions flags are not affected.

3.2.2 Exchange Instruction

XCHG DX, [BX]

	Before	After
DX	1234H	ABCDH
BX	1000H	
DS:1000H	ABCDH	1234H
DS:1002H		

3.2.3 Add instruction

Unlike in 8085, result of add/subtract can be in any register or memory location

ADD [BX], DX

In 3234H, 34H has three 1's. So P flag =0

	Before	After
DX	1234H	
BX	1000H	
DS:1000H	2000H	3234H
DS:1002H		

ADC DH ,[SI]

Add with Carry

81H

1000 0001B(Two 1's)

	Before	After
DH	30H	81H
Carry flag	1	0
SI	2000H	
DS:2000H	50H	
DS:2001H	60H	

New flag values: Ac=0, S=1, Z=0, V=1, P=1

SUB DH, CL

Subtract (without borrow)

0BH =

	Before	After
DH	30H	0BH
CL	25H	

0000 1011B(Three 1's)

New flag values: Ac=1, S=0, Z=0, V=0, P=0, Cy=0

		Before	After
SBB DH, CL	DH	20H	FAH
Subtract (with borrow)	Cy flag	1	1
	CL	25H	

FAH =1111 1010(Six 1's)

2's complement of FAH=0000 0110 = +06 So, FAH = -06

New flag values: Ac=1, S=1, Z=0, V=0, P=1, Cy=1

Discussion about Overflow (V) flag V

23H (+ve)	43H (+ve)
+ 46H (+ve)	+ 54H (+ve)
= 69H (+ve)	= 97H (-ve)
V= 0, Cy = 0	V = 1, Cy = 0
Correct answer	Wrong answer

Overflow used with signed numbers only

Carry flag used with unsigned numbers only

83H (-ve)	F2H (-ve)
+ 94H (-ve)	+ F3H (-ve)

= 17H (+ve)	= E5H (-ve)
V= 1, Cy = 1	V = 0, Cy = 1
Wrong answer	Correct answer

94H (-ve)	F6H (-ve)
- 83H (-ve)	- 43H (+ve)
= 11H (+ve)	= B3H (-ve)
V= 0, Cy = 0	V = 0, Cy = 0
Correct answer	Correct answer
94H (-ve)	66H (+ve)
- 23H (+ve)	- 83H (-ve)
= 71H (+ve)	= E3H (-ve)
V= 1, Cy = 0	V = 1, Cy = 1
Wrong answer	Wrong answer

3.2.4 AND instruction

AND BH, CL

Subtract (with borrow)

0FH=0000 1111B

06H=0000 0110B

		Before	After
	BH	56H	06H
AND		1	1
	CL	0FH	

Use: Selectively reset to 0 some bits of the destination

Bits that are ANDed with 0's are reset to 0

Bits that are ANDed with 1's are not changed

3.2.5 OR instruction

		Before	After
OR BH, CL	BH	56H	5FH
56H=0101 0110B	OR		
0FH=0000 1111B	CL	0FH	
5FH=0101 1111B			

Use: Selectively set to 1 some bits of the destination

Bits that are ORed with 1's are set to 1

Bits that are ORed with 0's are not changed

3.2.6 Ex-OR instruction

		Before	After
XOR BH, CL	BH	56H	59H
56H=0101 0110B	XOR		
0FH=0000 1111B	CL	0FH	
59H=0101 1001B			

Use: Selectively complement some bits of the destination.

Bits that are XORed with 1's are complemented

Bits that are XORed with 0's are not changed

3.2.7 TEST instruction

		Before	After
TEST BH, CL	BH	56H	56H
56H=0101 0110B	AND		
0FH=0000 1111B	CL	0FH	0FH
06H=0000 0110B			
Only flages are affected	Temp	45H	06H

TEST basically performs AND operation. Result of AND is not stored in destination. It is stored in Temp register. Temp is not accessible to programmer. There is no instruction like MOV Temp, 67H

3.2.8 Compare Instruction

		Before	After
CMP BH, CL	BH	56H	56H
56H=0101 0110B			
0FH=0000 1111B	CL	0FH	
Only flags are affected			
	Temp	45H	47H

CMP basically performs Subtract operation. Result of CMP is not stored in destination. It is stored in Temp register. Temp is not accessible to programmer.