MIT TUTORIAL-2

25/1/2020

U19CS012

1) Specify the output at PORT 1 if the following program is executed.

INSTRUCTION	A(H)	B(H)	C(H)	D(H)	PORT1 (H)
	00	00	00	00	00
MVI B, 82H	00	82	00	00	00
MOV A, B	82	82	00	00	00
MOV C, A	82	82	82	00	00
MVI D, 37H	82	82	82	37	00
OUT 01H	82	82	82	37	82 ⇓ 130 (decimal)
HLT					

OUT port (data) ← (A)

The content's of register A is placed on 8 bit bi-directional data bus, for tranemittion to port location 01H

Ans: output at PORT1 = 130 = 82H

2) Identify the contents of registers and flags at following instruction execution.

INSTRUCTION	A(H)	B(H)	C(H)	D(H)	S	Z	CY
	00	00	00	00	0	0	0
MVI A, 00H	00	00	00	00	0	0	0
MVI B, F8H	00	F8	00	00	0	0	0
MOV C, A	00	F8	00	00	0	0	0
MOV D, B	00	F8	00	F8	0	0	0
HLT							

Conditional Flags are not affected by Data Transfer Group instruction MOV, MVI.

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3.) Identify the content's of register and Flags after each Statement execution.

INSTRUCTION	A(H)	B(H)	S	Z	CY	PORT0 [00H]
INITIAL STATE	00	FF	0	1	0	0
MVI A, F2H	F2	FF	0	1	0	0
MVI B, 7AH	F2	7A	0	1	0	0
ADD B	6C	7A	0	0	1	0
OUT PORT0	6C	7A	0	0	1	108 [(6C)H]
HLT						

All instruction in Arithematic Group (ADD) effect zero, sign, parity, Carry & Aux. carry flag.

```
        (1)(1)(1)    (1)
  F2     1111       0010
+ 7A     0111       1010
     (1) 0110       1100  =  (6C)H ≠ (00)H  ∴(Z=0)   (Not zero)
      ↑
  carry generator ∴ CY = 1
```

4.) Identify the contents of register and flags after each statement execution

INSTRUCTION	A(H)	C(H)	S	Z	CY
INITIAL STATE	00	00	0	1	0
MVI A, 5EH	5E	00	0	1	0
ADI A2H	00	00	0	1	1
MOV C, A	00	00	00	1	1
HLT					

ADI data   Add immediate

(A) ← (A) + (byte 2)

```
       (1)(1)(1)(1)   (1)(1)
  5E     0101        1110                         (∴ Z=1)
+ A2     1010        0010       (Accumulator)   ∵ Result is zero
   (1) [0000         0000]  =  (00)H = zero [∴ Z = 1]
   ↖(carry generated)  ∴ CY = 1
```

5) Identify the contents of register's and flag's after following instruction execution.

INSTRUCTION	A(H)	B(H)	S	Z	CY
INITIAL STATE	00	00	0	0	0
MVI A, A9H	A9	00	0	0	0
MVI B, 57H	A9	57	0	0	0
ADD B	00	57	0	1	1
ORA A	00	57	0	1	0

ADD B : (A) ← (A)+(B)

	A9	1010	1001
+	57	0101	0111
(1)		0000	0000 = (00)H = (Z flag set)

carry generated ∴ CY = 1

result (00H) Z = 1 when

ORA A

A	0000	0000
A	0000	0000
0	0000	0000 = 00H (Z=1)

No carry generated CY = 0

6) Identify the contents of register's and flag's after following instruction execution.

INSTRUCTION	A(H)	B(H)	S	Z	CY
INITIAL STATE	00	00	0	0	0
XRA A	00	00	0	1	0
MVI B, 4AH	00	4A	0	1	0
SUI 4FH	B1	4A	1	0	1
ANA B	00	4A	0	1	0
HLT					

Ans: operation (XRA) performed
* Set the Z flag

(1) XRA A

A 0000 0000
(Ex-OR) ^ A 0000 0000 [∴ Z=1]
0000 0000 = (00)H = zero

(2) SUI 4FH

A (1) 0000 0000 (Borrow)
4FH 0100 1111
(1) (1)011 0001

ans (-ve) MSB = 1

Borrow generated [(S = 1) ∵(MSB of result = 1)]
∴ (CY = 1)

(3) ANA B

A 1011 0001
& B 0100 1010
(0000 0000) = (00) H
∵ Result = 00H = (Z = 1)

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(4)

7.) What does this program do

Memory Location: [2000: 18H 2001: 10H 2002: 2BH]

```
        MVI C, 03H   // total numbers in Array
A       LXI H, 2000H // initialise H-L pointer
Result→ MOV A, M     // initialise first no
        DRC C        // 1 value compared
LOOP :  INX H        // point to next location
A<B → CY=1  MOV B, M // store the val in B
(Acc → remains unchanged) + (A-B)  CMP B  // compare A & B
        JNC LOOP2    // if carry not generated
        MOV A,B      // if (current value > A)
LOOP2:  DCR C        // 1 element checked
        JNZ LOOP1    // is array counter reached zero??
        STA 2100H    // store the result from Acc to location 2100H
        HLT
```

CMP r
(A) - r
- content of r subtract from A
- Acc. remains unchanged
- Z flag (set) if A = r
- CY flag (set) (1) (A) < (r)

(a) What does above program do? Finds the highest number in Array of memory locations

Finally, Highest number will be present in Accumulator.

(b) At the end of program, what will be content of

(i) reg // Highest No.
A = 2B
B = 2B // last no. to be
C = 00 // (counter sets to zero finally)
H = 20
L = 02
pointer location to last element

(ii) CY = 1
(last number (2B) > old highest (18)H))
Z = 1 (∵ © counter reaches '0')

(iii) (STA instruction)
[2000] = 18H
[2001] = 10H
[2002] = 2BH
(Not affected)
Ans: [2100] = 2BH

8.) This program is to multiply the numbers 0AH by 0BH and store the result in Accumulator. If contents of B = 0AH, C = 0BH, then complete the following program.

m x n = { adding 'n' number m times }

```
MVI A, 00H
LOOP:   ADD B       ; (A) ← (A) + (B)
        DCR C       ; (C) ← (C) - 1  Decrement the counter
        JNZ LOOP    ; whether counter reached zero?
HLT
END
```

9.) Identify the contents of register, memory location (2055H), and the flags at following instructions execution

(decimal)

INSTRUCTION	A	H	L	S	Z	CY	M(2055 H)
	00	00	00	0	0	0	0
LXI H, 2055H	00	20	55	0	0	0	0
MVI M, 8AH	00	20	55	0	0	0	138 ((8A)H)
MVI A, 76H	76	20	55	0	0	0	138 ((8A)H
ADD M	00	20	55	0	1	1	138 ((8A)H
STA 2055H	00	20	55	0	1	1	0 (00H)

```
            (1)(1)(1)(1)  (1)(1)
  A   76H   0111   0100
+ M   8AH   1000   1010        ( zero flag set )
        (1) 0000   0000   = 00H = 0 = [Z = 1]
```

carry generated ∴ [CY = 1] (carry flag set)

x

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