Question No: 01

Question: For each of the following instructions, give the new destination contents and the new settings of CF, SF, ZF, PF and OF. Suppose that the flags are initially 0 in each part of this question

a. ADD AX, BX where AX contains 7FFFh and BX contains 0001h
b. DEC AL where Al contains 00h
c. NEG AL where AL contains 7Fh
d. XCHG AX, BX where AX contains 1ABCh and BX contains 712Ah

Answer:

A) Here , AX contains 7FFFh and BX contains 0001h. Initially all flags registers contain zero.

```
7FFFh =        0111 1111 1111 1111
0001h =      + 0000 0000 0000 0001
           ---------------------
               1000 0000 0000 0000
```

In Hexadecimal the sum is 8000h

Here,
CF= 0, because there is no carry out in the MSB on addition.
SF= 1, because the MSB is 1, so the result is negative.
ZF= 0, because the answer is non-zero.
PF= 1, because the low byte has even number (0) of 1's.
OF= 1, because On addition the numbers with the same sign produces result of different sign hence signed overflow occurs and also Cin XOR Cout = 1 XOR 0 = 1.

B) Here AL contains 00h. Initially all flags registers contain zero.

```
00h          =      0000 0000
01h 2's comp =    + 1111 1111
                  -----------
                    1111 1111
```

In Hexadecimal the result is FFh
Here,
CF= 0, because increment/decrement don't affect CF
SF= 1, because the MSB is 1, so the result is negative.
ZF= 0, because the answer is non-zero.
PF= 1, because the low byte has even number of 1's.
OF= 0, because there is borrow in and borrow out

C) Here AL contains 7Fh. Initially all flags registers contain zero.

7Fh	=	0111 1111
1's comp	=	1000 0000
		+ 0000 0001
2's comp	=	1000 0001

In Hexadecimal the result is 81h

Here,
CF= 1, because for NEG CF is always 1 unless the result is 0.
SF= 1, because the MSB is 1, so the result is negative.
ZF= 0, because the answer is not equal to zero.
PF= 1, because the low byte has even number of 1's.
OF= 0, because On addition there is no carryout in MSB and also Cin XOR Cout=0 XOR 0=0

D) AX contains 1ABCh and BX contains 712Ah. Initially all flags registers contain zero.
XCHG AX, BX , in this instruction no flag is affected, so all the flags will remain zero.

Here,
CF= 0
SF= 0
ZF= 0
PF= 0
OF= 0