

Chapter No:- 5

Flag Registers:-

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
				OF	DF	IF	TF	SF	ZF		AF		PF		CF

→ One important feature that distinguishes a computer from other machines is the computer's ability to make decisions.

→ Flags are placed in FLAG register (16 bit).

Status Flag:

0, 2, 4, 6, 7, 11

Control Flag:

8, 9, 10

Carry Flag:-

→ Set when the result of an unsigned arithmetic operation is too large to fit into the destination.

- $CF = 1$: if there is a carry out from the most significant bit (msb) or there is a borrow into the msb on subtraction.
- $CF = 0$ otherwise.
- Also affected by the shift and rotate instruction.

Parity Flag:-

- Reflects whether the number of 1 bits in the result of an operation is even or odd.
- $PF = 1$ (if the low byte of a result has an even number of one bits; even parity).
- $PF = 0$ (if the low byte of a result has an odd number of one bits; odd parity).
- If a word addition is $FFFFh$, then low byte contains 7 1s bits so odd parity.

Auxiliary Carry Flag:-

- Set when the result of an operation causes a carry from bit 3 to bit 4.

- $AF = 1$, if there is carry out from bit 3 on addition, or a borrow into bit 3 on subtraction.
- $AF = 0$, otherwise.
- Significant in binary coded decimal (bcd) operations.

Zero Flag:-

- Set when the result of an arithmetic or logical operation is zero.
- $ZF = 1$, for a zero result.
- $ZF = 0$, for a Non-zero result.

Sign Flag:-

- Set when the result of an arithmetic and logical operation generates a negative result.
- $SF = 1$, if the msb of a result is 1; representing a negative result in a signed.
- $SF = 0$, if the msb of a result is 0; representing a positive result in a signed.

Overflow Flag:-

- $OF = 1$; if signed overflow occurred
- $OF = 0$, otherwise

$A + B = C$	No overflow / sign same
$A + B = -C$	Overflow / sign different

Example:-

• Instruction	Affects flags
• MOV / XCHG	none
• ADD / SUB	all
• INC / DEC	all except CF
• NEG	all

$CF = 1$ unless result is 0.

$OF = 0$ if word operand is 8000h or byte operand is 80h.