→ Sorting Algorithms :

A sorting algorithm is used to rearrange a given array or list elements according to a comparision operator on the elements.

1. What is in place sorting ?

An in-place sorting algorithm uses constant extra space for producing the output (modifies the given array only) It sorts the list only by modifying the order of the elements within the list.

- For Example : Insertion sort & selection sort are in-place sorting algorithms as they do not use any additional space for sorting the list.

2. Stability in sorting algorithms :

A sorting algorithm is said to be stable if two objects / elements with equal key / value appears in the same order in sorted

output as they appear in the input array to be sorted.

- For example: Merge sort, insertion sort, & Bubble sort are example of stable algorithms, whereas Quick sort & selection sort are unstable.

⇒ Time complexities of all sorting algorithms:

Efficiency of an algorithm depends on two parameters:

1. Time complexity: is defined as the number of times a particular instruction set is executed rather than the total time is taken. It is because the total time taken also depends on some external factors like the compiler used, processor's speed etc.

2. Space complexity: is the total memory space required by the program for its execution.

Algorithm	Best	Average	worst
selection sort	$\Omega(n^2)$	$\Theta(n^2)$	$O(n^2)$
Bubble sort	$\Omega(n)$	$\Theta(n^2)$	$O(n^2)$
Insertion sort	$\Omega(n)$	$\Theta(n^2)$	$O(n^2)$
Heap sort	$\Omega(n\log n)$	$\Theta(n\log n)$	$O(n\log n)$
Quick sort	$\Omega(n\log n)$	$\Theta(n\log n)$	$O(n^2)$
Merge sort	$\Omega(n\log n)$	$\Theta(n\log n)$	$O(n\log n)$
Bucket sort	$\Omega(n+k)$	$\Theta(n+k)$	$O(n^2)$
Radix sort	$\Omega(nk)$	$\Theta(nk)$	$O(nk)$