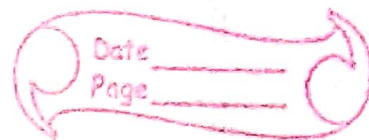


Name -> GARUN DHARJ

Branch -> IT

Roll no. -> 11G12053

DS - assign



Q1 -> Insertion Sort

Algo:-

Insertion Sort (int arr[], size)

{

for i -> size

j = arr[i];

k = j - 1;

while k >= 0 && arr[k] > j

arr[k+1] = arr[k]

k--;

end while

arr[k+1] = j

endfor

}

- Since Insertion Sort is modifying the original array by inserting the lower element at the right place in the original array only thus it does not require any extra space hence, it is an "In-place Sorting" Algorithm

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\therefore Space complexity = $O(1)$

- 2 basic operation takes place in the algo 1) comparison
ii) Swapping considering both these operations cost the same

In the Best case i.e. the array is already sorted
This algorithm only compares n elements

\therefore Time complexity = $O(n)$

Ans \rightarrow Quick sort

for n elements (n) comparison are done :-

$$T(n) = 1 + 2 + 2 + \dots + (n-1)$$

$$\frac{n(n-1)}{2} \rightarrow \frac{n^2 - n}{2}$$

$$= O(n^2)$$

\rightarrow Both, Quick sort & Bubble sort algorithm are "in-place"

algorithm

→ Bubble sort is different for small size array.

- Time complexity for merge sort → $O(n \log n)$
- Time complexity for Insertion sort → $O(n^2)$