

### Selection Sort Short Notes:

- Selection sort ek simple aur effective sorting algorithm hai.
- Yeh algorithm array ko do hisson mein taqseem karta hai: sorted aur unsorted.
- Har pass mein, sabse chhota element unsorted hissay se select kiya jata hai aur sorted hissay ke aakhri position par rakha jata hai.
- Har pass ke baad, sorted hissa barh jata hai aur unsorted hissa chhota hota hai.
- Selection sort ka Time complexity  $O(N^2)$  hai, lekin isme swaps ki tadaad  $O(N)$  hai, jo bubble sort se kaafi kam hai.
- Selection sort mein har element ko uske saamne wale sabhi elements ke saath mawazna karna padta hai, isliye iska efficiency  $O(N^2)$  hota hai, lekin yeh bubble sort se tez hota hai kyun ke swaps kam hote hain.

### Java Code for Selection Sort:

```
public class Solution {  
  
    // Selection Sort Function  
    public static void selectionSort(int arr[], int n) {  
        int i, j, k;  
  
        // Bahar ka loop (sorted aur unsorted hisson ke beech taqseem karta hai)  
        for(i = 0; i < n - 1; i++) {  
  
            // Andar ka loop (sabse chhota element select karne ke liye)  
            // i se lekar n tak, kyunki pehle i elements already sorted hain  
            for(j = k = i; j < n; j++) {  
  
                // Agar abhi tak ke sabse chhote element se chhota element mil gaya hai  
                if(arr[j] < arr[k]) {  
                    k = j; // Toh usse remember karo  
                }  
            }  
        }  
  
        // Ab sabse chhota element ko sorted hisse ke aakhri position par rakho
```

```

        swap(arr, i, k);
    }
}

// Swap Function (Do elements ko swap karne ke liye)
private static void swap(int arr[], int i, int k) {
    int temp = arr[i];
    arr[i] = arr[k];
    arr[k] = temp;
}
}

```

### Explanation:

`selectionSort` function array ko selection sort se sort karne ke liye hai.

1. `for(i = 0; i < n - 1; i++)`: Ye bahar ka loop hai jo array ko sorted aur unsorted hisson mein taqseem karta hai.
2. `for(j = k = i; j < n; j++)`: Ye andar ka loop hai jo unsorted hisson mein se sabse chhota element select karne ke liye hota hai. `k` variable sabse chhota element ko store karta hai.
3. `if(arr[j] < arr[k])`: Agar abhi tak ke sabse chhote element se chhota element mil gaya hai toh, `k` ko update karo.
4. `swap(arr, i, k)`: Bahar ke loop ke andar, sabse chhota element ko sorted hisse ke aakhri position par rakho.
5. `swap` function: Ye function hai jo do elements ko swap karta hai. `temp` ka istemal in dono elements ko swap karne mein hota hai.

Yeh pura process hota rahega jab tak array puri tarah se sorted na ho jaye.