**DSA LAB**

**Lab Assignment number 18**

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**Aim:** To implement Merge Sort and Quick Sort

# A**lgorithm**:

Merge Sort:

Step 1: READ n

Step 2: [INITIALIZE] first =0 ,last = n-1

Step 3: IF first>=last

RETURN

Step 4: [INITIALIZE] mid = (first+last)/2

Step 5: merge\_sort(first,mid)

Step 6: merge\_sort(mid+1,last)

Step 7: merge(first,last)

Step 8:EXIT

Merge :

Step 1: [INITIALIZE] mid = (first+last)/2

Step 2: [INITIALIZE] i = first , j = mid+1 , k = first

Step 3: [INITIALIZE] temp[100]

Step 4: Repeat following while i<=mid AND j<=last

IF array[i] < array[j]

SET temp[k++] = array[i++]

ELSE

SET temp[k++] = array[j++]

Step 5: Repeat following while i<=mid

SET temp[k++] = array[i++]

Step 6: Repeat following while j<=last

SET temp[k++] = array[j++]

Step 7: [INITIALIZE] i = first

Step 8: Repeat while i<=last

SET array[i] = temp[i]

SET i++

Step 9: EXIT

Quick Sort:

Step 1: READ n

Step 2: [INITIALIZE] first =0 ,last = n-1

Step 3: IF first<last

[INITIALIZE] pivot=first , i=first , j=last

Repeat following while i<j

Repeat following while array[i]<=array[pivot] AND i<last

SET i++

Repeat following while array[j]>array[pivot]

SET j--

IF i<j

SET temp=array[i]

SET array[i]=array[j]

SET array[j]=temp

SET temp=array[pivot]

SET array[pivot]=array[j]

SET array[j]=temp

quick\_sort(first,j-1)

quick\_sort(j+1,last) [END OF IF]

Step 4:EXIT

**EXAMPLE:**

Array[6] = {1,45,76,22,38,99}

Merge Sort:

[1,45,76,22,38,99]

Dividing and calling merge\_sort(1):

([1 ,45,76] [22,38,99])

Dividing and calling merge\_sort(2):

(([1,45] [76]) ([22,38][99]))

Dividing and calling merge\_sort(3):

((([1][45])[76])(([22][38])[99]))

Calling merge(1):

(([1,45][76])([22,38][99]))

Calling merge(2):

(([1,45,76])([22,38,99]))

Calling merge(3):

[1,22,38,45,76,99]

Sorted array: 1,22,38,45,76,99

Quick Sort:

[1,45,76,22,38,99]

Pivot: 99

[1,45,76,22,38] [99]

Pivot: 38

[1,22,][38] [45,76] [99]

Pivot: 22 Pivot : 76

[1][22][38][45][76][99]

Sorted array: 1,22,38,45,76,99