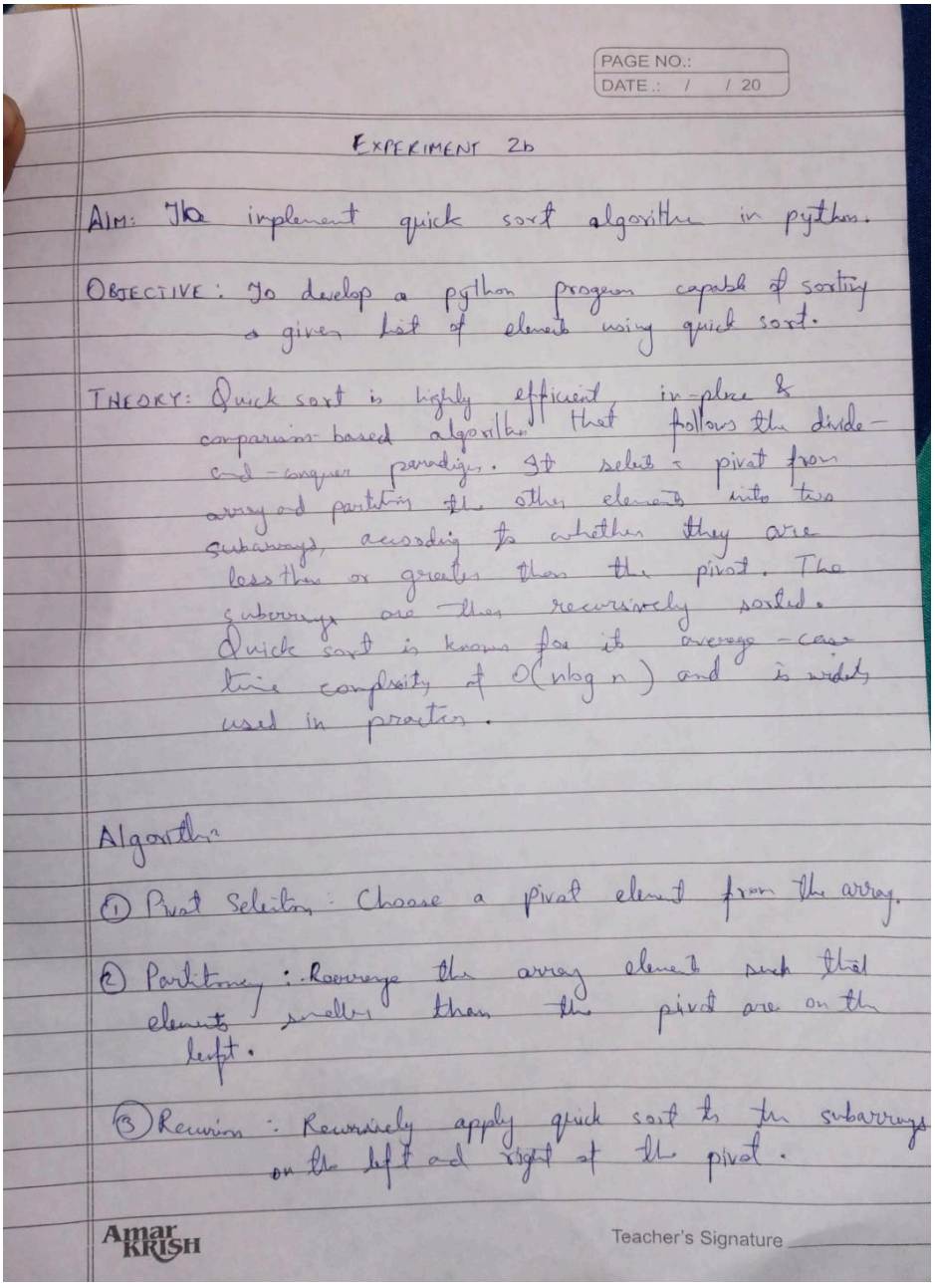
Vivekanand Education Society's
Institute of Technology
Approved by AICTE & Affiliated to University of Mumbai

Artificial Intelligence and Data Science Department

Subject/Odd Sem 2023-23/Experiment 1

Name : Rajat Disawal	Class/Roll No. : 13	Grade :

Title of Experiment : To implement merge sort in python.



PAGE NO.:
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EXPERIMENT 2b

AIM: To implement quick sort algorithm in python.

OBJECTIVE: To develop a python program capable of sorting a given list of elements using quick sort.

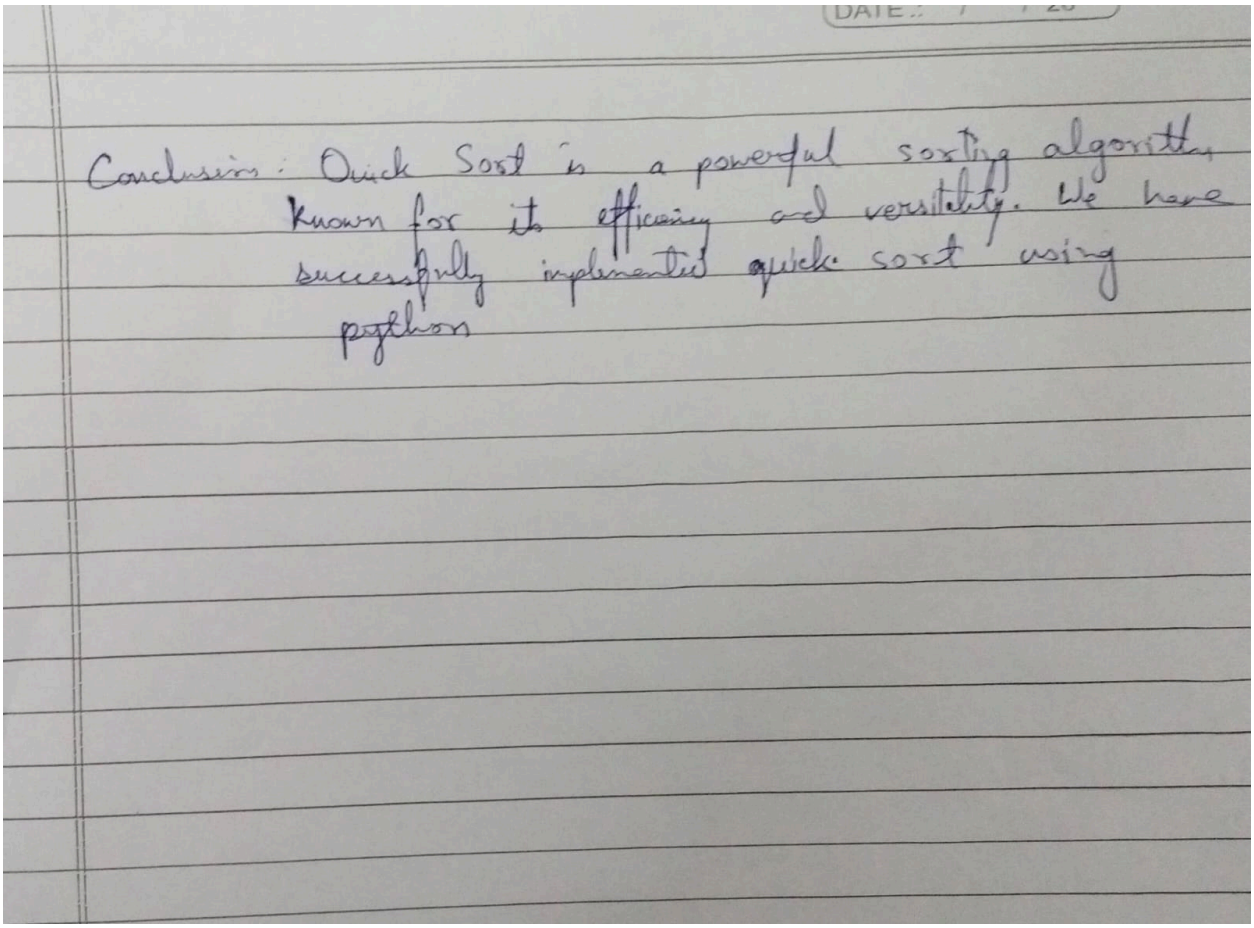
THEORY: Quick sort is highly efficient in-place & comparison-based algorithm that follows the divide-and-conquer paradigm. It selects a pivot from array and partitions the other elements into two subarrays, according to whether they are less than or greater than the pivot. The subarrays are then recursively sorted. Quick sort is known for its average-case time complexity of O(n log n) and is widely used in practice.

Algorithm:

1. Pivot Selection: Choose a pivot element from the array.
2. Partitioning: Rearrange the array elements such that elements smaller than the pivot are on the left.
3. Recursion: Recursively apply quick sort to the subarrays on the left and right of the pivot.

Amar KRISH

Teacher's Signature


Conclusion: Quick Sort is a powerful sorting algorithm
known for its efficiency and versatility. We have
successfully implemented quick sort using
python

Program code: Quick sort

```
def partition(array, low, high):
 pivot = array[high]
 i = low - 1
 for j in range(low, high):
 if array[j] <= pivot:
 i = i + 1
 (array[i], array[j]) = (array[j], array[i])

 (array[i + 1], array[high]) = (array[high], array[i + 1])
 return i + 1
def quickSort(array, low, high):
 if low < high:
 pi = partition(array, low, high)
 quickSort(array, low, pi - 1)
 quickSort(array, pi + 1, high)
data = [1,9,15,3,22,66,31]
print("Unsorted Array")
print(data)
size = len(data)
quickSort(data, 0, size - 1)
print('Sorted Array in Ascending Order:')
print(data)
```

Subject/Odd Sem 2023-23/Experiment 1

Program :

1.	**Programs on Basic programming constructs like branching and looping.**

```
Unsorted Array
[1, 9, 15, 3, 22, 66, 31]
Sorted Array in Ascending Order:
[1, 3, 9, 15, 22, 31, 66]


...Program finished with exit code 0
Press ENTER to exit console.
```

Output Screenshots :

Results and Discussions : Thus we have successfully executed quick sort program in python language.