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**T.Y.B.Tech (CSE)**

Design And Analysis of Algorithms

**Tutorial : 2**

**Name: Aniruddha Shende**

**Roll number: PE04**

**Batch: E1**

**Panel: E**

Table

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Diagram, letter

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Letter

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A piece of paper with writing

Description automatically generated with medium confidence

Diagram, engineering drawing, schematic

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**Program Code :**

*// Name : Aniruddha Shende*

*// Roll no : PE-04*

*// Batch : E1*

*// Panel : E*

#include <bits/stdc++.h>

using namespace std;

void merge(vector<int> *&*nums, int l, int r)

{

int mid = (l + r) / 2;

int lo = l;

int hi = mid + 1;

vector<int> temp(r - l + 1);

int c = 0;

while (lo <= mid && hi <= r)

{

if (nums[lo] < nums[hi])

{

temp[c++] = nums[lo++];

}

else

{

temp[c++] = nums[hi++];

}

}

while (lo <= mid)

temp[c++] = nums[lo++];

while (hi <= r)

temp[c++] = nums[hi++];

c = 0;

for (int e = l; e <= r; e++)

{

nums[e] = temp[c++];

}

}

void merge\_sort(vector<int> *&*nums, int l, int r, int level)

{

if (r > l)

{

int mid = (l + r) / 2;

merge\_sort(nums, l, mid, level + 1);

cout << "Left half of the array in " << level << " level \t";

for (int p = l; p <= mid; p++)

{

cout << nums[p] << " ";

}

cout << "\n\n";

merge\_sort(nums, mid + 1, r, level + 1);

cout << "Right half of the array in " << level << " level : \t";

for (int p = mid + 1; p <= r; p++)

{

cout << nums[p] << " ";

}

cout << "\n\n";

merge(nums, l, r);

}

}

int main()

{

int n;

cout << "\n\nEnter Number of elements in the array : " << endl;

cin >> n;

vector<int> nums(n);

cout << "Enter " << n << " element " << endl;

for (int i = 0; i < n; i++)

{

int element;

cin >> element;

nums[i] = element;

}

merge\_sort(nums, 0, n - 1, 1);

cout << "\nFinal Sorted array\n\n";

for (int i = 0; i < n; i++)

{

cout << nums[i] << " ";

}

cout << "\n\n";

return 0;

}

**Output :**

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**Graphical user interface, text, application

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