```cpp
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//Device name:LAPTOP-MGJPSU5N
//*************************
#include<bits/stdc++.h>
#define RUN 4
using namespace std;



void insertionSort(int arr[], int left, int right)
{
    for (int i = left + 1; i <= right; i++)
    {
        int temp = arr[i];
        int j = i - 1;
        while (j >= left && arr[j] > temp)
        {
            arr[j+1] = arr[j];
            j--;
        }
        arr[j+1] = temp;
    }
}

void MERGE(int arr[], int l, int m, int r)
{

    int len1 = m - l + 1, len2 = r - m;
    int left[len1], right[len2];
    for (int i = 0; i < len1; i++)
        left[i] = arr[l + i];
    for (int i = 0; i < len2; i++)
        right[i] = arr[m + 1 + i];

    int i = 0;
    int j = 0;
    int k = l;


    while (i < len1 && j < len2)
    {
        if (left[i] <= right[j])
        {
            arr[k] = left[i];
            i++;
        }
        else
        {
            arr[k] = right[j];
            j++;
        }
        k++;
    }

    while (i < len1)
    {
        arr[k] = left[i];
        k++;
        i++;
    }

    while (j < len2)
    {
        arr[k] = right[j];
        k++;
```

```cpp
67              j++;
68          }
69  }
70

71
72  void timSort(int arr[], int n)
73  {
74
75      for (int i = 0; i < n; i+=RUN)
76          insertionSort(arr, i, min((i+RUN-1),
77                                      (n-1)));
78

79
80      for (int SIZE = RUN; SIZE < n;
81                              SIZE = 2*SIZE)
82      {
83
84          for (int left = 0; left < n;
85                              left += 2*SIZE)
86          {
87

88
89
90              int mid = left + SIZE - 1;
91              int right = min((left + 2*SIZE - 1),
92                                      (n-1));
93

94
95              if(mid < right)
96                  MERGE(arr, left, mid, right);
97          }
98      }
99  }
100

101
102 void printArray(int arr[], int n)
103 {
104     for (int i = 0; i < n; i++)
105         cout<<arr[i]<<" " ;
106     cout<<endl;
107 }
108
109 int main()
110 {
111     int n;
112     cout <<endl<<"enter the number of element in array : ";
113     cin>>n;
114     int arr[n];
115
116     cout << "enter array elements ."<<endl;
117     for(int m =0; m<n;m++){
118         cin >> arr[m];
119     }
120

121
122     timSort(arr, n);
123
124     cout<<"After Sorting Array is"<<endl;
125     printArray(arr, n);
126     return 0;
127 }
```