Name- Chiradeep Banik.

Enrol. No. - 20UCS176

Branch - Computer Sc. and Engineering

Section - A

Reg. No. - 201281D

8.1

Heap Sort without heapify

```
#include<iostream>
using namespace std;
void buildMaxHeap(int arr[], int n){
    for(int i=1; i<n; i++){
        if(arr[i] > arr[(i-1)/2]){
            int j=i
            while(arr[j] > arr[(j-1)/2]){
                swap(arr[j], arr[(j-1)/2]);
                j=(j-1)/2;
            }
        }
    }
}
void heapSort(int arr[], int n){
    buildMaxHeap(arr[], n);
    for(int i=n-1; i>0; i--){
        swap(arr[0], arr[i]);
        int j=0, index;
        do{
            index = (2*j+1);
            if(arr[index] < arr[index+1] && index<(i-1)){
                index++;
            }
```

→

```
        if (arr[i] < arr[index] && index < n) {
            swap(arr[i], arr[index]);
        }
        i = index;
    } while (index < i);
}

int main() {
    int arr[] = {10, 20, 15, 17, 9, 21};
    int n = sizeof(arr) / sizeof(arr[0]);

    heapSort(arr, n);
    printf("Sorted array : ");
    for (int i = 0; i < n; i++) {
        printf("%d ", arr[i]);
    }
    printf("\n");
    return 0;
}
```

Console Output

→ Sorted array: 9 10 15 17 20 21.

Heap Sort with Heapify

```
#include <iostream>
using namespace std;
void heapify (int arr[], int n, int i){
    int largest = i;
    int l = 2*i + 1;
    int r = 2*i + 2;
    if (l < n && arr[l] > arr[largest]){
        largest = l;
    }
    if (r < n && arr[r] > arr[largest]){
        largest = r;
    }
    if (largest != i){
        swap(arr[i], arr[largest]);
        heapify(arr, n, largest);
    }
}
```

→

```
void heapSort(int arr[], int n){
    for (int i = n/2 - 1; i >= 0; i--){
        heapify(arr, n, i);
    }
    for (int i = n-1; i > 0; i--){
        swap(arr[0], arr[i]);
        heapify(arr, i, 0);
    }
}
int main(){
    int arr[] = {12, 11, 13, 5, 6, 7};
    int n = sizeof(arr)/sizeof(arr[0]);
    heapSort(arr, n);
    printf("Sorted array: ");
    for (int i=0; i<n; i++){
        printf("%d", arr[i]);
    }
    printf("\n");
    return 0;
}
```

Console Output

↳ Sorted array: 5 6 7 11 12 13

Siddhesh Dhavale