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Subject: Data Structure and Algorithm Laboratory

Assignment No.10

```cpp
#include <iostream>

using namespace std;

class heap1

{

public:

        void accept();

        void MAX_HEAPIFY(int a[], int, int);

        void BUILD_MAX_HEAP(int a[], int);

        void HEAPSORT(int a[], int);

        void display(int a[], int);

};


void heap1::MAX_HEAPIFY(int a[], int i, int n)

{

        int l, r, largest, loc;

        l = (2 * i);

        r = (2 * i + 1);

        if ((l <= n) && (a[l] > a[i]))

                largest = l;

        else

                largest = i;

        if ((r <= n) && (a[r] > a[largest]))

                largest = r;

        if (largest != i)

        {

                loc = a[i];

                a[i] = a[largest];
```

```cpp
                a[largest] = loc;

                MAX_HEAPIFY(a, largest, n);

        }

}


void heap1::BUILD_MAX_HEAP(int a[], int n)

{

        for (int k = n / 2; k >= 1; k--)

        { //start from the last parent in subtrees

                MAX_HEAPIFY(a, k, n);

        }

}


void heap1::HEAPSORT(int a[], int n)

{

        BUILD_MAX_HEAP(a, n);

        int i, temp;

        for (i = n; i >= 2; i--)

        {

                temp = a[i];

                a[i] = a[1];

                a[1] = temp;

                MAX_HEAPIFY(a, 1, i - 1);

        }

}


void heap1::accept()

{

        int n;

        cout << "Enter the number of students" << endl;

        cin >> n;
```

```cpp
        int a[n];

        cout << "Enter the marks of the students " << endl;

        for (int i = 1; i <= n; i++)

        {cin >> a[i];}

        HEAPSORT(a, n);

        display(a, n);

}

void heap1::display(int a[], int n)

{

        cout << "Minimum marks obtained are:" << a[1];

        cout << "\nMaximum marks obtained are:" << a[n];

}


int main()

{

        heap1 h;

        h.accept();

}
```