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Subject: Data Structure and Algorithm Laboratory  
Assignment No.10

```
#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];
```

```

        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;
}

```

```

    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();

}

```

The screenshot shows the Visual Studio Code editor with a C++ file named `hep.cpp` open. The code defines a `heap1` class with methods `accept()`, `MAX_HEAPIFY()`, `BUILD_MAX_HEAP()`, `HEAPSORT()`, and `display()`. The `main` function creates a `heap1` object `h` and calls `h.accept()`. The terminal window shows the program's execution: it prompts for the number of students (4) and their marks (50, 51, 52, 49). It then outputs the minimum mark (49) and the maximum mark (52).

```

1  #include <iostream>
2  using namespace std;
3  class heap1
4  {
5  public:
6      void accept();
7      void MAX_HEAPIFY(int a[], int i, int n);
8      void BUILD_MAX_HEAP(int a[], int n);
9      void HEAPSORT(int a[], int n);
10     void display(int a[], int n);
11 };
12
13 void heap1::MAX_HEAPIFY(int a[], int i, int n)
14 {
15     int l, r, largest, loc;
16     l = (2 * i);

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

1: powershell

```

PS D:\AbdulMuiz\College Practicals\DSA> g++ hep.cpp
PS D:\AbdulMuiz\College Practicals\DSA> ./hep
Enter the number of students
4
Enter the marks of the students
50
51
52
49
Minimum marks obtained are:49
Maximum marks obtained are:52
PS D:\AbdulMuiz\College Practicals\DSA>

```

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