

## **PROGRAM 6: HEAP IMPLEMENTATION**

**Aim:** To write a program in C++ for implementing Max Heap.

**Description:**

A Binary Heap is a complete binary tree which is either Min Heap or Max Heap. In a Max Binary Heap, the key at root must be maximum among all keys present in Binary Heap. This property must be recursively true for all nodes in Binary Tree. Min Binary Heap is similar to MinHeap.

**Algorithm:**

*For max\_heap:*

Begin

Declare function max\_heap ()

Declare j, t of the integer datatype.

Initialize t = a[m].

j = 2 \* m;

while (j <= n) do

if (j < n && a[j+1] > a[j]) then

j = j + 1

if (t > a[j]) then

break

else if (t <= a[j]) then

a[j / 2] = a[j]

j = 2 \* j

a[j/2] = t

return

End.

*For build\_maxheap:*

Begin

Declare function build\_maxheap(int \*a,int n).

Declare k of the integer datatype.

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

Call function max\_heap(a,k,n)

End.

**Program:**

```
#include <iostream>
```

```
using namespace std;
```

```
void max_heap(int *a, int m, int n) {
```

```
    int j, t;
```

```
    t = a[m];
```

```
    j = 2 * m;
```

```
    while (j <= n) {
```

```
        if (j < n && a[j+1] > a[j])
```

```
            j = j + 1;
```

```
        if (t > a[j])
```

```
            break;
```

```
        else if (t <= a[j]) {
```

```
            a[j / 2] = a[j];
```

```
            j = 2 * j;
```

```

    }
}
a[j/2] = t;
return;
}
void build_maxheap(int *a,int n) {
    int k;
    for(k = n/2; k >= 1; k--) {
        max_heap(a,k,n);
    }
}
int main() {
    int n, i;
    cout<<"enter no of elements of array\n";
    cin>>n;
    int a[30];
    for (i = 1; i <= n; i++) {
        cout<<"enter elements"<<" "<<(i)<<endl;
        cin>>a[i];
    }
    build_maxheap(a,n);
    cout<<"Max Heap\n";
    for (i = 1; i <= n; i++) {
        cout<<a[i]<<endl;
    }
}

```

Output:

enter no of elements of array

5

enter elements 1

7

enter elements 2

6

enter elements 3

2

enter elements 4

1

enter elements 5

4

Max Heap

7

6

2

1

4

### Result:

Thus a C++ program has been written and executed for implementing Max Heap.

