**Practical No.10**

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**🔘PROBLEM STATEMET:-**

**Read the marks obtained by students of second year in an online**

**examination of particular subject. Find out maximum and minimum marks**

**obtained in that subject. Use heap data structure.Analyze the algorithm.**

**\*/**

#include<iostream>

using namespace std;

#define MAX 10

class Heap

{

private:

int Marks[MAX];

int n;

public:

Heap();

void insert(int num);

void makeheap();

void heapsort();

void display();

void display\_max\_min\_marks();

};

Heap::Heap()

{

n=0;

for(int i=0;i<MAX;i++)

Marks[i]=0;

}

void Heap::insert(int num)

{

if(n<MAX)

{

Marks[n]=num;

n++;

}

else

cout<<"\nArray is full...";

}

void Heap::makeheap()

{

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

{

int val=Marks[i];

int j=1;

int f=(j-1)/2;

while((j>0) && Marks[f]<val)

{

Marks[j]=Marks[f];

j=f;

f=(j-1)/2;

}

Marks[j]=val;

}

}

void Heap::heapsort()

{

for(int i=n-1;i>0;i--)

{

int temp=Marks[i];

Marks[i]=Marks[0];

int k=0;

int j;

if(i==1)

j=-1;

else

j=1;

if(i>2&&Marks[2]>Marks[1])

j=2;

while(j>=0&&temp<Marks[j])

{

Marks[k]=Marks[j];

k=j;

j=2\*k+1;

if(j+1<=i-1&&Marks[j]<Marks[j+1])

j++;

if(j>i-1)

j=-1;

}

Marks[k]=temp;

}

}

void Heap::display()

{

for(int i=0;i<n;i++)

cout<<" "<<Marks[i];

cout<<"\n";

}

void Heap::display\_max\_min\_marks()

{

cout<<"\nThe Maximum marks="<<Marks[n-1];

cout<<"\nThe Minimum marks="<<Marks[0];

cout<<"\n";

}

int main()

{

Heap obj;

obj.insert(55);

obj.insert(48);

obj.insert(89);

obj.insert(91);

obj.insert(75);

obj.insert(63);

obj.insert(45);

obj.insert(78);

cout<<"\nFollowing Marks are obtained by students...."<<endl;

obj.display();

obj.makeheap();

cout<<"\n\nHeapified....."<<endl;

obj.heapsort();

obj.display\_max\_min\_marks();

return 0;

}

**Output:**

Following Marks are obtained by students....

55 48 89 91 75 63 45 78

Heapified.....

The Maximum marks=91

The Minimum marks=45