Assignment No 3

Name :Prerana Gajare Class:TEIT RollNo:TI50

3b)Write a program for Towers of Hanoi using appropriate techniques.

Source Code:

```
#include <iostream>
using namespace std;
#include <stack>
#include <cmath>

int transfer_disk(stack<int>& a,stack<int>& b){
    if(b.empty()==true){
        b.push(a.top());
        a.pop();
        return 1;
    }
    else if(a.empty()==true){
        a.push(b.top());
        b.pop();
        return 2;
    }
    else{
        if(b.top()>a.top()){
            b.push(a.top());
            a.pop();
            return 1;
        }
        else{
            a.push(b.top());
            b.pop();
            return 2;
        }
    }
}

int main(){
    stack<int> s,a,d;
    int n=0;
    cout<<"\nEnter the number of disks : ";
    cin>>n;
    for(int i=n;i>=1;i--){
        s.push(i);
    }

    int x=pow(2,n)-1;
```

```
   int i=1;

if(n%2==0){
   while(i<=x){
         if(i%3==1){
         int y=transfer_disk(s,a);
         if(y==1){
            cout<<"Move the disk "<<a.top()<<" from source to auxiliary"<<endl;
         }
         else
            cout<<"Move the disk "<<s.top()<<" from auxiliary to source"<<endl;
         }
         else if(i%3==2){
         int y=transfer_disk(s,d);
         if(y==1){
            cout<<"Move the disk "<<d.top()<<" from source to destination"<<endl;
         }
         else
            cout<<"Move the disk "<<s.top()<<" from destination to source"<<endl;
         }
         else{
         int y=transfer_disk(a,d);
         if(y==1){
            cout<<"Move the disk "<<d.top()<<" from auxiliary to destination"<<endl;
         }
         else
            cout<<"Move the disk "<<a.top()<<" from destination to auxiliary"<<endl;
         }
         i++;
   }
}
else{
   while(i<=x){
         if(i%3==1){
         int y=transfer_disk(s,d);
         if(y==1){
            cout<<"Move the disk "<<d.top()<<" from source to destination"<<endl;
         }
         else
            cout<<"Move the disk "<<s.top()<<" from destination to source"<<endl;
         }
         else if(i%3==2){
         int y=transfer_disk(s,a);
         if(y==1){
            cout<<"Move the disk "<<a.top()<<" from source to auxiliary"<<endl;
         }
         else
            cout<<"Move the disk "<<s.top()<<" from auxiliary to source"<<endl;
```

```
        }
        else{
        int y=transfer_disk(a,d);
        if(y==1){
           cout<<"Move the disk "<<d.top()<<" from auxiliary to destination"<<endl;
        }
        else
           cout<<"Move the disk "<<a.top()<<" from destination to auxiliary"<<endl;
        }
        i++;
   }
}


while(d.empty()!=true){
                cout<<"\nDisk at the top of destination Stack : ";
      cout<<d.top()<<endl;
      d.pop();
   }


return 0;
}
```

**********OUTPUT**********

```
Enter the number of disks : 3
Move the disk 1 from source to destination
Move the disk 2 from source to auxiliary
Move the disk 1 from destination to auxiliary
Move the disk 3 from source to destination
Move the disk 1 from auxiliary to source
Move the disk 2 from auxiliary to destination
Move the disk 1 from source to destination

Disk at the top of destination Stack : 1

Disk at the top of destination Stack : 2

Disk at the top of destination Stack : 3
```