Experiment 2

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Branch: CSE
Section/Group: 806/B
Semester: 5th
Date of Performance: 10/08/2022
Subject Name: DAA Lab
Subject Code: 20CSP-312

1. Aim/Overview of the practical:

Code implements power function in O (log n) time complexity.

2. Task to be done/ Which logistics used:

Vs Code IDE, C++ Language, C++ Compiler, Concepts of Recursion etc**.**

3. Algorithm/Flowchart:

The algorithm is simple implementation of following recurrence relation used to calculate 'a' to the power 'b' where 'a' and 'b' are integers.

```
int power(int x, unsigned int y)
{
int temp;
if( y == 0)
return 1;
temp = power(x, y/2);
if (y%2 == 0)
return temp*temp;
else
return x*temp*temp;
}
```

4. Code:

```
//calculate pow(x,n) with time complexity O(log(n))

#include<iostream>
#include<cmath>
using namespace std;
int power(int x, int n)
 {
 if(n==0)
 return 0;
 else if(n%2==0)
 return pow(x,n/2) * pow(x,n/2);
 else
 return x * pow(x,n/2) * pow(x,n/2);
 }
int main()
{
 int num,pow;
 cout<<"enter number: ";cin>>num;
 cout<<"enter power :";cin>>pow;
 cout<<endl<<"output: "<<power(num,pow);
 cout<<"\n\n\t---- SANSKAR AGRAWAL 20BCS5914";
}
```

5. Observations/Discussions/ Complexity Analysis:

The algorithm is simple implementation of following recurrence relation used to calculate 'a' to the power 'b' where 'a' and 'b' are integers. The time complexity of this algorithm is O(log(b)) while computing power(a, b). This is because at every level in recursion sub-tree, we are doing only one computation (and using that value sub-sequent and there are log(b) levels overall. The time complexity of the algorithm is O(log n), where n is the power of the number x

6. Output:

```
Output

/tmp/nz2wqeiSMP.o
enter number: 5
enter power :3
output: 125

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```

Learning outcomes (What I have learnt):

1. We learnt about time complexity.
2. We learnt to calculate time complexity of programs and thereby create the most optimal program possible.
3. We learned to create a program for calculating power with time complexity O(log n)

Evaluation Grid (To be created as per the SOP and Assessment guidelines by the faculty):

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.			
2.			
3.			