

Experiment 2

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Subject Name: Design and Analysis of Algorithms

Subject Code: 20CSP-312

1. Aim/Overview of the practical:

Code implement power function in $O(\log n)$ time complexity.

2. Task to be done/ Which logistics used:

Given two integers x and n , write a function to compute x^n . We may assume that x and n are small and overflow doesn't happen.

Write a program to calculate $\text{pow}(x,n)$

$$x = 5, n = 2$$

$$x^n \rightarrow 5^2 \rightarrow 25$$

Examples:

Input: $x = 2, n = 3$

Output: 8

Input: $x = 7, n = 2$

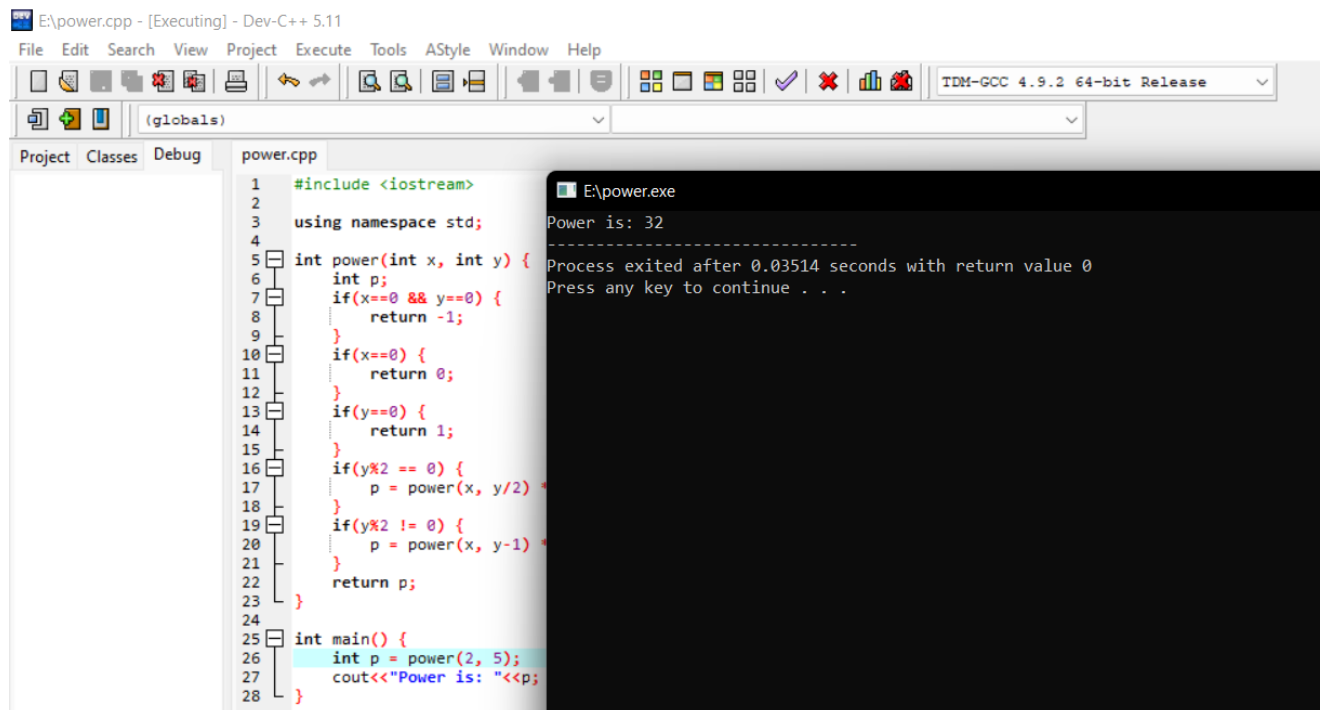
Output: 49

4. Steps for experiment/practical/Code:

```
#include <iostream>
using namespace std;
int power(int x, int y) {
    int p;
    if(x==0 && y==0) {
        return -1;
    }
    if(x==0) {
        return 0;
    }
    if(y==0) {
        return 1;
    }
    if(y%2 == 0) {
        p = power(x, y/2) * power(x, y/2);
    }
    if(y%2 != 0) {
        p = power(x, y-1) * x;
    }
    return p;
}
```

```
int main() {
    int p = power(2, 5);
    cout<<"Power is: "<<p;
}
```

5. Observations/Discussions/ Complexity Analysis:



E:\power.cpp - [Executing] - Dev-C++ 5.11

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(globals)

Project Classes Debug power.cpp

```
1 #include <iostream>
2
3 using namespace std;
4
5 int power(int x, int y) {
6     int p;
7     if(x==0 && y==0) {
8         return -1;
9     }
10    if(x==0) {
11        return 0;
12    }
13    if(y==0) {
14        return 1;
15    }
16    if(y%2 == 0) {
17        p = power(x, y/2);
18    }
19    if(y%2 != 0) {
20        p = power(x, y-1);
21    }
22    return p;
23 }
24
25 int main() {
26     int p = power(2, 5);
27     cout<<"Power is: "<<p;
28 }
```

E:\power.exe

Power is: 32

Process exited after 0.03514 seconds with return value 0

Press any key to continue . . .