

**CHANDIGARH UNIVERSITY
UNIVERSITY INSTITUTE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING**



Submitted By: Vivek Kumar(21BCS8129)		Submitted To: Neha Dutta(E12830)	
Subject Name	Design and Analysis of Algorithm Lab		
Subject Code	20CSP-312		
Branch	Computer Science and Engineering		
Semester	5 th		

Experiment - 2

Student Name: Vivek Kumar

Branch: BE-CSE(LEET)

Semester: 5th

Subject Name: DAA Lab

UID: 21BCS8129

Section/Group: 20BCS-WM-616/A

Date of Performance: 16/08/2022

Subject Code: 20CSP-312

1. Aim/Overview of the practical:

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

2. Task to be done/ Which logistics used:

Find a^b using divide and conqueror algorithm.

3. Requirements (For programming-based labs):

- Laptop or PC.
- Operation system (Mac, Windows, Linux, or any)
- Vs-Code with MinGw or any C++ Compiler

4. Algorithm/Flowchart (For programming-based labs):

Step 1: Let a, b be the two numbers

Step 2: Call function power(a,b)

Step 3: If $b=0$ return 1 go to step 7

Step 4: If $b<0$ return $1/\text{power}(a,-b)$ and go to step 2

Step 5: If b is even return $\text{power}(a,b/2) * \text{power}(a,b/2)$ go to step 2

Step 6: If b is odd return $(a*\text{power}(a,(b-1)/2)*\text{power}(a,(b-1)/2))$ go to step 2

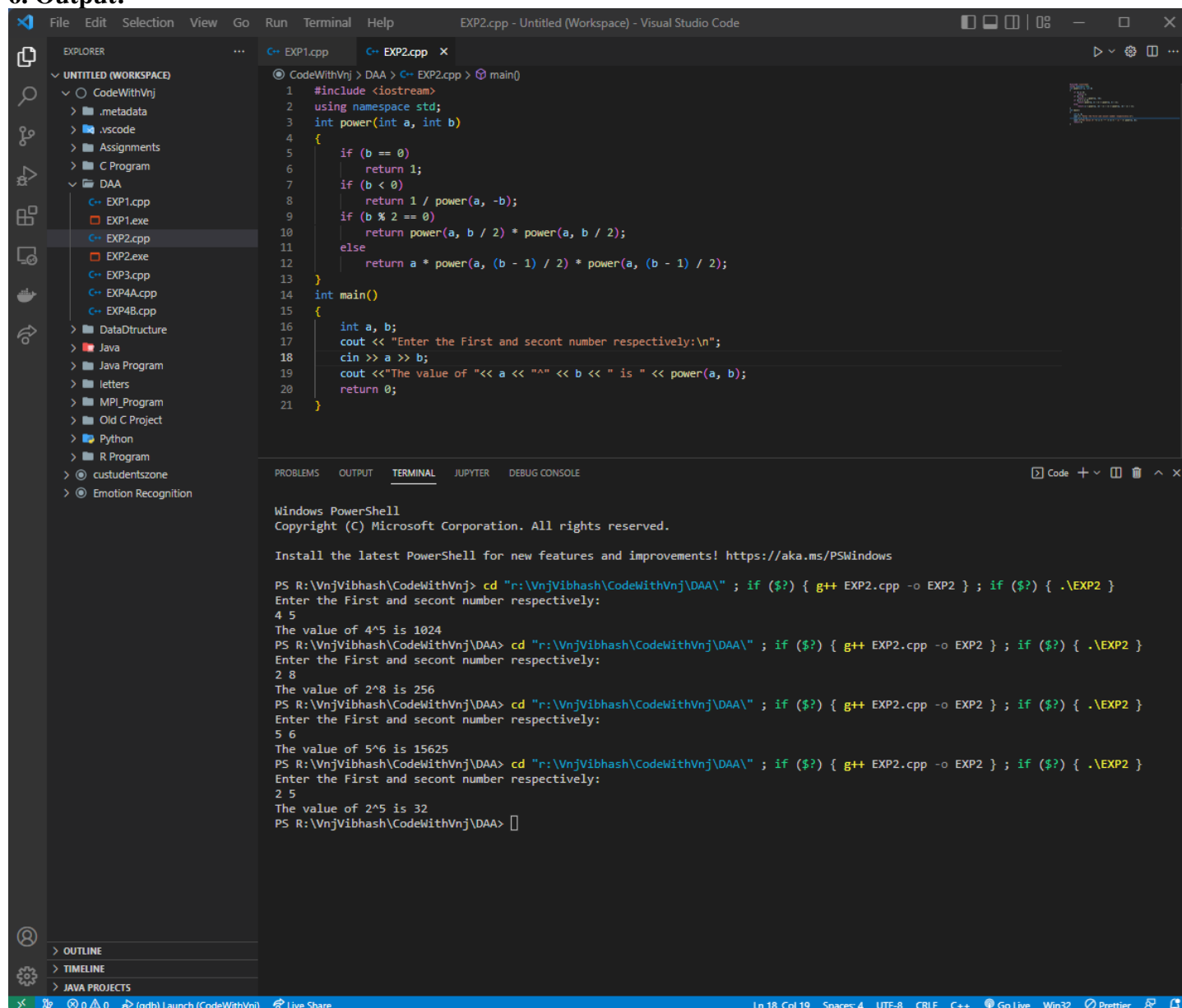
Step 7: Finish

5. Steps for experiment/practical/Code:

```
#include <iostream>
using namespace std;
int power(int a, int b)
{
    if (b == 0)
        return 1;
    if (b < 0)
        return 1 / power(a, -b);
    if (b % 2 == 0)
        return power(a, b / 2) * power(a, b / 2);
    else
        return a * power(a, (b - 1) / 2) * power(a, (b - 1) / 2);
}
int main()
{
    int a, b;
    cout << "Enter the First and secont number respectively:\n";
```

```
cin >> a >> b;
cout << "The value of " << a << "^" << b << " is " << power(a, b);
return 0;
}
```

6. Output:



The screenshot shows the Visual Studio Code interface with the file `EXP2.cpp` open. The code implements a recursive function `power` to calculate the power of a number. The terminal window shows the execution of the program, where the user enters two numbers, and the program outputs the result of the power calculation.

```
CodeWithVnJ > DAA > C++ EXP2.cpp > main()
1  #include <iostream>
2  using namespace std;
3  int power(int a, int b)
4  {
5      if (b == 0)
6          return 1;
7      if (b < 0)
8          return 1 / power(a, -b);
9      if (b % 2 == 0)
10         return power(a, b / 2) * power(a, b / 2);
11     else
12         return a * power(a, (b - 1) / 2) * power(a, (b - 1) / 2);
13 }
14 int main()
15 {
16     int a, b;
17     cout << "Enter the First and second number respectively:\n";
18     cin >> a >> b;
19     cout << "The value of " << a << "^" << b << " is " << power(a, b);
20     return 0;
21 }
```

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS R:\VnjVibhash\CodeWithVnJ> cd "r:\VnjVibhash\CodeWithVnJ\DAA\" ; if ($?) { g++ EXP2.cpp -o EXP2 } ; if ($?) { .\EXP2 }
Enter the First and second number respectively:
4 5
The value of 4^5 is 1024
PS R:\VnjVibhash\CodeWithVnJ\DAA> cd "r:\VnjVibhash\CodeWithVnJ\DAA\" ; if ($?) { g++ EXP2.cpp -o EXP2 } ; if ($?) { .\EXP2 }
Enter the First and second number respectively:
2 8
The value of 2^8 is 256
PS R:\VnjVibhash\CodeWithVnJ\DAA> cd "r:\VnjVibhash\CodeWithVnJ\DAA\" ; if ($?) { g++ EXP2.cpp -o EXP2 } ; if ($?) { .\EXP2 }
Enter the First and second number respectively:
5 6
The value of 5^6 is 15625
PS R:\VnjVibhash\CodeWithVnJ\DAA> cd "r:\VnjVibhash\CodeWithVnJ\DAA\" ; if ($?) { g++ EXP2.cpp -o EXP2 } ; if ($?) { .\EXP2 }
Enter the First and second number respectively:
2 5
The value of 2^5 is 32
PS R:\VnjVibhash\CodeWithVnJ\DAA>
```

Learning outcomes (What I have learnt):

1. How to find the Power of any number.
2. How to Use recursive function.
3. How to achieve the $O(\log n)$ complexity.

Evaluation Grid (To be created per the faculty's SOP and Assessment guidelines):

Sr. No.	Parameters	Marks Obtained	Maximum Marks
1.	Worksheet completion including writing learning objectives/Outcomes. (To be submitted at the end of the day).		
2.	Post-Lab Quiz Result.		
3.	Student Engagement in Simulation/Demonstration/Performance and Controls/Pre-Lab Questions.		
	Signature of Faculty (with Date):	Total Marks Obtained:	