Assignment 11

Aim : To Implement Diffie-Hellman Key Exchange Algorithm.

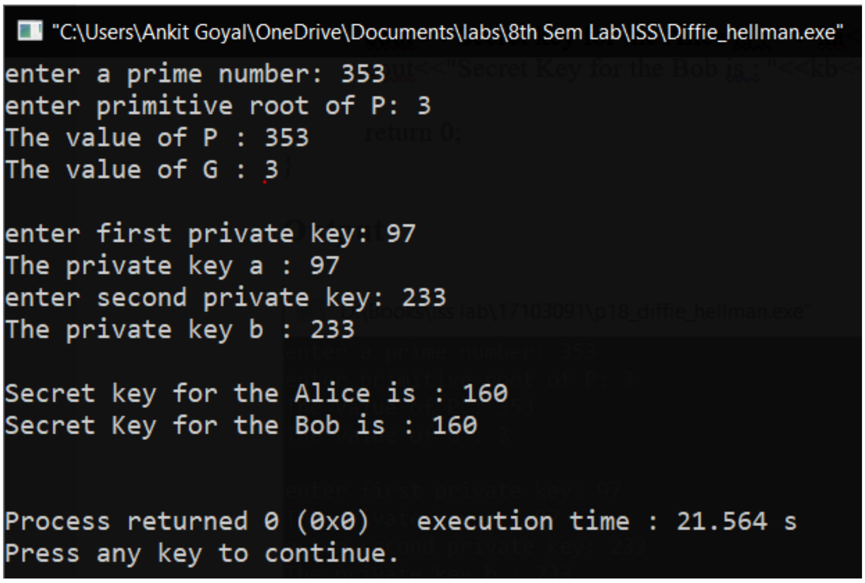
Theory:

The Diffie-Hellman algorithm is being used to establish a shared secret that can be used for secret communications while exchanging data over a public network using the elliptic curve to generate points and get the secret key using the parameters.

Code:

```
#include<bits/stdc++.h>
using namespace std;

long long int power(long long int x, long long int y, long long int p)
{
        long long int res = 1;

    x = x % p;
    if (x == 0) return 0;

    while (y > 0)
    {

        if (y & 1)
            res = (res*x) % p;
        y = y>>1;
        x = (x*x) % p;
    }
    return res;
}

int main()
{
        long long int P, G, x, a, y, b, ka, kb;

        cout<<"enter a prime number: ";
        cin>>P;
        cout<<"enter primitive root of P: ";
        cin>>G;
        cout<<"The value of P : "<<P<<"\n";
        cout<<"The value of G : "<<G<<"\n\n";

        cout<<"enter first private key: ";
        cin>>a;
        cout<<"The private key a : "<<a<<"\n";
        x = power(G, a, P);

        cout<<"enter second private key: ";
        cin>>b;
        cout<<"The private key b : "<<b<<"\n\n";
        y = power(G, b, P);

        ka = power(y, a, P);
        kb = power(x, b, P);

        cout<<"Secret key for the Alice is : "<<ka<<"\n";
        cout<<"Secret Key for the Bob is : "<<kb<<"\n\n";

        return 0;
}
```

Output



"C:\Users\Ankit Goyal\OneDrive\Documents\labs\8th Sem Lab\ISS\Diffie_hellman.exe"

```
enter a prime number: 353
enter primitive root of P: 3
The value of P : 353
The value of G : 3

enter first private key: 97
The private key a : 97
enter second private key: 233
The private key b : 233

Secret key for the Alice is : 160
Secret Key for the Bob is : 160


Process returned 0 (0x0)   execution time : 21.564 s
Press any key to continue.
```