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EXP NO: 2b
DATE:

DIFFIE HELMAN KEY EXCHANGE

AIM:

To write a python program implementing the Diffie Hellman algorithm.

ALGORITHM:

1. P, G => available public keys. P, G => available public keys.
2. a is selected as a private key. b is selected as a private key.
3. Eq. to generate key: $x=G_a \bmod P$. Eq. to generate key: $y=G_b \bmod P$.
4. After exchanging keys, user1 receives key y. After exchanging keys, user2 receives key x.

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PROGRAM:

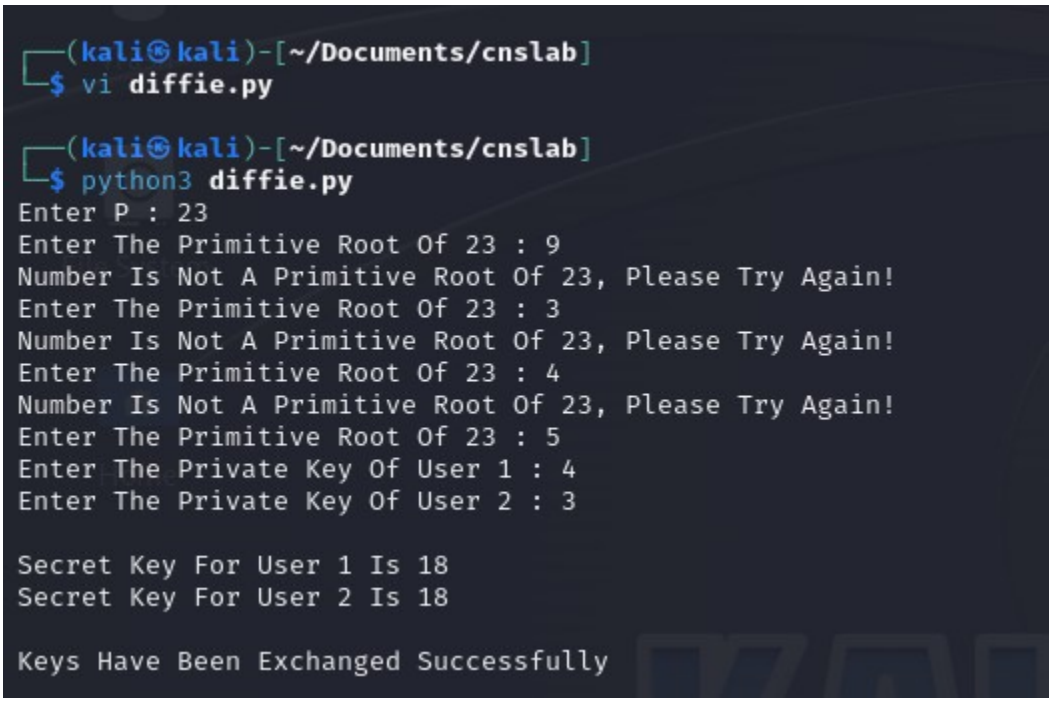
```
def prime_checker(p):
    # Checks If the number entered is a Prime Number or not
    if p < 1:
        return -1
    elif p > 1:
        if p == 2:
            return 1
        for i in range(2, p):
            if p % i == 0:
                return -1
            return 1
def primitive_check(g, p, L):
    # Checks If The Entered Number Is A Primitive Root Or Not
    for i in range(1, p):
        L.append(pow(g, i) % p)
    for i in range(1, p):
        if L.count(i) > 1:
            L.clear()
            return -1
        return 1
l = []
while 1:
    P = int(input("Enter P : "))
    if prime_checker(P) == -1:
        print("Number Is Not Prime, Please Enter Again!")
        continue
    break

while 1:
    G = int(input(f"Enter The Primitive Root Of {P} : "))
    if primitive_check(G, P, l) == -1:
        print(f"Number Is Not A Primitive Root Of {P}, Please Try Again!")
        continue
    break

# Private Keys
x1, x2 = int(input("Enter The Private Key Of User 1 : ")), int(
    input("Enter The Private Key Of User 2 : "))
```

```
while 1:
        if x1 >= P or x2 >= P:
                print(f"Private Key Of Both The Users Should Be Less Than {P}!")
                continue
        break
# Calculate Public Keys
y1, y2 = pow(G, x1) % P, pow(G, x2) % P
# Generate Secret Keys
k1, k2 = pow(y2, x1) % P, pow(y1, x2) % P
print(f"\nSecret Key For User 1 Is {k1}\nSecret Key For User 2 Is {k2}\n")
if k1 == k2:
        print("Keys Have Been Exchanged Successfully")
else:
        print("Keys Have Not Been Exchanged Successfully")
```

OUTPUT:



RESULT:

Thus, a python program has been implemented to demonstrate Diffie Hellman Key Exchange Algorithm.