EXP NO: 2b
DATE: 16/03/24

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: $x=G^a \text{ mod} P$. Eq. to generate key: $y=G^b \text{ mod} P$.
4. After exchanging keys, user1 receives key y. After exchanging keys, user2 receives key x.

PROGRAM:

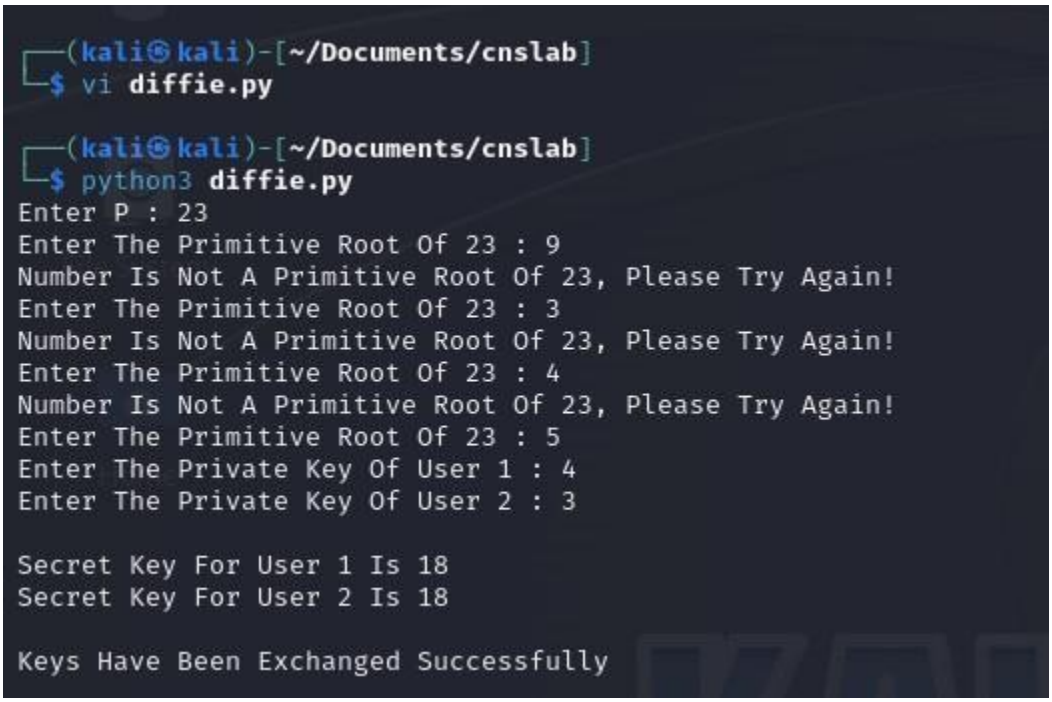
```
def prime_checker(p):
	# Checks If the number entered is a Prime Number or not
	if p < 1:
		return -1
	elif p > 1:
		if p == 2:
			return 1
		for i in range(2, p):
			if p % i == 0:
				return -1
			return 1
def primitive_check(g, p, L):
	# Checks If The Entered Number Is A Primitive Root Or Not
	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.