Ex. No. 2	Implement Substitution Cipher
Date of Exercise	19.08.2024

Aim

To implement the simple substitution technique named Caesar cipher using python language.

Description

To encrypt a message with a Caesar cipher, each letter in the message is changed using a simple rule: shift by three. Each letter is replaced by the letter three letters ahead in the alphabet. A becomes D, B becomes E, and so on. For the last letters, we can think of the alphabet as a circle and "wrap around". W becomes Z, X becomes A, Y becomes B, and Z becomes C. To change a message back, each letter is replaced by the one three before it.

1. Perform Caesar Cipher encryption

Algorithm

STEP-1: Read the plain text from the user.

STEP-2: Read the key value from the user.

STEP-3: If the key is positive then encrypt the text by adding the key with

each character in the plain text.

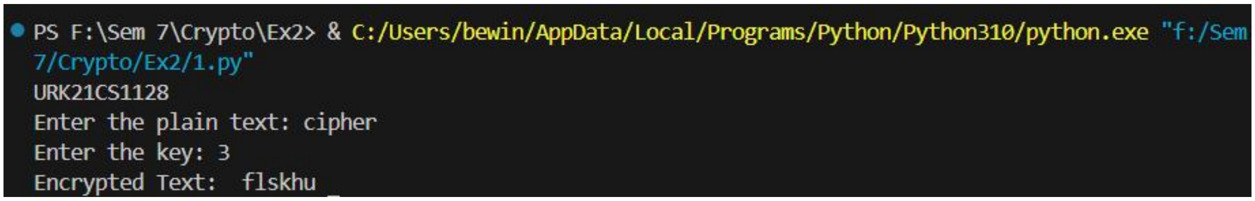
STEP-4: Else subtract the key from the plain text.

STEP-5: Display the cipher text obtained above.

Program

```
print("URK21CS1128")

plaintxt = input("Enter the plain text: ")

key = int(input("Enter the key: "))

ct = ""

for i in plaintxt:

    if i.islower():

        ct += chr((ord(i)-97+key)%26+97)

    elif i.isupper():

        ct += chr((ord(i)-65+key)%26+65)

    else:

        ct += " "

print("Encrypted Text: ",ct)
```

Output Screenshot



```
PS F:\Sem 7\Crypto\Ex2> & C:/Users/bewin/AppData/Local/Programs/Python/Python310/python.exe "f:/Sem
7/Crypto/Ex2/1.py"
URK21CS1128
Enter the plain text: cipher
Enter the key: 3
Encrypted Text:  flskhu
```

2. Perform encryption and decryption using affine cipher.

Algorithm

STEP 1: Read the problem statement

STEP 2: Get the plaintext, value of ‘a’ and ‘b’ from the user

STEP 3: Create an empty string ‘ct’ to store the cipher text

STEP 4: Perform the encryption operation.

STEP 5: Print the encrypted text

STEP 6: Create an empty string ‘pt’ to store the plain text

STEP 7: Perform the decryption operation.

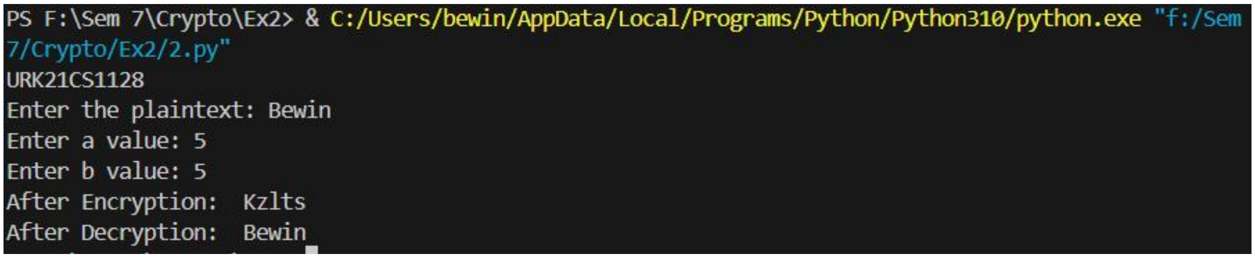
STEP 8: Print the decrypted text.

Program:

```
print("URK21CS1128")
plaintext = input("Enter the plaintext: ")
a = int(input("Enter a value: "))
b = int(input("Enter b value: "))
ct = ""
for char in plaintext:
    if char.isalpha():
        base = ord('A') if char.isupper() else ord('a')
        ct += chr(((a*(ord(char)-base)+b)%26)+base)
    else:
        ct += char
print("After Encryption: ",ct)
```

```
pt = ""
inverse = pow(a,-1,26)
for char in ct:
    if char.isalpha():
        base = ord('A') if char.isupper() else ord('a')
        pt += chr(((inverse * (ord(char)-base-b))%26)+base)
    else:
        pt += char
print("After Decryption: ",pt)
```

Output:



```
PS F:\Sem 7\Crypto\Ex2> & C:/Users/bewin/AppData/Local/Programs/Python/Python310/python.exe "f:/Sem 7/Crypto/Ex2/2.py"
URK21CS1128
Enter the plaintext: Bewin
Enter a value: 5
Enter b value: 5
After Encryption:  Kzlts
After Decryption:  Bewin
```

3. Perform encryption and decryption using vigenere cipher.

Algorithm:

STEP 1: Read the problem statement.

STEP 2: Get the plaintext and key from the user

STEP 3: Convert the key into a list of characters.

STEP 4: If the key length is less than the plaintext length, repeat the key until it matches it.

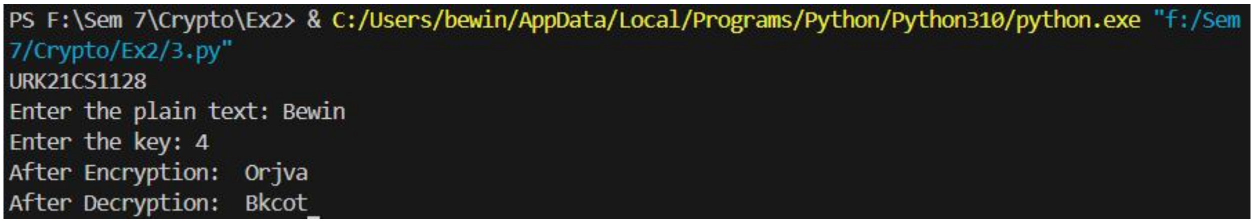
STEP 5: Do the Encryption operation and print the ciphertext.

STEP 6: Do the Decryption operation and print the decrypted text.

Program:

```
print("URK21CS1128")
plaintext = input("Enter the plain text: ")
key = input("Enter the key: ")
key = list(key)
if len(plaintext) == len(key):
    key = "".join(key)
else:
    for i in range(len(plaintext) - len(key)):
        key.append(key[i % len(key)])
    key = "".join(key)
ct = ""
for i in range(len(plaintext)):
    if plaintext[i].isalpha():
        base = ord('A') if plaintext[i].isupper() else ord('a')
        ct += chr((ord(plaintext[i])- base + ord(key[i])-ord('A')) %26 +base)
    else:
        ct += plaintext[i]
print("After Encryption: ",ct)
pt = ""
for i in range(len(ct)):
    if ct[i].isalpha():
        base =  ord('A') if ct[i].isupper() else ord('a')
        pt += chr((ord(ct[i]) - ord(key[i])+26)%26+base)
    else:
        pt += ct[i]
print("After Decryption: ",pt)
```

Output:



```
PS F:\Sem 7\Crypto\Ex2> & C:/Users/bewin/AppData/Local/Programs/Python/Python310/python.exe "f:/Sem 7/Crypto/Ex2/3.py"
URK21CS1128
Enter the plain text: Bewin
Enter the key: 4
After Encryption:  Orjva
After Decryption:  Bkcot
```

Result

The program has executed successfully and the output is displayed in the console.