EXP NO: 1d
DATE:

COLUMNAR TRANSPOSITION TECHNIQUES

AIM:

To write a python program implementing columnar transposition techniques.

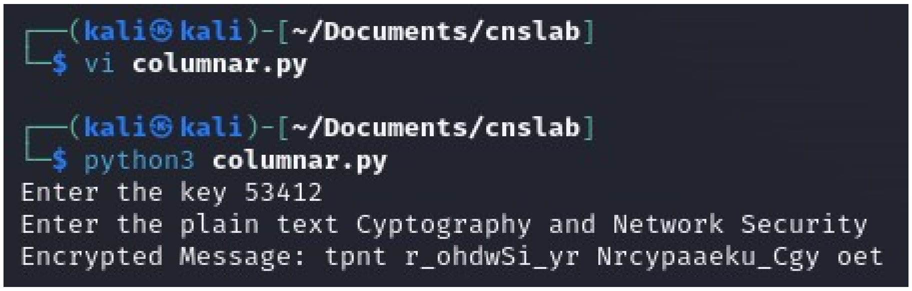
ALGORITHM:

1. The message is written out in rows of a fixed length, and then read out again column by column, and the columns are chosen in some scrambled order.
2. Width of the rows and the permutation of the columns are usually defined by a keyword.
3. The permutation is defined by the alphabetical order of the letters in the keyword.
4. Any spare spaces are filled with nulls or left blank or placed by a character (Example: _).
5. Finally, the message is printed off in columns, in the order specified by the keyword.

PROGRAM:

```
import math

key = input("Enter the key ")

# Encryption
def encryptMessage(msg):
    cipher = ""

    # track key indices
    k_indx = 0

    msg_len = float(len(msg))
    msg_lst = list(msg)
    key_lst = sorted(list(key))

    # calculate column of the matrix
    col = len(key)

    # calculate maximum row of the matrix
    row = int(math.ceil(msg_len / col))

    # add the padding character '_' in empty
    # the empty cell of the matix
    fill_null = int((row * col) - msg_len)
    msg_lst.extend('_' * fill_null)

    # create Matrix and insert message and
    # padding characters row-wise
    matrix = [msg_lst[i: i + col]
                for i in range(0, len(msg_lst), col)]

    # read matrix column-wise using key
    for _ in range(col):
        curr_idx = key.index(key_lst[k_indx])
        cipher += ''.join([row[curr_idx]
                        for row in matrix])
        k_indx += 1

    return cipher

# Decryption
def decryptMessage(cipher):
    msg = ""

    # track key indices
    k_indx = 0

    # track msg indices
    msg_indx = 0
    msg_len = float(len(cipher))
    msg_lst = list(cipher)

    # calculate column of the matrix
    col = len(key)

    # calculate maximum row of the matrix
    row = int(math.ceil(msg_len / col))

    # convert key into list and sort
    # alphabetically so we can access
    # each character by its alphabetical position.
    key_lst = sorted(list(key))

    # create an empty matrix to
    # store deciphered message
    dec_cipher = []
    for _ in range(row):
        dec_cipher += [[None] * col]

    # Arrange the matrix column wise according
    # to permutation order by adding into new matrix
    for _ in range(col):
        curr_idx = key.index(key_lst[k_indx])

        for j in range(row):
            dec_cipher[j][curr_idx] = msg_lst[msg_indx]
            msg_indx += 1
        k_indx += 1

    # convert decrypted msg matrix into a string
    try:
        msg = ".join(sum(dec_cipher, []))
    except TypeError:
        raise TypeError("This program cannot","handle repeating words.")
    null_count = msg.count('_')
    if null_count > 0:
        return msg[: -null_count]
    return msg
msg = input("Enter the plain text ")
cipher = encryptMessage(msg)
print("Encrypted Message: {}".
            format(cipher))

print("Decryped Message: {}".
    format(decryptMessage(cipher)))
```

OUTPUT:



```
┌──(kali㉿kali)-[~/Documents/cnslab]
└─$ vi columnar.py

┌──(kali㉿kali)-[~/Documents/cnslab]
└─$ python3 columnar.py
Enter the key 53412
Enter the plain text Cyptography and Network Security
Encrypted Message: tpnt r_ohdwSi_yr Nrcypaaeku_Cgy oet
```

RESULT:

Thus, a python program has been implemented to demonstrate Columnar Transposition techniques.