**Practical – 4**

**Subject – Cryptography**

**Aim**

**Alice wants to send some confidential information to Bob over a secure network. Prepare a key matrix for the given key and apply encryption on the plain text (key is your surname & plain text is your name).**

Code:

import numpy as np

def arrayGenerate(kw):

    array = np.empty((5, 5), dtype='str')

    alpha = 'ABCDEFGHIKLMNOPQRSTUVWXYZ'

    used\_letters = set()

    row, col = 0, 0

    for letter in kw:

        if letter not in used\_letters:

            array[row, col] = letter

            used\_letters.add(letter)

            col += 1

            if col == 5:

                col = 0

                row += 1

                if row == 5:

                    break

    for letter in alpha:

        if letter not in used\_letters and letter != 'J':

            array[row, col] = letter

            used\_letters.add(letter)

            col += 1

            if col == 5:

                col = 0

                row += 1

                if row == 5:

                    break

    return array

def print\_matrix(matrix):

        for row in matrix:

            print(" ".join(row))

def find\_letter(matrix, letter):

        for row in range(5):

            for col in range(5):

                if matrix[row, col] == letter:

                    return row, col

        return None, None

def playfair\_encrypt(plain\_text, matrix):

        encrypted\_text = ""

        plain\_text = plain\_text.upper().replace("J", "I").replace(" ", "")

        for i in range(0, len(plain\_text), 2):

            letter1 = plain\_text[i]

            letter2 = plain\_text[i + 1] if i + 1 < len(plain\_text) else 'X'

            row1, col1 = find\_letter(matrix, letter1)

            row2, col2 = find\_letter(matrix, letter2)

            if row1 == row2:

                encrypted\_text += matrix[row1, (col1 + 1) % 5] + matrix[row2, (col2 + 1) % 5]

            elif col1 == col2:

                encrypted\_text += matrix[(row1 + 1) % 5, col1] + matrix[(row2 + 1) % 5, col2]

            else:

                encrypted\_text += matrix[row1, col2] + matrix[row2, col1]

        return encrypted\_text

def main():

    keyword = input("Enter keyword: ").upper()

    matrix = arrayGenerate(keyword)

    print("Generated Playfair Matrix:")

    print\_matrix(matrix)

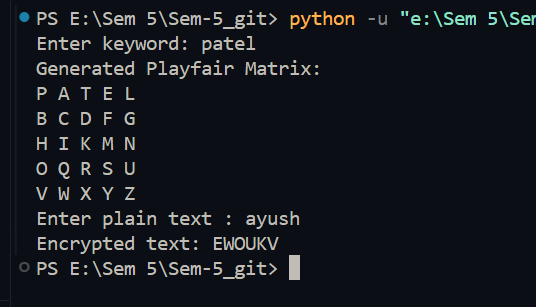
    plain\_text = input("Enter plain text : ")

    encrypted\_text = playfair\_encrypt(plain\_text, matrix)

    print("Encrypted text:", encrypted\_text)

main()

Output:

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