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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()
```

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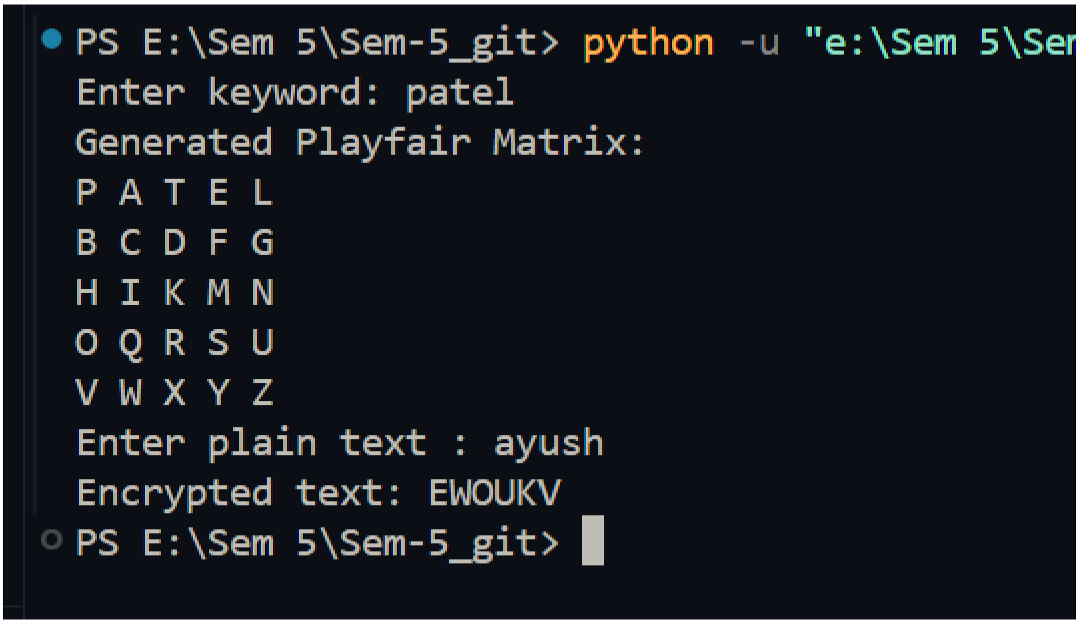
Output:



```
PS E:\Sem 5\Sem-5_git> python -u "e:\Sem 5\Ser
Enter keyword: patel
Generated Playfair Matrix:
P A T E L
B C D F G
H I K M N
O Q R S U
V W X Y Z
Enter plain text : ayush
Encrypted text: EWOUKV
PS E:\Sem 5\Sem-5_git>
```