

3. Write a python program for Playfair algorithm is based on the use of a 5 X 5 matrix of letters constructed using a keyword. Plaintext is encrypted two letters at a time using this matrix.

Code:

```
def matrix(key):  
    key = key.upper().replace("J", "I")  
    result = ""  
    for ch in key + "ABCDEFGHIJKLMNOPQRSTUVWXYZ":  
        if ch not in result:  
            result += ch  
    return [list(result[i:i+5]) for i in range(0, 25, 5)]  
  
def pos(mat, ch):  
    for i in range(5):  
        for j in range(5):  
            if mat[i][j] == ch:  
                return i, j  
  
def encrypt(text, key):  
    text = text.upper().replace("J", "I").replace(" ", "")  
    mat = matrix(key)  
  
    # make pairs  
    pairs = []  
    i = 0  
    while i < len(text):  
        a = text[i]  
        b = text[i+1] if i+1 < len(text) else 'X'  
        if a == b:  
            b = 'X'  
            i += 1  
        else:
```

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        i += 2

    pairs.append((a, b))

    cipher = ""

for a, b in pairs:

    r1, c1 = pos(mat, a)

    r2, c2 = pos(mat, b)

    if r1 == r2: # same row

        cipher += mat[r1][(c1+1)%5] + mat[r2][(c2+1)%5]

    elif c1 == c2: # same column

        cipher += mat[(r1+1)%5][c1] + mat[(r2+1)%5][c2]

    else: # rectangle rule

        cipher += mat[r1][c2] + mat[r2][c1]

return cipher

msg = input("Enter message: ")

key = input("Enter keyword: ")

print("Encrypted:", encrypt(msg, key))

```

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IDLE Shell 3.14.0
File Edit Shell Debug Options Window Help
Python 3.14.0 (tags/v3.14.0:ebf955d, Oct 7 2025, 10:15:03) [MSC v.1944 64 bit (AMD64)] on win32
Enter "help" below or click "Help" above for more information.
>>>
===== RESTART: C:/Users/Maria/OneDrive/Documents/ex3.py =====
Enter message: Today is the best day
Enter keyword: 6
Encrypted: YT6BDOTPIF6GTP6BUY
>>>

```