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 + "ABCDEFGHIKLMNOPQRSTUVWXYZ":
   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:
```

```
            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))
```