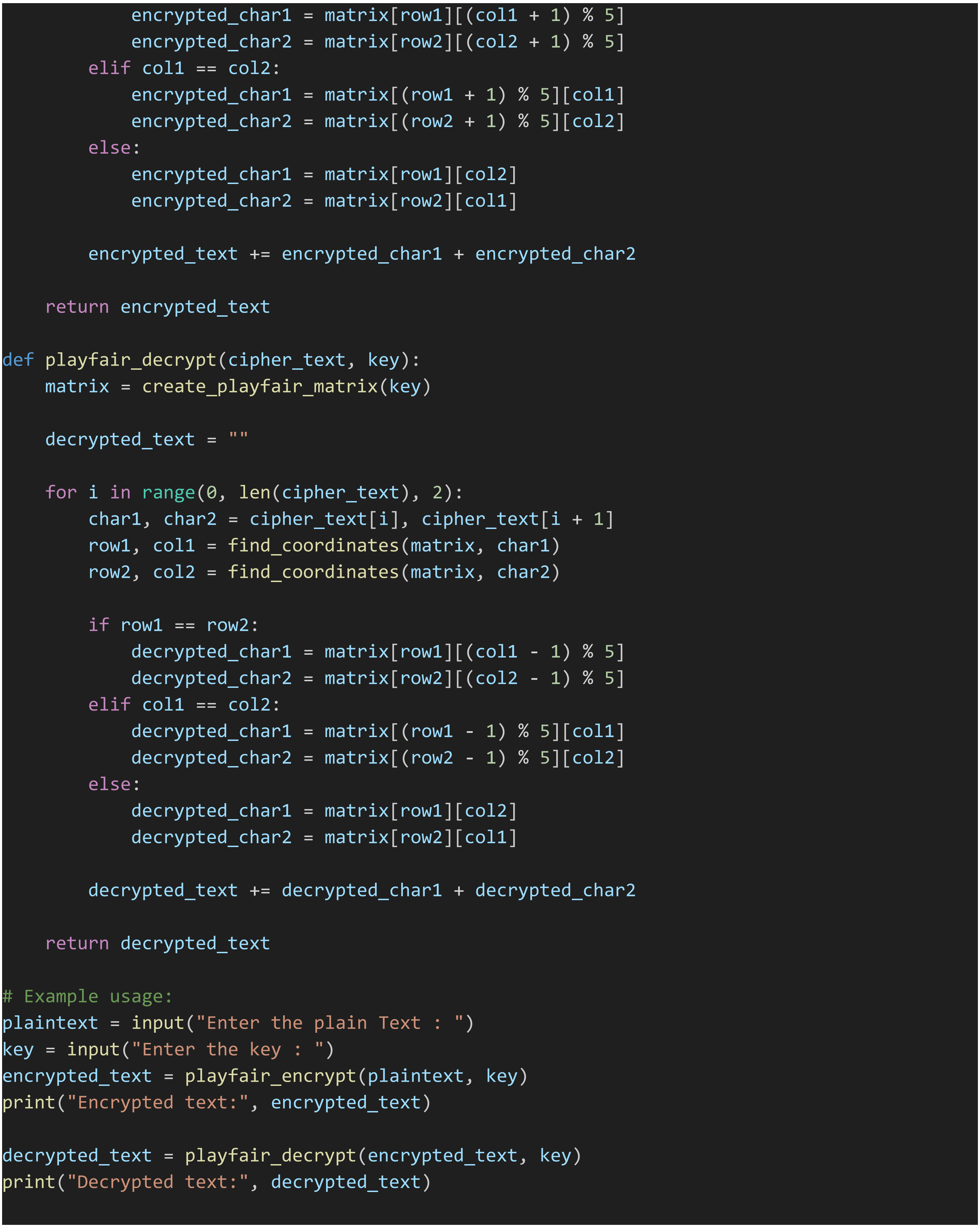
INS Practical

Playfair Cipher

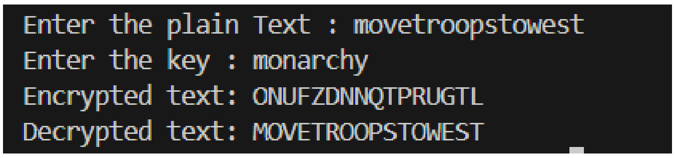
Source Code:

```python
def prepare_key(key):
    key = key.upper().replace("J", "I")
    key_set = set()
    prepared_key = ""

    for char in key:
        if char not in key_set:
            key_set.add(char)
            prepared_key += char

    alphabet = "ABCDEFGHIKLMNOPQRSTUVWXYZ"
    for char in alphabet:
        if char not in key_set:
            prepared_key += char
    # print(prepared_key)
    # print(len(prepared_key))
    return prepared_key

def create_playfair_matrix(key):
    key = prepare_key(key)
    matrix = [[0] * 5 for _ in range(5)]
    index = 0

    for row in range(5):
        for col in range(5):
            matrix[row][col] = key[index]
            index += 1
    # print(matrix)
    return matrix

def find_coordinates(matrix, char):
    for row in range(5):
        for col in range(5):
            if matrix[row][col] == char:
                return row, col

def playfair_encrypt(plain_text, key):
    matrix = create_playfair_matrix(key)
    plain_text = plain_text.upper().replace("J", "I")

    encrypted_text = ""

    for i in range(0, len(plain_text), 2):
        char1, char2 = plain_text[i], plain_text[i + 1]
        row1, col1 = find_coordinates(matrix, char1)
        row2, col2 = find_coordinates(matrix, char2)

        if row1 == row2:
```



```python
            encrypted_char1 = matrix[row1][(col1 + 1) % 5]
            encrypted_char2 = matrix[row2][(col2 + 1) % 5]
        elif col1 == col2:
            encrypted_char1 = matrix[(row1 + 1) % 5][col1]
            encrypted_char2 = matrix[(row2 + 1) % 5][col2]
        else:
            encrypted_char1 = matrix[row1][col2]
            encrypted_char2 = matrix[row2][col1]

        encrypted_text += encrypted_char1 + encrypted_char2

    return encrypted_text

def playfair_decrypt(cipher_text, key):
    matrix = create_playfair_matrix(key)

    decrypted_text = ""

    for i in range(0, len(cipher_text), 2):
        char1, char2 = cipher_text[i], cipher_text[i + 1]
        row1, col1 = find_coordinates(matrix, char1)
        row2, col2 = find_coordinates(matrix, char2)

        if row1 == row2:
            decrypted_char1 = matrix[row1][(col1 - 1) % 5]
            decrypted_char2 = matrix[row2][(col2 - 1) % 5]
        elif col1 == col2:
            decrypted_char1 = matrix[(row1 - 1) % 5][col1]
            decrypted_char2 = matrix[(row2 - 1) % 5][col2]
        else:
            decrypted_char1 = matrix[row1][col2]
            decrypted_char2 = matrix[row2][col1]

        decrypted_text += decrypted_char1 + decrypted_char2

    return decrypted_text

# Example usage:
plaintext = input("Enter the plain Text : ")
key = input("Enter the key : ")
encrypted_text = playfair_encrypt(plaintext, key)
print("Encrypted text:", encrypted_text)

decrypted_text = playfair_decrypt(encrypted_text, key)
print("Decrypted text:", decrypted_text)
```

Output:



```
Enter the plain Text : movetroopstowest
Enter the key : monarchy
Encrypted text: ONUFZDNNQTPRUGTL
Decrypted text: MOVETROOPSTOWEST
```