**10. Write a high level code to Encrypt the message “meet me at the usual place at ten rather than eight oclock” using the Hill cipher with the key.**

**9 4**

**5 7**

**a. Show your calculations and the result.**

**b. Show the calculations for the corresponding decryption of the ciphertext to recover the original plaintext.**

**CODE:**

**# Define the key matrix**

**key = [[9, 4], [5, 7]]**

**# Define the plaintext message**

**plaintext = "meet me at the usual place at ten rather than eight oclock"**

**# Convert the plaintext to uppercase and remove spaces**

**plaintext = plaintext.upper().replace(" ", "")**

**# Pad the plaintext with "X" if necessary to make the length a multiple of 2**

**if len(plaintext) % 2 != 0:**

**plaintext += "X"**

**# Split the plaintext into pairs of 2 letters and convert each pair to a vector**

**plaintext\_vectors = []**

**for i in range(0, len(plaintext), 2):**

**pair = plaintext[i:i+2]**

**vector = [ord(pair[0])-65, ord(pair[1])-65]**

**plaintext\_vectors.append(vector)**

**# Multiply each plaintext vector by the key matrix to get the corresponding ciphertext vector**

**ciphertext\_vectors = []**

**for vector in plaintext\_vectors:**

**ciphertext\_vector = [(key[0][0]\*vector[0] + key[0][1]\*vector[1]) % 26, (key[1][0]\*vector[0] + key[1][1]\*vector[1]) % 26]**

**ciphertext\_vectors.append(ciphertext\_vector)**

**# Convert each ciphertext vector back to a pair of letters**

**ciphertext = ""**

**for vector in ciphertext\_vectors:**

**pair = chr(vector[0]+65) + chr(vector[1]+65)**

**ciphertext += pair**

**# Print the ciphertext**

**print(ciphertext)**

**OUTPUT:**

