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

**CODE:**

**key=input("Enter key")**

**key=key.replace(" ", "")**

**key=key.upper()**

**def matrix(x,y,initial):**

**return [[initial for i in range(x)] for j in range(y)]**

**result=list()**

**for c in key: #storing key**

**if c not in result:**

**if c=='J':**

**result.append('I')**

**else:**

**result.append(c)**

**flag=0**

**for i in range(65,91): #storing other character**

**if chr(i) not in result:**

**if i==73 and chr(74) not in result:**

**result.append("I")**

**flag=1**

**elif flag==0 and i==73 or i==74:**

**pass**

**else:**

**result.append(chr(i))**

**k=0**

**my\_matrix=matrix(5,5,0) #initialize matrix**

**for i in range(0,5): #making matrix**

**for j in range(0,5):**

**my\_matrix[i][j]=result[k]**

**k+=1**

**def locindex(c): #get location of each character**

**loc=list()**

**if c=='J':**

**c='I'**

**for i ,j in enumerate(my\_matrix):**

**for k,l in enumerate(j):**

**if c==l:**

**loc.append(i)**

**loc.append(k)**

**return loc**

**def encrypt(): #Encryption**

**msg=str(input("ENTER MSG:"))**

**msg=msg.upper()**

**msg=msg.replace(" ", "")**

**i=0**

**for s in range(0,len(msg)+1,2):**

**if s<len(msg)-1:**

**if msg[s]==msg[s+1]:**

**msg=msg[:s+1]+'X'+msg[s+1:]**

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

**msg=msg[:]+'X'**

**print("CIPHER TEXT:",end=' ')**

**while i<len(msg):**

**loc=list()**

**loc=locindex(msg[i])**

**loc1=list()**

**loc1=locindex(msg[i+1])**

**if loc[1]==loc1[1]:**

**print("{}{}".format(my\_matrix[(loc[0]+1)%5][loc[1]],my\_matrix[(loc1[0]+1)%5][loc1[1]]),end=' ')**

**elif loc[0]==loc1[0]:**

**print("{}{}".format(my\_matrix[loc[0]][(loc[1]+1)%5],my\_matrix[loc1[0]][(loc1[1]+1)%5]),end=' ')**

**else:**

**print("{}{}".format(my\_matrix[loc[0]][loc1[1]],my\_matrix[loc1[0]][loc[1]]),end=' ')**

**i=i+2**

**def decrypt(): #decryption**

**msg=str(input("ENTER CIPHER TEXT:"))**

**msg=msg.upper()**

**msg=msg.replace(" ", "")**

**print("PLAIN TEXT:",end=' ')**

**i=0**

**while i<len(msg):**

**loc=list()**

**loc=locindex(msg[i])**

**loc1=list()**

**loc1=locindex(msg[i+1])**

**if loc[1]==loc1[1]:**

**print("{}{}".format(my\_matrix[(loc[0]-1)%5][loc[1]],my\_matrix[(loc1[0]-1)%5][loc1[1]]),end=' ')**

**elif loc[0]==loc1[0]:**

**print("{}{}".format(my\_matrix[loc[0]][(loc[1]-1)%5],my\_matrix[loc1[0]][(loc1[1]-1)%5]),end=' ')**

**else:**

**print("{}{}".format(my\_matrix[loc[0]][loc1[1]],my\_matrix[loc1[0]][loc[1]]),end=' ')**

**i=i+2**

**while(1):**

**choice=int(input("\n 1.Encryption \n 2.Decryption: \n 3.EXIT"))**

**if choice==1:**

**encrypt()**

**elif choice==2:**

**decrypt()**

**elif choice==3:**

**exit()**

**else:**

**print("Choose correct choice")**

**OUTPUT:**

