Task -4:

First finding the key matrix, K =[ k1 k2

K3 k4]

In hill cipher ,

C = KxP mod 26

Since the key length is 4, we will be processing the first 4 letters of the cipher and plaintext,

Cipher text = [ V B] = [21 1]

Plain text = [T H] = [ 19 7]

[21 =[a b \* [19 mod 26

1] c d] 7]

19 a +7 b = 21 mod 26---->1

19 c+ 7 d = 1 mod 26 ----->2

Cipher text = [I D] = [8 3]

Plain text = [E F] = [4 5]

[8 = [a b \* [4 mod 26

1. c d] 5]

4 a + 5 b = 8 mod 26 ------->3

4 c + 5 d = 3 mod 26 -------->4

Solving the quadratic equations :

a = 5 , b =8 , c= 18, d =7

K = [5 8

18 7] So the key is F I S H

Finding the key matrix inverse

K^-1 = [ 9 12

14 25]

P = K^-1 \* C mod 26

For the cipher text: A N=[0 13]

Plain text= K^-1 \* C mod 26 = [0 13] = A N

For the cipher text : L F =[ 11 5]

Plain text = K^-1 \*C mod 26 = [3 19]= D T

For the cipher text : P Y =[ 15 24]

Plain text = K^-1 \*C mod 26 = [7 4] = H E

For the cipher text : P U =[15 20]

Plain text = K^-1 \*C mod 26 = [11 8] = L I

For the cipher text : S F=[ 18 5]

Plain text = K^-1 \*C mod 26 = [14 13] = O N

For the cipher text : G P =[6 15]

Plain text = K^-1 \*C mod 26 = [0 17]=A R

For the cipher text : I D =[8 3]

Plain text = K^-1 \*C mod 26 = [4 5] = E F

For the cipher text : T Y=[ 19 24]

Plain text = K^-1 \*C mod 26 = [17 8]=R I

For the cipher text : U H =[ 20 7]

Plain text = K^-1 \*C mod 26 = [4 13] =E N

For the cipher text : D Y =[ 3 24]

Plain text = K^-1 \*C mod 26 = [3 18] = D S

The Plain text is THEFOXANDTHELIONAREFRIENDS