Date :

**PRACTICAL-7**

**Objective** – WAP to implement encrypt and decrypt the plain text using Hill cipher.

**Code**-

#include <stdio.h>

#include <math.h>

float encrypt[3][1], decrypt[3][1], a[3][3], b[3][3], mes[3][1], c[3][3];

void encryption(); //encrypts the message

void decryption(); //decrypts the message

void getKeyMessage(); //gets key and message from user

void inverse(); //finds inverse of key matrix

void main()

{

getKeyMessage();

encryption();

decryption();

}

void encryption()

{

int i, j, k;

for (i = 0; i < 3; i++)

for (j = 0; j < 1; j++)

for (k = 0; k < 3; k++)

encrypt[i][j] = encrypt[i][j] + a[i][k] \* mes[k][j];

printf("\nEncrypted string is: ");

for (i = 0; i < 3; i++)

printf("%c", (char)(fmod(encrypt[i][0], 26) + 97));

}

void decryption()

{

int i, j, k;

inverse();

for (i = 0; i < 3; i++)

for (j = 0; j < 1; j++)

for (k = 0; k < 3; k++)

decrypt[i][j] = decrypt[i][j] + b[i][k] \* encrypt[k][j];

printf("\nDecrypted string is: ");

for (i = 0; i < 3; i++)

printf("%c", (char)(fmod(decrypt[i][0], 26) + 97));

printf("\n");

}

void getKeyMessage()

{

int i, j;

char msg[3];

printf("Enter 3x3 matrix for key (It should be inversible):\n");

for (i = 0; i < 3; i++)

for (j = 0; j < 3; j++)

{

scanf("%f", &a[i][j]);

c[i][j] = a[i][j];

}

printf("\nEnter a 3 letter string: ");

scanf("%s", msg);

for (i = 0; i < 3; i++)

mes[i][0] = msg[i] - 97;

}

void inverse()

{

int i, j, k;

float p, q;

for (i = 0; i < 3; i++)

for (j = 0; j < 3; j++)

{

if (i == j)

b[i][j] = 1;

else

b[i][j] = 0;

}

for (k = 0; k < 3; k++)

{

for (i = 0; i < 3; i++)

{

p = c[i][k];

q = c[k][k];

for (j = 0; j < 3; j++)

{

if (i != k)

{

c[i][j] = c[i][j] \* q - p \* c[k][j];

b[i][j] = b[i][j] \* q - p \* b[k][j];

}

}

}

}

for (i = 0; i < 3; i++)

for (j = 0; j < 3; j++)

b[i][j] = b[i][j] / c[i][i];

printf("\n\nInverse Matrix is:\n");

for (i = 0; i < 3; i++)

{

for (j = 0; j < 3; j++)

printf("%d ", b[i][j]);

printf("\n");

}

}

**Output-**

