Practical No. 3.

Aim:- To write C/Java program to implement hill cipher for encryption and decryption.

Theory:- Hill cipher is a polyalphabetic substitution cipher based on linear algebra.

Each letter is represented by a number mod 26.

A=0, B=1, C=2 . . . . z=25 scheme is used.

- To encrypt message, each block of n letters is multiplied by an invertible nxn matrix, against mod 26.
- To decrypt the message, each block is multiplied by the inverse of the matrix used for encryption.
- The matrix used for encryption is the cipher key and it should be chosen randomly from the set of invertible nxn matrices (mod 26)

Ex:-

Plaintext - ACT

Key:- GYBNQKURP

Ciphertext => POH

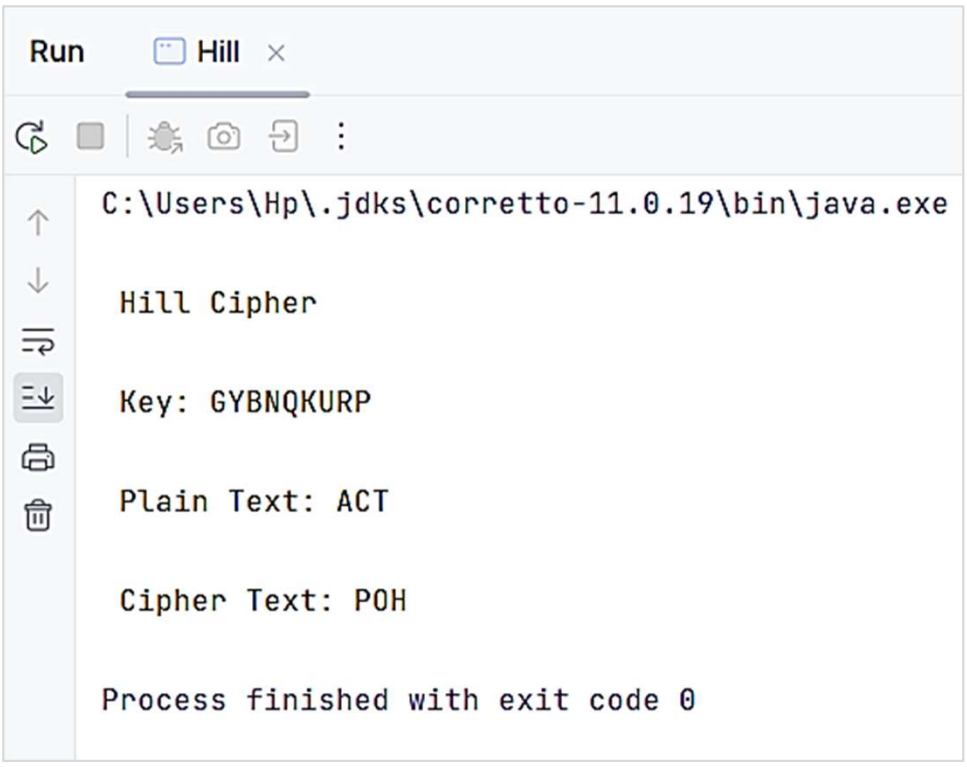
Conclusion:- The program to implement Hill cipher is successfully done.

Mahakar

Program:

```
public class Hill  {
   static void getKeyMatrix(String key, int keyMatrix[][]) {
      int k = 0;
      for (int i = 0; i < 3; i++) {
         for (int j = 0; j < 3; j++) {
            keyMatrix[i][j] = (key.charAt(k)) % 65;
            k++;
         }
      }
   }

   static void encrypt(int cipherMatrix[][], int keyMatrix[][], int messageVector[][]) {
      int x, i, j;
      for (i = 0; i < 3; i++) {
         for (j = 0; j < 1; j++) {
            cipherMatrix[i][j] = 0;
            for (x = 0; x < 3; x++) {
               cipherMatrix[i][j] += keyMatrix[i][x] * messageVector[x][j];
            }
            cipherMatrix[i][j] = cipherMatrix[i][j] % 26;
         }
      }
   }

   static void HillCipher(String message, String key) {
      int [][]keyMatrix = new int[3][3];
      getKeyMatrix(key, keyMatrix);

      int [][]messageVector = new int[3][1];

      for (int i = 0; i < 3; i++)
         messageVector[i][0] = (message.charAt(i)) % 65;

      int [][]cipherMatrix = new int[3][1];

      encrypt(cipherMatrix, keyMatrix, messageVector);

      String CipherText="";

      for (int i = 0; i < 3; i++)
         CipherText += (char)(cipherMatrix[i][0] + 65);

      System.out.print("\n Cipher Text: " + CipherText + "\n");
   }

   // Driver code
   public static void main(String[] args) {
      System.out.println("\n Hill Cipher");
      String message = "ACT";
      String key = "GYBNQKURP";
      System.out.println("\n Key: " + key);
      System.out.println("\n Plain Text: " + message);
      HillCipher(message, key);
   }
}
```

Output:


Run
Hill
C:\Users\Hp\.jdks\corretto-11.0.19\bin\java.exe
Hill Cipher
Key: GYBNQKURP
Plain Text: ACT
Cipher Text: POH
Process finished with exit code 0