ISC ASSIGNMENT -03

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1) Write a program to implement the Rail Fence Cipher to perform encryption and decryption. Take plain text from the user and generate an encrypted text using the Rail Fence Cipher (Consider depth = 2 and depth = 3).

```
import java.util.Arrays;
import java.util.Scanner;

public class p1_rail_fence_d2{
    public static void print(Character arr[][]){
        for(int r=0;r<arr.length;r++){
            for(int c=0;c<arr[0].length;c++){

                System.out.print(arr[r][c]+" ");

            }
            System.out.println();
        }
    }
    public static String encryption(String str,int depth){
        StringBuilder ans=new StringBuilder();
        int n=str.length();
        Character arr[][]=new Character[depth][n];
        for(int i=0;i<arr.length;i++){
            Arrays.fill(arr[i], '$');
            // System.out.println(arr[i].length+" => ");
        }

        // print(arr);
        // System.out.println("---------");
        // int count=0;

        for(int r=0;r<depth;r++){
```

```
            int idx=r;
            String curr_word="";
            for(int c=r;c<n;c+=depth){
                if(c>n || r>n || idx>=n){break;}
                // if(idx>n){break;}
                // System.out.println("r : "+r+" c: "+c+" str.charAt(idx)
: " +str.charAt(idx));
                arr[r][c]= str.charAt(idx);
                curr_word+= arr[r][c];
                // print(arr);
                // System.out.println("=========");
                idx+= depth;
            }
            ans.append(curr_word);
            ans.append("@");
        }
        // System.out.println("----------");
        // print(arr);
        return ans.toString();
    }
    public static String decryption(String str,int depth){
        String ans="";
        String strs[]=str.split("@");
        int max_len=0;
        for(int i=0;i<strs.length;i++){
            max_len=Math.max(strs[i].length(), max_len);
        }



        for(int j=0;j<max_len;j++){
            for(int i=0;i<strs.length;i++){
                ans+= strs[i].charAt(j);
            }
        }

        return ans;
    }
    public static void print_encrypted_text(String str){
        String strs[]=str.split("@");
```

```
        for(int i=0;i<strs.length;i++){
            System.out.println(strs[i]);
        }
    }
    public static void main(String[] args) {
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter the string");
        String str=sc.nextLine();
       String encrypted_str= encryption(str,2);

    //    System.out.println("hahdflkajdfl ");
    //    System.out.println(encrypted_str);
       print_encrypted_text(encrypted_str);
       System.out.println(" ========== ");
       String dencrypted_str= decryption(encrypted_str,2);
       System.out.println("decrypted text ============> "+dencrypted_str);
        // encryption(str,3);
    }
}
```

Depth =2

```
c:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\01_information security\02_labs\03_lab3>java p1_ra
il_fence_d2.java
Enter the string
Meet at five pm behind P lab.
printing the encrpted text
Mtti  hd b
e  vpbi l.
eafemenPa
decrypted text ============> Meet at five pm behind P lab.

c:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\01_information security\02_labs\03_lab3>
```

Depth =3

```
e  vpbi l.
eafemenPa
decrypted text ============> Meet at five pm behind P lab.

c:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\01_information security\02_labs\03_lab3>java p1_ra
il_fence_d2.java
Enter the string
Meet at five pm behind P lab.
printing the encrpted text
Me tfv mbhn  a.
eta iep eidPlb
decrypted text ============> Meet at five pm behind P lab.

c:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\01_information security\02_labs\03_lab3>
```

2) Implement a program to perform encryption and decryption using a Permutation Cipher with a block size up to 10 characters. Also show how to compute the reverse permutation to decrypt the cipher text and get the plain text

```
import java.util.*;

public class p2_permutation {
    public static String key="XIEOURVLKC";
    public static List<Integer>  k;

    public static void getKey(){
        k=new ArrayList<>();
        PriorityQueue<Character> pq=new PriorityQueue<>();
        for(int i=0;i<key.length();i++){
            pq.add(key.charAt(i));
        }
        HashMap<Character,Integer> h1=new HashMap<>();

        int i=0;
        while(!pq.isEmpty()){
            h1.put(pq.poll(), i++);
        }
        for( i=0;i<key.length();i++){
            k.add(h1.get(key.charAt(i)));
        }
        System.out.println("h1 => "+h1);
    }


    public static String encryption_util(String str){
        String ans="";
        // LinkedHashMap<Character,Integer> curr_map=str_to_num(str);
        // System.out.println(ans);

        PriorityQueue<Character> pq=new PriorityQueue<>();
        for(int i=0;i<str.length();i++){
            pq.add(str.charAt(i));
        }
```

```
        HashMap<Integer,Character> h1=new HashMap<>();

        int i=0;
        while(!pq.isEmpty()){
            h1.put(i++, pq.poll());
        }

        // System.out.println("h1 => "+h1);

        for( i=0;i<k.size() && i<str.length();i++){
            int idx=k.get(i);
            ans+= h1.get(idx);
        }
        // System.out.println("ans =======         "+ans);
        return ans;
    }
    public static String encryption(String str){
        String ans="";
        int n=str.length();

        // System.out.println("k ===> "+k);
        int i=0;
        // System.out.println("substrings are => ");
        // System.out.println("-------");
        // System.out.println("-------");
        while(i<n){
            String sub_str=str.substring(i, Math.min(n,i+10));

            // System.out.println("sub_str : "+sub_str);

            String encrypted_sub_str=encryption_util(sub_str);
            ans+= encrypted_sub_str;
            i+=10;
            // System.out.println("-------");
            // System.out.println("-------");
        }

        return ans;
```

```
    }
    public static String decryption_util(String str){
        // int l=Math.min(10,str.length());
        // String ans= String.join("", Collections.nCopies(l, "$"));
        StringBuilder ans = new
StringBuilder(String.valueOf("$").repeat(k.size()));

        // System.out.println("ans => "+ans);
         for(int i=0;i<k.size() && i<str.length();i++){
            if(str.charAt(i)=='|'){
                ans.setCharAt(k.get(i), ' ');

            }else {
                ans.setCharAt(k.get(i), str.charAt(i));
            }
         }
         System.out.println(" ans ======> "+ans);
        ans= new StringBuilder(ans.toString().replaceAll("\\$", ""));

        // ans= new StringBuilder(ans.toString().replaceAll("\\|", "
"));
        //  System.out.println("ans  ========= /////// "+ans);
        return ans.toString();
    }
    public static String decryption(String str){
        int i=0;
        String decrypted_str ="";
        int n=str.length();
        while(i<n){
            String sub_str=str.substring(i, Math.min(n,i+10));
            // System.out.println("sub_str => "+sub_str);
            String sub_str_decrypt= decryption_util(sub_str);
            i+=10;
            decrypted_str+= sub_str_decrypt;
            // System.out.println("====================");
        }
        return decrypted_str;
    }
```

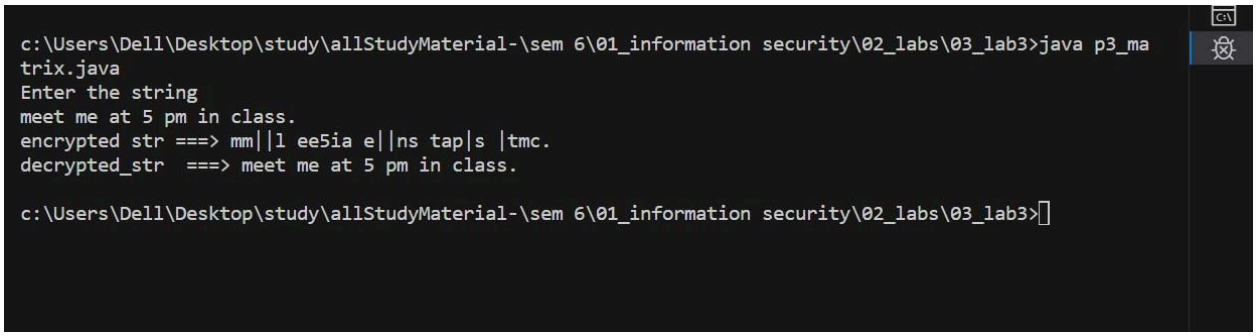
```
    public static void main(String args[]){

        getKey();
        System.out.println(k);

        // Scanner sc=new Scanner(System.in);
        // System.out.println("Enter the string");
        // String str=sc.nextLine();
        // /*handle the spaces  */
        // str = str.replace(' ', '|');

        // String encrypted_str=encryption(str);

        // System.out.println("encrypted str ===> "+encrypted_str);

        String decrypted_str=decryption("|cbfhgieda");

        // System.out.println("decrypted_str  ===> "+decrypted_str);

        System.out.println(decrypted_str);
        // sc.close();

    }
}
```

```
abcdefghi

c:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\01_information security\02_labs\03_lab3>java p2_pe
rmutation.java
h1 => {R=6, C=0, E=1, U=7, V=8, X=9, I=2, K=3, L=4, O=5}
[9, 2, 1, 5, 7, 6, 8, 4, 3, 0]
Enter the string
abcdefghij
encrypted str ===> jcbfhgieda
decrypted_str  ===> abcdefghij

c:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\01_information security\02_labs\03_lab3>
```

Que 3: Implement a Columnar Transposition Cipher (5x5) with column ordering, to perform both encryption and decryption processes.

```
import java.util.Arrays;
import java.util.Scanner;

public class p3_matrix {
    public static String encryption(String str){
        String ans ="";
        Character mat[][]=new Character[5][5];
        for(int i=0;i<mat.length;i++){
            Arrays.fill(mat[i],'X');
        }
        /*place the letters row-wise   */
        int idx=0,n=str.length();
        for(int i=0;i<mat.length;i++){
            for(int j=0;j<mat[0].length;j++){
                mat[i][j]=str.charAt(idx++);
                if(idx==n){break;}
            }
        }
        /*read it column wise */
        for(int j=0;j<mat[0].length;j++){
            for(int i=0;i<mat.length;i++){
                if(mat[i][j]=='X'){break;}
                ans+= mat[i][j];
            }
            ans+=" ";
        }

        return ans;
    }
    public static String decryption(String str){
        String strs[]=str.split(" ");
        int max_len=0;
```

```
        for(int i=0;i<strs.length;i++){
            max_len=Math.max(max_len, strs[i].length());
        }
        String ans="";
        for(int j=0;j<max_len;j++){
            for(int i=0;i<strs.length;i++){
                if(strs[i].charAt(j)=='|'){
                    ans+= " ";
                }else {
                    ans+= strs[i].charAt(j);
                }
            }
        }

        return ans;
    }
    public static void main(String args[]){
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter the string");
        String str=sc.nextLine();
        /*handle the spaces  */
        str= str.replaceAll(" ", "|");
        String encrypted_str=encryption(str);

        System.out.println("encrypted str ===> "+encrypted_str);

        String decrypted_str=decryption(encrypted_str);

        System.out.println("decrypted_str  ===> "+decrypted_str);

        // System.out.println(decrypted_str);
    }
}
```


c:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\01_information security\02_labs\03_lab3>java p3_ma
trix.java
Enter the string
meet me at 5 pm in class.
encrypted str ===> mm||l ee5ia e||ns tap|s |tmc.
decrypted_str ===> meet me at 5 pm in class.
c:\Users\Dell\Desktop\study\allStudyMaterial-\sem 6\01_information security\02_labs\03_lab3>