GHARDA FOUNDATION’S

GHARDA INSTITUTE OF TECHNOLOGY

Department of Computer Engineering

Evaluation Sheet

Class: T.E Computer Engineering **Sem:** VI

Subject: Cryptography and System Security

Experiment No: 8

Date:

Title of Experiment: a) Implementation and analysis of RSA cryptosystem. b) Digital signature scheme using RSA/EI Gamal.

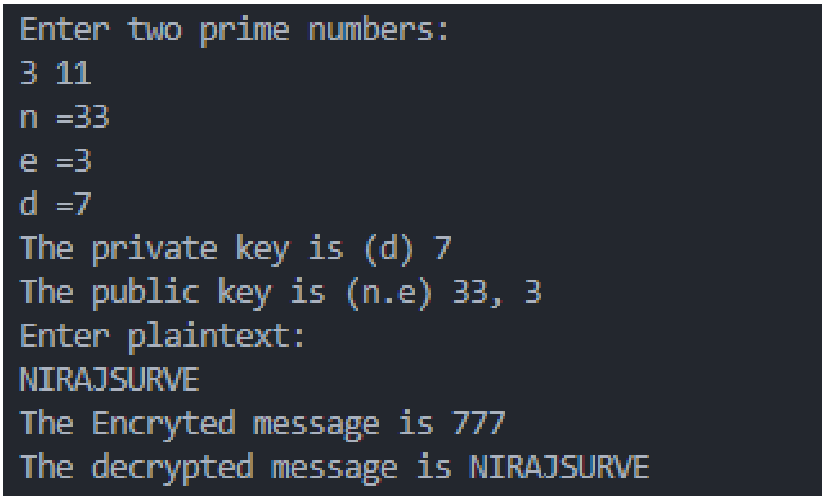
Sr. No.	Evaluation Criteria	Max Marks	Marks Obtained
1	Practical Performance	12	
2	Oral	2	
3	Timely Submission	1	
	Total	15	

Signature of Subject Teacher
[Vijesh M.Nair]

a) **RSA Program Code –**

```
import java.util.*;


class RSAcrypto {


  public static void main(String args[]) {
    Scanner sc = new Scanner(System.in);
    int d = 0;
    System.out.println("Enter two prime numbers: ");
    int p = sc.nextInt();
    int q = sc.nextInt();
    int n = p * q;
    System.out.println("n =" + n);
    int e = 0;
    int pn = (p - 1) * (q - 1);
    search:{
      for (int i = 2; i <= pn; i++) {
        int r;
        int j = i;
        int k = pn;
        while (k != j) {
          if (k > j) k = k - j; else j = j - k;
        }
        if (k == 1) {
          e = i;
          break search;
        }
      }
    }
    System.out.println("e =" + e);
    go:{
      for (int i = 1; i <= pn; i++) {
        int x = (e * i) % pn;
        if (x == 1) {
          System.out.println("d =" + i);
          System.out.println("The private key is (d) " + i);
          d = i;
          break go;
        }
      }

 }
    System.out.println("The public key is (n.e) " + n + ", " + e);
    String t;
    int c;
    System.out.println("Enter plaintext: ");
    t = sc.next();
    int m = 0;
    for (int i = 0; i < t.length(); i++) {
      m += (int) t.charAt(i);
    }
    c = ((m) ^ e) % n;
    System.out.println("The Encryted message is " + m);
    m = (c ^ d) % n;
    System.out.println("The decrypted message is " + t);
  }
}
```

Output –

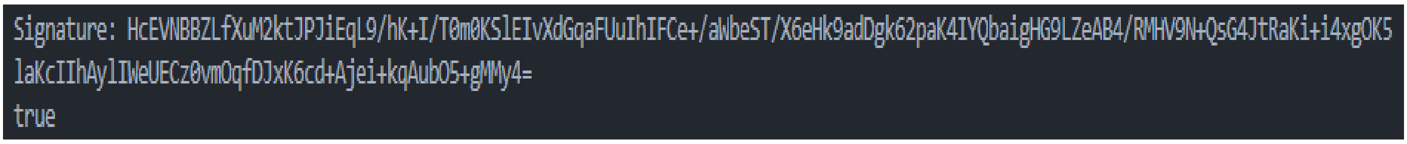


```
Enter two prime numbers:
3 11
n =33
e =3
d =7
The private key is (d) 7
The public key is (n.e) 33, 3
Enter plaintext:
NIRAJSURVE
The Encryted message is 777
The decrypted message is NIRAJSURVE
```

b) Digital Signature using RSA/EI Gamal Code –

```
import java.security.KeyPair;

import java.security.KeyPairGenerator;

import java.security.Signature;

import java.util.Base64;


public class RSADigSig {


    public static void main(String[] args) throws Exception {

        KeyPairGenerator kpg = KeyPairGenerator.getInstance("RSA");

        kpg.initialize(1024);

        KeyPair keyPair = kpg.genKeyPair();

        byte[] data = "NIRAJ".getBytes("UTF8");

        Signature sig = Signature.getInstance("MD5WithRSA");

        sig.initSign(keyPair.getPrivate());

        sig.update(data);

        byte[] signatureBytes = sig.sign();

        System.out.println(

                "Signature: " +
Base64.getEncoder().encodeToString(signatureBytes));

        sig.initVerify(keyPair.getPublic());

        sig.update(data);

        System.out.println(sig.verify(signatureBytes));

    }

}
```

Output –



```
Signature: HcEVNBBZLfXuM2ktJPJiEqL9/hK+I/T0m0KSlEIvXdGqaFUuIhIFCe+/aWbeST/X6eHk9adDgk62paK4IYQbaigHG9LZeAB4/RMHV9N+QsG4JtRaKi+i4xgOK5
laKcIIhAylIWeUECz0vmOqfDJxK6cd+Ajei+kqAubO5+gMMy4=
true
```