EXP NO:4

DATE: 17/2/24 RSA

Aim: To implement an encryption algorithm using Rsa.

Algorithm:

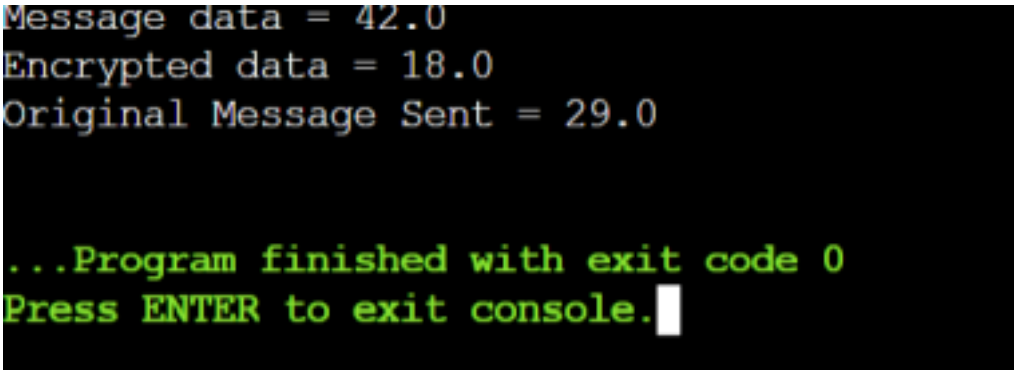
- Step 1: Select two large prime numbers, p and q. ● Step 2: Calculate the modulus, n = p * q.
- Step 3: Compute Euler's totient function, φ(n) = (p - 1) * (q - 1).
- Step 4: Choose a public exponent, e, such that 1 < e < φ(n) and gcd(e, φ(n)) = 1.
- Step 5: Compute the private exponent, d, such that (d * e) mod φ(n) = 1.
- Step 6: Convert the plaintext message into a numerical representation, usually using ASCII values or Unicode.
- Step 7: Encrypt the message by computing ciphertext, c, using the formula c = (msg^e) mod n.
- Step 8: Print the encrypted data.
- Step 9: Decrypt the ciphertext by computing the original message, m, using the formula m = (c^d) mod n.
- Step 10: Print the original message.
- Step 11: Return 0 for successful execution and program termination.

Program:

```
import java.io.*; import
java.math.*;
import java.util.*;

public class GFG {
```

```
 public static double gcd(double a, double h) {
double temp; while (true) { temp =  a % h;
 if (temp == 0)
return h; a =
h; h = temp;
 }
 }

 public static void main(String[] args) {
double p = 9; double q = 5;

 double n = p * q;

 double e = 2; double
phi = (p - 1) * (q - 1); while
(e < phi) { if (gcd(e, phi)
== 1) break;
else e++; }
int k = 2;
 double d = (1 + (k * phi)) / e;

 double msg = 42;

 System.out.println("Message data = " + msg);

 double c = Math.pow(msg, e);
c = c % n;
 System.out.println("Encrypted data = " + c);  double m =
Math.pow(c, d); m = m % n;
System.out.println("Original Message Sent = " + m);   }
}
```

Output:



Result: To implement an encryption algorithm using Rsa has been Executed successfully.