

**EXP NO:6**

**DATE:**

### **DSA**

**Aim:** To implement Digital Signature Algorithm (DSA) using C.

#### **Algorithm:**

- Step 1: Include the necessary header files `#include <stdio.h>` and `#include <math.h>`.
- Step 2: Declare the required variables for the program, including integers for prime numbers, private keys, hash value, and computed values like *gg*, *rr*, and *ss*.
- Step 3: Prompt the user to enter the prime number *pp* and the prime divisor *qq* of  $(p-1)$ . Also, prompt the user to enter *hh* such that it's greater than 1 and less than  $(p-1)$ .
- Step 4: Calculate *gg* using the function `power(h,t,p)`.
- Step 5: Prompt the user to enter their private key *xx* and per-message secret key *kk*. Also, prompt the user to enter the hash value *MM*.
- Step 6: Compute *rr* and *ss* values for the signature using the provided formulas.
- Step 7: Print the computed values of *gg*, *yy*, *rr*, and *ss*.
- Step 8: Define the power function to calculate the power of a number modulo *pp*.
- Step 9: Define the `multiplicativeInverse` function to find the multiplicative inverse of a number modulo *nn*.

#### **Program:**

```
#include <stdio.h>
#include <math.h>
int
power(int,unsigned int,int);
int multiplicativeInverse(int,int,int);
int main() {
int p,q,h,g,r,s,t,x,y,z,k,inv,hash;

printf("\nEnter prime number p and enter q prime divisor of (p-1): ");
```

```

scanf("%d %d",&p,&q);
printf("\nEnter h such that it greater than 1 and less than (p-1): ");
scanf("%d",&h);
g = power(h,t,p);
printf("\nEnter user's private key such that it is greater than 0 and less than q : ");
scanf("%d",&x);
printf("\nEnter user's per-message secret key k such that it is greater than 0 and less
than q : ");
scanf("%d",&k);
printf("\nEnter the hash(M) value : ");
scanf("%d",&hash);
r = z % q;
s inv = multiplicativeInverse(k,q,p);
t = inv * (hash + x * r) % q;
printf("\n*****Computed Values*****");
printf("\ng = %d",g);
printf("\ny = %d",y);
printf("\nGenerated Signature Sender = (%d, %d) \n",r,s);
}
int power(int x, unsigned int y, int p)
{
    int res =
    1; x = x
    % p;
    {
    res = (res * x) % p;
    }
    return res;
}
int multiplicativeInverse(int a, int b, int n)
{
    int sum,x,y; for(y=0;y<n;y++)
    {
    for(x=0;x<n;x++)
    {

```

```
sum = a * x + b * (-y);  
if(sum == 1) return  
x;  
}  
}  
}
```

### Output:

```
/tmp/BMI0y8oYxU.o  
  
Enter prime number p and enter q prime divisor of (p-1): 7  
7  
  
Enter h such that it greater than 1 and less than (p-1): 8  
  
Enter user's private key such that it is greater than 0 and less than q : 4  
  
Enter user's per-message secret key k such that it is greater than 0 and less than q :  
2  
  
Enter the hash(M) value : 1  
  
*****Computed Values*****  
g = 1  
y = 0  
Generated Signature Sender = (6, 2)  
  
=== Code Execution Successful ===
```

### Result: