

EXP NO:6

DATE: 15/3/24

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 $(p-1)(p-1)$. Also, prompt the user to enter hh such that it's greater than 1 and less than $(p-1)(p-1)$.
- 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;
inv = multiplicativeInverse(k,q,p);
s = 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:

Thus Digital Signature Algorithm (DSA) using C was implemented successfully.