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 $(p-1)$ (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.

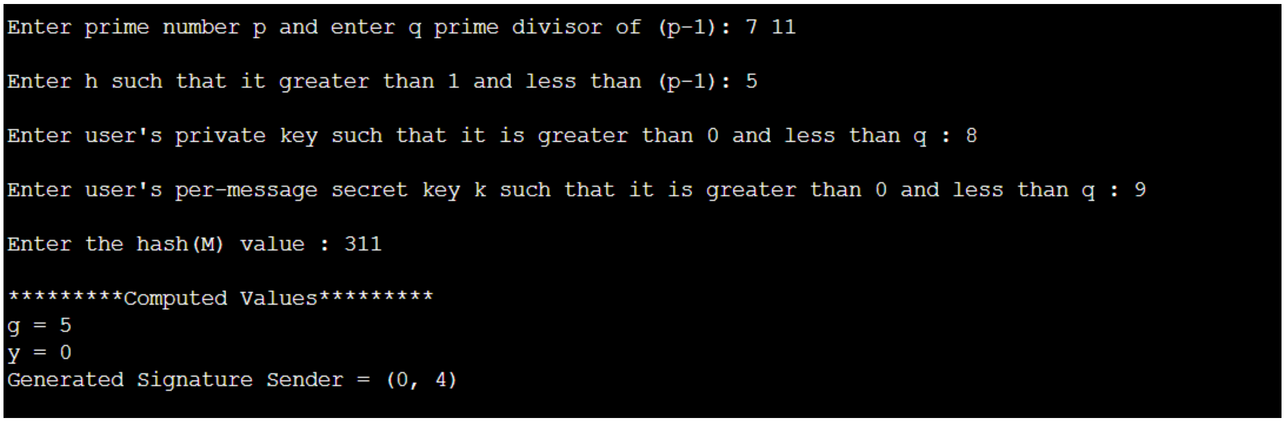
Step 9: Define the multiplicativeInverse function to find the multiplicative inverse of a number modulo nn.

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:



```
Enter prime number p and enter q prime divisor of (p-1): 7 11

Enter h such that it greater than 1 and less than (p-1): 5

Enter user's private key such that it is greater than 0 and less than q : 8

Enter user's per-message secret key k such that it is greater than 0 and less than q : 9

Enter the hash(M) value : 311

*********Computed Values*********
g = 5
y = 0
Generated Signature Sender = (0, 4)
```

RESULT: