EXP NO:6 **DATE:**

DSA

Aim:

To implement Digital Signature Algorithm (DSA) using C.

Algorithm:

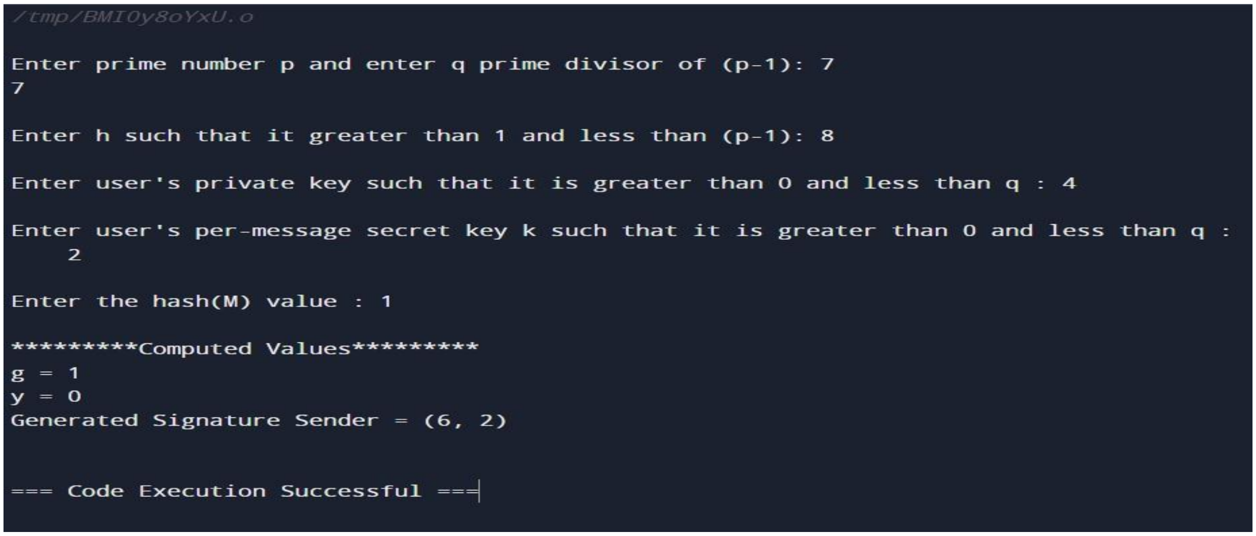
- Step 1: Include the necessary header files #include <stdio.h> and #include <math.h>.
- Step 2: Declare the required variables for the program, including integers for prime numbers, private keys, hash value, and computed values like gg, rr, and ss.
- Step 3: Prompt the user to enter the prime number 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:



```
/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: