**Ex. No.: 6** **Date:**

## DSA

**Aim:**

To implement Digital Signature Algorithm (DSA) using C.

**Algorithm:**

1. Get the prime number p and its divisor q from the user.

2. Get the value of h from the user.

3. Compute the value of g.

4. Get the private key xa from the user.

5. Compute the user's public key y.

6. Get the per-message secret key k and hash value of message M.

7. Compute the value of z using g, k & p

8. Compute z % q to get the value of r 9. Compute the multiplicative inverse.

10.Compute the value of s.

11. Print the signature (r, s).

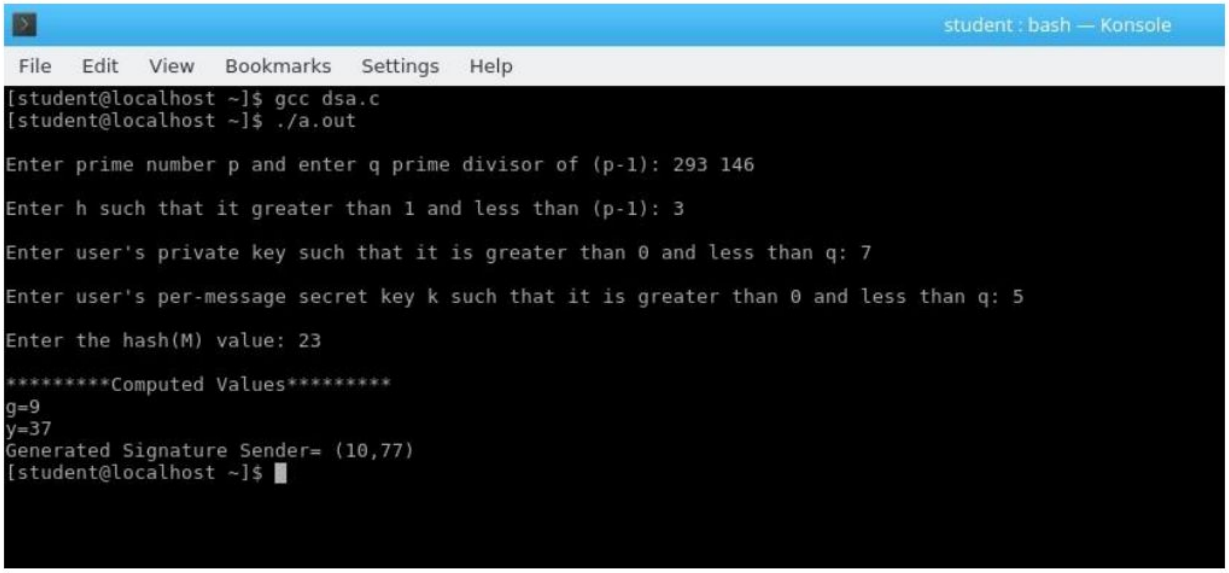
**Program Code:**

```
#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);

//Compute g

t=(p-1)/q;
```

```
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);

y=power(g,x,p);
//Computer user's public key y-
power(g.x.p);

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);

//Signing. Computer and s pair

z=power(g,k,p);

r=z% q;

inv= multiplicativeInverse(k,q,p);

s=inv*(hash+x*r) % q;

//Display

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;

// Initialize result.

x=x% p; // Update x if it is more
```

```
than or equal to p

while (y > 0)
{
// If y is odd, multiply x with result

if (y & 1)

res =(res* x) % p;

// y must be even now

y=y>>1;

x=(x*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:**



```
[student@localhost ~]$ gcc dsa.c
[student@localhost ~]$ ./a.out

Enter prime number p and enter q prime divisor of (p-1): 293 146

Enter h such that it greater than 1 and less than (p-1): 3

Enter user's private key such that it is greater than 0 and less than q: 7

Enter user's per-message secret key k such that it is greater than 0 and less than q: 5

Enter the hash(M) value: 23

*********Computed Values*********
g=9
y=37
Generated Signature Sender= (10,77)
[student@localhost ~]$ 
```

**Result:**