DATE:19.11.14

**ASSIGNMENT NO.7**

->PROBLEM STATEMENT:

Write a program in C to print the prime factors of a number.

**->ALGORITHM:**

**->1: ALGORITHM FOR FUNCTION isPrime().**

**Purpose :** To test whether an integer passed as an argument is prime or not.

**Argument:** An integer ,n.

**Return :** 1 if n is prime otherwise 0.

**Step 1: -**If (n<=1) Then Return 0

**Step 2:-** If (n=2) OR (n=3) Then Return 1

**Step 3:-** If (n%2=0) Then Return 0

**Step 4:-** For i3 to sqrt(n) Increment i by 2 in each iteration

1. If (n%i)=0 Then Return 0

[End of For loop]

**Step 5:-** Return 1

**Step 6:-** End

**-2>ALGORITHM TO PRINT THE PRIME FACTORS OF A NUMBER.**

**Purpose :** To print the prime factors of a non negative number.

**Input :**  A non negative integer ,num.

**Output :** Print prime factors of num.

**Step 1:-**Input num.

**Step 2:-**If (num<=0) Then

1. Print “Incorrect input”.

**Step 3:-**Else

1. For x←2 to num/2
2. If (num% x)=0 Then
3. If (isPrime(i) ) Then Print i

[End of If…..Then structure of Step 3.i.a]

[End of If…….Then structure of Step 3.1i

[End of For loop]

1. If (isPrime(num)) Then Print num

[End of If…..Else…structure]

**Step 5:-**End

->CODE:

/\*\*\*PRIME FACTORS OF A NUMBER USING FUNCTION\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

#include<stdio.h>

#include<conio.h>

#include<stdlib.h>

#include<math.h>

/\*\*\*\*\*\*\*\*Definition of function isPrime()\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\*\*\*\*\*\*\*\*The function isPrime() returns 1 if the number is prime otherwise 0\*\*\*\*\*\*\*/

int isPrime(int n) //Function definition

{

int i,s=sqrt(n);

if(n<=1)

return(0); //Returns 0 if the number is less than 0

if( (n==2) || (n==3))

return(1); //Returns 1 if the number is 2 or 3

if( (n%2)==0)

return(0); //Returns 0 if the number is even except 2

for(i=3;i<=s;i=i+2)

{

if( (n%i)==0)

return(0); //Returns 0 if the number is divisible by the odd numbers less than it

}

return(1); //Returns 1 if the above conditions is not satisfied

}

/\*\*\*\*End of function definition\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

/\*Stub to print the prime factors of a number\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

void main()

{

int isPrime(int n);

/\*Declaration of variables\*/

int num,i;

clrscr();

/\*Check for input validation\*/

printf("\n Enter a non negative integer :");

scanf("%d",&num);

printf("\n\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*");

if(num<=0)

{

printf("\n Incorrect input.");

}

else

{

/\*Print the prime factors of the number\*/

printf("\n The prime factors of %d are \n ",num);

for(i=2;i<=num/2;i++)

{

if(num%i==0) //To find the factors of the number

{

if(isPrime(i)) //The function isPrime is being called

printf("%d ",i);//To find the prime factors and to print

}

}

if(isPrime(num)) //To print the number if it itself is a prime factor

printf("%d ",num);

}

printf("\n\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*");

getch();

} //End of main function

/\*\*\*End of the program\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

->OUTPUT

/\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*OUTPUT\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

\*\*\*\*\*\*\*\*\*\*\*1ST RUN\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Enter a non negative integer :36

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

The prime factors of 36 are

2 3

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*2ND RUN\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Enter a non negative integer :-24

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Incorrect input.

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Enter a non negative integer :4650

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

The prime factors of 4650 are

2 3 5 31

Enter a non negative integer :4935

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

The prime factors of 4935 are

3 5 7 47

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*/

**>DISCUSSION:**

A factor is a whole number which divides exactly into a whole number, leaving no remainder. For example, 13 is a factor of 52 because 13 divides exactly into 52 (52 ÷ 13 = 4 leaving no remainder).A prime number is any number with no divisors other than itself and 1, such as 2 and 11. In [number theory](http://en.wikipedia.org/wiki/Number_theory), the primefactors of a positive [integer](http://en.wikipedia.org/wiki/Integer) are the [prime numbers](http://en.wikipedia.org/wiki/Prime_number) that divide that integer exactly. A function is a self contained program segment that carries out some specific well defined task.In C there are User defined functions and Built in functions such as printf(),scanf() etc.

Here in this program we have defined an user defined function called isPrime() which returns 1 if the number passed as an argument is prime otherwise 0.In the main function we have first found the factors of a non negative integer and then passed the factors as argument to the function isPrime().If the functions returns 1 we have printed the prime factors.