**Home Work**

Using the Laplace transformation find the solution of the differential equation.

; Where and

**Solution:**

The given differential equation is

............. (1)

Taking the Laplace transform of both sides of (1), we get

=>

...................(2)

Taking the inverse Laplace transform of both sides of (2), we get

..................(3)

Now

⸫

Putting this value in (3), we get

which is the required solution.

**Formula:**

**Some Special Function:**

1. The unit impulse Function (or Dirac delta function)

The unit impulse function is defined by

**Problem:** Find the Laplace transform of unit impulse function.

**Solution:**

The unit impulse function is defined by

We know that

⸫

= + 0

=

=

=

=

=

1. The Bessel Function

The Bessel Function of order n is defined by

=

**Problem:** Find the Laplace transform of Bessel Function

Prove that

Solution: By definition of Bessel Function of order n, we have

.............(1)

Putting in (1), we get

.............(2)

Now we taking Laplace transform in both side of eqn. (2), we get

= + ........

=

Hence