**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

**⸫**

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

Putting in (1), we get

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

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

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



Hence,