Assignment B.Tech Ist year by Siddharth Shankar Bhatt

Topic – Laplace and Inverse Laplace Transform with Applications

Q.N(1) Define Laplace Transform.

Q.N(2) Prove that If $L[F(t)] = f(s)$ then

$$L[F''(t)] = s^2 f(s) - sF(0) - F'(0)$$

where $F''(t) = \frac{d^2F(t)}{dt^2}$

Q.N(3) State and Prove second shifting property

Q.N 4 Find $L[t^2 \cos at]$

Q.N(5) Evaluate the integral

$$\int_0^\infty \frac{e^{-2t} \sin 2t}{t} dt$$ with help of Laplace transform

Q.N(6) Find Laplace transform of $F(t)$ where

$$F(t) = \begin{cases} t & 0 \le t < \frac{1}{2} \\ t-1 & \frac{1}{2} \le t \le 1 \\ 0 & t > 1 \end{cases}$$

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Q7(c) Find $L^{-1}\left[\frac{3}{s-2} + \frac{6}{s^4} + \frac{2s}{s^2+25}\right]$

Q8) Evaluate $L^{-1}\left[\frac{1}{(s^2+1)^2}\right]$

Q9) Solve the differential equation

$$\frac{d^2y}{dt^2} + 4y = t, \quad y(0) = 1, \quad y'(0) = -2$$

using Laplace & Inverse Laplace Transform.

Q10) Solve the differential equation

$$t\frac{d^2y}{dt^2} + \frac{dy}{dt} + 4ty = 0$$

given that $y(0) = 3$, $y'(0) = 0$

using Laplace & Inverse Laplace Transform