Department of Mathematics
Kalinga Institute of Industrial Technology
Deemed to be University, Bhubaneswar
Transforms and Numerical Transforms (MA-11002)
Assignment-I
B.Tech., Session-2022-2023

F.M.=10

Answer All Questions.

Q.1 Find the Laplace transform of f(t) defined as

(a) $f(t) = \begin{cases} \frac{1}{k}, & \text{when } 0 < t < k \\ 1, & \text{when } t > k \end{cases}$

(b) $f(t) = \sin^3 t,$

Q.2. (a)Solve the shifted data IVP $y'' + 2y' - 3y = 0, y(2) = -3, y'(2) = -5$ by the Laplace transform.

(b) Using Laplace transform, solve $y'' + 4y = 4\,cost,\ if\ 0 < t < \pi\,, and\ 0\ if\ t > \pi\,.$

Q.3. (a) Find the solution of IVP $y'' + 9y = \delta(t - \frac{\pi}{2})\,.$

(b) Solve the Integral equation $y(t) - \int_0^t y(\tau)(t-\tau)d\tau = 2 - \frac{t^2}{2}$ for $y(t)$.

Q.4. (a) Find the Inverse Laplace transform of $\frac{18s}{(s^2+36)^2}$ using Convolution.

(b) Find the Laplace transform of $\frac{1}{2}\,t^2 cos\,\frac{\pi}{2}t$ by differentiation.

Q.5. (a) Find the inverse transform of $\ln\frac{s}{s-1}$.

(b) Find the convolution $\cos\omega t * \cos\omega t\,.$