Engineering Mathematics-3

Half Range Fourier Series, Complex Fourier Series and Laplace Transform

Tutorial and Assignment-2

Tutorial-2

1. Express $f(x) = 2x(1-x), 0 < x < 1$ as a Fourier series expansion consisting of sine terms only.
2. Obtain the complex form of the Fourier series expansion of the square wave

$$f(x) = \begin{cases} 0 & -2 < x < 0 \\ 1 & 0 < x < 2, \end{cases} \quad f(x+4) = f(x).$$

3. Obtain the complex form of the Fourier series expansion of the following periodic function.

$$f(x) = \begin{cases} a\sin(\omega x) & 0 < x < \frac{T}{2} \\ 0 & \frac{T}{2} < x < T, \end{cases} \quad f(x+T) = f(x).$$

4. Obtain the Laplace transforms of the following functions:
   - i) te^{-6t}
   - ii) $e^{-2t}(t-1)^2$
   - iii) $\sin 2t \sinh t$
   - iv) $\dfrac{e^{-t}\cos t \cos 2t}{t}$

Assignment-2

1. Determine the Laplace transform of the following functions:
   - i) $2\sin t + \cos 4t$
   - ii) $e^{-2t}t\cos 3t$
   - iii) $\dfrac{(e^t \sin t)^2}{t}$
2. Obtain the complex Fourier series of $f(x)$ on the given interval. $f(x) = e^{-|x|}$, $-1 < x < 1$.

Note: Submit assignment to the respective course leader on or before 20^{th} September 2019.