Assignment 1. Deadline: 09/01/2024, 4:55pm

The transfer function (TF) of a resistance R may be represented either as $\frac{V(s)}{I(s)} = R$ or as $\frac{I(s)}{V(s)} = \frac{1}{R}$. Similarly, it appears at first sight that the TF of an inductor with inductance L and zero initial condition may be either sL or $\frac{1}{Ls}$, and that of a capacitor with capacitance C may be either $\frac{1}{Cs}$ or Cs.

1. Representing an inductor as a block with TF of sL and a capacitor as a block with TF of $\frac{1}{Cs}$, obtain a block diagram representation of a series RLC circuit excited by a voltage source $v(t)$.
2. Using MATLAB-SIMULINK, obtain the voltage responses $v_L(t), v_C(t)$ and the current $i(t)$ when $v(t)$ is the unit step input, $R = 40$ ohm, $L = 10$ mH, $C = 1\mu$F.
3. Repeat the above considering the TF of inductor as $\frac{1}{Ls}$ and capacitor as Cs.
4. Are the responses obtained in (1) and (2) identical? If not, explain the reason behind the difference and explain which of the above representations is more appropriate.