



Experiment One Mathematical Model Response

Object

- 1-To learn how to derive the transfer function of a linear electric system.
- 2- To represent the system response on personal computer by using MATLAB and Simulink with the transfer function of the system.

Theory

The transfer function of single input single output dynamic system is defined as:

$$G(s) = \frac{Y(s)}{X(s)}$$

Where:

$Y(s)$ = laplace transform of the output signal $y(t)$

$X(s)$ = laplace transform of the input signal $x(t)$

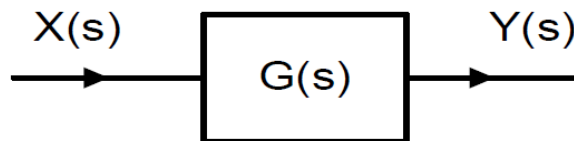


Fig (1-1) Transfer Function block diagram.

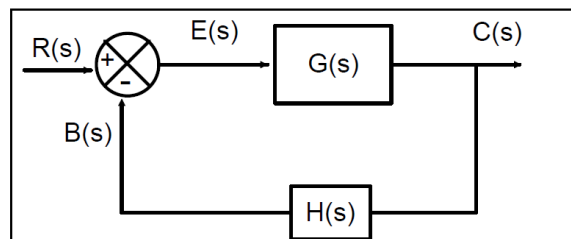


Figure (1-2) shows the block diagram for closed loop control system.



Electric circuits

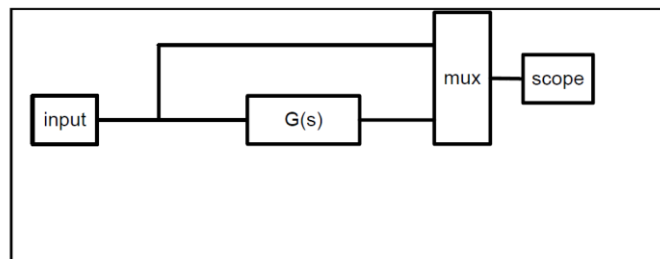
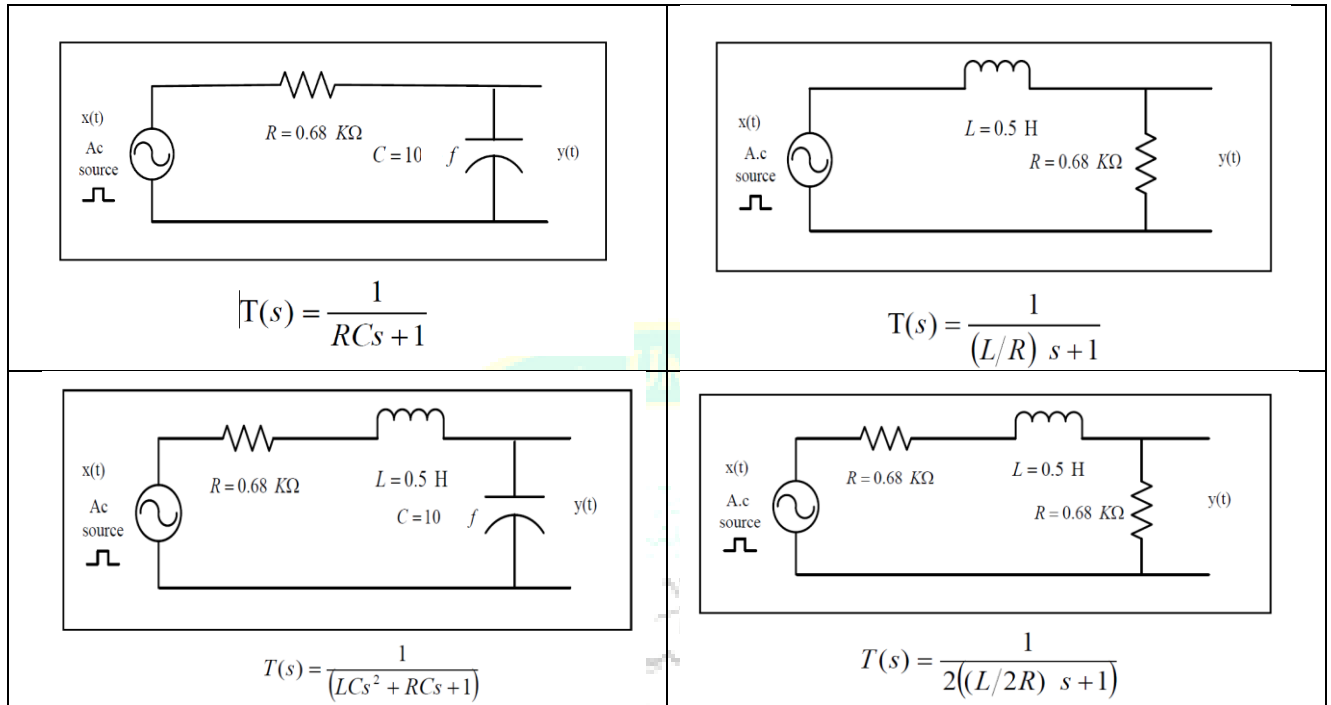
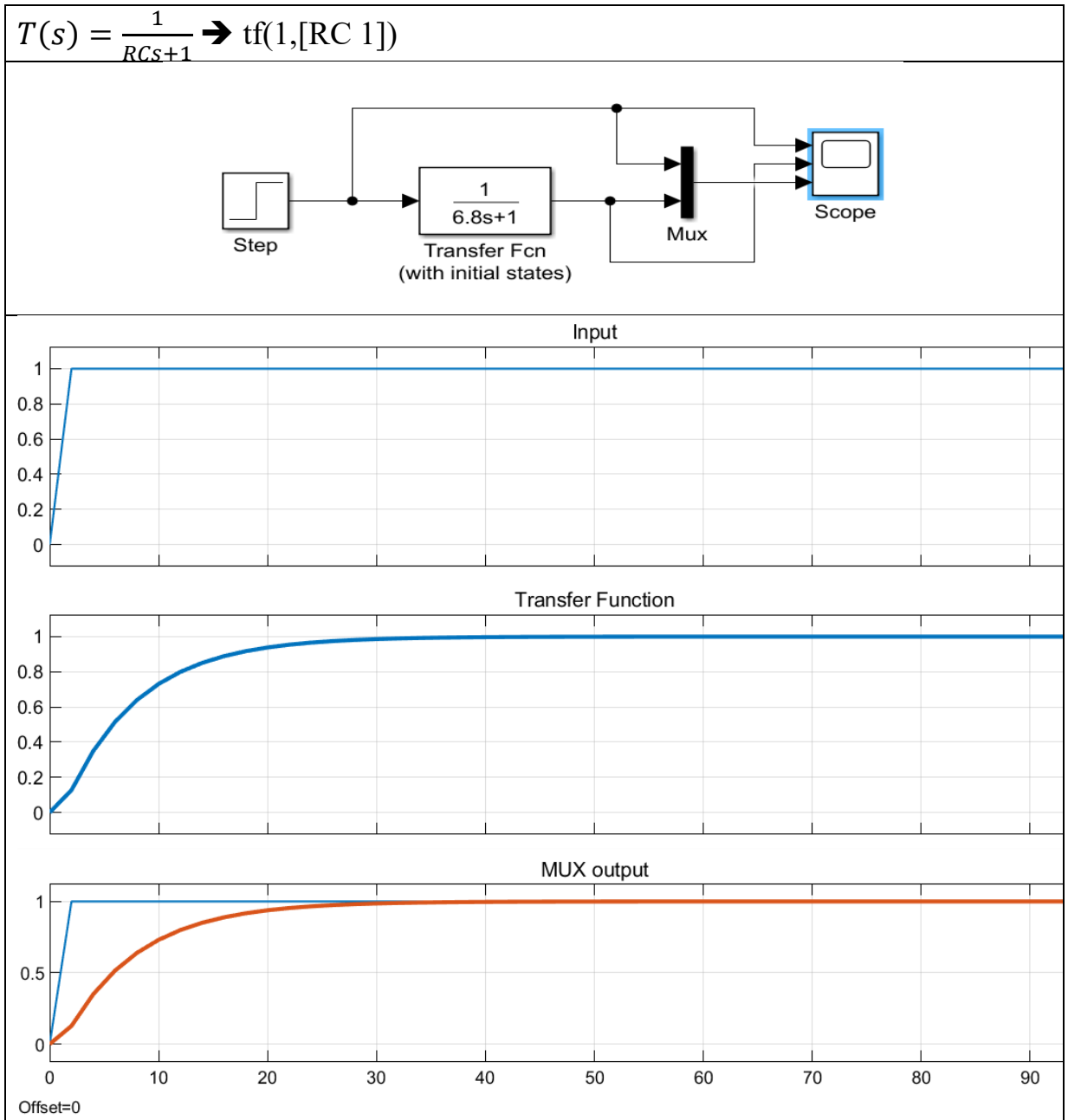


Fig. (1-3): MATLAB and Simulink representation.

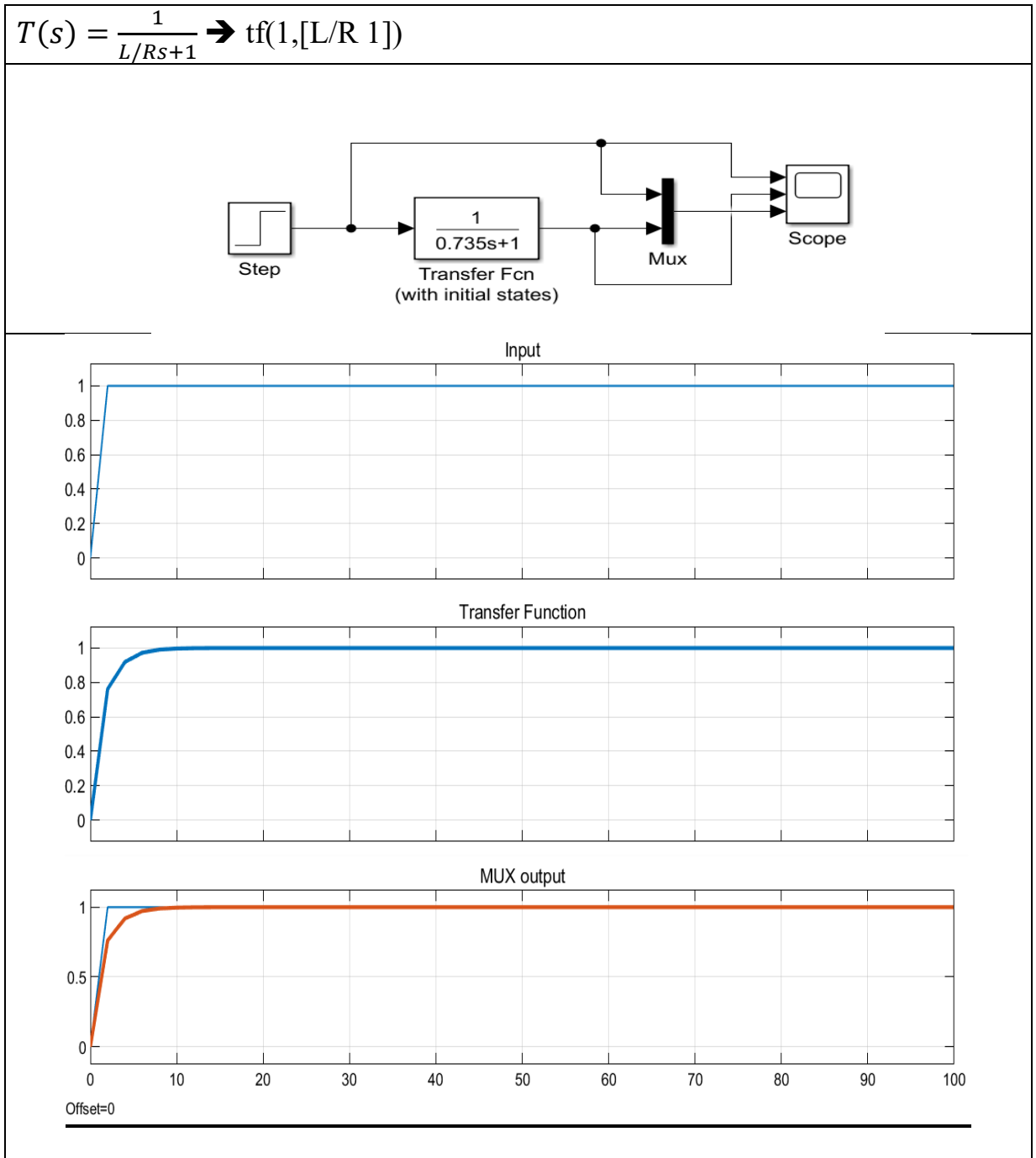


1- (R-C) circuit





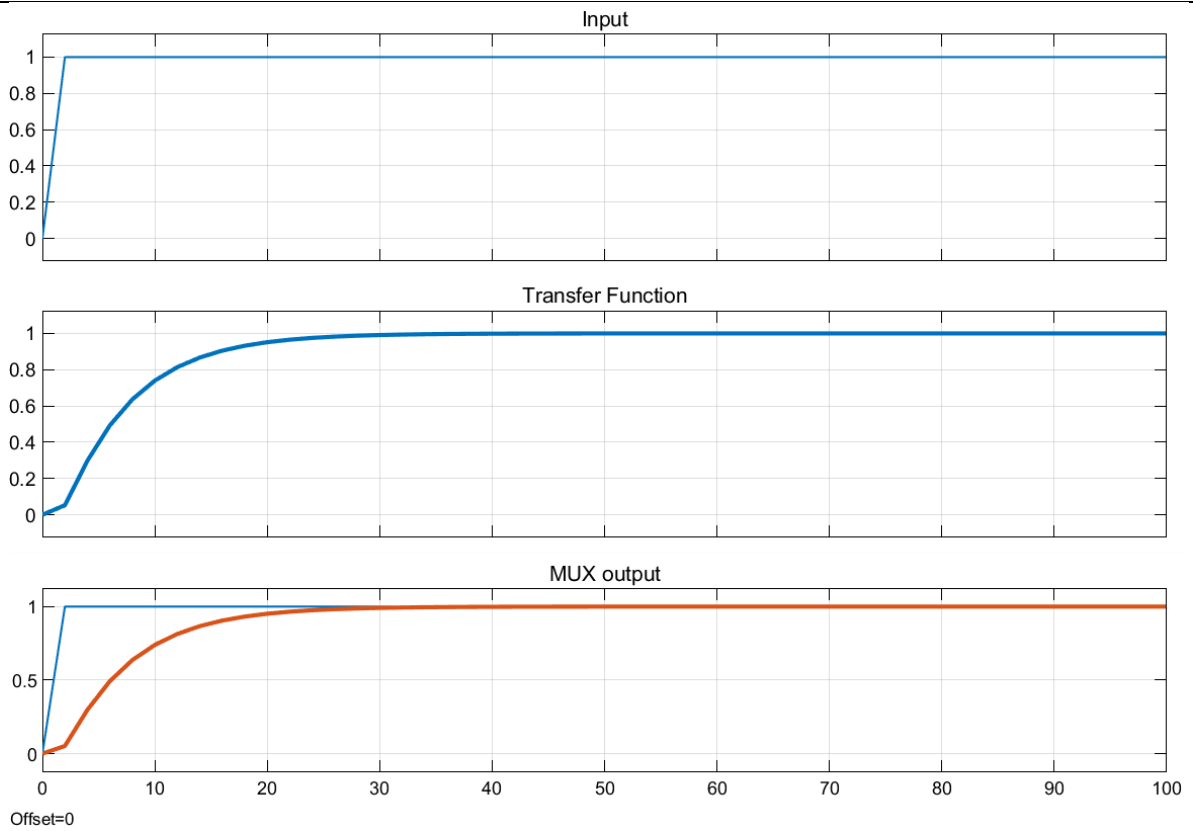
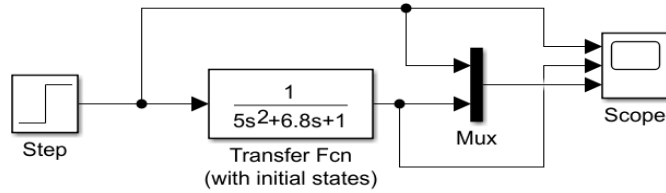
2-(R-L) circuit





3- (R-C-L) circuit

$$T(s) = \frac{1}{L/Rs+1} \rightarrow \text{tf}(1,[LC RC 1])$$





Discussion

- Derive the transfer function of the electric circuits.
- Derive the Laplace transform of a test signal:

$$f(t) = 3\sin wt$$

