LAB-1 Preliminary

Please follow the instructions in the document and mail your pdf-files to the TA of your section

artunsel@gmail.com,

karahanmehmet13@gmail.com

Please name your pdf files as in the given example file:

Mehmet-Ali-Demir-111211102-lab-1-preliminary-G-3.pdf

Mehmet-Ali-Demir-111211102-lab-1-labreport-G-3.pdf

ALSO STATE YOUR SECTION in the E-MAIL, [there are 3 sections]

section-1 TA: Mehmet Karahan,

section-2 TA: Mehmet Karahan,

section-3 TA: Artun Sel.

PLEASE READ "Important Rules" section at the end of this document before submitting your document.

THE DEADLINE: Friday, October 21, 2022, 20:00.

WARNING: Any work submitted at any time within the first 24 hours following the published submission deadline will receive a penalty of 10% of the maximum amount of marks available. Any work submitted at any time between 24 hours and up to 48 hours late will receive a deduction of 20% of the marks available.

Contents

Simulation-1

In this study, the circuit given below is to be simulated. There are 3 resistors, 1 capacitor, 1 op-amp and 1 voltage source.

Then, the "reference voltage" and "output voltage" signals are to be measured.

[You can use any circuit-simulation-program that you want]

Here, as an example "LT-spice" has been used and reference voltage and output voltage have been measured.

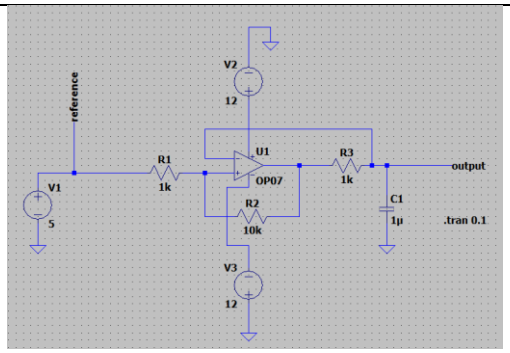


Figure 1: op-amp Circuit

The circuit parameters are given in the table below.

Table-1: The circuit parameters

The parameter	Value
R_1	$1k\Omega$
R_2	$10k\Omega$
R_3	$1k\Omega$
C_1	$1\mu F$
Op-amp V^+	$+12V$
Op-amp V^-	$-12V$
Op-amp	Type:741

Use the circuit parameters as given in Table-1. The other parameters for this simulation are given in the table-2 below.

Table 2: Circuit Simulation Parameters

The parameter	Value
$V\ reference$	$+5V$
$simulation\ duration$	$100ms$

Then measure, "reference voltage" and "output voltage".

[The plot must be clearly visible, THE BACKGROUND OF THE PLOT MUST BE WHITE!!!]

The simulation output must be the plot given below.

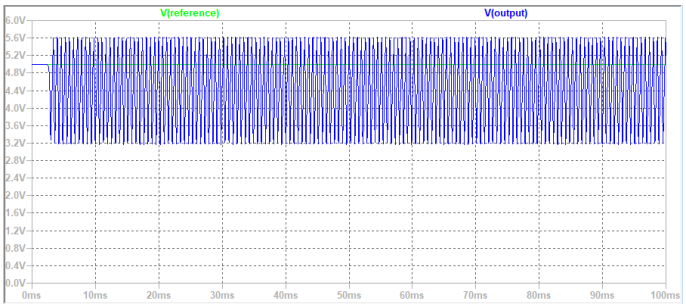


Figure 2: Spice Simulation Output

As an example, the same circuit has been simulated by using matlab-simulink-simscape-electronics.

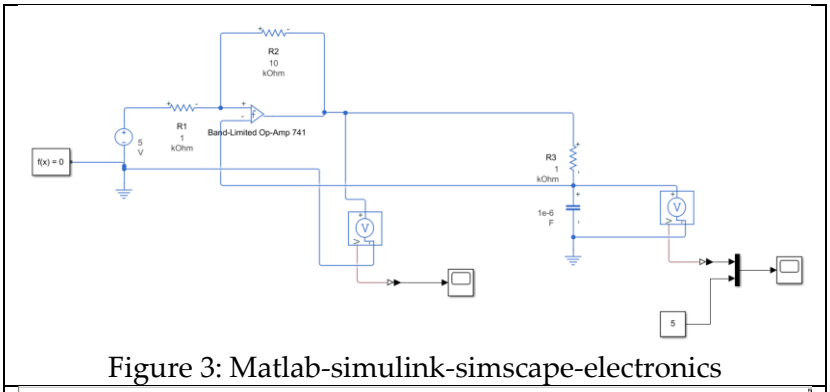


Figure 3: Matlab-simulink-simscape-electronics

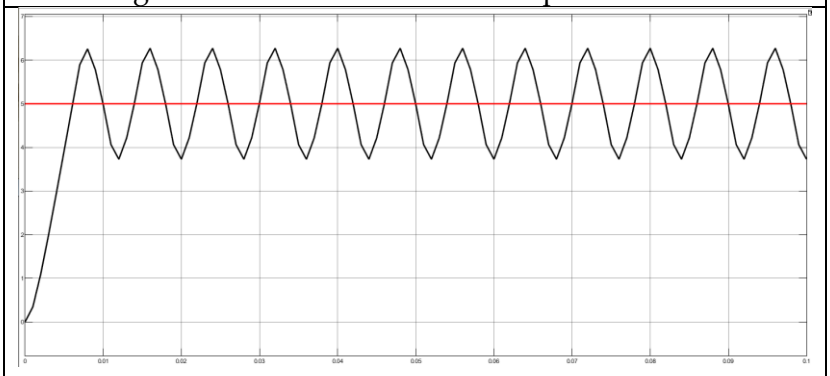


Figure 4: Simulation output

AGAIN: [You can use any circuit-simulation-program that you are familiar with!]

Simulation-2

Use the circuit parameters as given in Table-1. The other parameters for this simulation are given in the table below.

Table 3: Circuit Simulation Parameters

The parameter	Value
$V\ reference$	$square\ wave\ signal$ $\{0V, 5V\}, 10Hz$
$simulation\ duration$	$1s$

Then measure, "reference voltage" and "output voltage".

[The plot must be clearly visible, THE BACKGROUND OF THE PLOT MUST BE WHITE!!!]

Simulation-3

Use the circuit parameters as given in Table-1. The other parameters for this simulation are given in the table below.

Table 4: Circuit Simulation Parameters

The parameter	Value
$V\ reference$	$sine\ wave\ signal$ $\{peak-to-peak\ voltage: 5V\}, 10Hz$
$simulation\ duration$	$1s$

Then measure, "reference voltage" and "output voltage".

[The plot must be clearly visible, THE BACKGROUND OF THE PLOT MUST BE WHITE!!!]

Simulation-4

Use the circuit parameters as given in Table-1. The other parameters for this simulation are given in the table below.

Table 5: Circuit Simulation Parameters

The parameter	Value
$V\ reference$	$sine\ wave\ signal$ $\{peak-to-peak\ voltage: 5V\}, 20Hz$
$simulation\ duration$	$1s$

Then measure, "reference voltage" and "output voltage".

[The plot must be clearly visible, THE BACKGROUND OF THE PLOT MUST BE WHITE!!!]

Simulation-5

Use the circuit parameters as given in Table-1. The other parameters for this simulation are given in the table below.

Table 6: Circuit Simulation Parameters

The parameter	Value
$V\ reference$	$sine\ wave\ signal$ $\{peak-to-peak\ voltage: 5V\}, 100Hz$
$simulation\ duration$	$1s$

Then measure, "reference voltage" and "output voltage".

[The plot must be clearly visible, THE BACKGROUND OF THE PLOT MUST BE WHITE!!!]

Simulation-6

Using **MATLAB-Simulink**, simulate the given system below.

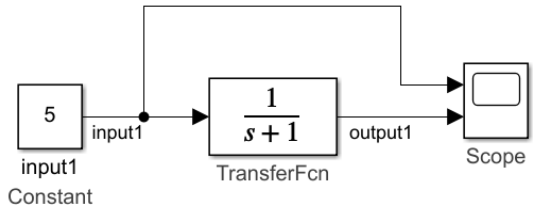


Figure 5: Simulink Block Diagram

Table 7: Circuit Simulation Parameters

The parameter	Value
Constant input	5
$Transfer\ Function$	$\frac{1}{s+1}$
Simulation duration	$10\ s$

Then measure, "input1 signal" and "output1-signal".

[The plot must be clearly visible, THE BACKGROUND OF THE PLOT MUST BE WHITE!!!]

The simulation output must be the plot given below.

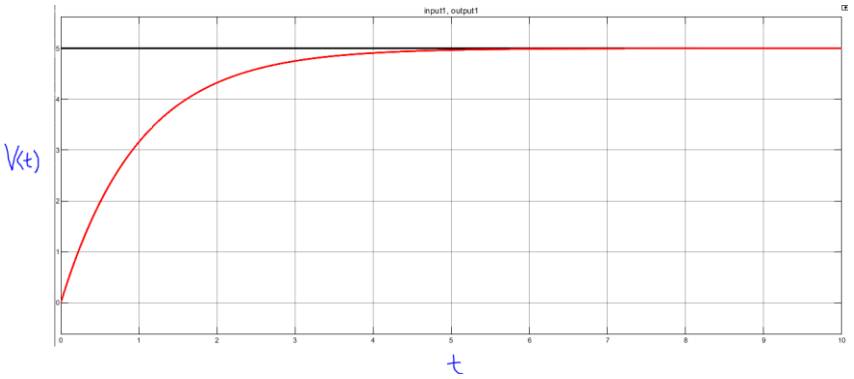


Figure 6: Simulink simulation output

Simulation-7

Using **MATLAB-Simulink**, simulate the given system below.

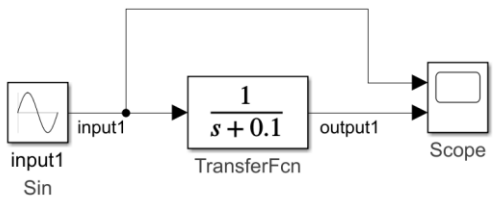


Figure 7: Simulink Block Diagram

Table 8: Circuit Simulation Parameters

The parameter	Value
Input sine-wave	$Amplitude: 1$ $Freq: 0.1Hz$
$Transfer\ Function$	$\frac{1}{s+0.1}$
Simulation duration	$100\ s$

Then measure, "input1 signal" and "output1-signal".

[The plot must be clearly visible, THE BACKGROUND OF THE PLOT MUST BE WHITE!!!]

Simulation-8

Using **MATLAB-Simulink**, simulate the given system below.

Figure 8: Simulink Block Diagram

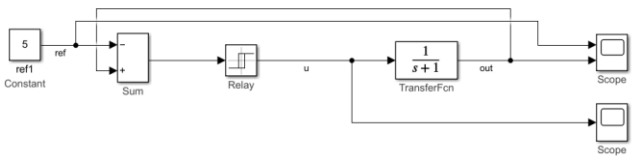
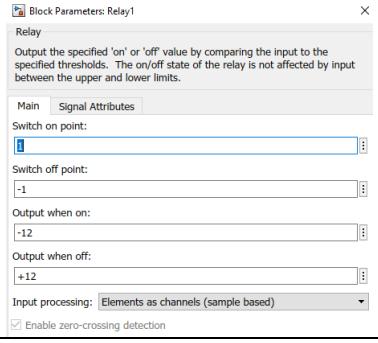


Table 9: Circuit Simulation Parameters

The parameter	Value
Constant input	5
$Transfer\ Function$	$\frac{1}{s+1}$
Simulation duration	$10\ s$

Figure 9: RELAY block parameters



Then measure, "ref-signal" and "out-signal" and plot them in the same plot.
Then measure, "u-signal" and plot it.
[The plot must be clearly visible, THE BACKGROUND OF THE PLOT MUST BE WHITE!!!]

Simulation-9

Using **MATLAB-Simulink**, simulate the given system below.

Figure 10: Simulink Block Diagram

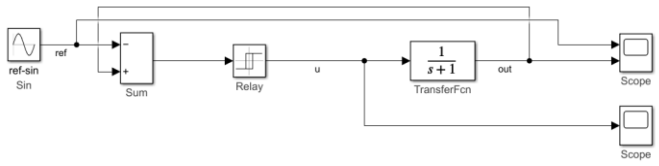


Table 10: Circuit Simulation Parameters

The parameter	Value
Input sine-wave	$Amplitude$: 1 $Freq$: $0.1Hz$
$Transfer\ Function$	$\frac{1}{s+1}$
Simulation duration	$10\ s$

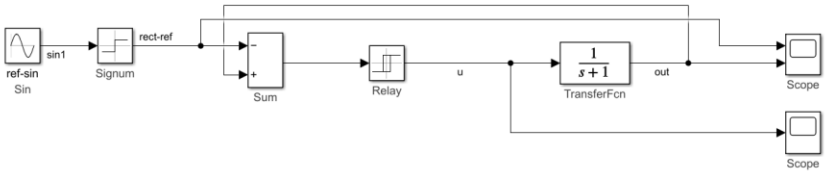
Then measure, "ref-signal" and "out-signal" and plot them in the same plot.

Then measure, "u-signal" and plot it.

[The plot must be clearly visible, THE BACKGROUND OF THE PLOT MUST BE WHITE!!!]

Simulation-10

Using **MATLAB-Simulink**, simulate the given system below.



The parameter	Value
Reference signal [rect-ref]	$sgn(\sin(2\pi(0.1)t))$
$Transfer\ Function$	$\frac{1}{s+1}$
Simulation duration	$10\ s$

[The RELAY block parameters are given in Figure 10.]

Then measure, "rect-ref-signal" and "out-signal" and plot them in the same plot.

Then measure, "u-signal" and plot it.

[The plot must be clearly visible, THE BACKGROUND OF THE PLOT MUST BE WHITE!!!]

Important Rules

The following is the list of the rules that must be followed. The failure of following the rules listed below will be resulted in point-deduction as stated in the table.

No.	Rule	Corresponding point-deduction for the failure of following the rule
01	The document must be mailed to TA of the section	5 pt.
02	The pdf file must be named as stated at the top of the document	5 pt.
03	The file must be in pdf format	5 pt.
04	Section-name must be stated in the mail that is to be sent to submit the **lab-report** or **preliminary** document	5 pt.
05	The deadline must be met.	10 pt. for each day after the deadline
06	The file must be prepared in digital form. MSword or Latex must be used.	5 pt.
07	All plots must be on a white background and the lines must be clearly visible. The names of the signals in the plot must be stated [either by using legend or by using appropriate Figure Naming such as "Figure 1: (red) input signal, (blue) output signal"]	3 pt.
08	All figures must be numbered.	3 pt.
09	All tables must be numbered.	3 pt.
10	All equations must be numbered.	3 pt.
11	Reference must be added. Only books are allowed. Do not use internet sources. Example references: [1] "Modern Control Engineering 5th Ed", Ogata K., 2010, Prentice Hall [2] "Linear Systems Theory 2nd Ed", Hespanha J., 2018, Princeton Press	3 pt.
12	Font style must be consistent. Times-New-Roman or Palatino-Linotype must be used. Font size must be 11.	3 pt.