* Review of Passive Networks

Results Sheet for Laboratory Exercises

NAME: LAB SECTION:

* Finite Instrumentation Impedance

1. *Rtest* =

*Vout* =

1. Rgen =

* A Simple Lowpass Network

1. Filter Rise Time *tr*= (attach oscilloscope plot)

Value of  computed from measured rise time

1. Rise Time of Generator = (attach oscilloscope plot)

Is the rise time of the generator small enough to be ignored? Justify by computing the predicted error resulting from an assumption that the generator output is an ideal step; i.e., compute the theoretical rise time for the lowpass filter circuit using your measured values of *R* and *C* and assuming an ideal step input (but don’t neglect the *RS* of the generator), then calculate the percent error between the measured and theoretical rise times.



Value of  predicted from the component values

(and assuming an ideal step input)

% error between measured and computed ’s from (a) and (b) above \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Explain any discrepancies between the computed and measured values of .

1. Using a semi-log scale, construct and attach the Bode plot of the lowpass filter. (The gain and phase should be on separate axes.) How many points did you use? \_\_\_\_\_\_\_. Attach annotated oscilloscope plots showing measurement of both gain and phase at the 3dB point.

Assuming that you know a given circuit has a single pole, and that you can make qualitative observations over a very broad frequency range, how many quantitative data points are required to construct the asymptotic Bode plot? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

From the Bode plot, or otherwise, determine the cut-off frequency of the lowpass filter \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Does this value agree with the value of  measured above? Explain.



* A Prototype Oscilloscope Probe

1. Rise Time *tr* = (without *C*1; attach annotated oscilloscope plot)

Predicted Rise Time Using Circuit Analysis =

1. After compensation:

*C*1 =

*C*2 =

*R*1 =

*R*2 =

Rise Time at Input = (attach annotated oscilloscope plot with scale magnified to accurately show *tr*)

Rise Time at Output = (attach annotated oscilloscope plot with scale magnified to accurately show *tr*)

After compensation, is the output voltage a reasonable representation of the input voltage? Do you need to take the actual oscilloscope probe characteristics into account in your discussion? Justify.



How long did the prototype oscilloscope probe take to reach its final value?

How long would the prototype probe have taken without compensation?

Comment on the need for compensation and its benefits.

3(a) Plot:

3(b) Plot:

3(c) Bode Plot:

3(c) Oscilloscope Plot:

4(a) Plot:

4(b) Input Plot:

4(b) Output Plot:

**Workspace**

**3(c)**

**3(b)**

**4**