ELEN 458 (ESS) **Due: November 1, 1999**
Fall '99

Homework Assignment #4

Obtain the transfer function of a 7th Order Thompson (Bessel) with an approximate cut-off frequency of 4KHz. When using FIESTA2 to obtain the transfer function do not specify the order instead provide as specs delay 250E-06, Pass frequency for delay 40000, maximum delay error in passband (percent) 0.1. Alternatively you can use the equiripple group delay approximation with only a 1% maximum delay error

a) Design an active-RC filter using commercial op amps, by using a sequence of 3 second-orders followed by a first-order. Specify why you picked a particular order of the cascade blocks.

b) Repeat a) by selecting at the input the first-order followed by your selected order of cascade second-order. This order of the second-orders can be different from a), please justify your choices.

Both design must be normalized such that the output voltage gain of each block is one at f_o=4KHz.

c) Compare results about delays, step response, maximum input signal fielding 1% THD total value of R's and C's for both designs.

Discuss these results and suggest the best choice.

For Graduate Students:

Use Monte Carlo analysis for $\Delta RC = \pm 10\%$ and observe the delay variations. Discuss results.