ENEE 610 To Consider #5

1. Read sections 8.8, pages 378 - 382, on sensitivity, as well as sections 5.4 & 5.5, pages 216 - 233, on the state variable formulation.

2. Find the even part of

$$y(s) = \frac{s^2 + as + b}{(s+c)^2}$$

and then evaluate this for s = jω. Locate all the zeros of the even part.

3. Show that the y(s) of 2. is positive real for a=1, b=c=3and find all zeros of its even part. Find its minimum over s = jω. Extract a resistor with this minimum conductance and show that the resulting function is not zero at the minimum frequency. Then use a Richards' function to perform synthesis in two different ways, one in cascade form and the other in bridge form using the Bott-Duffin synthesis.

4. For the synthesis y(s) of 3. above find the sensitivity to c as well as to the gyrator conductance in the cascade synthesis.

5. For the cascade synthesis of 3. above, set up the state variable equations [equations (5.4-1) & (5.4.3) of page 217 of the text]

$$\frac{dx}{dt} = Ax + Bu$$
$$y = Cx + Du$$

6.(harder problem) Synthesis can proceed without forming the minimum function. For this one can use the Richards' function with k a complex zero of the even part giving complex valued elements and then repeating at the conjugate zero of the even part, after which the two complex 2-ports are combined into one real 2-port by examining their combined Y matrix. Carry out this type of synthesis on the function of 3. above.