File: c:\temp\courses\fall2005\610\hmwrk5.doc RWN 10/19/05-11/02/05
ENEE 610
Homework Problems for Grading, Set 5 (100 points)
Due at class W 11/02/05 changed to M 11/07/05
Lossless and Passive Synthesis

1. (50 points)
A. For the following functions determine which are
a) positive-real
b) lossless (and PR)

A1. $y(s)=2 \frac{s\left(s^{2}+6\right)\left(s^{2}+8\right)}{\left(s^{2}+3\right)\left(s^{2}+7\right)}$
A2. $z(s)=2 \frac{s\left(s^{2}+6\right)\left(s^{2}+8\right)}{\left(s^{2}+3\right)\left(s^{2}+7\right)}$
A3. $\mathrm{z}(\mathrm{s})=\frac{\mathrm{s}\left(\mathrm{s}^{2}+6\right)\left(\mathrm{s}^{2}+8\right)}{\left(\mathrm{s}^{2}+3\right)^{2}(\mathrm{~s}+7)}$
A4. $y(s)=\tanh (s)$
B. Synthesize by the four canonical forms $\left(1^{\text {st }} \& 2^{\text {nd }}\right.$ Foster and Cauer $)$ the
lossless admittance $\mathrm{y}(\mathrm{s})=\frac{5}{21} \frac{\mathrm{~s}\left(\mathrm{~s}^{2}+3\right)\left(\mathrm{s}^{2}+7\right)}{\left(\mathrm{s}^{2}+1\right)\left(\mathrm{s}^{2}+5\right)}$
2. (50 points)

For the following 2-port
a) Find the load admittance, $y_{L}(s)$, in terms of the input admittance $y(s)$ and from that determine an appropriate Richards' type function to use for synthesis. Give the values of $\mathrm{C}(\mathrm{k})$ and $\mathrm{g}(\mathrm{k})$ to make the $\mathrm{y}_{\mathrm{L}}(\mathrm{s})$ agree with the Richards' type function.
b) Use a cascade of two of the sections to synthesize $\mathrm{y}(\mathrm{s})=2 \frac{s^{2}+2 s+4}{s^{2}+s+6.25}$


