

LE 325 Assignment #4

1. Derive the equation for $Z_{0\pi}$ and also show that

$$Z_{0\pi} = \sqrt{Z_{oc}Z_{sc}}.$$

2. Show that for symmetrical T- and π -networks,

$$e^{-\gamma} = \sqrt{AD} - \sqrt{BC}, \text{ (or } e^{\gamma} = \sqrt{AD} + \sqrt{BC} \text{)}$$

where A, B, C, D are transmission parameters.

3. Design the low-pass filter that has the cut-off frequency of 100 MHz and the characteristic impedance at this cut-off frequency of 50 Ω . Also sketch the characteristic impedance and the attenuation constant as a function of frequency.

4. Design the high-pass filter that has the cut-off frequency of 100 MHz and the characteristic impedance at this cut-off frequency of 50 Ω . Also sketch the characteristic impedance and the attenuation constant as a function of frequency.

5. Design the band-pass filter that has the center frequency of 100 MHz, the bandwidth of 1 MHz and the characteristic impedance at the center frequency of 50 Ω . Also sketch the characteristic impedance and the attenuation constant as a function of frequency.

6. Repeat problem 3 and 4 above using the m -derived T-section filters. Use $m = 0.4$ and compare the results with the constant- k filters.