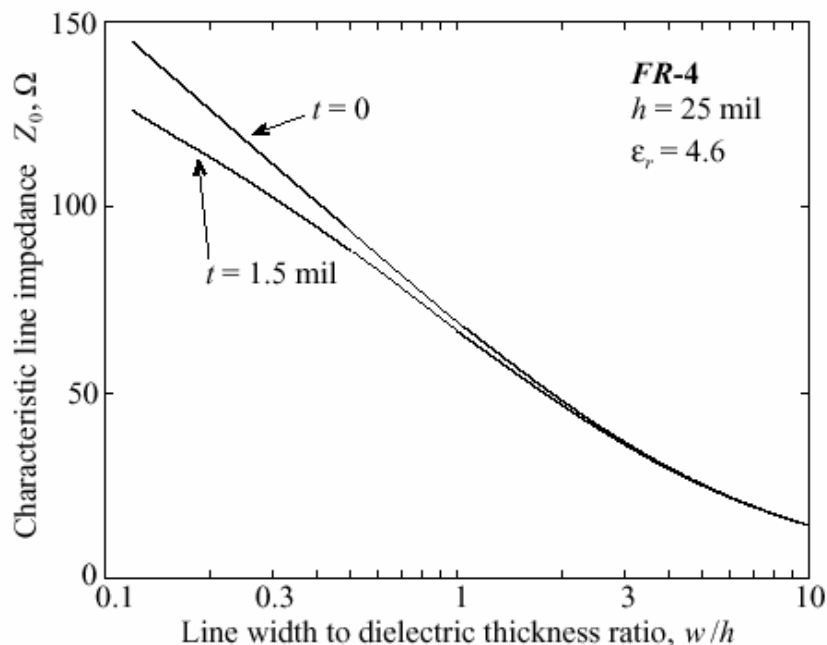


Teamwork is not permitted on this examination. The university academic integrity policy will be strictly enforced. Failure to comply with the academic integrity policy will result in a zero for this examination.

Show all work. Complete all 4 problems provided. Good Luck!

- Design a microstripline low pass filter with characteristics of a third order Chebyshev filter with 3 dB ripple to meet the following specifications: Cut-off frequency $f_c = 2.45$ GHz with source and load resistances of 50Ω . Given that a Rogers TMM-4 printed circuit board with $\epsilon_r = 4.5$ which is approximately that of FR-4 is used with board height of 25 mils and 1.5 mil thick electrodeposited copper foil. Using the w/h curves draw a representation of the resulting microstripline filter with appropriate stripline lengths and widths. Confirm your design with Ansoft SV. Provide the output S_{21} and the filter diagram.



- Design an L - C high pass filter with a cutoff frequency of 330 MHz and 25 dB attenuation at 660 MHz. Confirm your design with Ansoft Designer SV. Provide the output S_{21} and the filter diagram.
- What is the plotted transfer function using ABCD matrices for the filter circuit of Problem #3? Plot using MathCAD or MatLab. Please provide the MathCAD or MatLab routine.
- The load impedance at $f = 400$ MHz lies in the forbidden area for the simple LC impedance matching network shown below. To circumvent the forbidden area, length of 50Ω waveguide is placed between the load and the LC network.
 - For the length $l = \lambda/4$, determine C and L for the impedance matching network. Show the work on a Smith Chart.

- (b) What is the length l in meters or millimeters if the relative permittivity of the waveguide is $\epsilon_r = 4.5$?

Confirm your work with Ansoft Designer SV or Berner Smith V2.01. Provide the S_{11} and the Designer SV or or Berner Smith V2.01 circuit diagram .

