ECE 391 Transmission Lines, Winter 2020

Test Date: 02/05/2020

Problems: 4

Total Pages: 6

Name: _____

1. (10 points) _____

2. (10 points) _____

3. (20 points) _____

4. (20 points) _____

Total (60 points) _____

Good Luck

Problem 1: (10 points) A surface mount resistor is 2mm in length. Propagation velocity of the signal through this resistor is 0.6c (where $c=3x10^8$m/s). Up to what frequency can you consider this component as lumped parameter?

Note: Transit time effect can be safely ignored if the length of the transmission line is less than 1% of the signal wavelength.

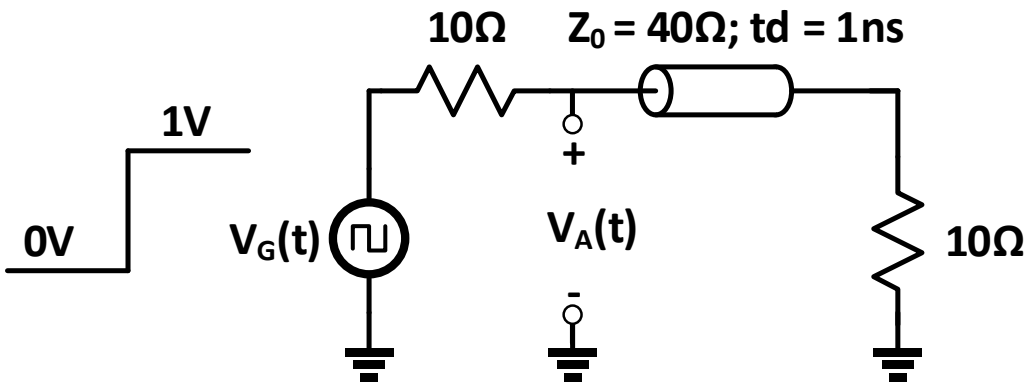
Frequency = _____

Problem 2: (10 points) Parameters of a transmission lines are: R = 0.5Ω/m; L=0.237μH/m; G = $6.21x10^{-4}$ S/m; C=106pF/m; Calculate the characteristic impedance of the transmission line at 1MHz and 10GHz?

Zo (1MHz) = _____

Zo (10GHz) = _____

Problem 3: (20 points) Given the following transmission line:



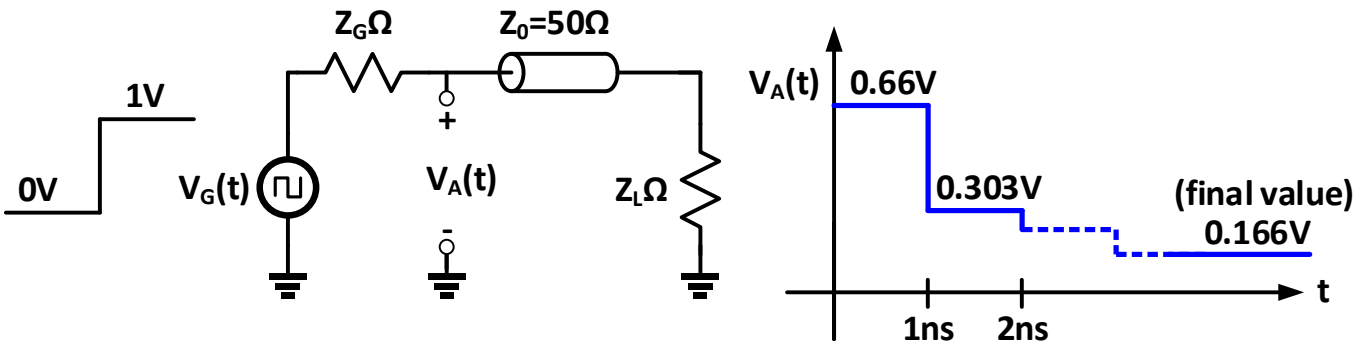
(a) **(5 points)** Calculate the reflection coefficient at the generator side and load side:

Reflection Coefficient on Generator (Γ_G) = _____
Reflection Coefficient on Load (Γ_L) = _____

(b) **(10 points)** Draw lattice diagram for up to 5ns.

(c) **(10 points)** Plot $V_A(t)$ up to 6ns.

Problem 4: (20 points) Given the following transmission line and measurement of voltage near generator $V_A(t)$:



(a) **(14 points)** Calculate the impedance Z_G and Z_L.

Z_G = _____

Z_L = _____

(b) **(6 points)** Given the propagation velocity of the signal through this transmission line is 0.5c (where $c=3x10^8$m/s), calculate the length of the transmission line.

Length = _____