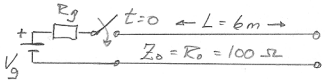
Solutions for Exam 6-May-2014 - Transmission Lines

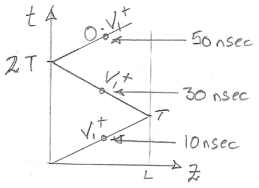
a)



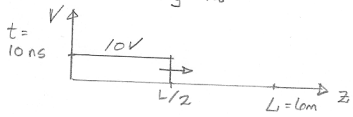
$\Gamma_g = \frac{R_g - R_0}{R_g + R_0} = \frac{100-100}{100+100} = 0$

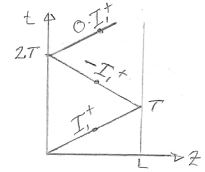
$T = \frac{L}{c} = \frac{6}{3\cdot 10^8} = 20\,\text{nsec}.$

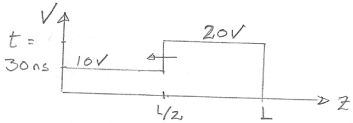
$\Gamma_L = \left.\frac{R_L - R_0}{R_L + R_0}\right|_{R_L \to \infty} = +1$

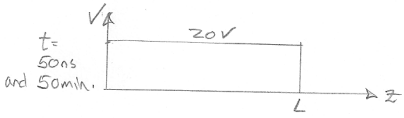


$V_1^+ = V_0 \cdot \frac{R_0}{R_g + R_0} = 20 \cdot \frac{100}{200} = 10\,V.$

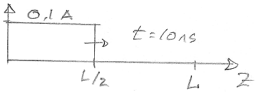


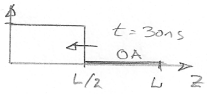


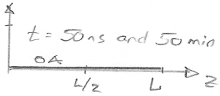




$I_1^+ = \frac{V_1^+}{R_0} = \frac{10}{100} = 0{,}1\,A.$

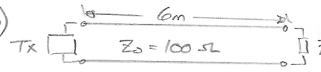






Note: It is "reasonable" that in the steady state ($t = 50$ min.) the voltage is equal to $V_g = 20V$ and the current is zero (open circuit).

b)



$\lambda = c/f = \frac{3\cdot 10^8}{112{,}5\cdot 10^6} = 2{,}667\,m$

$L_\lambda = \frac{6}{2{,}667} = 2{,}25\lambda$

$= 2\lambda + \lambda/4$

$z_L = \frac{50 - j80}{100} = 0{,}5 - j0{,}8$