EE311 Name _____

Spring 2020 4/20/20 Code _____

Game Transmission line I

Find $\Gamma\left(x=-\frac{12\lambda}{2}\right)$ *and* $Z\left(-\frac{12\lambda}{2}\right)$ *and show. your work*

$\boldsymbol{\Gamma\left(x=-\frac{12\lambda}{2}\right)=\Gamma_0 e^{j2\beta(-\frac{12\lambda}{2})}=\Gamma_0 e^{j\left(2\frac{2\pi}{\lambda}\right)\left(-\frac{12\lambda}{2}\right)}=\Gamma_0 e^{j(-24\pi))}=\Gamma_0}$

$\boldsymbol{\Gamma\left(x=-\frac{24\lambda}{2}\right)=\Gamma_0=\frac{Z_L-Z_0}{Z_L+Z_0}=\frac{75-50}{75+50}=\frac{1}{5}}$

$\boldsymbol{Z\left(-\frac{12\lambda}{2}\right)=Z_0\frac{1+\Gamma_0 e^{j2\beta(-\frac{12\lambda}{2})}}{1-\Gamma_0 e^{j2\beta(-\frac{12\lambda}{2})}}=Z_0\frac{1+\Gamma_0}{1-\Gamma_0}=Z_0\frac{1+\frac{Z_L-Z_0}{Z_L+Z_0}}{1-\frac{Z_L-Z_0}{Z_L+Z_0}}=Z_L}$

Z_L=75 ohms

Z_0= 50 ohms

$\boldsymbol{Z\left(-\frac{12\lambda}{2}\right)=Z_L}$

$\boldsymbol{\Gamma\left(x=-\frac{12\lambda}{2}\right)=\Gamma_0=\frac{1}{5}}$

$x=-\frac{12\lambda}{2}$

$x=0$

Find $\Gamma\left(x=-\frac{15\lambda}{4}\right)$ *and* $Z\left(-\frac{15\lambda}{4}\right)$ *and show your work*

Z_0= 50 ohms

Z_L=75 ohms

$x=-\frac{15\lambda}{4}$

$\boldsymbol{\Gamma\left(x=-\frac{15\lambda}{4}\right)=\Gamma_0 e^{j2\beta(-\frac{15\lambda}{4})}=\Gamma_0 e^{j(-15\pi))}=-\Gamma_0}$

$\boldsymbol{Z\left(-\frac{15\lambda}{4}\right)=Z_0\frac{1+\Gamma_0 e^{j2\beta(-\frac{15\lambda}{4})}}{1-\Gamma_0 e^{j2\beta(-\frac{15\lambda}{4})}}=Z_0\frac{1-\Gamma_0}{1+\Gamma_0}=Z_0\frac{1-\frac{Z_L-Z_0}{Z_L+Z_0}}{1+\frac{Z_L-Z_0}{Z_L+Z_0}}=\frac{{Z_0}^2}{Z_l}}$

$\boldsymbol{Z\left(-\frac{15\lambda}{4}\right)=\frac{{Z_0}^2}{Z_l}=\frac{2500}{75}=33.33\ \Omega}$

$\boldsymbol{\Gamma\left(x=-\frac{15\lambda}{4}\right)=-\Gamma_0=-\frac{1}{5}}$