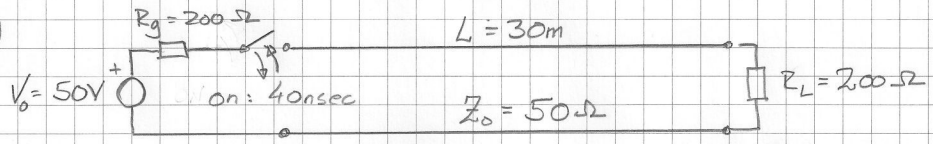
HÁSKÓLI ÍSLANDS
VERKFRÆÐI- OG NÁTTÚRUVÍSINDASVIÐ

# Solutions for exam 28-Apr-2015

## Transmission Lines

RAF402G

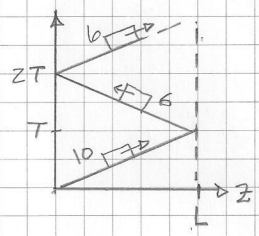
a)

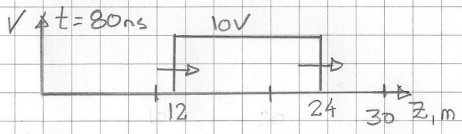


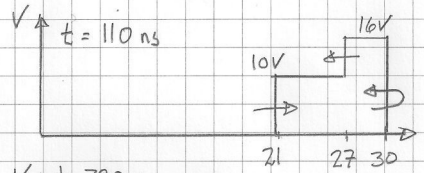

$$\Gamma_g = \frac{R_g - R_0}{R_g + R_0} = +1 \qquad \Gamma_L = \frac{R_L - R_0}{R_L + R_0} = +0{,}6$$

Note: Switch is opened again after 40ns, so the returning pulse will encounter an open circuit, $R_g \to \infty$.

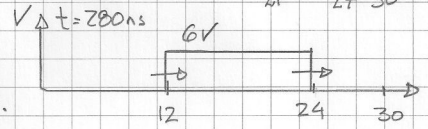
$$T = \frac{L}{c} = \frac{30}{3\cdot 10^8} = 10^{-7} = 100\,\text{nsec}. \qquad V_1 = V_0 \cdot \frac{R_0}{R_g + R_0} = 10V.$$



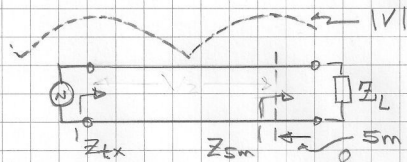




At $t = 1$ minute we simply have the voltage source disconnected and no voltage (0V) on the line.




b)




$$f = 7{,}5\,\text{MHz} \Rightarrow \lambda = \frac{c}{f} = \frac{3\cdot 10^8}{7{,}5\cdot 10^6} = 40m$$

$$L = \frac{30m}{40m}\lambda = 0{,}75\lambda$$

$$5m = 5/40\,\lambda = \lambda/8.$$

$$z_{5m} = 3 \Rightarrow Z_{5m} = 3\cdot 50 = 150\,\Omega$$

$$z_{ant} \simeq 0{,}6 + j0{,}8 \to 30 + j40\,\Omega$$

$$z_{tx} \simeq 0{,}6 - j0{,}8 \to 30 - j40\,\Omega$$

- Draw the $S = 3$ circle on Smith ch.
- $|V|_{max}$ is on real-axis to the right.