

THE UNIVERSITY OF BRITISH COLUMBIA
Department of Electrical and Computer Engineering

ELEC 311 – Electromagnetic Fields and Waves
2025 W1

Example Problems for
Chapter 10 – Transmission Lines

The purpose of these eight example problems is to help you master some of fundamental techniques used to analyze transmission lines, including use of the Smith Chart to aid in design of impedance matching networks.

Try these problems before we review the problem-solving strategies and detailed solutions in class. Answers should be short and to the point. Use sketches to explain your solution as required. Clarity, conciseness, and presentation all count. Solution = Intuition (strategy) + Execution (calculation). Make both explicit.

I. Transmission Lines

1. The parameters of a certain transmission line operating at $\omega = 6 \times 10^8$ rad/s are $L = 0.35$ $\mu\text{H/m}$, $C = 40$ pF/m , $G = 75$ $\mu\text{S/m}$, and $R = 17$ Ω/m . Find γ , α , β , λ , and Z_0 .

2. A $50\text{-}\Omega$ load is attached to a 50-m section of the transmission line of problem 1 and a 100-W signal is applied to the input end of the line. Evaluate:
 - i. the distributed line loss in dB/m .
 - ii. the reflection coefficient at the load.
 - iii. the power that is dissipated by the load resistor.
 - iv. the power that is returned to the input.

