# *EE303 Homework #8*

Due Date/Time: *December 28, 2020 Monday, 1:00 pm*

Please upload your solutions to ODTUClass next Monday <u>no later than 1:00 pm</u>.

<mark>Course Ethics</mark>: In all activities (homeworks, quizzes, exams, attendance questionnaire) of the course, students should not receive any unauthorized help from other students or persons. All submissions must be students' own work. Students are assumed to understand what constitutes plagiarism, cheating, and other unethical activities.

Q1. A lossless transmission line of length 14 cm is terminated by a load impedance of Z_L= (40-30j) Ω. The characteristic impedance of the line is 50 Ω and the wavelength on the line is 16 cm at frequency f_o.
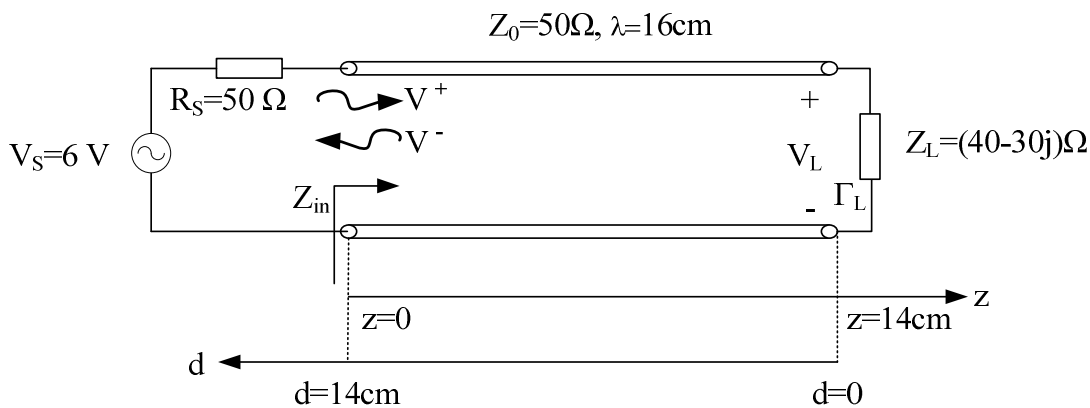
a) Find the input impedance seen at the source end of the transmission line (Z_{in}).
b) Find the reflection coefficient at the load (Γ_L) .
c) A voltage source of v_s=6cos($2\pi f_o t$) V with an internal resistance of 50Ω is connected to the transmission line. Let V^+ and V^- denote the phasors of the forward and backward traveling voltage waves at the input of the line (z=0), respectively. Find V^+ and V^-.

Q2. The input impedance of a 31 cm long lossless transmission line of unknown characteristic impedance is measured at 1 MHz. When the line is terminated by a short circuit, measured input impedance is equivalent to an inductor with inductance of 0.128 µH and when the line is terminated by an open circuit, measured input impedance is equivalent to a capacitor with capacitance of 20 pF. Find the characteristic impedance of the line, the phase velocity, and the relative permittivity of the insulating nonmagnetic material.

Q3. (Reading Assignment Problem) Draw the voltage standing wave pattern along the line as a function of position (|V(z)| vs z for the following terminations

a) Matched load
b) Short circuited line
c) Open circuited line

If you have questions/comments about this Homework Assignment, please send your e-mails to

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