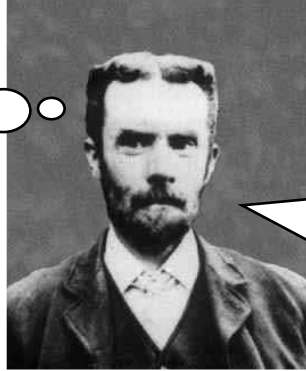


University of Portland
School of Engineering

EE 301-Electromagnetic Fields-3 cr. hrs.

Spring 2007

You will pay a heavy price for turning the unit-step function into a girly cartoon character Inan!
@*\$*#&XΘχ@*§ξ!



Best of luck to you EE 301 students and please, demonstrate Inan that unlike what everyone might think, his tests are nothing but simply a piece of cake! (Bring his fame down about giving challenging exams!)

Midterm Exam # 1

(Prepared by Professor A. S. Inan)

(Friday, March 2, 2007)

(Closed Book Exam; 1 Formula Sheet Allowed)

(Total Time: 55 mins.)

Name: _____ 😊

Signature: _____ 😊

“Honesty is the best policy.”

Aesop (~ 620B.C. -?)

“An honest mind possesses a kingdom.”

Lucius Annaeus Seneca (4B.C.-65A.D.)

“Honest people are the true winners of the universe.”

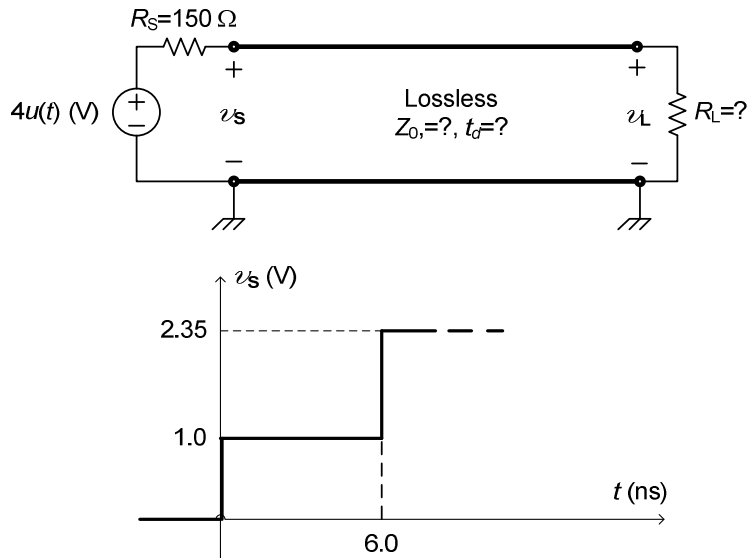
Anonymous

“Honesty is not for sale.”

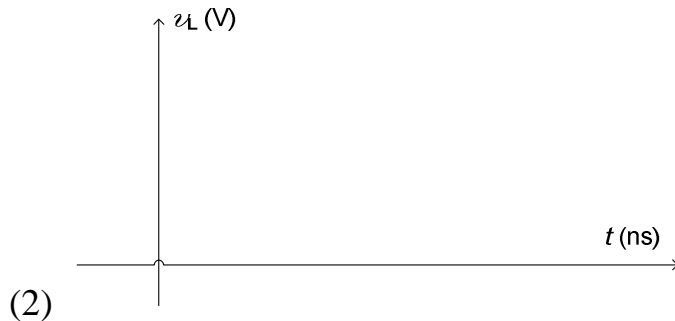
A. Inan

(1) (15 mins., Total: 30 points) **TDR characterization.** A TDR experiment is constructed to determine the unknown parameters of a distributed circuit as shown. Based on the source-end voltage waveform given:

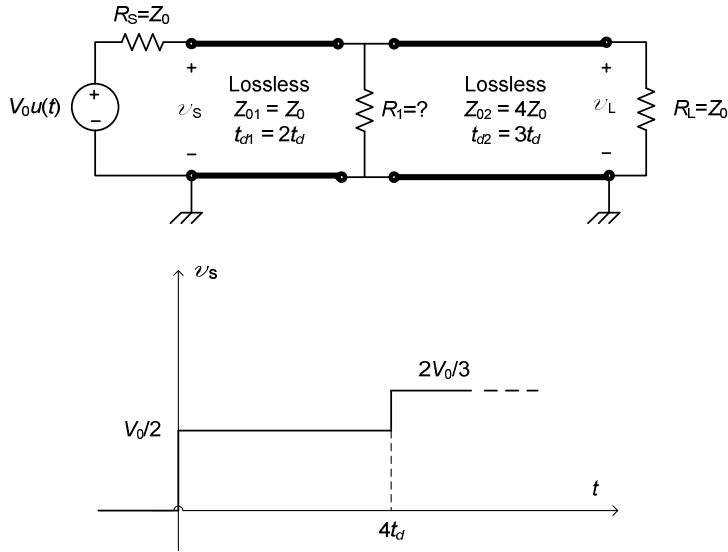
(a) (20 points) Determine the values of Z_0 , t_d , and R_L . Show your work clearly.



(b) (10 points) Sketch the load-end voltage v_L as a function of time t for the time interval $0 \leq t \leq 10$ ns.



(2) (15 mins., Total: 35 points) **A distributed circuit involving two transmission lines.** For the transmission line circuit shown, based on the source-end voltage waveform provided, do the following:



(a) (15 points) Determine the value of the lumped resistor R_1 in terms of the characteristic impedance Z_0 .

(b) (10 points) Determine the value of the load-end voltage v_L in terms of V_0 at $t = 6t_d$.

(c) (10 points) Determine the value of the source-end voltage v_S in terms of V_0 at $t = 11t_d$.

- (3) (15 mins., 35 points) **Reactive termination.** In the transmission-line circuit shown, find the complete mathematical expression and sketch both the source-end voltage v_s and the load-end voltage v_L as a function of time. Sketch the two waveforms separately. Provide all the pertinent values on each sketch.

