ECEG 390 Theory and Applications of Electromagnetics Spring 2025

Selected Answers to HW #2

Include explanatory text and intermediate calculations in your solutions. You will not receive credit for merely repeating an answer given here without supporting work.

If an answer is not provided below, it is either because the solution is trivial or because disclosure of the answer would give away too much of the solution.

It is possible that one or more of the answers given below is incorrect. There is a trade-off between speed and accuracy. The faster that selected answers are posted to the web site, the more likely that a mistake could have been made in the rush to prepare them. You should develop the ability to evaluate the accuracy of any information that you rely on.

If you suspect that an answer below is incorrect, please let me know as soon as possible.

1. **a.** f = 7.0 MHz
b. λ = 29 m
c. [answer not given]
d. $I_0^- = 2.6e^{j0.75\pi}$ μA
e. load voltage is $0.90e^{-j1.41}$ mV or (equivalently) 0.90 $\angle$ −81° mV
f. total voltage at z = –20 m is $0.78e^{j2.72}$ mV or (equivalently) 0.78 $\angle$ 156° mV
g. phase shift is 123° or –237°

2. $V(-2) = 0.097 \angle 175°$ V
$V_{in} = V(-10) = 0.12 \angle -133°$ V
$V_L = V(0) = 0.12 \angle 47°$ V [time-domain functions not given]

3. [proof]

4. $\tilde{V} = 5e^{j2.75}e^{-0.0028x}e^{-j0.209x} = (5\angle 158°)e^{-0.0028x}e^{-j0.209x}$ V

5. $\tilde{V}_{in} = 39e^{j0.191} = 39\angle 11°$ mV rms; $\tilde{I}_L = 1.4e^{-j0.335} = 1.4\angle -19°$ mA rms