Arab Academy for Science & Technology and Maritime Transport – Cairo Branch
College of Engineering & technology
Electronics & Communication Engineering Department

EC443 EM Transmitting Media

Instructor:Prof.Esmat Abdel Fattah
Tutorial : Eng. Sherif Eldyasti

Problems Set #3

"Graphical Solution for Transmission Line Problems"

P3.1 A lossless line having an air dielectric has a characteristic impedance of 400 Ω. The line is operating at 200 MHz and Zin=200-j200 Ω. Use analytical methods & the Smith chart to find: (a) S, (b) ZL, if the line is 1 m long; (c) the distance from the load to the nearest voltage maximum.

P3.2 The normalized load on a lossless transmission line is 2+j1. the wavelength of the signal is 20 m . Let l=20 m and make use of the Smith chart to find: (a) the shortest distance from the load to a point at which Zin=rin+j0, where rin>1; (b) Zin at this point. (c) the line is cut at this point and the portion containing ZL is thrown away. A resistor r=rin of part (a) is connected across the line. What is the S on the remainder of the line? (d)what is the shortest distance from this resistor to appoint at which Zin=2+j1 ?

P3.3 A 300 Ω transmission line is short-circuited at z=0. A voltage maximum equals 10 v is found at z= -25 cm, and the minimum voltage equals zero at z=-50 cm. Use the Smith chart to find ZL(WITH THE SHORT CIRCUIT REPLACED BY THE LOAD) if the voltage readings are:

(a) Vmax=12 v at z= -5 cm, and Vmin=5 v.
(b) Vmax=17 v at z= -20 cm and Vmin=0 v.

Homework Assignment:

H3.1 The characteristic admittance (Yo=1/Zo) of a lossless transmission line is 20 mS. The line is terminated in a load YL=40-j20 mS. Make use of the Smith chart to find: (a) S. (b) Yin if l=0.15λ; (c) the distance in wavelengths from YL to the nearest voltage maximum.

H3.2 The wavelength on a certain lossless transmission line is 10 cm. If the normalized input impedance is Zin=1+j2, use the Smith chart to determine:

(a) S
(b) ZL if the line length is 12 cm.
(c) XL if ZL=2+Jxl where XL >0.

Good Luck☺