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EE214000 Nonlinear Optics, Fall 2012

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Oct. 16, 2012

EE214000 Electromagnetics, Fall
Homwork#2, due in class, Oct. 24, 2012
Total credit points = 90

Problem 1 (15 points) A load impedance 30+j10 Ohm is connected to a lossless transmission line of length 0.101λ and characteristic impedance 50 Ohm. Use a Smith Chart to find (1) the standing wave ratio, (2) the voltage reflection coefficient, (3) the input impedance, (4) the input admittance, (5) the location of the voltage minimum on the line. Mark your answers on a Smith Chart and give the numerical values on your answer sheet.

Problem 2 (10 points)
The shunt-stub method is used to match a load impedance $25 + j25$ Ohmto a 50 Ohm transmission line. Mark on a Smith Chart to find (1) the required length and position of a short-circuited stub made of a section of the same 50 Ohm line. (2) the required length and position of an open-circuited stub made of a section of the same 50 Ohm line.

Problem 3, (15 points) The standing-wave ratio on a lossless 300 Ohm transmission line terminated in a unknown load impedance is 2.0, and the nearest voltage minimum is at a distance 0.3λ from the load. Mark a Smith Chart to determine (a) the reflection coefficient Γ of the load (including the magnitude and phase), (b) the unknown load impedance Z_L. (c) the equivalent length and terminating resistance of a line, such that the input impedance is equal to Z_L.

Problem 4, (15 points) Prob. 2-14 in D. K. Cheng's textbook.

Problem 5 (10 points) Prob. 2-17 in D. K. Cheng's textbook.

Problem 6 (10 points) Prob. 2-21 in D. K. Cheng's textbook.

Problem 7 (5 points) Prob. 2-24 in D. K. Cheng's textbook.

Problem 8 (5 points) Prob. 2-29 in D. K. Cheng's textbook.

Problem 9 (5 points) Prob. 2-36 in D. K. Cheng's textbook.