

**Indian Institute of Technology, Delhi**  
**ELL112/EEL 202: Circuit Theory**  
**Practice problems, October 7, 2014**

Most problems are from backs of different books.

1. F. F. Kuo, Chapter 9: Problems 9.1, 9.2, 9.3, 9.6, 9.10, 9.14, 9.15, 9.16, 9.18.
2. Chua, Desoer, Kuh, Chapter 13: Problems 2, 3, 4 (a) to (g), 6, 8, 17.
3. F. F. Kuo, Chapter 14: Problems 14.1, 14.4 (a), (b), (e).
4. Transmission lines: Find the input impedance, when a transmission line is terminated with (a) an inductor, (b) a capacitor, (c) an impedance,  $R + jX$ . Show that the plot of  $\Gamma_{in}$  as a function of any of the variables ( $R$ ,  $X$ , capacitance value, inductance value) is a circle.
5. Transmission lines: Find the unit step response of a transmission line of length 1 m, characteristic impedance of  $50 \Omega$ , when the source impedance is  $25 \Omega$  and the load impedance is  $75 \Omega$ . (Speed of light is  $3 \times 10^8$  m/s).
6. Transmission lines: A transmission line of characteristic impedance  $Z_0$  is terminated with an impedance of  $Z_L$ , when the source impedance is  $Z_S$ . The velocity of the wave is  $c$ , length of the transmission line is  $l$ . The source is a sine wave of angular frequency  $\omega_0$ . Evaluate the amplitude of the voltage along the transmission line, at steady state, as a function of distance from the source. What is the ratio of the maximum voltage amplitude to the minimum voltage amplitude?