Ph.D. Preliminary Written Examination
Problem 8.

8. (a) A measurement system is affected by signals from AM stations of frequencies of 550 kHz and higher and needs to be screened. The screen enclosure for this measurement system is to be made of aluminum, conductivity 3.82×10^7 S/m. Disregard any reflections at the interfaces.
   i. Determine the thickness of the screen enclosure panels for a signal level reduction of at least 20 dB. (1 point)
   ii. Determine the attenuation of spurious 60 Hz signals through the screen enclosure panels. (1 point)

   (b) A vertical quarter-wave monopole antenna, 36.54+j7 Ω impedance, is used in a radio to receive a 100MHz signal.
   i. Design a matching circuit for this antenna to match it to the input impedance of 50 Ω of a low noise preamplifier. Use a circuit which includes an open circuit shunt stub. (1 point)
   ii. If the monopole is made slightly shorter, then its input impedance becomes real at 36.54 Ω. Design a quarter-wave transformer matching circuit to match this shortened antenna to the input impedance of 50Ω of a low noise preamplifier. (1 point)