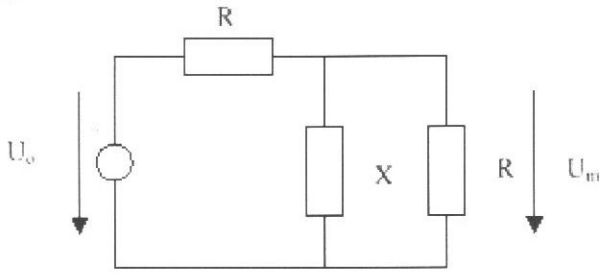
S-81.4100 EMC in Power Electronics **Exam 5.3.2012**

1. Give a short explanation to the following definitions: ESD, Peak detector, EUT, EFT/B, LISN

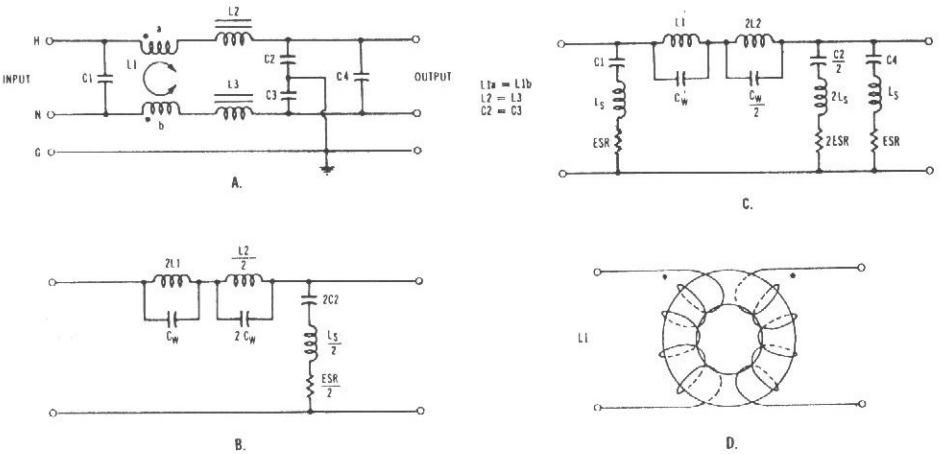
2. Consider the setup for measuring the insertion loss of a noise suppression element as shown in the figure below. The test item is a reactance X. The impedance of both signal generator and measuring equipment is $R = 50\ \Omega$.

a) Calculate the insertion loss as a function of frequency considering three following cases: X is an ideal capacitor $C = 10\ \mu F$, X is an ideal inductor $L = 1\ \mu H$, X is a real capacitor with $C = 10\ \mu F$ and a leakage inductance $L = 1\ \mu H$ in series. (3 points)

b) What is your observation based on the results? What is the best choice for noise suppression in this example? (2 points)



3. The figures below describe an EMI filter for conducted emission. Explain the circuit diagrams, equivalent circuits and layouts, what are they describing? What is the purpose of the various reactive and inductive components shown in the filter?



4. Power electronics as a source of electromagnetic interference. Describe phenomena in power electronics, which are causing the interference.