1. Calculate the Z, Y, ABCD and S matrices for the following structures, that operate at the frequency of 1.9 GHz and are fabricated on a thin membrane \((\varepsilon_r=\mu_r=1)\). Are these reciprocal and/or lossless? Give the general forms of the T- and π- equivalent circuits.
   (a) Series inductor \(L=1\text{nH}\)
   (b) Shunt capacitor \(C=10\text{pF}\)
   (c) T-configuration with series inductor \(L=1\text{ nH}\), shunt capacitor \(C=10\text{pF}\) and series resistor \(R=50\Omega\)
   (d) Similar to (c) with feeding input and output lines with lengths of 8mm
   (e) Shunt open-circuited stub with length of 5mm

2. Calculate the passband(s) of a filter consisting of an alternating configuration of two different lossless dielectric layers, one with \(\varepsilon_r=3, \mu_r=1\), thickness of \(l_1=3\text{cm}\) and another with \(\varepsilon_r=7, \mu_r=1\) and thickness of \(l_2=2\text{cm}\).