LE 325 Assignment #2

Please show all details leading to solutions.

1. Show that the driving-point impedance function for the network in Fig. 1 (a) is given by

$$Z(\omega) = -\frac{j}{\omega C_2}\frac{\omega^2 - 1/L_1C_1}{\omega^2 - \dfrac{C_1 + C_2}{L_1C_1C_2}}.$$

Then determine the values of C_0, C_p and L_p such that the network in Fig. 1 (b) has the same impedance function.

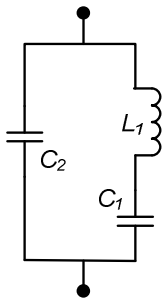

Fig. 1 (a)

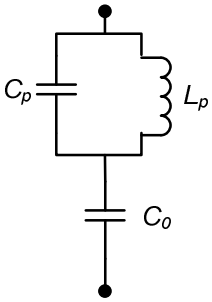

Fig. 1 (b)

2. Show that the driving-point admittance function for the network in Fig. 2 (a) is given by

$$Y(\omega) = -\frac{j}{\omega L_2}\frac{\omega^2 - 1/L_1C_1}{\omega^2 - \dfrac{L_1 + L_2}{C_1L_1L_2}}.$$

Then determine the values of L_0, L_s and C_s such that the network in Fig. 2 (b) has the same admittance function.

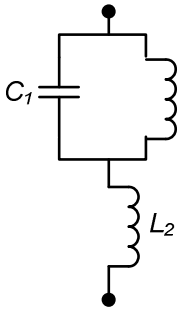

Fig. 2 (a)

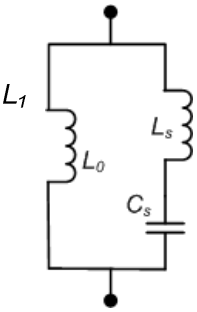

Fig. 2 (b)

3. Show that the voltage transfer function of the bridged-T network shown in Fig. 3 can be written as

$$G_{12} = \frac{V_2}{V_1} = \frac{Z_1Z_2 + Z_2'(Z_1 + Z_1' + Z_2)}{Z_1Z_2 + (Z_1 + Z_2')(Z_1' + Z_2)}.$$

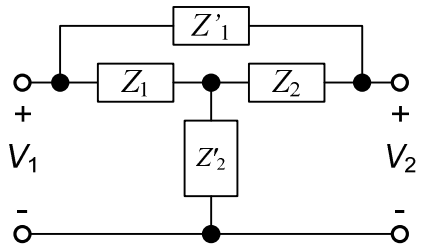

Fig. 3: a bridged-T network

Also find the driving-point impedance when port 2 is short-circuited.

4. Synthesize first and second Foster and Cauer forms of the LC driving-point impedance function

$$Z(s) = \frac{(s^2 + 1)(s^2 + 16)}{s(s^2 + 4)}.$$

5. Synthesize the following driving-point impedance function using first Foster and first Cauer forms.

$$Z(s) = \frac{2s^5 + 12s^3 + 16s}{s^4 + 4s^2 + 3}$$