(1)

Subject : microwave electronics

Level: 5

Mid-Term exam. Summer 2015

1-A ——— Model Answer ———

$$Z_i(z) = Z_0 \left(\frac{Z_L + jZ_0 \tan(\beta L)}{Z_0 + jZ_L \tan \beta L} \right) \Rightarrow$$

At S.C: $Z_L = 0$

At O.C $Z_L = \infty$

E- L Band 1-2 GHz — X Band 8-12 GHz

B- $\Gamma(0) = \frac{Z_L - Z_0}{Z_L + Z_0} = \frac{75-50}{75+50} = 0.2$

$$\Gamma\left(\frac{\lambda}{4}\right) = \Gamma_0 e^{-2\gamma L} = 0.2\, e^{-j2 \times \frac{2\pi}{4}} = 0.2\, e^{-j\pi} = -0.2$$

Question no 2:

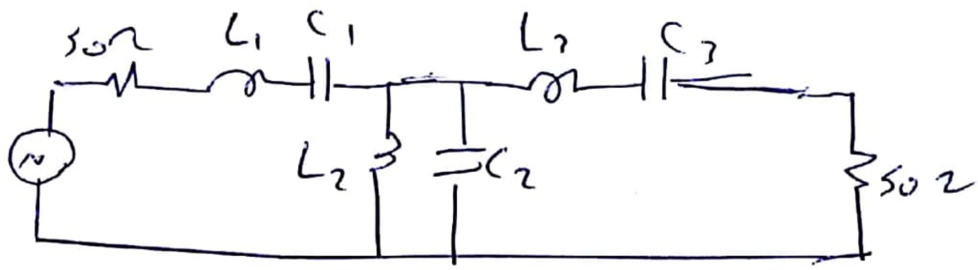
2-a The Process of Filter Design

1. Filter specification
2. Low-pass prototype design
3. Scaling and conversion
4. implementation

2-C

equal-ripple: sharp cutoff At stop Band

Q_2 - c   (Z)



$g_1 = 1.59$

$g_2 = 1.096$

$g_3 = 1.59$

$g_4 = 1$

$$L_1' = \frac{L_1 R_0}{w_0 \Delta} = 127.0 \, nH$$

$$C_1' = \frac{\Delta}{w_0 L_1 R_0} = 0.199 \, pF$$

$$L_2' = \frac{\Delta R_0}{w_0 C_2} = 0.725 \, nH$$

$$C_2' = \frac{C_2}{w_0 \Delta R_0} = 34.9 \, pF$$

$$L_3' = \frac{L_3 R_0}{w_0 \Delta} = 127.0 \, nH$$

$$C_3' = \frac{\Delta}{w_0 L_3 R_0} = 0.199 \, pF$$

Q3 :

$$\frac{w}{w_c} - 1 = \frac{4}{2.5} - 1 = 0.6$$

from the chart $N = 6$

From the table

$g_1 = 0.517 = C_1$

$g_2 = 1.414 = L_2$

$g_3 = 1.932 = C_3$

$g_4 = 1.932 = L_4$

$g_5 = ~~1.414~~ = C_5$

$g_6 = 0.517 = L_6$

Section	$Z_i = Z_L$ or Z_H	βl_i (deg)	l_i (mm)	
1	20	11.8	2.05	
2	120	0.428	6.63	
3	20	11.3	7.69	
4	120	0.428	9.05	
5	20	11.3	5.63	
6	120	0.428	2.41	