Tutorial 6 EE1100
Resonance

Problem 1

In the circuit shown, find the amplitude of the sinusoidal voltage across the capacitor when the circuit is at resonance condition.

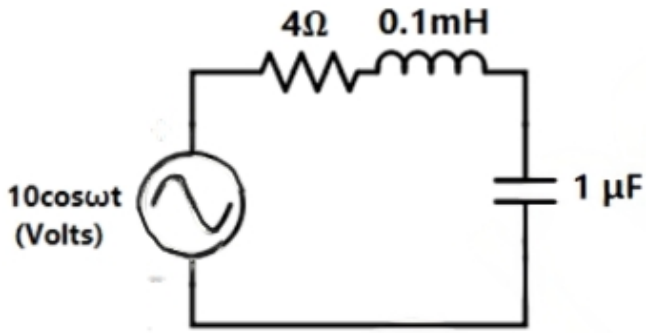

Figure 1: Circuit 1

Problem 2

For the given circuit 2, find the cut-off frequencies
Ans: $\Delta f1 = 1.256$ MHz; $\Delta f2 = 1.244$ MHz

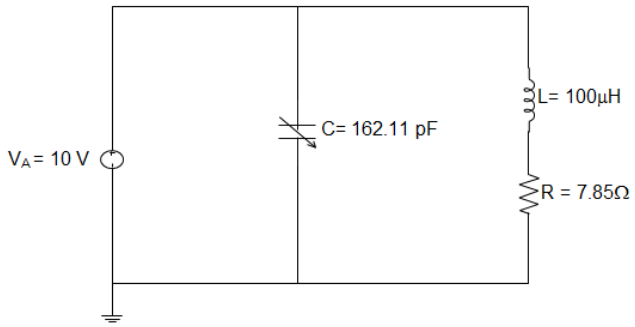

Figure 2: Circuit 2

Problem 3

For the network shown in figure 3, Find input impedance ($Z_{in}(j\omega)$) and the resonant frequency.

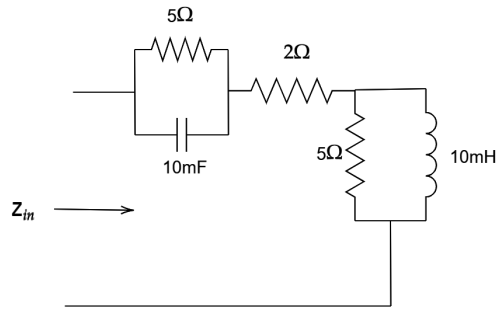

Figure 3: Circuit 3

Ans: $\omega = 100\ rad/sec$

Problem 4

Consider a parallel RLC circuit such that L = 2 mH, Q = 5, and C = 10 nF. Determine the value of R and the magnitude of the steady-state admittance at $0.1\omega_0$, ω_0, and $1.1\omega_0$, where ω_0 is the resonant frequency in rad/sec, and Q is the quality factor.
Ans: $|Y(0.9\omega_0)| = 6.504 * 10^{-4}S$, $|Y(\omega_0)| = 4.472 * 10^{-4}S$, $|Y(1.1\omega_0)| = 6.182 * 10^{-4}S$

Problem 5

A certain series resonant circuit has fo=500Hz, Qo=10 and XL= 500 ohm at resonance.
a). Find R, L, C
b). If a source Vs=1v is connected in series with the circuit, find —Vc— at f=450Hz.
Ans:- R=50ohm, L= 0.159H, C= 0.6372µF Vc=4.755V

Problem 6

The voltmeter in the circuit 4 is reading zero volts. Find the value of R_x and L_x.

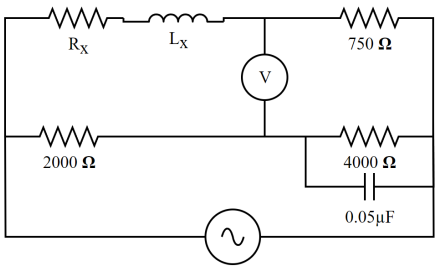

Figure 4: Circuit 4

Answer: 375 Ω, 75 μH