Tutorial 4

Q.1.

Compute Q_0 and ζ for a simple parallel *RLC* network if (*a*) $R = 1\ \text{k}\Omega$, $C = 10$ mF, and $L = 1$ H; (*b*) $R = 1\ \Omega$, $C = 10$ mF, and $L = 1$ H; (*c*) $R = 1\ \text{k}\Omega$, $C = 1$ F, and $L = 1$ H; (*d*) $R = 1\ \Omega$, $C = 1$ F, and $L = 1$ H.

Q.2.

The circuit of Fig. 16.1 is built using component values $L = 1$ mH and $C = 100\ \mu$F. If $Q_0 = 15$, determine the bandwidth and estimate the magnitude and angle of the input impedance for operation at (*a*) 3162 rad/s; (*b*) 3000 rad/s; (*c*) 3200 rad/s; (*d*) 2000 rad/s. (*e*) Verify your estimates using an exact expression for $\mathbf{Y}(j\omega)$.

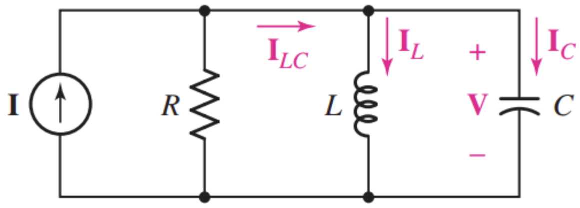

FIGURE 16.1

Q.3.

A series *RLC* circuit is constructed employing component values $R = 100\ \Omega$ and $L = 1.5$ mH along with a sinusoidal voltage source v_s. If $Q_0 = 7$, determine (*a*) the magnitude of the impedance at 500 Mrad/s; (*b*) the current which flows in response to a voltage $v_s = 2.5\cos(425 \times 10^6 t)$ V.

Q.4.

After deriving $\mathbf{Z}_{\text{in}}(\mathbf{s})$ in Fig. 16.54, find (*a*) ω_0; (*b*) Q_0.

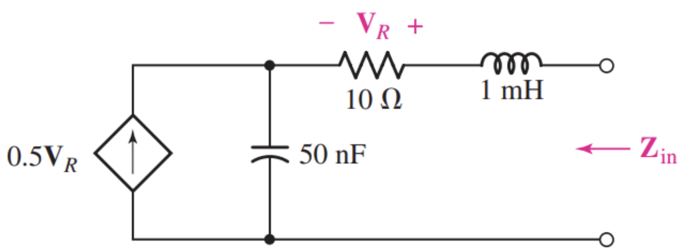

FIGURE 16.54

Q.5.

For the network represented in Fig. 16.55, determine the resonant frequency and the corresponding value of $|\mathbf{Z}_{\text{in}}|$.

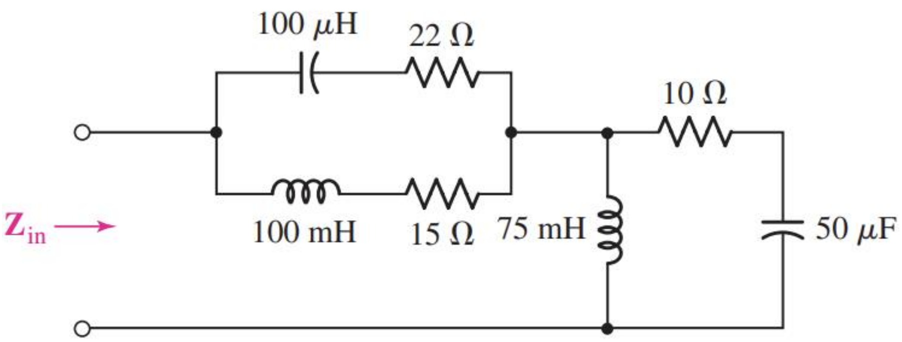

FIGURE 16.55