1. A series resonant circuit has R = 100 Ω, L = 10mH and C = 0.01μF. Determine ω_o, Q factor and bandwidth,BW. ***[1 Mrad/s, 10, 100 krad/s]***

2. A series resonant circuit has L = 1 mH and C = 10 μF. Find the required Q and R when it is desired that the bandwidth be 15.9 Hz. ***[100, 0.1 Ω]***

3. A series resonant circuit has an inductor, L = 10 mH.
   (a) select C and R so that $\omega_o = 10^6$ rad/s and the BW = 10^3 rad/s. ***[100 pF, 10 Ω]***

   (b) find the admittance, Y of the circuit for a signal at $\omega = 1.05 \times 10^6$ rad/s. ***[(1 /(10 + j97.6)]S***

4. Design a series resonant circuit to have ω_o = 2500 rad/s, $Y(\omega_o)$ = 1/100 and bandwidth, BW = 500 rad/s. ***[100 Ω, 0.2 H, 0.8 μ F]***

5. Design a series RLC circuit that is to be excited with a voltage source, v(t) = 10 cos (ωt) volt and that meets the following specifications:
   (i) At 1.45 MHz, the magnitude of the voltage across the resistor is to be 10 V and the magnitude of the current through the resistor is to be 40 mA.
   (ii) At 1.35 MHz and at 1.55 MHz, the magnitude of the voltage across the resistor is to be 7.07 V.
   [250 Ω, 0.2 mH, 60 pF]

6. Given an 8 Ω resistor is connected in series with and inductor, L a capacitor, C and a variable frequency, sinusoidal voltage source, $v_S(t)$. The voltage source can be modeled as an ideal voltage source whose amplitude is a constant 3 V at the frequency is varied from d,c, to 10^9 Hz that is in series with a 12 Ω resistor and a 3 mH inductor. The resonant frequency of the circuit without the source connected is 10^4 Hz and the Q factor is 17.
   Find the resonant frequency and the Q factor of the circuit with the source connected. ***[6.477 kHz, 10.5]***

7. For the RLC parallel resonant circuit when R = 10 kΩ, L = (1/120)H and C = (1/30) μF. Find ω_o, Q factor, cutoff frequency and the bandwidth.
   [60 krad/s, 20, 58.52 krad/s, 61.5 krad/s, 3 krad/s]

8. Given the circuit shown in Figure Q8.
   (a) find the maximum value of $i_R(t)$ at resonance. ***[5 sin $\omega_o(t)$] mA***
   (b) when $i_R(t)$ is at ats maximum, find $i_L(t)$. ***[2.887 sin (5774t - 90°] A***

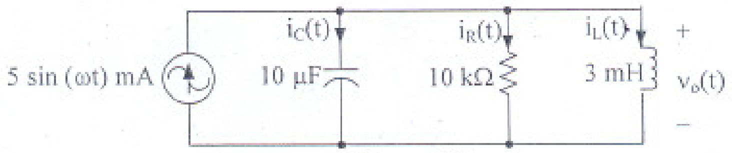

Figure Q8

9. For the circuit shown in Figure Q9;
   (a) find the maximum value for $v_o(t)$. *[4 sin (8165t + 50°) V]*
   (b) find the bandwidth of the circuit as shown. *[250 rad/s]*
   (c) find the Q factor of the circuit as shown. *[32.66]*

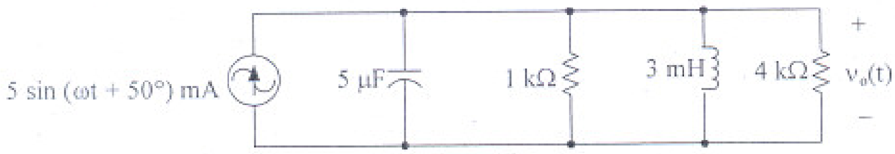

Figure Q9

10. A high-frequency RLC parallel resonant circuit is required to operate at ω_o = 10 Mrad/s with a bandwidth of 200 krad/s. Determine the required Q factor and L when C = 10 pF. *[50, 1 mH]*

11. A parallel resonant RLC circuit is driven by a current source $i_o = 20 \cos \omega t$ mA and shows a maximum response of 8 V at ω = 1 krad/s and 4 V at 897.6 rad/s. Find R, L and C. *[400 Ω, 50 mH, 20 μF]*

12. Design a parallel resonant circuit that has R = 4 kΩ, Q = 14 and ω_o = 14.13 krad/s. *[20 mH, 0.25 μF]*

13. Design a parallel resonant circuit to have ω_o = 2500 rad/s, $Z(\omega_o)$ = 100 Ω and BW = 500 rad/s. *[100 Ω, 8 mH, 20 μF]*

14. Consider the circuit in Figure Q14. Select C to obtain a purely resistive at ω = 5000 rad/s. *[20 μF]*

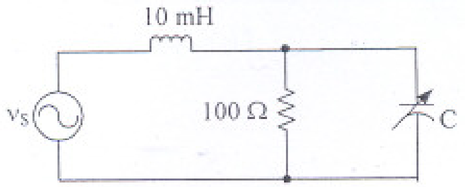

Figure Q14

15. Consider the circuit in Figure Q15. Show that the resonant frequency, f_o

$$f_o = \frac{1}{2\pi}\sqrt{\frac{1}{LC} - \frac{R^2}{L^2}}$$

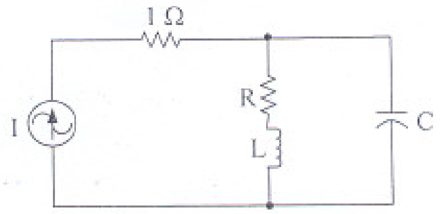

Figure Q15

16. Consider the circuit in Figure Q16.

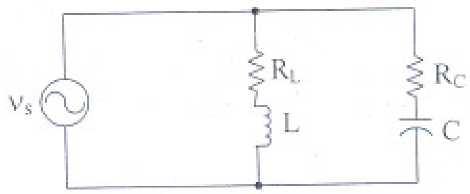

Figure Q16

(a) Show that the resonant frequency, f_o

$$f_o = \frac{1}{2\pi\sqrt{LC}}\sqrt{\frac{R_L^{\ 2} - (L/C)}{R_C^{\ 2} - (L/C)}}$$

(b) if $R_L = 6\ \Omega$, $L = 1$ mH, $R_C = 4\ \Omega$ and $C = 20\ \mu F$, find the value of resonant frequency, f_o. ***[722.15 Hz]***

17. The circuit shown in Figure Q17 represents a capacitor, coil and resistor in parallel. Calculate the resonant frequency, Q factor and bandwidth for the circuit. ***[251.14 kHz, 14.02, 17.83 kHz]***

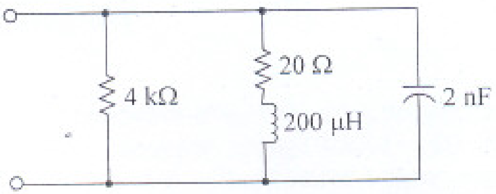

Figure Q17