Benha University
Faculty of Engineering
Shoubra

Electrical Circuits (2)

Electrical Eng. Dept.
1st year communication
8-10 March 2015

Sheet (4)... Parallel Resonance

1. Consider the circuit shown in Figure 1.

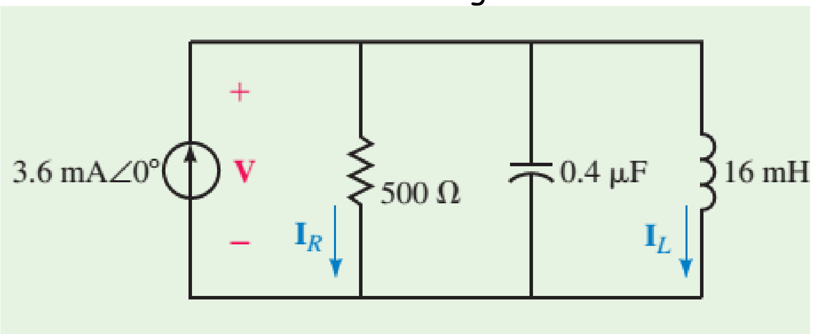

Fig. 1

a. Determine the resonant frequencies, ω_P(rad/s) and f_P(Hz) of the tank circuit.
b. Find the Q of the circuit at resonance.
c. Calculate the voltage across the circuit at resonance.
d. Solve for currents through the inductor and the resistor at resonance.
e. Determine the bandwidth of the circuit in both radians per second and hertz.
f. Sketch the voltage response of the circuit, showing the voltage at the half-power frequencies.
g. Sketch the selectivity curve of the circuit showing P(watts) versus ω(rad/s).

2. Consider the circuit of Figure 2.

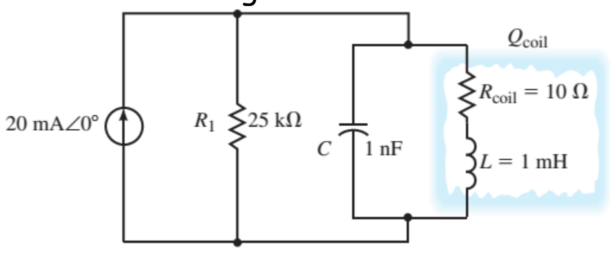

Fig. 2

a. Calculate the resonant frequency, ω_P, of the tank circuit.
b. Find the Q of the coil at resonance.
c. Sketch the equivalent parallel circuit.
d. Determine the Q of the entire circuit at resonance.
e. Solve for the voltage across the capacitor at resonance.

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3. Determine the values of R1and C for the resonant tank circuit of Figure 3 so that the given conditions are met.
   L=10 mH, Rcoil=30Ω, fP=58 kHz, BW =1 kHz
   Solve for the current, IL, through the inductor.

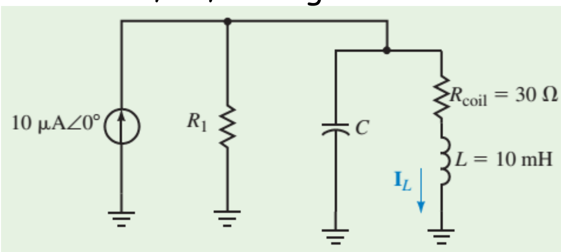

Fig. 3

4. Let V_s= 20 cos(at) V in the circuit of Fig. 4. Find ω_o, Q, and B, as seen by the capacitor.

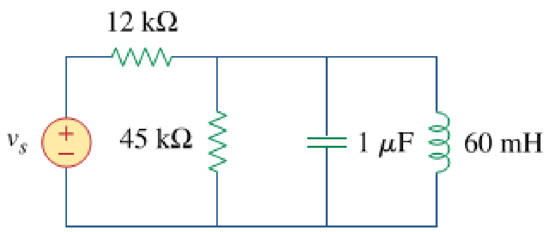

Fig. 4

5. Design a parallel resonant RLC circuit with ωo= 10rad/s and Q = 20. Calculate the bandwidth of the circuit. Let R= 10Ω.

6. It is expected that a parallel RLC resonant circuit has a mid-band admittance of 25 $\times 10^{-3}$S, quality factor of 80, and a resonant frequency of 200 krad/s. Calculate the values of R, L, and C. Find the bandwidth and the half-power frequencies.

7. For the "tank" circuit in Fig. 5, find the resonant frequency.

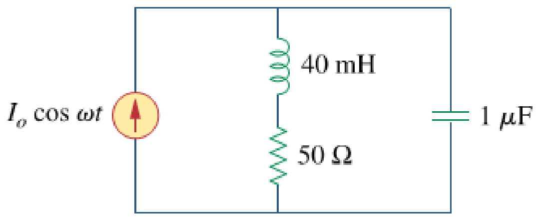

Fig. 5

Good Luck

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