



**Faculty of Engineering and Technology  
Electrical and Computer Engineering  
Department**

**ENEE2102  
CIRCUITS LAB**

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**Pre lab exp#9**

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Q1)

**Circuit 9.12:**  $W_c = \frac{1}{C*(Rl/Rs)}$

→  $\frac{1}{0.1*10^{-6}*5K} = 2000 \text{ rad/s.}$

**Circuit 9.13:**  $W_c = \frac{1}{c*(Rl+Rs)}$

→  $\frac{1}{0.1*10^{-6}*(10+10K)} = 500 \text{ rad/s}$

**Circuit 9.14:**  $W_c^2 = \frac{2}{L*C}$

→  $\frac{2}{1*0.1*10^{-6}} = 4472.1 \text{ rad/s}$

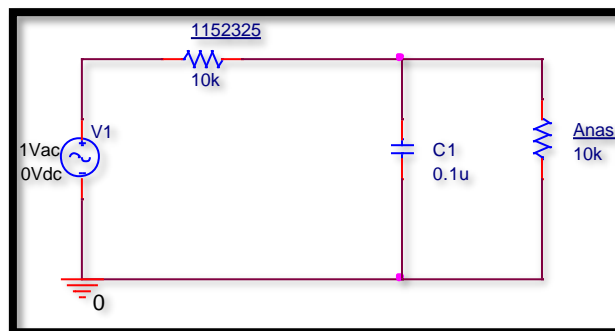
**Circuit 9.15:**  $W_c^2 = \frac{1}{2*L*C}$

→  $\frac{1}{2*1*0.1*10^{-6}} = 2236.06 \text{ rad/s}$

Q2)

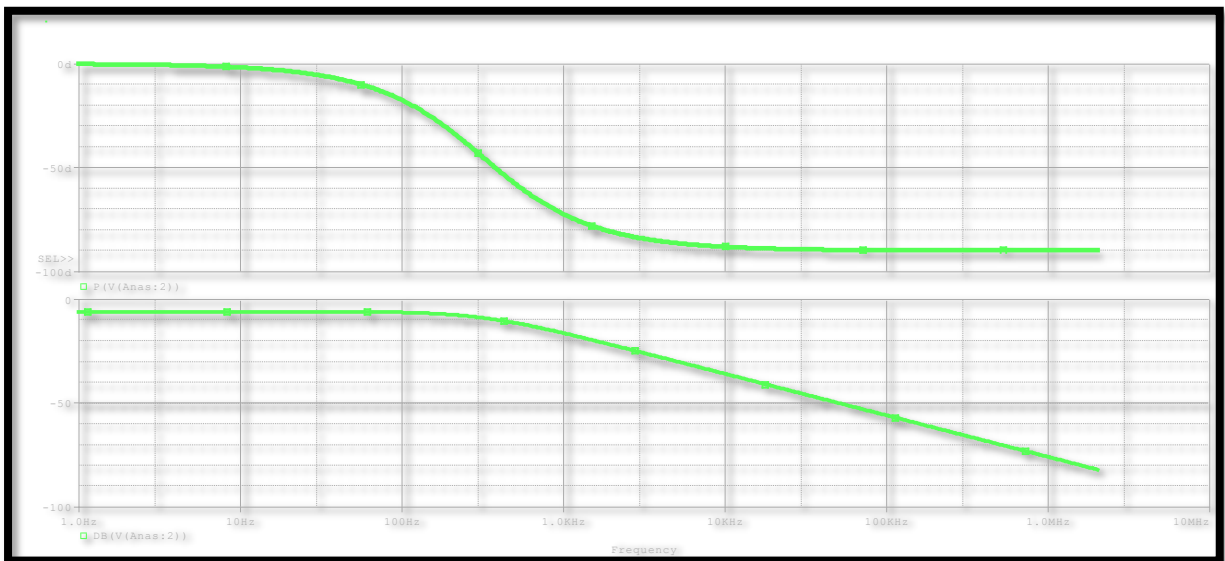
- **First order low pass filter**

**The circuit diagram::**



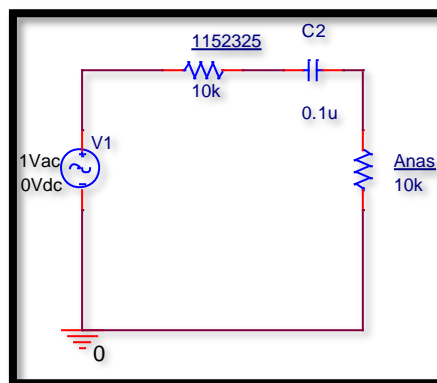
**circuit 9.12**

**The result:**



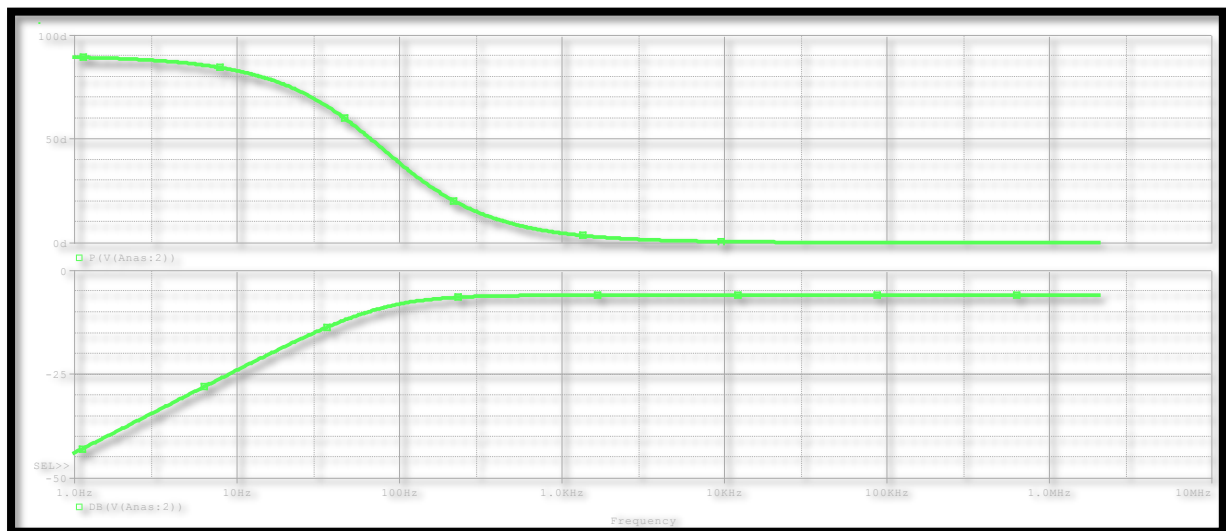
- **First order high pass filter:**

**Circuit diagram:**



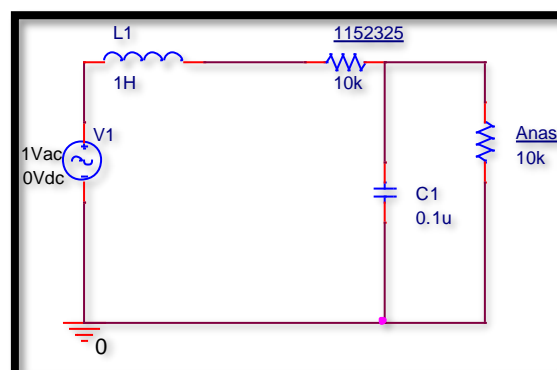
**Circuit 9.13**

**The result:**



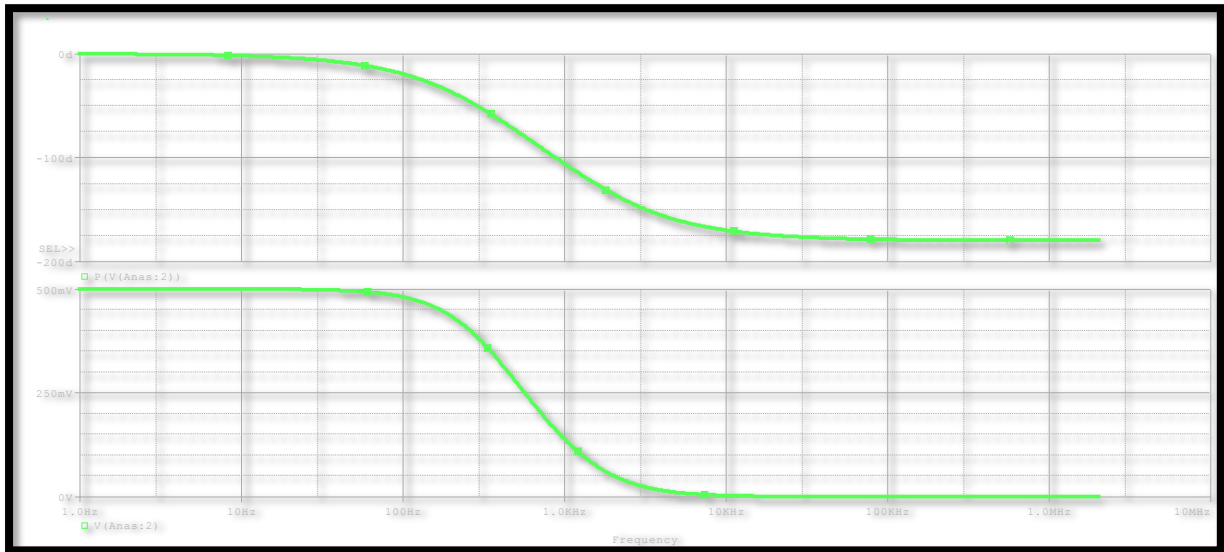
- **Second order low pass filter:**

**Circuit diagram:**



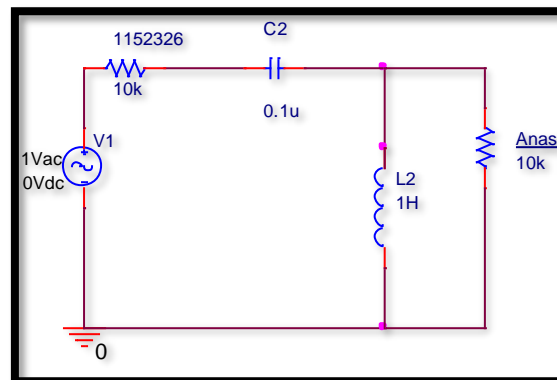
The result:

circuit 9.14



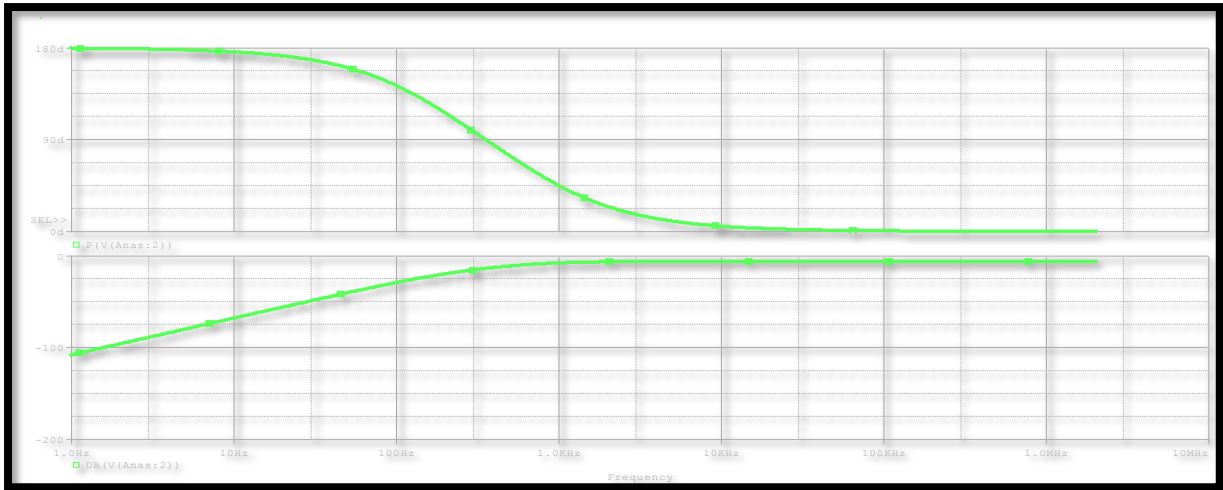
- Second order high pass filter:

Circuit diagram:



The result:

circuit 9.15



**Q5)**

**Circuit 9.16 for R=10K:  $\omega_0 = \frac{1}{\sqrt{L \cdot C}}$**

$$\rightarrow \frac{1}{\sqrt{100 \cdot 10^{-3} \cdot 10 \cdot 10^{-9}}} = 31622.7 \text{ rad/s}$$

$$\omega_{c,1,2} = \sqrt{\left(\frac{R}{2 \cdot L}\right)^2 + \frac{1}{L \cdot C}} \pm \frac{R}{2 \cdot L}$$

$$\rightarrow 32.015 \mp 5000 \text{ Krad/s}$$

**For R=5.6K**

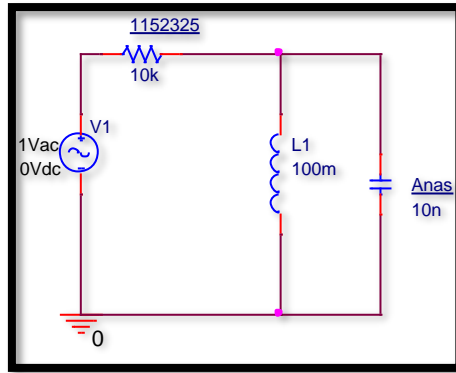
$$\omega_0 = 31622.7 \text{ rad/s}$$

$$\omega_{c,1,2} = 32.856 \pm 8.928 \text{ K rad/s.}$$

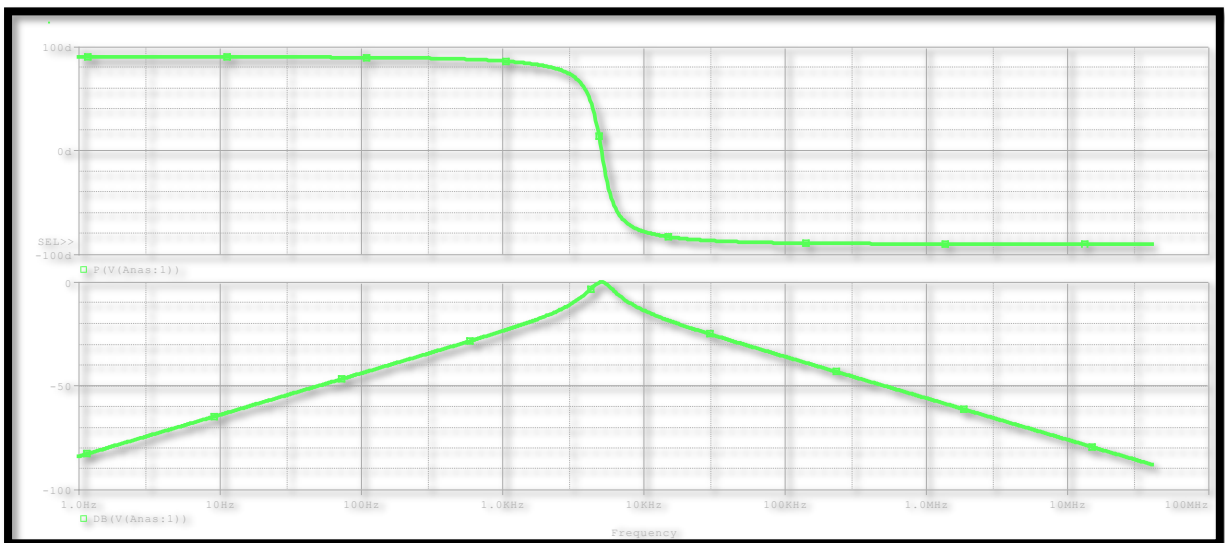
**Q6) Band pass filter:**

**For R=10K:**

**Circuit diagram:**

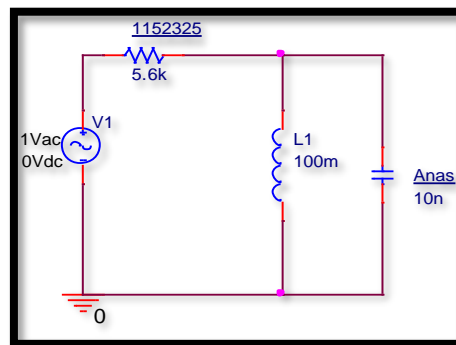


**The result:**

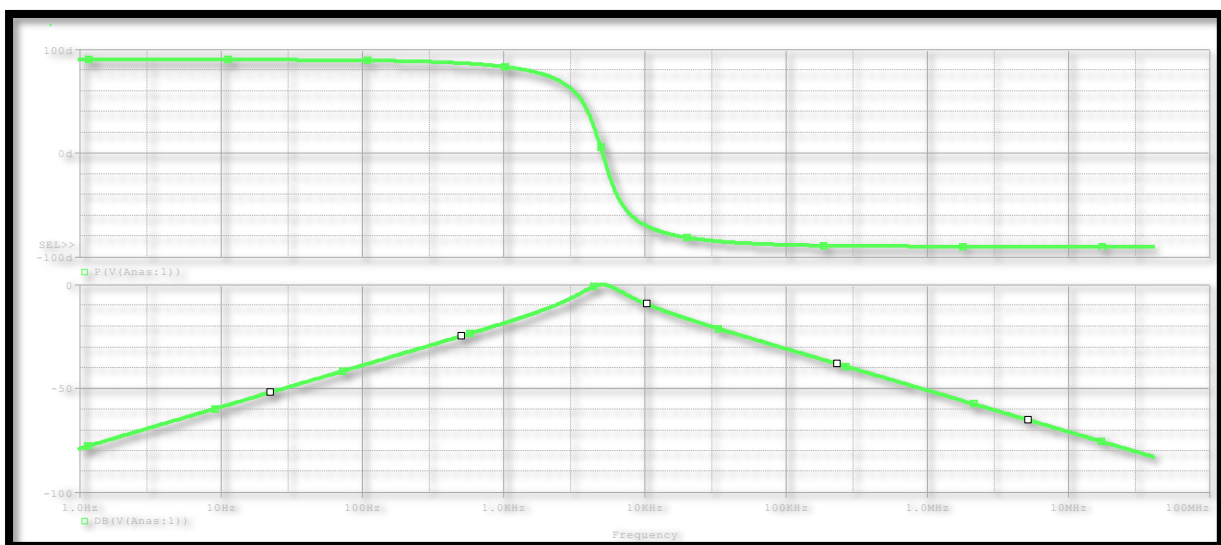


**For R=5.6K:**

### Circuit diagram:



### The result:



### Q7)

#### Circuit 9.17:

✓ For R=820

$$W_0 = \frac{1}{\sqrt{L \cdot C}}$$

$$\rightarrow W_0 = 28.867 \text{K rad/s}$$

$$W_{c1} = \frac{R}{2 \cdot L} + \sqrt{\left(\frac{R}{2 \cdot L}\right)^2 + \frac{1}{L \cdot C}} \rightarrow 32.484 \text{K rad/s}$$

$$W_{c2} = \frac{R}{2 \cdot L} - \sqrt{\left(\frac{R}{2 \cdot L}\right)^2 + \frac{1}{L \cdot C}} \rightarrow 25.625 \text{K rad/s}$$

✓ For R=2.2K

$$W_0 = 28.867 \text{K rad/s}$$



$\omega_{c1} = 39.453\text{K rad/s}$

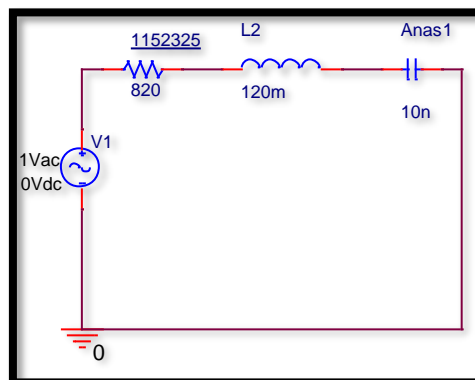
$\omega_{c2} = 21.121\text{K rad/s}$

Q8)

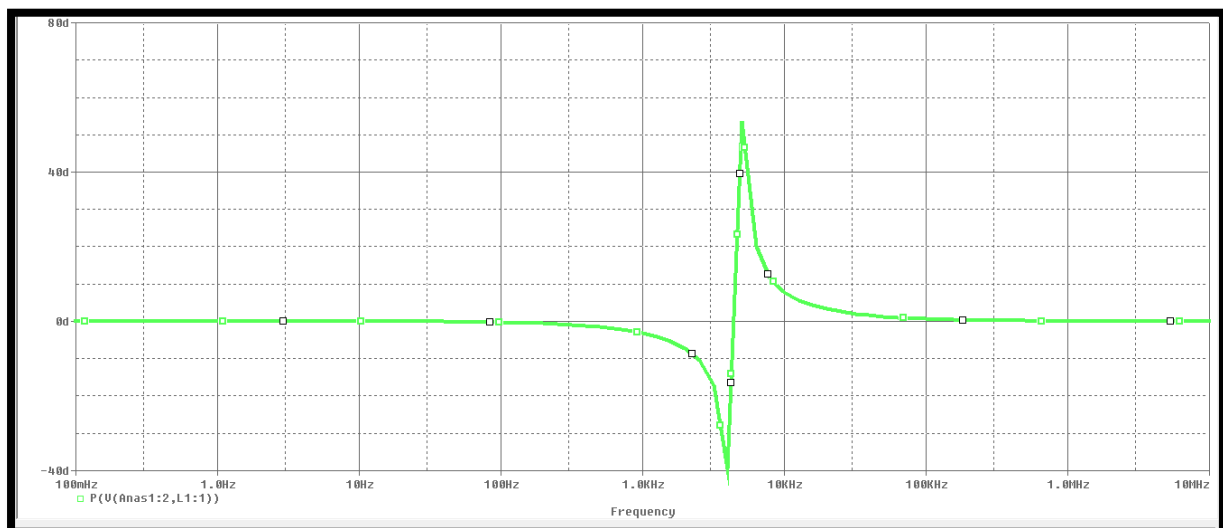
Band reject filter:

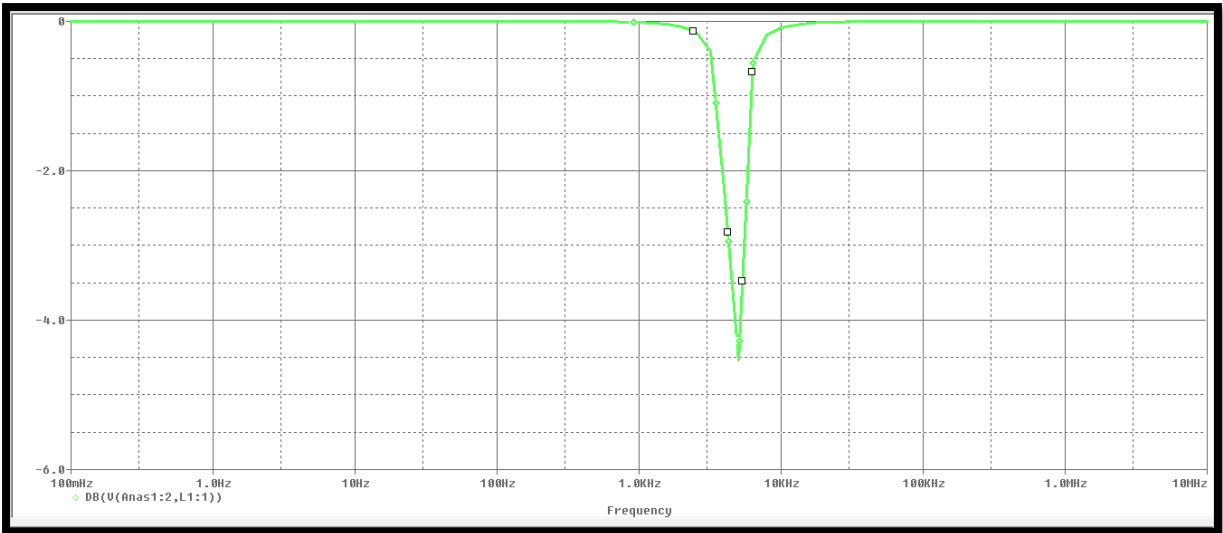
For  $R=820$ :

Circuit diagram:



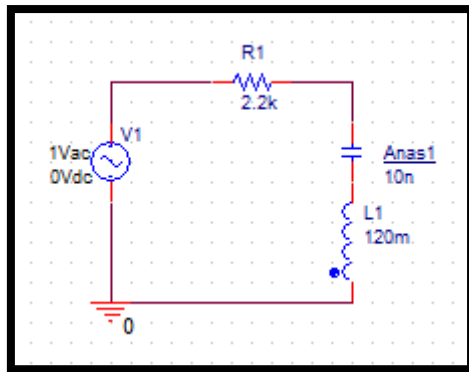
The result:





For R=2.2K

Circuit diagram:



The result:

