DAY-5

• Series Resonance Circuit:

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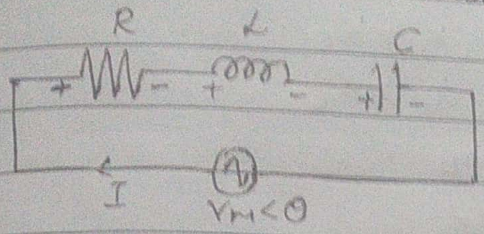


Resonance occurs in a series circuit when the supply frequency causes the voltages across L and C to be equal and opposite in phase. Thus far we have analysed the behaviour of a series RLC circuit whose source voltage is a fixed frequency steady state sinusoidal supply. we have also seen in our tutorial about series RLC circuit that two or more sinusoidal signals can be combined using phasor providing that they have the same frequeny supply. But what would happen to the character-istics of the circuit if a supply voltage of fixed amplitude but of different frequencies was applied to the circuit. Also what would the circuits "frequency response" behaviour be upon the two reactive components due to this varying frequency.

In a series RLC circuit there becomes a frequency point were the inductive reactance of the inductor becomes equal in value to the capacitive reactive of the capacitor. In other words $X_L = X_C$. The point at which this occurs is called the Resonant Frequency point. (f_r) of the circuit.

$X_L = 2\pi f L = \omega L$

$X_C = 1/2\pi f C = 1/\omega C$ $\quad X_L > X_C$

$X_C > X_L$

$X_T = X_L - X_C \quad X_C - X_L$

$Z = \sqrt{R^2 + X_T^2} = R + jX$

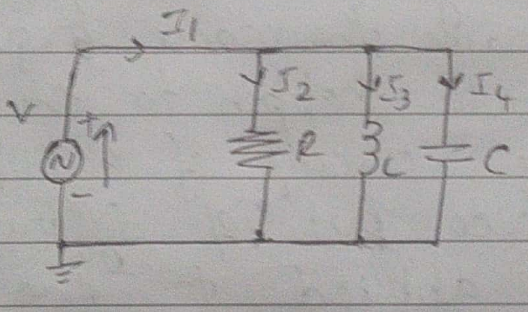
$X_L = X_C \Rightarrow 2\pi f L = 1/2\pi f C$

$$f^2 = \frac{1}{2\pi L \times 2\pi C} = \frac{1}{4\pi^2 LC}$$

$$f = \sqrt{\frac{1}{4\pi^2 LC}}$$

$$\therefore f_r = \frac{1}{2\pi\sqrt{LC}} \text{ (Hz) (or) } \omega_r = \frac{1}{\sqrt{LC}} \text{ (rad/s)}$$

- Parallel RLC Circuit:



The parallel RLC circuit is the exact opposite to the series circuit we looked at same in series.

In the above parallel RLC circuit we can see that the supply voltage, V_s is common to all 3 components whilst the supply current I_s consists of 3 parts. The current flowing through the resistor I_R, the current flowing through the inductor, I_L and the current through the capacitor I_C.

But the current flowing through each branch and therefore each component will be different to each other and also to the supply current, I_S. The total current drawn from the supply.

$$I_S^2 = I_R^2 + (I_L - I_C)^2$$

$$I_S = \sqrt{I_R^2 + (I_L - I_C)^2}$$

$$\therefore I_S = \sqrt{\left(\frac{V}{R}\right)^2 + \left(\frac{V}{X_L} - \frac{V}{X_C}\right)^2} = V/Z.$$

$$I_R = V/R \quad , I_L = V/X_L \, , \quad I_C = V/X_C.$$

$$KCL = I_S - I_R - I_L - I_C = 0.$$

$$I_S - V/R - 1/L \int v\,dt - C\frac{dv}{dt} = 0.$$

Since the voltage across the circuit is common to all three circuit elements, the current through each branch can be found using Kirchoff's Current Law, (KCL) "The total current entering the junction or node is exactly equal to the current leaving the node". Thus the currents entering and leaving the node.

Taking the derivative, dividing through the above equation by C and then re-arranging gives us the following second-order equation for the circuit. It becomes a second order equation because there are two reactive elements in the circuit. Since the voltage is common to all three circuit elements, the current through each branch can be found using KCL.

• RL-RC circuits.

Consider a resistor (with resistance R) in series of a capacitor (with capacitance C), together connected to a voltage source (with voltage output V), as desired in fig 1. If the voltage source is switched on at time t=0, a time dependent current i(t) will start to flow in the circuit, through the resistor R. The current is also known as the "charging current" for the capacitor, as it "flow into" the capacitor, to develop a time development voltage drop V_C across the capacitor.

$$V = V_C(t) + i(t) \times R$$

At the begining (t=0, immediately after the voltage supply is switched on with o/p V), the capacitor has not had the chance to develop any voltage, and therefore $V_C(t=0)=0$, $i(t=0) = V/R$. As time proceeds, charges build up on the capacitor and V_C will increases, and thus i(t) will decreases.

Furthermore, the full, quarandiative time-dependent current i(t) can be solved by

$$i(t) = (V/R)\exp(-t/RC)$$

where $\tau = RC$ is known as the "RC time constant" for the RC circuit and characteristics in general the time scale for the response of the RC circuit upon a transient change in an input.

Python: Application 11:

Project Exercise on Building a Geocoder web server.

→ Data collector web App - How the O/P will look like.

→ Student project - How the O/P should look like.

Here we are going build it independently. In form of project.

→ It is flask application which ask the user atleast a column called Address.

→ Once the user upload the file and submit the table would shows up this is because as the user upload the file the backend of the python will read that file and it will add latitude and longitude column which are calculated O/T of the column.

→ Geocoding - Pandas, and we can add other file.

→ Here we would build geocoding app.
There are four directories
static, templates, uploads, virtual etc.

→ If there is address column in a file. there try to read the file.

→ We use version 3, then we will learn difference b/w version 4.

→ GeoCoding - we have a file, CSD file that's a string, which submit the data. there may We have data clashes so we have different names for it.