***For RL and RC Series Circuit*:**

For RL Series Circuit
$V= \sqrt{V_{R}^{2}+V_{L}^{2}}$
$V=I \sqrt{R^{2}+X_{L}^{2}}$
For RC Series Circuit
$V= \sqrt{V_{R}^{2}+V_{C}^{2}}$
$V=I \sqrt{R^{2}+X_{C}^{2}}$

V= rms value of the applied voltage
I= rms value of the circuit current
V_R= Voltage across resistance
V_L= Voltage across inductance
V_C= Voltage across capacitance
R= Resistance
X_L= Inductive Reactance
X_C= Capacitive Reactance

For RL:
$Z= \sqrt{R^{2}+X_{L}^{2}}$
For RC :
$Z= \sqrt{R^{2}+X_{C}^{2}}$

Z= Impedance
R= Resistance
X_L= Inductive Reactance
X_C= Capacitive Reactance

For RL:
$\tan{\phi}=\frac{V_L}{V_R}\ =\frac{X_L}{R}$
For RC:
$\tan{\phi}=\frac{V_C}{V_R}\ =\frac{X_C}{R}$

Circuit current I lags behind the applied voltage V by ϕ°

***For RLC Series Circuit*:**

$V = \sqrt{V_R^2 + (V_L – V_C)^2}$

$V = I\sqrt{R^2 + (X_L – X_C)^2}$

When $X_L > X_C$

V= rms value of the applied voltage
I= rms value of the circuit current
V_R= Voltage across resistance
V_L= Voltage across inductance
V_C= Voltage across capacitance
R= Resistance
X_L= Inductive Reactance
X_C= Capacitive Reactance

$Z =\sqrt{R^2 + (X_L – X_C)^2}$

When $X_L > X_C$

Z= Impedance
R= Resistance
X_L= Inductive Reactance
X_C= Capacitive Reactance

$\cos \phi = \frac{R}{Z}$

$\cos \phi$ = Power Factor
Z= Impedance
R= Resistance

$\tan \phi = \frac{V_L - V_C}{V_R} = \frac{X_L - X_C}{R}$

ϕ = Angle between supplied voltage and circuit current, Here, $X_L > X_C$

For Series Resonance:

$f_r = \frac{1}{2\pi\sqrt{LC}}$

$\omega_r = \frac{1}{\sqrt{LC}}$

f_r = Resonance frequency
L= Inductance
C= Capacitance

Q-factor = $\frac{V_L}{V}=\frac{V_C}{V}=\frac{X_L}{R}=\frac{X_C}{R}$

Q-factor = $\frac{1}{R}\sqrt{\frac{L}{C}}$

Q-factor = Quality factor
L= Inductance
C= Capacitance
R= Resistsnce

Bandwidth = $f_2 - f_1$

f_2 = Upper cut-off frequency
f_1 = Lower cut-off frequency

Bandwidth = $\frac{f_r}{Q}$

f_r = Resonance frequency
Q-factor = Quality factor

$f_r = \sqrt{f_1 f_2}$

f_r = Resonance frequency
f_2 = Upper cut-off frequency
f_1 = Lower cut-off frequency