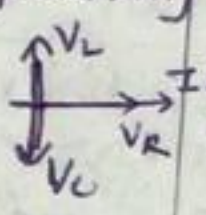
$X_L = \omega L = (2\pi f) L$ | $X_C = \frac{1}{\omega C} = \frac{1}{(2\pi f) C}$

comp	$\Delta\phi$	Resistance	Ohm's law
Pure R	$0°$ (समांग)	R	$V = IR$
Pure L	$+\pi/2$ e→aage	$X_L = \omega L$	$V = X_L I$
Pure C	$-\pi/2$ e-Piche	$X_C = \frac{1}{\omega C}$	$V = I X_C$

Kuch nhi diya hai to RMS manege
- Peak voltage of 100V $[V_0 = 100V]$
- Reading of ammeter [Irms puchah]

⑦ LCR Circuit

$$V = \sqrt{V_R^2 + (V_L - V_C)^2}$$



$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

→ impedence (Ω)

★ Phase difference b/w voltage and current.

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

LCR series	R-L circuit	RC circuit
$V = \sqrt{V_R^2 + (V_L - V_C)^2}$	$V = \sqrt{V_R^2 + V_L^2}$	$V = \sqrt{V_R^2 + V_C^2}$
$Z = \sqrt{R^2 + (X_L - X_C)^2}$	$Z = \sqrt{R^2 + X_L^2}$	$Z = \sqrt{R^2 + X_C^2}$
$\tan\phi = \frac{X_L - X_C}{R}$	$\tan\phi = \frac{X_L}{R}$	$\tan\phi = \frac{X_C}{R}$

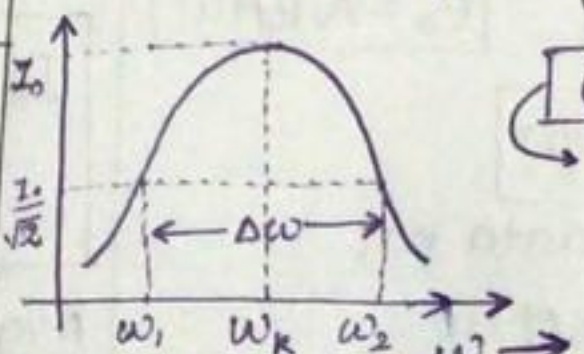
⑧ Resonance

- $X_L = X_C$
- $V_L = V_C$
- $\omega_0 = \frac{1}{\sqrt{LC}}$
- I → Maximum
- Z → Minimum
- Phase diff b/w V and I = 0°
- $Z_{min} = R$
- Behave as a pure R circuit.
- tuning sawal resonance ka hai

$f \rightarrow$ hz / cycle/s

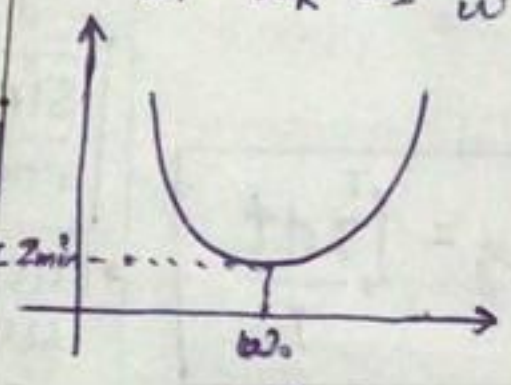
$\omega \rightarrow$ rad/s

External frequency matches with natural frequency.



ω_1 and ω_2 → Half power frequency

$\Delta\omega \rightarrow$ Band width



$$I_0 = \frac{V_0}{\sqrt{R^2 + (X_L - X_C)^2}}$$

→ curve jitha sharp hoga uski ~~selection~~ selectivity utni badiya

⑨ Q-factor

$$Q = \frac{\omega_0 L}{R} \qquad Q = \frac{\omega_0}{\Delta\omega}$$

→ achi tuning ke liye Q factor ↑

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

Q↑ → R↓ C↓ L↑

⑩ Power Calculation

$$P_{inst} = eI \qquad P_{avg} = \frac{e_0}{\sqrt{2}} \times \frac{I_0}{\sqrt{2}} \cos\phi$$

$$P_{avg} = e_{RMS} I_{RMS} \cos\phi \qquad \cos\phi = \frac{V_R}{V}$$

$$\cos\phi = \frac{R}{Z} \qquad P = i_{RMS}^2 R$$

$$P_{avg} = e_{RMS}^2 \frac{R}{R^2 + \left(\omega L - \frac{1}{\omega C}\right)^2}$$

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