

CLASS 12

PHYSICS

REVISION NOTES

Class 12 Physics Chapter 7 Alternating Current – Revision Notes

Alternating current brings resistors, inductors, and capacitors together under a sinusoidal voltage, and this Class 12 Physics Chapter 7 summary traces that idea through rms values, reactance, resonance, and the Q-factor.

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RMS and Peak Values

For a sinusoidal signal of peak value A_0 : $A_{\text{rms}} = A_0/\sqrt{2} \approx 0.707A_0$.

AC Through R, L, and C

Resistor: voltage and current in phase; $X_R = R$.

Inductor: current lags voltage by 90° ; reactance $X_L = 2\pi fL = \omega L$.

Capacitor: current leads voltage by 90° ; reactance $X_C = 1/(2\pi fC) = 1/(\omega C)$.

Average power over a cycle is zero for a pure L or pure C circuit (current and voltage 90° out of phase).

Series LCR Circuit and Resonance

Impedance $Z = \sqrt{R^2 + (X_L - X_C)^2}$; power factor $\cos\phi = R/Z$.

Resonance occurs when $X_L = X_C$, at $\omega_r = 1/\sqrt{LC}$; impedance is then minimum ($Z = R$) and current is maximum.

Q-factor $Q = (1/R)\sqrt{L/C}$ measures the sharpness of resonance — a higher Q means a narrower, sharper resonance peak.

Average Power in AC Circuits

$P_{\text{avg}} = V_{\text{rms}} I_{\text{rms}} \cos\phi$; maximum ($= V_{\text{rms}} I_{\text{rms}}$) at resonance, where $\cos\phi = 1$.

LC Oscillations and Transformers

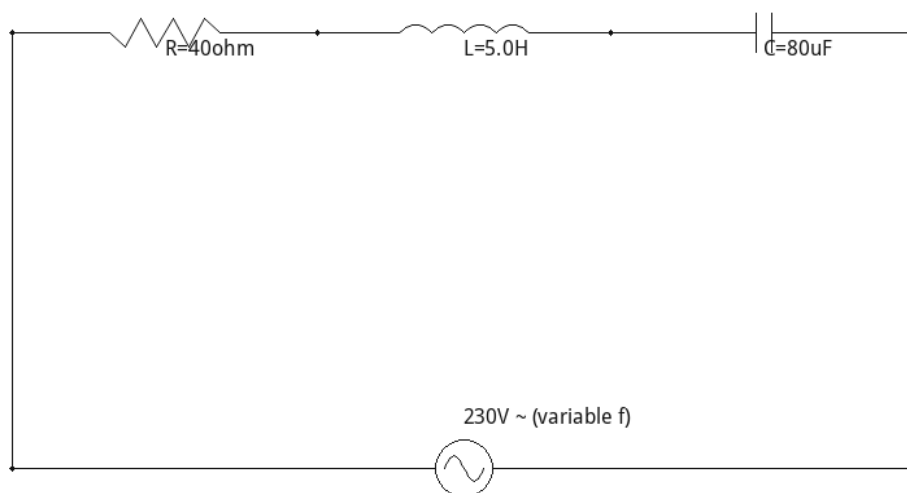
An ideal (resistance-free) LC circuit oscillates at $\omega = 1/\sqrt{LC}$, with energy continuously exchanged between the capacitor and inductor, total energy conserved.

A transformer changes ac voltage using the turns ratio: $V_s/V_p = N_s/N_p$; high-voltage transmission reduces line power loss (I^2R) for a given power delivered.

One-Line Summary

An ac circuit's response depends on frequency through the reactances of L and C, peaking (resonating) when these reactances cancel, with the Q-factor describing how sharply.

Quick visual: a worked diagram from the full [Solutions](#) page, for reference.



Series LCR circuit: $R=40\text{ohm}$, $L=5.0\text{H}$, $C=80\text{uF}$, variable-frequency 230V ac source.

Class 12 Physics Chapter 7 – Solutions and Important Questions

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