

Hard

Assistant Engineer (Electrical), Class 2025

Building Department

A 440 V, 50 Hz AC source supplies a series LCR circuit with a capacitor and a coil. If the coil has 100 m resistance and 15 mH inductance, then at a resonance frequency

A

50.53 Hz, 49.57 Hz

Correct

B

52.12 Hz, 49.8 Hz

C

55.02 Hz, 48.95 Hz

D

50 Hz, 49 Hz

Correct Answer: A

Full Detailed Explanation

Concept & Reasoning At series resonance the impedance is minimum and current is maximum. The half-power points occur where $|Z| = \sqrt{2}R$. For a narrow bandwidth, $f_1 \approx f_0 - R/(2L)$, and $f_2 \approx f_0 + R/(2L)$ exactly. Using these relationships gives frequencies close to the listed pair.

The 440 V value does not affect the half-power frequencies. How to Solve It in the Exam Series RLC bandwidth depends on R/L , not supply voltage. Important Exam Point For higher accuracy use $f_1 \approx f_0 - R/(2L)$ together with $f_2 \approx f_0 + R/(2L)$. Related Revision Path This question sits in the revision path Signals and Systems → RLC Circuits → Resonance.

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