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The ARRL Extra Class License Course

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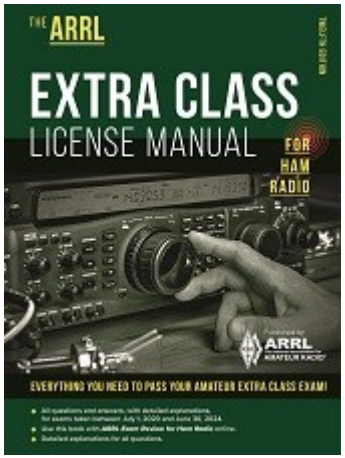

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What can cause the voltage across reactances in a series RLC circuit to be higher than the voltage applied to the entire circuit?

A. Resonance

B. Capacitance

C. Conductance

D. Resistance

E5A01 ECLM Page (4 - 30)

What can cause the voltage across reactances in a series RLC circuit to be higher than the voltage applied to the entire circuit?

A. Resonance

B. Capacitance

C. Conductance

D. Resistance

(A) E5A01 ECLM Page (4 - 30)

What is resonance in an LC or RLC circuit?

A. The highest frequency that will pass current

B. The lowest frequency that will pass current

C. The frequency at which the capacitive reactance equals the inductive reactance

D. The frequency at which the reactive impedance equals the resistive impedance

E5A02 ECLM Page (4 - 27)

What is resonance in an LC or RLC circuit?

A. The highest frequency that will pass current

B. The lowest frequency that will pass current

C. The frequency at which the capacitive reactance equals the inductive reactance

D. The frequency at which the reactive impedance equals the resistive impedance

(C) E5A02 ECLM Page (4 - 27)

What is the magnitude of the impedance of a series RLC circuit at resonance?

A. High, as compared to the circuit resistance

B. Approximately equal to capacitive reactance

C. Approximately equal to inductive reactance

D. Approximately equal to circuit resistance

E5A03 ECLM Page (4 - 30)

What is the magnitude of the impedance of a series RLC circuit at resonance?

A. High, as compared to the circuit resistance

B. Approximately equal to capacitive reactance

C. Approximately equal to inductive reactance

D. Approximately equal to circuit resistance

(D) E5A03 ECLM Page (4 - 30)

What is the magnitude of the impedance of a parallel RLC circuit at resonance?

A. Approximately equal to circuit resistance

B. Approximately equal to inductive reactance

C. Low compared to the circuit resistance

D. High compared to the circuit resistance

E5A04 ECLM Page (4 - 30)

What is the magnitude of the impedance of a parallel RLC circuit at resonance?

A. Approximately equal to circuit resistance

B. Approximately equal to inductive reactance

C. Low compared to the circuit resistance

D. High compared to the circuit resistance

(A) E5A04 ECLM Page (4 - 30)

What is the result of increasing the Q of an impedance-matching circuit?

A. Matching bandwidth is decreased

B. Matching bandwidth is increased

C. Matching range is increased

D. It has no effect on impedance matching

E5A05 ECLM Page (4 - 33)

What is the result of increasing the Q of an impedance-matching circuit?

A. Matching bandwidth is decreased

B. Matching bandwidth is increased

C. Matching range is increased

D. It has no effect on impedance matching

(A) E5A05 ECLM Page (4 - 33)

What is the magnitude of the circulating current within the components of a parallel LC circuit at resonance?

A. It is at a minimum

B. It is at a maximum

C. It equals 1 divided by the quantity 2 times pi, multiplied by the square root of inductance L multiplied by capacitance C

D. It equals 2 multiplied by pi, multiplied by frequency "F", multiplied by inductance "L"

E5A06 ECLM Page (4 - 30)

What is the magnitude of the circulating current within the components of a parallel LC circuit at resonance?

A. It is at a minimum

B. It is at a maximum

C. It equals 1 divided by the quantity 2 times pi, multiplied by the square root of inductance L multiplied by capacitance C

D. It equals 2 multiplied by pi, multiplied by frequency "F", multiplied by inductance "L"

(B) E5A06 ECLM Page (4 - 30)

What is the magnitude of the current at the input of a parallel RLC circuit at resonance?

A. Minimum

B. Maximum

C. R/L

D. L/R

E5A07 ECLM Page (4 - 30)

What is the magnitude of the current at the input of a parallel RLC circuit at resonance?

A. Minimum

B. Maximum

C. R/L

D. L/R

(A) E5A07 ECLM Page (4 - 30)

What is the phase relationship between the current through and the voltage across a series resonant circuit at resonance?

A. The voltage leads the current by 90 degrees

B. The current leads the voltage by 90 degrees

C. The voltage and current are in phase

D. The voltage and current are 180 degrees out of phase

E5A08 ECLM Page (4 - 31)

What is the phase relationship between the current through and the voltage across a series resonant circuit at resonance?

A. The voltage leads the current by 90 degrees

B. The current leads the voltage by 90 degrees

C. The voltage and current are in phase

D. The voltage and current are 180 degrees out of phase

(C) E5A08 ECLM Page (4 - 31)

How is the Q of an RLC parallel resonant circuit calculated?

A. Reactance of either the inductance or capacitance divided by the resistance

B. Reactance of either the inductance or capacitance multiplied by the resistance

C. Resistance divided by the reactance of either the inductance or capacitance

D. Reactance of the inductance multiplied by the reactance of the capacitance

E5A09 ECLM Page (4 - 32)

How is the Q of an RLC parallel resonant circuit calculated?

A. Reactance of either the inductance or capacitance divided by the resistance

B. Reactance of either the inductance or capacitance multiplied by the resistance

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(C) E5A09 ECLM Page (4 - 32)

How is the Q of an RLC series resonant circuit calculated?

A. Reactance of either the inductance or capacitance divided by the resistance

B. Reactance of either the inductance or capacitance multiplied by the resistance

C. Resistance divided by the reactance of either the inductance or capacitance

D. Reactance of the inductance multiplied by the reactance of the capacitance

E5A10 ECLM Page (4 - 32)

How is the Q of an RLC series resonant circuit calculated?

A. Reactance of either the inductance or capacitance divided by the resistance

B. Reactance of either the inductance or capacitance multiplied by the resistance

C. Resistance divided by the reactance of either the inductance or capacitance

D. Reactance of the inductance multiplied by the reactance of the capacitance

(A) E5A10 ECLM Page (4 - 32)

What is the half-power bandwidth of a resonant circuit that has a resonant frequency of 7.1 MHz and a Q of 150?

A. 157.8 Hz

B. 315.6 Hz

C. 47.3 kHz

D. 23.67 kHz

E5A11 ECLM Page (4 - 33)

What is the half-power bandwidth of a resonant circuit that has a resonant frequency of 7.1 MHz and a Q of 150?

A. 157.8 Hz

B. 315.6 Hz

C. 47.3 kHz

D. 23.67 kHz

(C) E5A11 ECLM Page (4 - 33)

What is the half-power bandwidth of a resonant circuit that has a resonant frequency of 3.7 MHz and a Q of 118?

A. 436.6 kHz

B. 218.3 kHz

C. 31.4 kHz

D. 15.7 kHz

E5A12 ECLM Page (4 - 33)

What is the half-power bandwidth of a resonant circuit that has a resonant frequency of 3.7 MHz and a Q of 118?

A. 436.6 kHz

B. 218.3 kHz

C. 31.4 kHz

D. 15.7 kHz

(C) E5A12 ECLM Page (4 - 33)

What is an effect of increasing Q in a series resonant circuit?

A. Fewer components are needed for the same performance

B. Parasitic effects are minimized

C. Internal voltages increase

D. Phase shift can become uncontrolled

E5A13 ECLM Page (4 - 32)

What is an effect of increasing Q in a series resonant circuit?

A. Fewer components are needed for the same performance

B. Parasitic effects are minimized

C. Internal voltages increase

D. Phase shift can become uncontrolled

(C) E5A13 ECLM Page (4 - 32)

What is the resonant frequency of an RLC circuit if R is 22 ohms, L is 50 microhenries and C is 40 picofarads?

A. 44.72 MHz

B. 22.36 MHz

C. 3.56 MHz

D. 1.78 MHz

E5A14 ECLM Page (4 - 28)

What is the resonant frequency of an RLC circuit if R is 22 ohms, L is 50 microhenries and C is 40 picofarads?

A. 44.72 MHz

B. 22.36 MHz

C. 3.56 MHz

D. 1.78 MHz

(C) E5A14 ECLM Page (4 - 28)

Which of the following increases Q for inductors and capacitors?

A. Lower losses

B. Lower reactance

C. Lower self-resonant frequency

D. Higher self-resonant frequency

E5A15 ECLM Page (4 - 31)

Which of the following increases Q for inductors and capacitors?

A. Lower losses

B. Lower reactance

C. Lower self-resonant frequency

D. Higher self-resonant frequency

(A) E5A15 ECLM Page (4 - 31)

What is the resonant frequency of an RLC circuit if R is 33 ohms, L is 50 microhenries and C is 10 picofarads?

A. 23.5 MHz

B. 23.5 kHz

C. 7.12 kHz

D. 7.12 MHz

E5A16 ECLM Page (4 - 29)

What is the resonant frequency of an RLC circuit if R is 33 ohms, L is 50 microhenries and C is 10 picofarads?

A. 23.5 MHz

B. 23.5 kHz

C. 7.12 kHz

D. 7.12 MHz

(D) E5A16 ECLM Page (4 - 29)

What is the term for the time required for the capacitor in an RC circuit to be charged to 63.2% of the applied voltage or to discharge to 36.8% of its initial voltage?

A. An exponential rate of one

B. One time constant

C. One exponential period

D. A time factor of one

E5B01 ECLM Page (4 - 9)

What is the term for the time required for the capacitor in an RC circuit to be charged to 63.2% of the applied voltage or to discharge to 36.8% of its initial voltage?

A. An exponential rate of one

B. One time constant

C. One exponential period

D. A time factor of one

(B) E5B01 ECLM Page (4 - 9)

What letter is commonly used to represent susceptance?

A. G

B. X

C. Y

D. B

E5B02 ECLM Page (4 - 19)

What letter is commonly used to represent susceptance?

A. G

B. X

C. Y

D. B

(D) E5B02 ECLM Page (4 - 19)

How is impedance in polar form converted to an equivalent admittance?

A. Take the reciprocal of the angle and change the sign of the magnitude

B. Take the reciprocal of the magnitude and change the sign of the angle

C. Take the square root of the magnitude and add 180 degrees to the angle

D. Square the magnitude and subtract 90 degrees from the angle

E5B03 ECLM Page (4 - 20)

How is impedance in polar form converted to an equivalent admittance?

A. Take the reciprocal of the angle and change the sign of the magnitude

B. Take the reciprocal of the magnitude and change the sign of the angle

C. Take the square root of the magnitude and add 180 degrees to the angle

D. Square the magnitude and subtract 90 degrees from the angle

(B) E5B03 ECLM Page (4 - 20)

What is the time constant of a circuit having two 220-microfarad capacitors and two 1-megohm resistors, all in parallel?

A. 55 seconds

B. 110 seconds

C. 440 seconds

D. 220 seconds

E5B04 ECLM Page (4 - 11)

What is the time constant of a circuit having two 220-microfarad capacitors and two 1-megohm resistors, all in parallel?

A. 55 seconds

B. 110 seconds

C. 440 seconds

D. 220 seconds

(D) E5B04 ECLM Page (4 - 11)

What happens to the magnitude of a pure reactance when it is converted to a susceptance?

A. It is unchanged

B. The sign is reversed

C. It is shifted by 90 degrees

D. It becomes the reciprocal

E5B05 ECLM Page (4 - 19)

What happens to the magnitude of a pure reactance when it is converted to a susceptance?

A. It is unchanged

B. The sign is reversed

C. It is shifted by 90 degrees

D. It becomes the reciprocal

(D) E5B05 ECLM Page (4 - 19)

What is susceptance?

A. The magnetic impedance of a circuit

B. The ratio of magnetic field to electric field

C. The imaginary part of admittance

D. A measure of the efficiency of a transformer

E5B06 ECLM Page (4 - 19)

What is susceptance?

A. The magnetic impedance of a circuit

B. The ratio of magnetic field to electric field

C. The imaginary part of admittance

D. A measure of the efficiency of a transformer

(C) E5B06 ECLM Page (4 - 19)

What is the phase angle between the voltage across and the current through a series RLC circuit if XC is 500 ohms, R is 1 kilohm, and XL is 250 ohms?

A. 68.2 degrees with the voltage leading the current

B. 14.0 degrees with the voltage leading the current

C. 14.0 degrees with the voltage lagging the current

D. 68.2 degrees with the voltage lagging the current

E5B07 ECLM Page (4 - 22)

What is the phase angle between the voltage across and the current through a series RLC circuit if XC is 500 ohms, R is 1 kilohm, and XL is 250 ohms?

A. 68.2 degrees with the voltage leading the current

B. 14.0 degrees with the voltage leading the current

C. 14.0 degrees with the voltage lagging the current

D. 68.2 degrees with the voltage lagging the current

(C) E5B07 ECLM Page (4 - 22)

What is the phase angle between the voltage across and the current through a series RLC circuit if XC is 100 ohms, R is 100 ohms, and XL is 75 ohms?

A. 14 degrees with the voltage lagging the current

B. 14 degrees with the voltage leading the current

C. 76 degrees with the voltage leading the current

D. 76 degrees with the voltage lagging the current

E5B08 ECLM Page (4 - 22)

What is the phase angle between the voltage across and the current through a series RLC circuit if XC is 100 ohms, R is 100 ohms, and XL is 75 ohms?

A. 14 degrees with the voltage lagging the current

B. 14 degrees with the voltage leading the current

C. 76 degrees with the voltage leading the current

D. 76 degrees with the voltage lagging the current

(A) E5B08 ECLM Page (4 - 22)

What is the relationship between the AC current through a capacitor and the voltage across a capacitor?

A. Voltage and current are in phase

B. Voltage and current are 180 degrees out of phase

C. Voltage leads current by 90 degrees

D. Current leads voltage by 90 degrees

E5B09 ECLM Page (4 - 14)

What is the relationship between the AC current through a capacitor and the voltage across a capacitor?

A. Voltage and current are in phase

B. Voltage and current are 180 degrees out of phase

C. Voltage leads current by 90 degrees

D. Current leads voltage by 90 degrees

(D) E5B09 ECLM Page (4 - 14)

What is the relationship between the AC current through an inductor and the voltage across an inductor?

A. Voltage leads current by 90 degrees

B. Current leads voltage by 90 degrees

C. Voltage and current are 180 degrees out of phase

D. Voltage and current are in phase

E5B10 ECLM Page (4 - 15)

What is the relationship between the AC current through an inductor and the voltage across an inductor?

A. Voltage leads current by 90 degrees

B. Current leads voltage by 90 degrees

C. Voltage and current are 180 degrees out of phase

D. Voltage and current are in phase

(A) E5B10 ECLM Page (4 - 15)

What is the phase angle between the voltage across and the current through a series RLC circuit if XC is 25 ohms, R is 100 ohms, and XL is 50 ohms?

A. 14 degrees with the voltage lagging the current

B. 14 degrees with the voltage leading the current

C. 76 degrees with the voltage lagging the current

D. 76 degrees with the voltage leading the current

E5B11 ECLM Page (4 - 23)

What is the phase angle between the voltage across and the current through a series RLC circuit if XC is 25 ohms, R is 100 ohms, and XL is 50 ohms?

A. 14 degrees with the voltage lagging the current

B. 14 degrees with the voltage leading the current

C. 76 degrees with the voltage lagging the current

D. 76 degrees with the voltage leading the current

(B) E5B11 ECLM Page (4 - 23)

What is admittance?

A. The inverse of impedance

B. The term for the gain of a field effect transistor

C. The turns ratio of a transformer

D. The inverse of Q factor

E5B12 ECLM Page (4 - 19)

What is admittance?

A. The inverse of impedance

B. The term for the gain of a field effect transistor

C. The turns ratio of a transformer

D. The inverse of Q factor

(A) E5B12 ECLM Page (4 - 19)

Which of the following represents a capacitive reactance in rectangular notation?

A. -jX

B. +jX

C. Delta

D. Omega

E5C01 ECLM Page (4 - 16)

Which of the following represents a capacitive reactance in rectangular notation?

A. -jX

B. +jX

C. Delta

D. Omega

(A) E5C01 ECLM Page (4 - 16)

How are impedances described in polar coordinates?

A. By X and R values

B. By real and imaginary parts

C. By phase angle and magnitude

D. By Y and G values

E5C02 ECLM Page (4 - 16)

How are impedances described in polar coordinates?

A. By X and R values

B. By real and imaginary parts

C. By phase angle and magnitude

D. By Y and G values

(C) E5C02 ECLM Page (4 - 16)

Which of the following represents an inductive reactance in polar coordinates?

A. A positive magnitude

B. A negative magnitude

C. A positive phase angle

D. A negative phase angle

E5C03 ECLM Page (4 - 16)

Which of the following represents an inductive reactance in polar coordinates?

A. A positive magnitude

B. A negative magnitude

C. A positive phase angle

D. A negative phase angle

(C) E5C03 ECLM Page (4 - 16)

What coordinate system is often used to display the resistive, inductive, and/or capacitive reactance components of an impedance?

A. Maidenhead grid

B. Faraday grid

C. Elliptical coordinates

D. Rectangular coordinates

E5C04 ECLM Page (4 - 16)

What coordinate system is often used to display the resistive, inductive, and/or capacitive reactance components of an impedance?

A. Maidenhead grid

B. Faraday grid

C. Elliptical coordinates

D. Rectangular coordinates

(D) E5C04 ECLM Page (4 - 16)

What is the name of the diagram used to show the phase relationship between impedances at a given frequency?

A. Venn diagram

B. Near field diagram

C. Phasor diagram

D. Far field diagram

E5C05 ECLM Page (4 - 16)

What is the name of the diagram used to show the phase relationship between impedances at a given frequency?

A. Venn diagram

B. Near field diagram

C. Phasor diagram

D. Far field diagram

(C) E5C05 ECLM Page (4 - 16)

What does the impedance 50 – j25 represent?

A. 50 ohms resistance in series with 25 ohms inductive reactance

B. 50 ohms resistance in series with 25 ohms capacitive reactance

C. 25 ohms resistance in series with 50 ohms inductive reactance

D. 25 ohms resistance in series with 50 ohms capacitive reactance

E5C06 ECLM Page (4 - 16)

What does the impedance 50 – j25 represent?

A. 50 ohms resistance in series with 25 ohms inductive reactance

B. 50 ohms resistance in series with 25 ohms capacitive reactance

C. 25 ohms resistance in series with 50 ohms inductive reactance

D. 25 ohms resistance in series with 50 ohms capacitive reactance

(B) E5C06 ECLM Page (4 - 16)

Where is the impedance of a pure resistance plotted on rectangular coordinates?

A. On the vertical axis

B. On a line through the origin, slanted at 45 degrees

C. On a horizontal line, offset vertically above the horizontal axis

D. On the horizontal axis

E5C07 ECLM Page (4 - 16)

Where is the impedance of a pure resistance plotted on rectangular coordinates?

A. On the vertical axis

B. On a line through the origin, slanted at 45 degrees

C. On a horizontal line, offset vertically above the horizontal axis

D. On the horizontal axis

(D) E5C07 ECLM Page (4 - 16)

What coordinate system is often used to display the phase angle of a circuit containing resistance, inductive and/or capacitive reactance?

A. Maidenhead grid

B. Faraday grid

C. Elliptical coordinates

D. Polar coordinates

E5C08 ECLM Page (4 - 16)

What coordinate system is often used to display the phase angle of a circuit containing resistance, inductive and/or capacitive reactance?

A. Maidenhead grid

B. Faraday grid

C. Elliptical coordinates

D. Polar coordinates

(D) E5C08 ECLM Page (4 - 16)

When using rectangular coordinates to graph the impedance of a circuit, what do the axes represent?

A. The X axis represents the resistive component and the Y axis represents the reactive component

B. The X axis represents the reactive component and the Y axis represents the resistive component

C. The X axis represents the phase angle and the Y axis represents the magnitude

D. The X axis represents the magnitude and the Y axis represents the phase angle

E5C09 ECLM Page (4 - 16)

When using rectangular coordinates to graph the impedance of a circuit, what do the axes represent?

A. The X axis represents the resistive component and the Y axis represents the reactive component

B. The X axis represents the reactive component and the Y axis represents the resistive component

C. The X axis represents the phase angle and the Y axis represents the magnitude

D. The X axis represents the magnitude and the Y axis represents the phase angle

(A) E5C09 ECLM Page (4 - 16)

Which point on Figure E5-1 best represents the impedance of a series circuit consisting of a 400-ohm resistor and a 38-picofarad capacitor at 14 MHz?

A. Point 2

B. Point 4

C. Point 5

D. Point 6

E5C10 ECLM Page (4 - 21)

Which point on Figure E5-1 best represents the impedance of a series circuit consisting of a 400-ohm resistor and a 38-picofarad capacitor at 14 MHz?

A. Point 2

B. Point 4

C. Point 5

D. Point 6

(B) E5C10 ECLM Page (4 - 21)

Which point in Figure E5-1 best represents the impedance of a series circuit consisting of a 300-ohm resistor and an 18-microhenry inductor at 3.505 MHz?

A. Point 1

B. Point 3

C. Point 7

D. Point 8

E5C11 ECLM Page (4 - 20)

Which point in Figure E5-1 best represents the impedance of a series circuit consisting of a 300-ohm resistor and an 18-microhenry inductor at 3.505 MHz?

A. Point 1

B. Point 3

C. Point 7

D. Point 8

(B) E5C11 ECLM Page (4 - 20)

Which point on Figure E5-1 best represents the impedance of a series circuit consisting of a 300-ohm resistor and a 19-picofarad capacitor at 21.200 MHz?

A. Point 1

B. Point 3

C. Point 7

D. Point 8

E5C12 ECLM Page (4 - 22)

Which point on Figure E5-1 best represents the impedance of a series circuit consisting of a 300-ohm resistor and a 19-picofarad capacitor at 21.200 MHz?

A. Point 1

B. Point 3

C. Point 7

D. Point 8

(A) E5C12 ECLM Page (4 - 22)