Q31.1

A resistor is connected across an ac source as shown. For this circuit, what is the relationship between the instantaneous current $i$ through the resistor and the instantaneous voltage $v_{ab}$ across the resistor?

A. $i$ is maximum at the same time as $v_{ab}$

B. $i$ is maximum one-quarter cycle before $v_{ab}$

C. $i$ is maximum one-quarter cycle after $v_{ab}$

D. not enough information given to decide
A resistor is connected across an ac source as shown. For this circuit, what is the relationship between the instantaneous current $i$ through the resistor and the instantaneous voltage $v_{ab}$ across the resistor?

A. $i$ is maximum at the same time as $v_{ab}$
B. $i$ is maximum one-quarter cycle before $v_{ab}$
C. $i$ is maximum one-quarter cycle after $v_{ab}$
D. not enough information given to decide
Q31.2

An inductor is connected across an ac source as shown. For this circuit, what is the relationship between the instantaneous current \(i\) through the inductor and the instantaneous voltage \(v_{ab}\) across the inductor?

A. \(i\) is maximum at the same time as \(v_{ab}\)
B. \(i\) is maximum one-quarter cycle before \(v_{ab}\)
C. \(i\) is maximum one-quarter cycle after \(v_{ab}\)
D. not enough information given to decide
A31.2

An inductor is connected across an ac source as shown. For this circuit, what is the relationship between the instantaneous current $i$ through the inductor and the instantaneous voltage $v_{ab}$ across the inductor?

A. $i$ is maximum at the same time as $v_{ab}$
B. $i$ is maximum one-quarter cycle before $v_{ab}$
C. $i$ is maximum one-quarter cycle after $v_{ab}$
D. not enough information given to decide
Q31.3

A capacitor is connected across an ac source as shown. For this circuit, what is the relationship between the instantaneous current $i$ through the capacitor and the instantaneous voltage $v_{ab}$ across the capacitor?

A. $i$ is maximum at the same time as $v_{ab}$
B. $i$ is maximum one-quarter cycle before $v_{ab}$
C. $i$ is maximum one-quarter cycle after $v_{ab}$
D. not enough information given to decide
A capacitor is connected across an ac source as shown. For this circuit, what is the relationship between the instantaneous current $i$ through the capacitor and the instantaneous voltage $v_{ab}$ across the capacitor?

A. $i$ is maximum at the same time as $v_{ab}$
B. $i$ is maximum one-quarter cycle before $v_{ab}$
C. $i$ is maximum one-quarter cycle after $v_{ab}$
D. not enough information given to decide
An $L-R-C$ series circuit as shown is operating at its *resonant frequency*. At this frequency, how are the values of the capacitive reactance $X_C$, the inductive reactance $X_L$, and the resistance $R$ related to each other?

A. $X_L = R$; $X_C$ can have any value.

B. $X_C = R$; $X_L$ can have any value.

C. $X_C = X_L$; $R$ can have any value.

D. $X_C = X_L = R$.

E. none of the above
An L-R-C series circuit as shown is operating at its resonant frequency. At this frequency, how are the values of the capacitive reactance $X_C$, the inductive reactance $X_L$, and the resistance $R$ related to each other?

A. $X_L = R$; $X_C$ can have any value.

B. $X_C = R$; $X_L$ can have any value.

C. $X_C = X_L$; $R$ can have any value.

D. $X_C = X_L = R$.

E. none of the above
Q31.5

In an \( L-R-C \) series circuit as shown, the current has a very small amplitude if the ac source oscillates at a very high frequency. Which circuit element causes this behavior?

A. the resistor \( R \)

B. the inductor \( L \)

C. the capacitor \( C \)

D. misleading question — the current actually has a very large amplitude if the frequency is very high
In an $L-R-C$ series circuit as shown, the current has a very small amplitude if the ac source oscillates at a very high frequency. Which circuit element causes this behavior?

A. the resistor $R$

B. the inductor $L$

C. the capacitor $C$

D. misleading question — the current actually has a very large amplitude if the frequency is very high
Q31.6

In an $L-R-C$ series circuit as shown, there is a phase angle between the instantaneous current through the circuit and the instantaneous voltage $v_{ad}$ across the entire circuit. For what value of the phase angle is the greatest power delivered to the resistor?

A. zero  
B. 90°  
C. 180°  
D. 270°  
E. none of the above
A31.6

In an $L-R-C$ series circuit as shown, there is a phase angle between the instantaneous current through the circuit and the instantaneous voltage $v_{ad}$ across the entire circuit. For what value of the phase angle is the greatest power delivered to the resistor?

✓ A. zero  
B. 90°  
C. 180°  
D. 270°  
E. none of the above
Q31.7

In an *L*-*R*-*C* series circuit as shown, suppose that the angular frequency of the ac source equals the resonance angular frequency. In this case, the circuit impedance

A. is maximum.
B. is minimum, but not zero.
C. is zero.
D. is neither a maximum nor a minimum.
E. not enough information give to decide
A31.7

In an $L-R-C$ series circuit as shown, suppose that the angular frequency of the ac source equals the resonance angular frequency. In this case, the circuit impedance

A. is maximum.

✓ B. is minimum, but not zero.

C. is zero.

D. is neither a maximum nor a minimum.

E. not enough information given to decide
Q31.8

In the transformer shown in the drawing, there are more turns in the secondary than in the primary. In this situation, the voltage amplitude is

A. greater in the primary than in the secondary.
B. smaller in the primary than in the secondary.
C. the same in the primary and in the secondary.
D. not enough information given to decide
In the transformer shown in the drawing, there are more turns in the secondary than in the primary. In this situation, the voltage amplitude is

A. greater in the primary than in the secondary.
B. smaller in the primary than in the secondary.
C. the same in the primary and in the secondary.
D. not enough information given to decide
Q31.9

In the transformer shown in the drawing, there are more turns in the secondary than in the primary. In this situation, the current amplitude is

A. greater in the primary than in the secondary.
B. smaller in the primary than in the secondary.
C. the same in the primary and in the secondary.
D. not enough information given to decide
A31.9

In the transformer shown in the drawing, there are more turns in the secondary than in the primary. In this situation, the current amplitude is

A. greater in the primary than in the secondary.
B. smaller in the primary than in the secondary.
C. the same in the primary and in the secondary.
D. not enough information given to decide