PHYSICS

BOOKS - KUMAR PRAKASHAN KENDRA PHYSICS (GUJRATI ENGLISH)

ALTERNATING CURRENTS

Section A Try Yourself

1. What are A.C. signals ?

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2. Write the reason why do we preferred an a.c. voltage instead of d.c. voltage.

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3. Write the common meaning of voltage.

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4. What are ac voltage ?

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5. Write the equation for ac voltage.

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6. What is phase difference between V and I in a circuit containing only a resistor ?

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7. What is the sum of the instantaneous current values over one complete ac cycle?

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8. What is rms? Write the formula of rms for current?

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9. What is the maximum voltage of 220V ?

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10. What is phasors?

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11. With whom the relation between the phase of current and voltage in AC cirucit will be represented?

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12. What is capacitive reactance? Write its unit.

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13. Write the SI unit of capacitive reactance.

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14. Write the unit of ωC.

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15. Write the phase difference V and I in AC circuit containing only capacitor.

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16. If i is the current in L-C-R series AC circuit then, formula of,

(i) Voltage across resistance.

(ii) Voltage across inductor.

(iii) Voltage across capacitor.

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17. (i) What is an angle between phasor V_R and I ?

(ii) Voltage phasor V_C is $\frac{\pi}{2}$ .... of the current phasor I. (Fill up the blank)

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18. What is the impedance of circuit of L-C-R series AC circuit ? Write its formula.

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19. What is the inductive reactance of L-C-R series AC circuit ? Write its formula and SI unit.

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20. What is capacitive reactance for L-C-R series AC circuit? Write its formula and SI unit.

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21. If $X_C > X_L$ the current in the circuit is ahead or behind of the voltage ?

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22. If $X_C < X_L$ the current in the circuit is ahead or behind of the voltage ?

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23. Write the differential equation of charge for L-C-R series AC circuit.

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24. What is resonance?

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25. Write the formula of resonant frequency.

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26. Give the value of impedance in resonance condition.

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27. What is Q factor ?

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28. On which , Q factor depends ?

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29. On which the sharpness of resonance depends?

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30. Define average power (true power).

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31. On which the power consumed in L-C-R series AC circuit depends ?

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32. What is resistive circuit ? Write the formula of power consumed in it.

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33. In which circuit average power consumed maximum ?

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34. What is power factor ?

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35. What is wattless power ?

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36. What is LC circuit?

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37. What is LC oscillations ?

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38. Write only differential equation of LC circuit.

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39. Write the expression of frequency of oscillation for LC circuit.

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40. Give the name of physical quantity in LCR circuit corresponds to displacement x in forced oscillations.

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41. Give the name of physical quantity in LCR circuit corresponds to mass m in forced oscillations.

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42. Give the name of physical quantity in LCR circuit corresponds to spring contant k in forcd oscillations.

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43. Give the name of physical quantity in LCR circuit corresponds to damping constant in forced oscillations.

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44. Write the principle of transformer.

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45. Why soft iron core is used in transformer?

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46. Write two types of transformer.

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47. What is transformation ratio?

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48. "In a ideal transformer power may increase or decrease".Such statement is true or false?

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49. "In step-down transformer output current decreases". This statement is true or false ?

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Section A Questions Answers

1. Write the reason why do we preferred an a.c. voltage instead of d.c. voltage.

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2. Explain AC voltage applied to a resistor and explain it with necessary graph.

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3. Explain electrical energy when an ac current passes through a resistor.

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4. Give definition and formula of root mean square plot graph of current versus ωt .

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5. Explain AC circuit for circuit with only resistor.

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6. Obtain an equation of current for AC voltage applied to an inductor and draw a graph of V and I.

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7. Discuss the power in AC circuit with only an inductor.

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8. Explain AC circuit with only capacitor.

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9. Discuss power in AC circuit containing only capacitor.

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10. Obtain the relation of voltage applied to a series LCR circuit.

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11. Obtain the relation of phase between instantaneous current and voltage with the help of phase diagram for series LCR circuit.

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12. Draw phasor diagram for $X_C > X_L$ and $X_C < X_L$ and give the disadvantages of this method.

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13. Obtain an anaalytical solution for the relation of phase between instantaneous current and voltage for an LCR series AC circuit.

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14. What is resonance? Give its example.

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15. Explain resonance for an L-C-R series circuit and write its uses. In what kind of circuit will it possible ?

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16. Obtain an equation for sharpness of resonance in an L-C-R series AC circuit and what is quality factor Q ? And explain bandwidth.

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17. Obtain the equation of the bandwidth for an L-C-R series AC circuit and deduce the equation of Q factor.

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18. What is sharpness of resonance ? Derive equation of Q-factor

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19. If L= 1.00 mH, C = 1.00nF, then find the resonant frequency.

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20. Define the power for AC circuit. Obtain an equation of average power for L-C-R series AC circuit.

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21. Write an equation of average power for L-C-R series AC circuit and discuss its various cases.

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22. What is meant by LC circuit? What are LC oscillations ?

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23. Obtain the differential equation for a LC circuit.

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24. Solve the differential equation of L-C circuit and obtain the expression of current.

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25. Explain how LC oscillations takes place in the circuit.

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26. Compare the oscillations in an LC circuit are analogous to the oscillation of a block at the end of a spring.

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27. For which 2 reasons the discussion of LC oscillations is not realistic ?

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28. Compare LC oscillations and a force damped oscillations in mechanics.

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29. What is transformer ? Write its principle and write its construction.

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30. Write the working procedure of transformer.

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31. Using the equation of power for an ideal transformer, prove $\frac{I_p}{I_s} = \frac{V_s}{V_p} = \frac{N_s}{N_p}$

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32. How a transformer affects the voltage and current ?

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33. Due to which reasons the energy losses do occurs in actual transformer ?

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34. Explain the use of transformer for distribution of power over long distances.

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35. Write important uses of transformer.

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Section B Numericals Textual Illustrations

1. A light bulb is rated at 100W for a 220 V supply. Find the resistance of the bulb

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2. A light bulb is rated at 100W for a 220 V supply. Find the peak voltage of the source

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3. A light bulb is rated at 100W for a 220 V supply. Find the rms current through the bulb.

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4. A pure inductor of 25.0 mH is connected to a source of 220 V . Find the inductive reactance and rms current in the circuit if the frequency of the source is 50 Hz.

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5. A lamp is connected in series with a capacitor. Predict your observations for dc and ac connections. What happens in each case if the capacitance of the capacitor is reduced ?

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6. A 15.0 μF capacitor is connected to a 220 V , 50 z source. Find the capacitive reactance and the current (rms and peak) in the circuit. If the frequency is doubled, what happens to the capacitive reactance and the current ?

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7. A light bulb and an open coil inductor are connected to an ac source through a key as shown in figure. The switch is closed and after sometime, an iron rod is inserted into the interior of the inductor. The glow of the light bulb (a) increases, (b) decreases, (c) is unchanged, as the iron rod is inserted. Give your answer with reasons.

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8. A resistor of 200Ω and a capacitor of $15.0\mu F$ are connected in series to a 220V, 50Hz as source .

(a) Calculate the current in the circuit.

(b) Calculate the voltage (rms) across the resistor and the capacitor. Is the alebraic sum of these voltages more than the source voltage? If yes resolve the paradox.

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9. For circuits used for transporting electric power, a low power factor implies large power loss in transmission. Explain.

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10. Power factor can often be improved by the use of a capacitor of appropriate capacitance in the circuit. Explain.

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11. A sinusoidal voltage of peak value of 283 V and frequency 50 Hz is applied to a series LCR circuit in which $R = 3\Omega, L = 25.48$ mH and $C = 796\mu F$. Find

the impedance of the circuit.

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12. A sinusoidal voltage of peak value of 283 V and frequency 50 Hz is applied to a series LCR circuit in which $R = 3\Omega, L = 25.48$ mH and $C = 796\mu F$. Find the phase difference between the voltage across the source the current.

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13. A sinusoidal voltage of peak value of 283 V and frequency 50 Hz is applied to a series LCR circuit in which $R = 3\Omega, L = 25.48$ mH and $C = 796\mu F$. Find

the power dissipated in the circuit, and

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14. A sinusoidal voltage of peak value of 283 V and frequency 50 Hz is applied to a series LCR circuit in which $R = 3\Omega, L = 25.48$ mH and $C = 796 \mu F$. Find the power factor.

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15. Suppose the frequency of the source in the previous example can be varied. (a) What is the frequency of the source at which resonance occurs? (b) Calculate the impedance, the current, and the power dissipated at the resonant condition.

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16. Suppose the frequency of the source in the previous example can be varied. (a) What is the frequency of the source at which resonance occurs? (b) Calculate the impedance, the current, and the power dissipated at the resonant condition.

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17. At an airport, a person is made to walk through the doorway of a metal detector, for security reasons. If she / he is carrying anything made of metal, the metal detector emits a sound. On what principal does this detector work?

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18. Show that in the free oscillations of an LC circuit, the sum of energies stored in the capacitor and the inductor is constant in time.

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19. A light bulb is rated at 200W for a 230 V supply. Find the resistance of the bulb.

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20. A light bulb is rated at 200W for a 230 V supply. Find the peak voltage of the source

Watch Video Solution

21. A light bulb is rated at 200W for a 230 V supply. Find the rms current through the bulb.

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22. A inductor of 5 mH is connected to a source of 220 V . Find the inductive reactance and rms current in the circuit if the frequency of the source is 60 Hz.

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23. A lamp is connected in series with a capacitor. Predict your observations for dc and ac connections. What happens in each case if the capacitance of the capacitor is reduced ?

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24. A $10\mu F$ capacitor is connected to a 230 V, 50 Hz source. Find the capacitive reactance and the current (rms and peak) in the circuit.

If the frequeny is doubled , what happens to the capacitive reactance and the current ?

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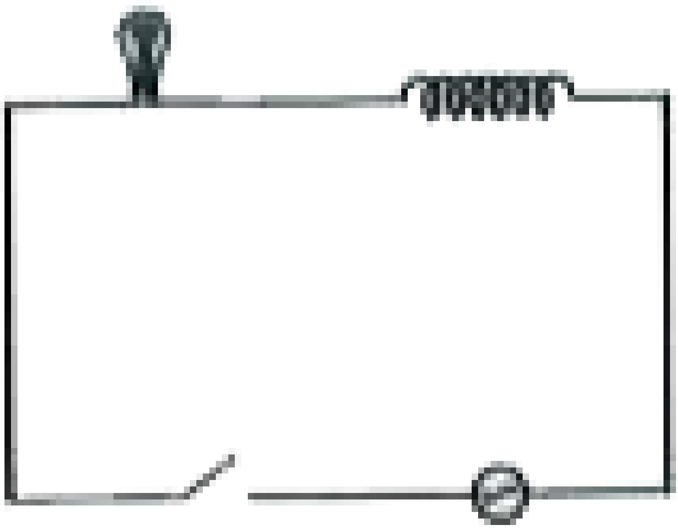

25.

After closing the key in above circuit, after some time, a glass rod is inserted in the inductor. Will the brightness of bulb . (a) Give answer with reason. Increase (b) decrease or (c) remain same ?

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26. A resistor of 100 Ω and a capacitor of 250 μF are connected in series to a 220 V , 50 Hz ac source.

Calculate the current in the circuit

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27. A resistor of 100 Ω and a capacitor of 250 μF are connected in series to a 220 V , 50 Hz ac source.

Calculate the voltage (rms) across the resistor and the capacitor . Is the algebraic sum of these voltages more than the source voltage ? If yes, resolve the paradox.

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28. A sinusoidal voltage of peak value 283 V and frequency 50 Hz is applied to a series LCR circuit in which R=6Ω, L=50.96 mH and C=398 μF. Find the impedance of the circuit

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29. A sinusoidal voltage of peak value 283 V and frequency 50 Hz is applied to a series LCR circuit in which R=6Ω, L=50.96 mH and C=398 μF. Find the phase difference between the voltage across the source and the current .

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30. A sinusoidal voltage of peak value 283 V and frequency 50 Hz is applied to a series LCR circuit in which R=6Ω, L=50.96 mH and C=398 μF. Find the power dissipated in the circuit

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31. A sinusoidal voltage of peak value 283 V and frequency 50 Hz is applied to a series LCR circuit in which R=6Ω, L=50.96 mH and C=398 μF. Find the power factor

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32. For one series LCR ac circuit, 200 V, 50 Hz source is connected . Here R= 6Ω , L=50.96 mH , C=398 μF, then find Resonant angular frequency

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33. For one series LCR ac circuit, 200 V, 50 Hz source is connected . Here R= 6Ω , L=50.96 mH , C=398 μF, then find Impedance at resonance , current and resonance and power dissipated at resonance .

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Section B Numericals Textual Exercise

1. A 100 Ω resistor is connected to a 200V, 50 Hz ac supply.

(a) What is the rms value of current in the circuit ?

(b) What is the net power consumed over a fully cycle ?

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2. (a) The peak voltage of an ac supply is 300V. What is the rms voltage ?

The rms value of current in an circuit is 10V. What is the peak current ?

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3. A 44 mH inductor is connected to 220V, 50 Hz ac supply. Determine the rms value of the current in the circuit.

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4. A $60\mu F$ capacitor is connected to a 110V, 60 Hz ac supply. Determine the rms value of the current in the circuit.

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5. What is the net power absorbed by each circuit over a complete cycle. Explain your answer.

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6. Obtain the resonant frequency ω_r of a series jLCR circuit with L= 2.0 H, C = $32\mu F$ and R = 10Ω. What is the Q-value of this circuit ?

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7. A charged $30\mu F$ capacitor is connected to a 27 mH inductor. What is the angular freuqency of free oscillations of the circuit?

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8. Suppose the initial charge on the capacitor in Exercise 7.7 is 6 mC. What is the total energy stored in the circuit initially ? What is the total energy at later time?

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9. A series LCR circuit with R $= 20\Omega$, $L = 1.5$H and C $= 35\mu F$ is connected to a variable-frequency 200V ac supply. When the frequency of the supply equals the natural frequency of the circuit,what is the average power transferred to the circuit in one complete cycle ?

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10. A radio can tune over the frequency range of a portion of MW broadcast band: (800 kHz to 1200kHz) . If its LC circuit has an effective inductance of $200\mu H$. What must be the range of its variable capacitor ?

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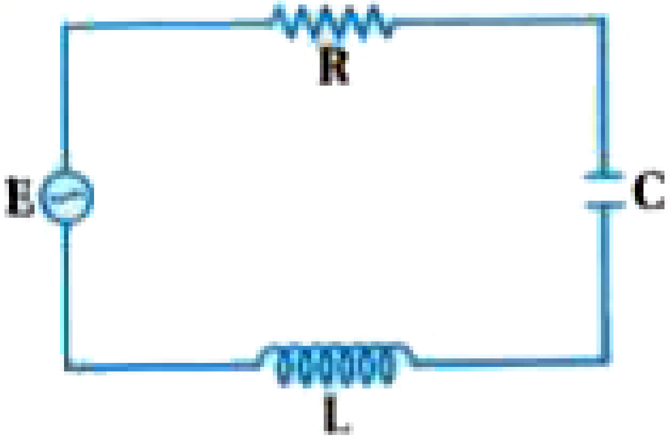
11. Figure shows a series LCR circuit connected to a variable frequency 230 V source. L = 5.0 H, C $= 80\mu F, R = 40\Omega$



Determine the source frequency which drives the circuit in resonance.

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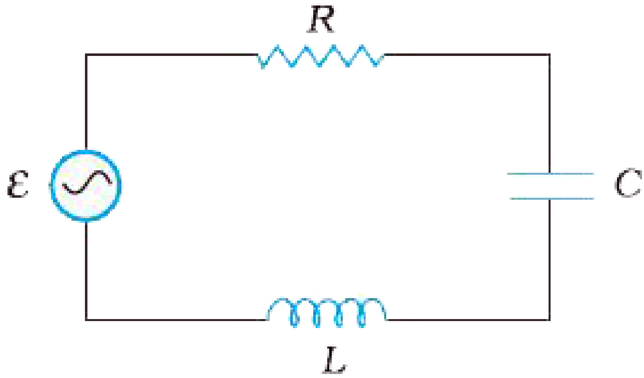
12. Figure shows a series LCR circuit connected to a variable frequency 230 V source. $L = 5.0H, C = 80\mu F, R = 40\Omega.$



(a) Determine the source frequency which drives the circuit in resonance.

(b) Obtain the impedance of the circuit and the amplitude of current at the resonating frequency.

(c) Determine the rms potential drops across the three elements of the circuit. Show that the potential drop across the LC combination is zero at the resonating frequency.

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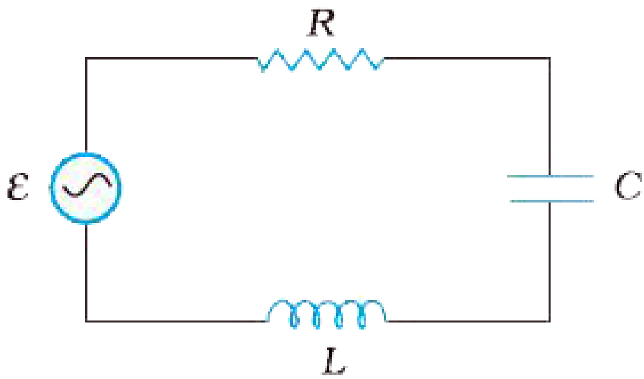
13. Figure shows a series LCR circuit connected to a variable frequency 230 V source. $L = 5.0H, C = 80\mu F, R = 40\Omega$.



(a) Determine the source frequency which drives the circuit in resonance.

(b) Obtain the impedance of the circuit and the amplitude of current at the resonating frequency.

(c) Determine the rms potential drops across the three elements of the circuit. Show that the potential drop across the LC combination is zero at the resonating frequency.

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Section B Numericals Additonal Exercise

1. An LC circuit contains a 20 mH inductor and a 50 μF capacitor with an initial charge of 10 mC. The resistance of the circuit is negligible. Let the instant the circuit is closed be t = 0.

(a) What is the total energy stored initially? Is it conserved during LC oscillations?

(b) What is the natural frequency of the circuit?

(c) At what time is the energy stored

(i) completely electrical (i.e., stored in the capacitor)? (ii) completely magnetic (i.e., stored in the inductor)?

(d) At what times is the total energy shared equally between the inductor and the capacitor?

(e) If a resistor is inserted in the circuit, how much energy is eventually dissipated as heat?

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2. An LC circuit contains a 20 mH inductor and a 50 μF capacitor with an initial charge of 10 mC. The resistance of the circuit is negligible. Let the instant the circuit is closed be t = 0.

(a) What is the total energy stored initially? Is it conserved during LC oscillations?

(b) What is the natural frequency of the circuit?

(c) At what time is the energy stored

(i) completely electrical (i.e., stored in the capacitor)? (ii) completely magnetic (i.e., stored in the inductor)?

(d) At what times is the total energy shared equally between the inductor and the capacitor?

(e) If a resistor is inserted in the circuit, how much energy is eventually dissipated as heat?

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3. An LC circuit contains a 20 mH inductor and a 50 μF capacitor with an initial charge of 10 mC. The resistance of the circuit is negligible. Let the instant the circuit is closed be t = 0.

(a) What is the total energy stored initially? Is it conserved during LC oscillations?

(b) What is the natural frequency of the circuit?

(c) At what time is the energy stored

(i) completely electrical (i.e., stored in the capacitor)? (ii) completely magnetic (i.e., stored in the inductor)?

(d) At what times is the total energy shared equally between the inductor and the capacitor?

(e) If a resistor is inserted in the circuit, how much energy is eventually dissipated as heat?

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4. An LC circuit contains a 20 mH inductor and a 50 μF capacitor with an initial charge of 10 mC. The resistance of the circuit is negligible.

Let the instant the circuit is closed be $t = 0$.

(a) What is the total energy stored initially? Is it conserved during LC oscillations?

(b) What is the natural frequency of the circuit?

(c) At what time is the energy stored

(i) completely electrical (i.e., stored in the capacitor)? (ii) completely magnetic (i.e., stored in the inductor)?

(d) At what times is the total energy shared equally between the inductor and the capacitor?

(e) If a resistor is inserted in the circuit, how much energy is eventually dissipated as heat?

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5. An LC circuit contains a 20 mH inductor and a 50 μF capacitor with an initial charge of 10 mC. The resistance of the circuit is negligible. Let the instant the circuit is closed be t = 0.

(a) What is the total energy stored initially? Is it conserved during LC oscillations?

(b) What is the natural frequency of the circuit?

(c) At what time is the energy stored

(i) completely electrical (i.e., stored in the capacitor)? (ii) completely magnetic (i.e., stored in the inductor)?

(d) At what times is the total energy shared equally between the inductor and the capacitor?

(e) If a resistor is inserted in the circuit, how much energy is eventually dissipated as heat?

6. A coil of inductance 0.50 H and resistance 100 Ω is connected to a 240 V, 50 Hz ac supply. What is the maximum current in the coil ?

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7. A coil of inductance 0.50 H and resistance 100 Ω is connected to a 240 V, 50 Hz ac supply. What is the time lag between the voltage maximum and the current maximum ?

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8. Obtain the answers (a) to (b) in Exercise if the circuit is connected to a high frequency supply (240 V, 10 kHz) .Hence explain the statement that at very high frequency, an inductor in a circuit nearly amounts to an open circuit. How does an inductor behave in a dc circuit after the steady state ?

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9. A 100 μF capacitor in series with a 40 Ω resistance is connected to a 110 V, 60 Hz supply.

(a) What is the maximum current in the circuit?

(b) What is the time lag between the current maximum and the voltage maximum?

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10. A 100 μF capacitor in series with a 40 Ω resistance is connected to a 110 V, 60 Hz supply.

(a) What is the maximum current in the

circuit?

(b) What is the time lag between the current maximum and the voltage maximum?

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11. Obtain the answers (a) to (b) in Exercise if the circuit is connected to a high frequency supply (240 V, 10 kHz) .Hence explain the statement that at very high frequency, an inductor in a circuit nearly amounts to an open circuit. How does an inductor behave in a dc circuit after the steady state ?

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12. Keeping the source frequency equal to the resonating frequency of the series LCR circuit, if the three elements, L, C and R are arranged in parallel, show that the total current in the parallel LCR circuit is minimum at this frequency. Obtain the current rms value in each branch of the circuit for the elements and source specified in Exercise for this frequency.

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13. A circuit containing a 80 mH inductor and a 60 μF capacitor in series is connected to a 230 V, 50 Hz supply. The resistance of the circuit is negligible.

(a) Obtain the current amplitude and rms values.

(b) Obtain the rms values of potential drops across each element.

(c) What is the average power transferred to the inductor?

(d) What is the average power transferred to the capacitor?

(e) What is the total average power absorbed by the circuit? ['Average' implies 'averaged over one cycle'.]

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14. A circuit containing a 80 mH inductor and a 60 μF capacitor in series is connected to a 230 V, 50 Hz supply. The resistance of the circuit is negligible.

(a) Obtain the current amplitude and rms values.

(b) Obtain the rms values of potential drops across each element.

(c) What is the average power transferred to the inductor?

(d) What is the average power transferred to the capacitor?

(e) What is the total average power absorbed by the circuit? ['Average' implies 'averaged over one cycle'.]

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15. A circuit containing a 80 mH inductor and a 60 μF capacitor in series is connected to a 230 V, 50 Hz supply. The resistance of the circuit is negligible.

(a) Obtain the current amplitude and rms values.

(b) Obtain the rms values of potential drops across each element.

(c) What is the average power transferred to the inductor?

(d) What is the average power transferred to the capacitor?

(e) What is the total average power absorbed by the circuit? ['Average' implies 'averaged over one cycle'.]

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16. A circuit containing a 80 mH inductor and a 60 μF capacitor in series is connected to a 230 V, 50 Hz supply. The resistance of the circuit is negligible.

(a) Obtain the current amplitude and rms values.

(b) Obtain the rms values of potential drops across each element.

(c) What is the average power transferred to the inductor?

(d) What is the average power transferred to the capacitor?

(e) What is the total average power absorbed by the circuit? ['Average' implies 'averaged over one cycle'.]

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17. A circuit containing a 80 mH inductor and a 60 μF capacitor in series is connected to a 230 V, 50 Hz supply. The resistance of the circuit is negligible.

(a) Obtain the current amplitude and rms values.

(b) Obtain the rms values of potential drops across each element.

(c) What is the average power transferred to the inductor?

(d) What is the average power transferred to the capacitor?

(e) What is the total average power absorbed by the circuit? ['Average' implies 'averaged over one cycle'.]

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18. Suppose the circuit in has a resistance of 15 W. Obtain the average power transferred to each element of the circuit, and the total power absorbed.

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19. A series LCR circuit with $L = 0.12H, C = 480nF, R = 23\Omega$ is connected to a 230 V variable frequency supply.

(a) What is the source frequency for which current amplitude is maximum. Obtain this maximum value.

(b) What is the source frequency for which average power absorbed by the circuit is maximum. Obtain the value of this maximum power.

(c) For which frequencies of the source is the power transferred to the circuit half the power at resonant frequency? What is the current amplitude at these frequencies?

(d) What is the Q-factor of the given circuit?

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20. A series LCR circuit with $L = 0.12 H, C = 480 nF, R = 23 \Omega$ is connected to a 230 V variable frequency supply.

(a) What is the source frequency for which current amplitude is maximum. Obtain this maximum value.

(b) What is the source frequency for which average power absorbed by the circuit is maximum. Obtain the value of this maximum power.

(c) For which frequencies of the source is the power transferred to the circuit half the power at resonant frequency? What is the current amplitude at these frequencies?

(d) What is the Q-factor of the given circuit?

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21. A series LCR circuit with $L = 0.12H, C = 480nF, R = 23\Omega$ is connected to a 230 V variable frequency supply.

(a) What is the source frequency for which current amplitude is maximum. Obtain this maximum value.

(b) What is the source frequency for which average power absorbed by the circuit is maximum. Obtain the value of this maximum power.

(c) For which frequencies of the source is the power transferred to the circuit half the power at resonant frequency? What is the current amplitude at these frequencies?

(d) What is the Q-factor of the given circuit?

Watch Video Solution

22. A series LCR circuit with $L = 0.12H, C = 480nF, R = 23\Omega$ is connected to a 230 V variable frequency supply.

(a) What is the source frequency for which current amplitude is maximum. Obtain this maximum value.

(b) What is the source frequency for which average power absorbed by the circuit is maximum. Obtain the value of this maximum power.

(c) For which frequencies of the source is the power transferred to the circuit half the power at resonant frequency? What is the current amplitude at these frequencies?

(d) What is the Q-factor of the given circuit?

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23. Obtain the resonant frequency and Q-factor of a series LCR circuit with $L = 3.0H, C = 27\mu F, \text{ and } R = 7.4\Omega.$ It is desired to improve the sharpness of the

resonance of the circuit by reducing its 'full width at half maximum' by a factor of 2. Suggest a suitable way.

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24. In any ac circuit, is the applied instantaneous voltage equal to the algebraic sum of the instantaneous voltages across the series elements of the circuit? Is the same true for rms voltage?

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25. A capacitor is used in the primary circuit of an induction coil.

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26. An applied voltage signal consists of a superposition of a dc voltage and an ac voltage of high frequency. The circuit consists of an inductor and a capacitor in series. Show that the dc signal will appear across C and the ac signal across L.

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27. A choke coil in series with a lamp is connected to a dc line. The lamp is seen to shine brightly. Insertion of an iron core in the choke causes no change in the lamp's brightness. Predict the corresponding observations if the connection is to an ac line.

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28. Why is choke coil needed in the use of fluorescent tubes with ac mains? Why can we not use an ordinary resistor instead of the choke coil?

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29. A power transmission line feeds input power at 2300 V to a stepdown transformer with its primary windings having 4000 turns. What should be the number of turns in the secondary in order to get output power at 230 V?

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30. At a hydroelectric power plant, the water pressure head is at a height of 300 m and the water flow available is 100 $m^3 s^{-1}$. If the turbine generator efficiency is 60%, estimate the electric power available from the plant $(g = 9.8 ms^{-2})$.

Watch Video Solution

31. A small town with a demand of 800 kW of electric power at 220 V is situated 15 km away from an electric plant generating power at 440 V. The resistance of the two wire line carrying power is 0.5 Ω per km. The town gets power from the line through a 4000-220 V step-down transformer at a sub-station in the town.

(a) Estimate the line power loss in the form of heat.

(b) How much power must the plant supply, assuming there is negligible power loss due to leakage?

(c) Characterise the step up transformer at the plant.

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32. Do the same exercise as above with the replacement of the earlier transformer by a 40,000-220 V step-down transformer (Neglect, as before, leakage losses though this may not be a good assumption any longer because of the very high voltage transmission involved). Hence, explain why high voltage transmission is preferred?

Watch Video Solution

Section B Numericals Numerical From Darpan Based On Textbook

1. The A.C. voltage and current in an L-C-R A.C. series circuit are given by the following expression $V = 200\sqrt{2}\cos(3000t - 55^{\circ}V,$

$I = 10\sqrt{2}\cos(3000t - 10^\circ)A$. Calculate the impedance and the resistance of the above circuit.

Watch Video Solution

2. An electric current has both A.C. and D.C. components . The value of D.C. component is equal to 12A while the A.C. component is given as 1 $= 9\sin\omega t$ A. Determine the formula for the resultant current and also calculate the value of I_{rms}.

Watch Video Solution

3. Calculate the resultant inductance of two inductor L_1 and L_2 when they are connected in parallel in A.C. circuit.

Watch Video Solution

4. Obtain the resonance angular frequency for the circuit shown in figure.

View Text Solution

5. The series combination of R(Ω) and capacitor C(F) is connected to an A.C. source of V volts and angular frequency ω. If the angular frequency is reduced to $\frac{\omega}{3}$, the current is found to be reduced to one-half without changing the value of the voltage. Determine the ratio of the capacitive reactance and the resistance.

Watch Video Solution

6. In an L-C-R A.C. series circuit L = 5H, $\omega = 100 \text{ rads}^{-1}$, R= 100 Ω and power factor is 0.5. Calculate the value of capacitance of the capacitor.

Watch Video Solution

7. L = 8.1 mH, C = 12.5 μF and R = 100 Ω are connected in series with A.C. source of 230 V and frequency 500 Hz. Calculate voltage across two ends of resistance.

Watch Video Solution

8. In an A.C. circuit maximum voltage and maximum currents are 200 V and 2.2A respectively. Calculate power and power factor in the circuit. (Here $X_C = 60\Omega$ and $R = 80\Omega$)

Watch Video Solution

Section C Ncert Exemplar Mcqs

1. If the rms current in a 50 Hz ac circuit is 5 A, the value of the current $\frac{1}{300}$s after its value becomes zero is _____

A. $5\sqrt{2}A$

B. $5\sqrt{\frac{3}{2}}A$

C. $\frac{5}{6}A$

D. $\frac{5}{\sqrt{2}}A$

Answer: B

Watch Video Solution

2. An alternating current generator has an internal resistance R_g and an internal reactance X_g. It is used to supply power to a passive load consisting of a resistance R_g and a reactance X_L. For maximum power to be delivered from the generator to the load, the value of X_L is equal to

A. 0

B. X_g

C. $-X_g$

D. R_g

Answer: C

Watch Video Solution

3. When a voltage measuring device is connected to AC mains, the meter shows the steady input voltage of 220V. This means

A. input voltage cannot be AC voltage, but a DC voltage.

B. maximum input voltage is 220V.

C. the meter reads not v but $< v^2 >$ and is calibrated to read $\sqrt{< V^2 >}$

D. the pointer of the meter is stuck by some mechanical defect.

Answer: C

Watch Video Solution

4. To reduce the resonant frequency in an LCR series circuit with a generator

A. the generator frequency should be reduced.

B. another capacitor should be added in parallel to the first.

C. the iron core of the inductor should be removed.

D. dielectric in the capacitor should be removed.

Answer: B

Watch Video Solution

5. Which of the following combinations should be selected for better tuning of an LCR circuit used for communication ?

A. $R = 20\Omega, L = 1.5H, C = 35\mu F$

B. $R = 25\Omega, L = 2.5H, C = 45\mu F$

C. $R = 15\Omega, L = 3.5H, C = 30\mu F$

D. $R = 25\Omega, L = 1.5H, C = 45\mu F$

Answer: C

Watch Video Solution

6. An inductor of reactance 1 $\Omega$and a resistor of 2Ω are connected in series to the terminals of a 6 V (rms) a.c. source. The power dissipated in the circuit is

A. 8 W

B. 12 W

C. 14.4 W

D. 18 W

Answer: C

Watch Video Solution

7. The output of a step-down transformer is measured to be 24 V when connected to a 12 watt light bulb. The value of the peak current is

A. $\frac{1}{\sqrt{2}}$A

B. $\sqrt{2}$A

C. $2A$

D. $2\sqrt{2}A$

Answer: A

Watch Video Solution

Section C Ncert Exemplar More Than One Options

1. As the frequency of an ac circuit increases, the current first increases and then decreases. What combination of circuit elements is most likely to comprise the circuit ?

A. Inductor and capacitor.

B. Resistor and inductor

C. Resistor and capacitor.

D. Resistor, inductor and capacitor.

Answer: A::D

Watch Video Solution

2. In an alternating current circuit consisting of elements in series, the current increases on increasing the frequency of supply. Which of the following elements are likely to constitute the circuit ?

A. Only resistor.

B. Resistor and an inductor.

C. Resistor and a capacitor.

D. Only a capacitor.

Answer: C::D

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3. Electrical energy is transmitted over large distances at high alternating voltages. Which of the following statements is (are) correct ?

A. For a given power level, there is a lower current.

B. Lower current implies less power loss.

C. Transmission lines can be made thinner.

D. It is easy to reduce the voltage at the receiving end using step-down transformers.

Answer: A::B::D

Watch Video Solution

4. For an LCR circuit, the power transferred from the driving source to the driven oscillator is $P = I^2 Z \cos\phi$ ____

A. Here, the power factor cos $\phi > 0, P > 0$

B. The driving force can give no energy to the oscillator (P = 0) in some cases.

C. The driving force cannot syphon out (P $<$ 0) the energy out of oscillator.

D. The driving force can take away energy out of the oscillator.

Answer: A::B::C

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5. When an AC voltage of 220 V is applied to the capacitor C

A. the maximum voltage between plates is 220 V.

B. the current is in phase with the applied voltage.

C. the charge on the plates is in phase with the applied voltage.

D. power delivered to the capacitor is zero.

Answer: C::D

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6. The line that draws power supply to your house from street has

A. zero average current.

B. 220 V average voltage.

C. voltage and current out of phase by 90°

D. voltage and current possibly differing in phase ϕ such that $|\phi| < \frac{\pi}{2}$

Answer: A::D

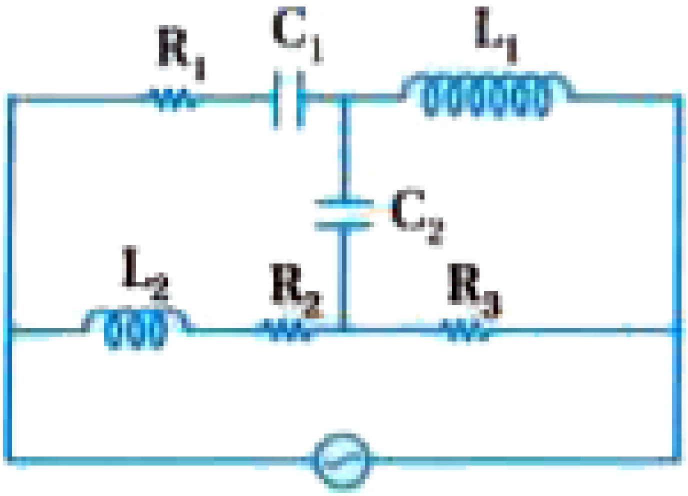
Watch Video Solution

Section C Ncert Exemplar Very Short Answer

1. If a LC circuit is considered analogous to a harmonically oscillating spring block system, which energy of the LC circuit would be analogous to potential energy and which one analogous to kinetic energy ?

Watch Video Solution

2. Draw the effective equivalent circuit of the circuit shown in figure at very high frequencies and find the effective impedance.



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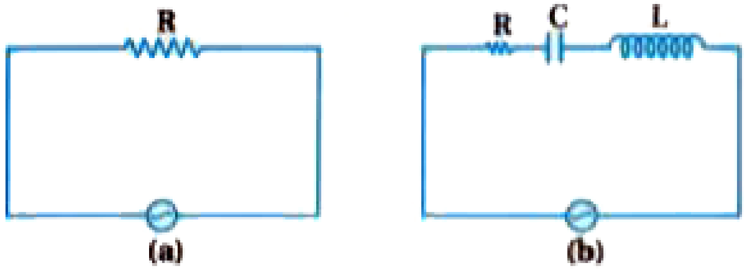
3. Study the circuits (a) and (b) shown in figure and answer the following questions.



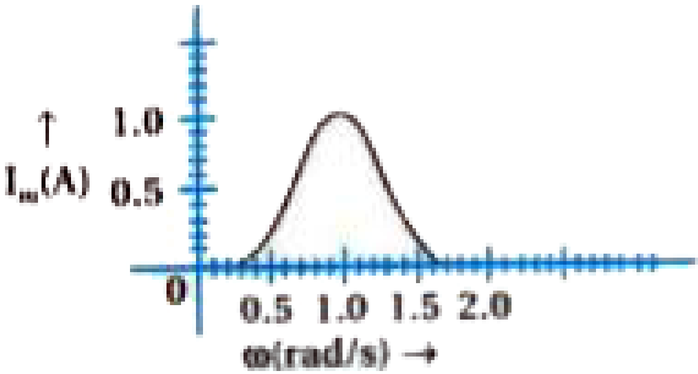
(a) Under which conditions would the rms currents in the two circuits be the same ? (b) Can the rms current in circuit (b) be larger than that in (a) ?

Watch Video Solution

4. Can the instantaneous power output of an ac source ever be negative ? Can the average power output be negative ?

Watch Video Solution

5. In series LCR circuit, the plot of $I_{\max}$ vs ω as shown in figure. Find the bandwidth and mark in the figure.



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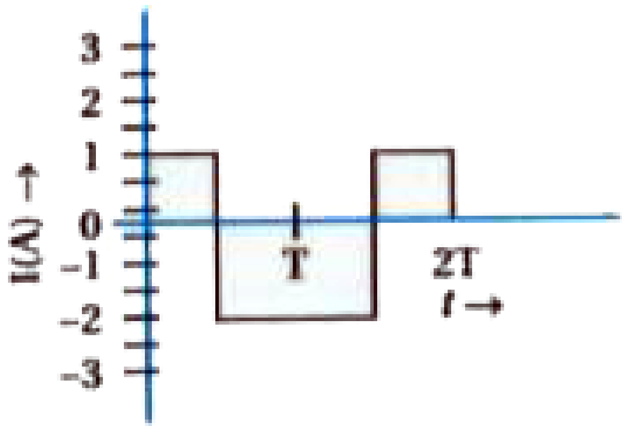
6. The alternating current in a circuit is described by the graph shown in figure. Show rms current in this graph.



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7. How does the sign of the phase angle ϕ, by which the supply voltage leads the current in an LCR series circuit, change as the supply frequency is gradually increased from very low to very high values.

Watch Video Solution

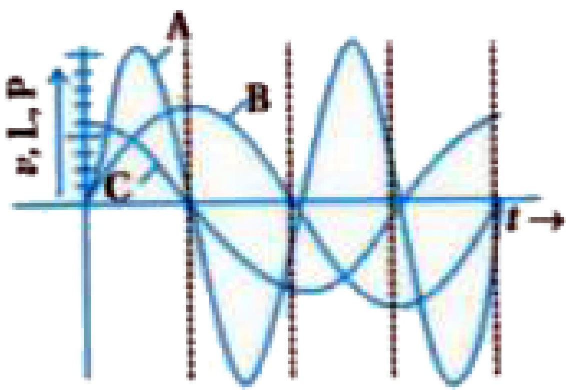
Section C Ncert Exemplar Short Answer

1. A device 'X' is connected to an ac source. The variation of voltage, current and power in one complete cycle is shown in figure.

(a) Which curve shows power consumption over a full cycle ?

(b) What is the average power consumption over a cycle ?

(c) Identify the device 'X'.



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2. Both alternating current and direct current are measured in amperes. But how is the ampere defined for an alternating current ?

Watch Video Solution

3. A coil of 0.01 henry inductance and 1Ω resistance is connected to 200 V, 50 Hz ac supply. Find the impedance of the circuit and time lag between max. alternating voltage and current.

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4. A 60 W load is connected to the secondary of a transformer whose primary draws line voltage. If a current of 0.54 A flows in the load, what is the current in the primary coil ? Comment on the type of transformer being used.

Watch Video Solution

5. Explain why the reactance provided by a capacitor to an alternating current decreases with increasing frequency.

Watch Video Solution

6. Explain why the reactance offered by an inductor increases with increasing frequency of an alternating voltage.

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Section C Ncert Exemplar Long Answer

1. An electrical device draws 2 kW power from AC mains (voltage 223V (rms) V_{rms} = $\sqrt{50000}$ V). The current differs (lags) in phase by $\left(\tan\phi = -\frac{3}{4}\right)$ As compared to voltage. Find (i) R, (ii) $X_C - X_L$, and (iii) I_M. Another device has twice the values for R, X_C and X_L. How are the answers affected ?

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2. 1MW power is to be delivered from a power station to a town 10 km away. One uses a pair of Cu wires of radius 0.5 cm for this purpose. Calculate the fraction of ohmic losses to power transmitted if

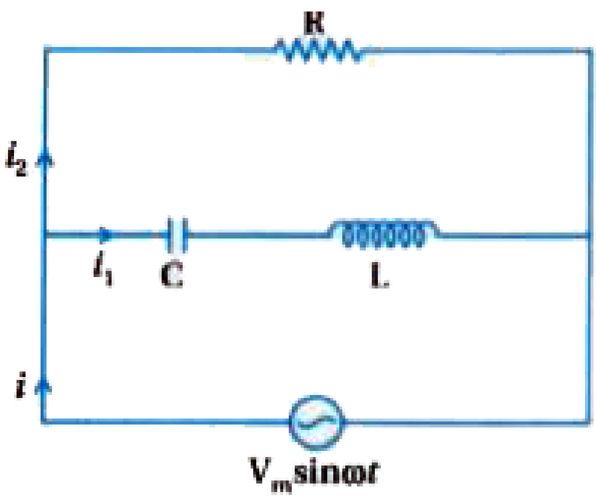
(a) power is transmitted at 220V. Comment on the feasibility of doing this.

(b) a step-up transformer is used to boost the voltage to 11000 V, power transmitted, then a step-down transformer is used to bring voltage to 220 V.

$(\rho_{cu} = 1.7 \times 10^{-8}$ SI unit)

Watch Video Solution

3. Consider the LCR circuit shown in figure. Find the net current i and the phase of i. Show that $i = \frac{V}{Z}$. Find the impedence Z for this circuit.



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4. For an LCR circuit driven at frequency ω, the di equation reads

$$L\frac{di}{dt} + Ri + \frac{q}{C} = V_i = V_m \sin \omega t$$

(a) Multiply the equation by i and simplify where possible.

(b) Interpret each term physically.

(c) Cast the equation in the form of a conservation of energy statement.

(d) Integrate the equation over one cycle to find that the phase difference between v and i must be acute.

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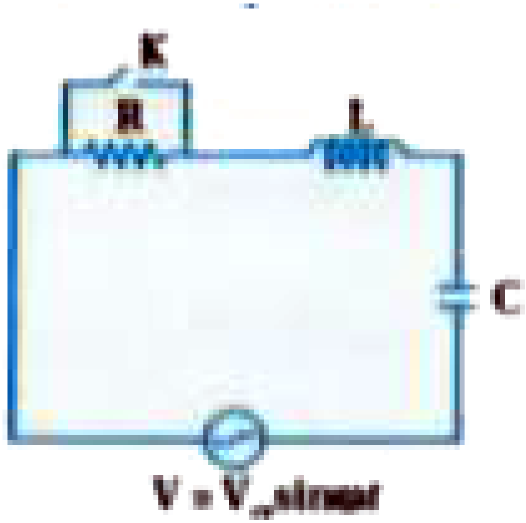
5. In the LCR circuit shown in figure, the ac driving voltage is $V = V_m \sin \omega t$

(a) Write down the equation of motion for q(t)

(b) At $t = t_0$, the voltage source stops and R is short circuited. Now write down how much energy is stored in each of L and C.

(c) Describe subsequent motion of charges.



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Section D Mcqs Darpan Based On Textbook

1. In an A.C. circuit the inductive reactance is defined as ......

A. $Z_L = -j\omega L$

B. $Z_L = -\frac{j}{\omega L}$

C. $Z_L = -\frac{\omega L}{j}$

D. $Z_L = \omega L$

Answer: C

Watch Video Solution

2. In an A.C. circuit, the capacitive reactance is defined as ....

A. $Z_C = j\omega C$

B. $Z_C = -\frac{1}{j\omega C}$

C. $Z_C = \frac{j}{\omega C}$

D. $Z_C = \frac{1}{j\omega C}$

Answer: D

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3. The value of capacitive reactance is given by

......

A. $X_C = -\frac{1}{\omega C}$

B. $X_C = \frac{1}{\omega C}$

C. $X_C = -\frac{j}{\omega C}$

D. $X_C = \frac{1}{\sqrt{\omega C}}$

Answer: B

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4. Impedance in L-C-R series circuit is a .... number. Its value is given by ....

A. real number , $R + j(Z_L + Z_C)$

B. complex number, $R + j(X_L - X_C)$

C. complex number , $R + j(Z_L + Z_C)$

D. complex number , $\sqrt{R^2 + (X_L - X_C)^2}$

Answer: B

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5. In an A.C. circuit in 1 second current reduces to zero value 120 times. Hence the frequency of A.C. current is ...... Hz.

A. 50

B. 100

C. 60

D. 120

Answer: C

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6. The displacement in Newton law corresponds to ...... is electrical quantity.

A. electromagnetic force

B. current

C. electric charge

D. the rate of change of electric charge

Answer: C

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7. Which of the following gives a correct correspondence between electrical and mechanical quantities ?

A. current $\rightarrow$ velocity

B. current $\rightarrow$ acceleration

C. current $\rightarrow$ displacement

D. none of these

Answer: A

Watch Video Solution

8. Which of the following does give a correct correspondence between an electrical quantity and a mechanical quantity ?

A. charge $\rightarrow$ moment of inertia, inductance $\rightarrow$ coefficient of friction

B. charge $\rightarrow$ displacement, inductance $\rightarrow$ force

C. charge $\rightarrow$ velocity, inductance $\rightarrow$ torque

D. charge $\rightarrow$ frictional force, inductance

$\rightarrow$ velocity

Answer: B

Watch Video Solution

9. On decreasing the angular frequency of A.C. source used in L-C-R series circuit, the capacitive reactance ...... and inductive resistance ......

A. increases, decreases

B. increases, increases

C. decreases, increases

D. decreases, decreases

Answer: A

Watch Video Solution

10. When does the impedance of a series L-C-R (AC) circuit become minimum ?

A. when the resistance is equal to zero

B. when the impedance is equal to zero

C. when the electric current is equal to zero

D. When the imaginary part of the impedance is equal to zero.

Answer: D

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11. Current of $\frac{50}{\pi}$ Hz frequency is passing through an A.C. circuit having series combination of resistance R = 100Ω and L = 1 H, then phase difference between voltage and current is ....

A. 60°

B. 45°

C. 30°

D. 90°

Answer: B

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12. An alternating voltage given as $V = 200\sqrt{2}\sin(100t)V$ is applied to a capacitor of 1 μf. The current reading of the ammeter will be equal to ...... mA.

A. 100

B. 20

C. 40

D. 80

Answer: B

Watch Video Solution

13. A coil of inductance L and resistance R is connected to an A.C. source of V volt. If the angular frequency of the A.C. source is equal to ωrads^{-1}, then the current in the circuit will be ....

A. $\frac{V}{R}$

B. $\frac{V}{L}$

C. $\dfrac{V}{R+L}$

D. $\dfrac{V}{\sqrt{R^2+\omega^2L^2}}$

Answer: D

Watch Video Solution

14. One inductor (of inductance L henry) is connected to an A.C. source, then the current flowing through the inductor I = ... A.

A. $\dfrac{V_0}{\omega L}\sin\left(\omega L+\dfrac{\pi}{2}\right)$

B. $\frac{V_0}{\omega L}\sin\left(\omega t-\frac{\pi}{2}\right)$

C. $V_0\omega L\sin\left(\omega t-\frac{\pi}{2}\right)$

D. $\frac{\omega L}{V_0}\sin\left(\omega t+\frac{\pi}{2}\right)$

Answer: B

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15. If angular frequency of an A.C. source used in L-C-R circuit is decreased, then inductive reactance .... and capacitive reactance......

A. Decrease, increase

B. Increase, increase

C. Increase, decrease

D. Decrease, decrease

Answer: A

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16. If angular frequency of an A.C. source used in L-C-R circuit is increased, then inductive reactance .... and capacitive reactance.....

A. Decrease, increase

B. Increase, increase

C. Increase, decrease

D. Decrease, decrease

Answer: C

Watch Video Solution

17. The force constant corresponds to ...... electric quantity.

A. resistance

B. inductance

C. capacitance

D. inverse of capacitance

Answer: D

Watch Video Solution

18. A coil having inductance of 1 mH is connected to an A.C. source, its inductive reactance wil obtained to 1Ω then what will be the angulai frequency (in rad/s) of an A.C. source ?

A. 10^{3}

B. 10

C. 10^{-3}

D. 1

Answer: A

Watch Video Solution

19. The reactance of a capacitor of $\frac{1}{\pi}$ in are A.C. circuit having frequency of 50Hz is .....

A. 100Ω

B. 10Ω

C. 50Ω

D. $10^{-2}\Omega$

Answer: D

Watch Video Solution

20. An LCR series circuit with L =0.5H, $C = 10 \times 10^{-6} F, R = 100\Omega$ is connected to an A.C. source of frequency of 50 Hz. The impedance of the circuit is ....

A. 1.8765 Ω

B. 18.76 Ω

C. 189.6 Ω

D. 101.3 Ω

Answer: C

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21. In an L-C-R circuit , $R = \sqrt{7}\Omega, X_L = 11\Omega$ and $X_C = 8\Omega$, then the value of impedance =______

A. 4Ω

B. 3Ω

C. 9Ω

D. $3\sqrt{7}\Omega$

Answer: A

Watch Video Solution

22. Capacitive reactance of a capacitor for a D.C. circuit is.......

A. 0

B. ωC

C. $\frac{1}{\omega C}$

D. infinite

Answer: D

Watch Video Solution

23. The expression for the A.C. supply voltage of 234V and frequency of 50Hz in our house is ....

A. V=165 sin $(100\pi t)$

B. V=331 sin $(100\pi t)$

C. $V = 334\sin(100\pi t)$

D. $V = 331\cos(100\pi t)$

Answer: B

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24. The time taken by A.C. voltage of frequency 50 Hz to change from zero to maximum is .... ms.

A. 5

B. 10

C. 20

D. 50

Answer: A

Watch Video Solution

25. When current passing through a series connection of 100Ω resistance and 2H inductance has frequency $\frac{25}{\pi}$ Hz, the phase difference between voltage and current is .....

A. 90°

B. 60°

C. 45°

D. 30°

Answer: C

Watch Video Solution

26. When 10 A current passes through 12Ω resistance, maximum voltage across it is ....

A. 20 V

B. 90 V

C. 169.68 V

D. 120 V

Answer: C

Watch Video Solution

27. When 1 μF capacitor is connected across $V = 100\sqrt{2}\sin(100t)$Volt, current passing through milliammeter connected in the circuit is ....

A. 10

B. 20

C. 40

D. 80

Answer: A

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28. Unit of ωC is ____

A. H

B. Ω

C. ℧

D. Faraday

Answer: C

Watch Video Solution

29. 20Ω resistance is connected to V = 220sin (100πt) voltage source. Time taken by current to reduce from maximum value to its rms value is .....

A. 0.2 s

B. 0.25 s

C. 25×10^{-3} s

D. 2.5×10^{-3} s

Answer: D

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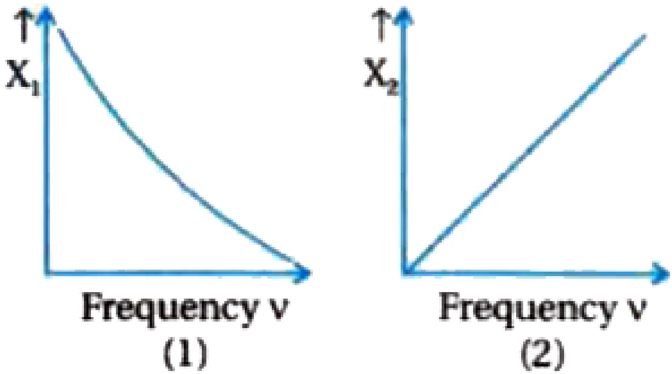
30.



Above graphs are for reactance versu frequency of A.C. emf's frequency. Then ......

A. Figure (1) is for inductor and figure (2) is for capacitor.

B. Figure (1) is for capacitor and figure (2) for inductor.

C. Figure (1) is for resistance and figure (2) is for capacitor.

D. Figure (1) is for inductor and figure (2) is for resistor.

Answer: B

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31. The resistance of a coil for D.C. is in ohms. In A.C. the resistance ......

A. will remain same

B. will increase

C. will decrease

D. will be zero.

Answer: B

Watch Video Solution

32. A coil having inductance of 1 mH is connected to an A.C. source, its inductive reactance wil obtained to 1Ω then what will be the angulai frequency (in rad/s) of an A.C. source ?

A. 10^3

B. 10

C. 10^{-3}

D. 1

Answer: A

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33. In a series D.C. circuit has core of a reactance of 8Ω and a resistance of 6Ω. The effective resistance of the circuit will be .....

A. $\frac{24}{7}\Omega$

B. 6Ω

C. 8Ω

D. 14Ω

Answer: B

Watch Video Solution

34. In an A.C. circuit of frequency $\frac{400}{\pi}$ Hz is of capacitance $C\mu F$ and reactance of capacitance is 25Ω then the value of C = ...

A. $25\mu F$

B. $50\mu F$

C. $400\mu F$

D. $100\mu F$

Answer: B

Watch Video Solution

35. In an L-C-R circuit , $R=\sqrt{7}\Omega, X_L = 11\Omega$ and $X_C = 8\Omega$, then the value of impedance =______

A. 4Ω

B. 3Ω

C. 9Ω

D. $3\sqrt{7}\Omega$

Answer: A

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36. A coil of self inductance of 1H and resistance 200Ω is connected to an A.C. source of frequency $\frac{200}{\pi}$ Hz. The phase difference between voltage and current will be ...

A. 30°

B. 63°

C. 45°

D. 75°

Answer: B

Watch Video Solution

37. The maximum value of an A.C. voltage coming in our houses is .... % more than that of its r.m.s. value.

A. 1.414

B. 4.14

C. 14.14

D. 41.4

Answer: D

Watch Video Solution

38. The ratio of r.m.s. value of an A.C. voltage and its mean value over half cycle is ....

A. $\sqrt{2} : 1$

B. $\sqrt{2} : \pi$

C. $2 : \pi$

D. $\pi : 2\sqrt{2}$

Answer: D

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39. An alternating voltage V = 400 sin (500ωt)V is connected to a 0.2 $k\Omega$ resistor, what will be the rms value of current ?

A. 14.14 A

B. 1.414 A

C. 0.1414 A

D. $2A$

Answer: B

Watch Video Solution

40. In an A.C. circuit, resistance = 12Ω and capacitance reactance = 9Ω are connected in series, then the value of impedance of a circuit will be ....

A. 15Ω

B. 21Ω

C. 3Ω

D. $3\sqrt{7}\Omega$

Answer: A

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41. I_{rms}= _____ I_m

A. $200\ \%$

B. $50\ \%$

C. $70.71\ \%$

D. $67.8\ \%$

Answer: C

Watch Video Solution

42. Usually in A.C. circuit ....

A. average current is zero.

B. average square of current is zero.

C. dissipiation of average power is zero

D. phase difference between voltage and current is zero.

Answer: A

Watch Video Solution

43. The force constant of a spring corresponds to .... in electrical circuit.

A. C

B. $\frac{1}{C}$

C. $\frac{1}{\sqrt{C}}$

D. $\frac{L}{\sqrt{C}}$

Answer: B

Watch Video Solution

44. A pure capacitor of capacitive reactance of 10Ω is connected to an A.C. source. If the frequency of a source is doubled, the capacitive reactance will be .... Ω.

A. 0.5

B. 1.0

C. 5.0

D. 10

Answer: C

Watch Video Solution

45. An L-C-R series circuit with inductor of reactance is 25 Ω, reactance of capacitor is 50 Ω and resistance of 10 Ω is connected to an A.C. source. The impedance of the circuit will be ....

A. 725Ω

B. 26.9Ω

C. 72.5Ω

D. 269Ω

Answer: B

Watch Video Solution

46. If 1.5 A constant current is passing through a resistance, then the value of rms of current over half period will be ....

A. 1.5A

B. 1.25 A

C. 3.0 A

D. none of these

Answer: A

Watch Video Solution

47. An L-C-R series A.C. circuit is tuned to resonance. The impedance of the circuit is ......

A. $\left[R^2+\left(\omega L-\frac{1}{\omega C}\right)^2\right]^{\frac{1}{2}}$

B. $\left[R^2+(\omega L)^2+\left(\frac{1}{\omega C}\right)^2\right]^{\frac{1}{2}}$

C. $\left[R^2+\left(\frac{1}{\omega C}-\omega L\right)^2\right]^{\frac{1}{2}}$

D. R

Answer: D

Watch Video Solution

48. In an L-C-R circuit, L = 8H, C = 0.5μF, R = 100 Ω connected in series. The resonance frequency of the circuit will be ....

A. 600 Hz

B. 60 Hz

C. $\dfrac{250}{\pi}$ Hz

D. 5000 Hz

Answer: C

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49. In a L-C oscillator circuit at any instant of time current is I and charge on capacitor is Q then the total energy of the system will be ....

A. $\frac{Q^2}{2C}$

B. $\frac{Q}{2C^2}$

C. $\frac{Q_0^2}{2C}$

D. $\frac{Q_0^2}{2C^2}$

Answer: C

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50. .... does not change with time for D.C. current and D.C. voltage.

A. only current

B. only voltage

C. only power

D. current, voltage and power

Answer: D

Watch Video Solution

51. An instantaneous current at any instant in an A.C. series circuit is zero. At this instant, the instantaneous voltage is maximum, then ....is not connected with the source.

A. capacitor

B. inductor

C. resistance

D. both the inductor and capacitor

Answer: C

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52. An a.c. source is rated at 220 V - 50 Hz. The time taken for voltage to change from its peak value to zero is

A. 50 sec

B. 0.02 sec

C. 5 sec

D. 5×10^{-3} sec

Answer: D

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53. The instantaneous value of current in an A.C. circuit is $I = 2\sin\left(100\pi t + \frac{\pi}{3}\right)A$. The current will be maximum for the first time at ....

A. $t = \frac{1}{100}s$

B. $t = \frac{1}{200}s$

C. $t = \frac{1}{400}s$

D. $t = \frac{1}{600}$s

Answer: D

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54. L, C and R represent physical quantities inductance, capacitance and resistance respectively. What is the combination representing dimension of frequency ?

A. LC

B. $(LC)^{\frac{-1}{2}}$

C. $\left(\frac{L}{C}\right)^{\frac{-1}{2}}$

D. $\frac{C}{L}$

Answer: B

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55. An emf E = 4 cos (1000t) volt is applied to an LR circuit of inductance 3 mH and resistance 4 Ω. What is the amplitude of current in the circuit ?

A. $\frac{4}{\sqrt{7}}A$

B. 1.0 A

C. $\frac{4}{7}$A

D. 0.8 A

Answer: C

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56. A coil of inductance L has an inductive reactance of X_L in an A.C. circuit in which the effective current is I. The coil is made from a super - conducting material then, what power is dissipated in the coil ?

A. 0

B. IX_L

C. I^2X_L

D. IX_L^2

Answer: A

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57. If 8Ω resistance and 6Ω reactance are present in an A.C. series circuit then what will be the impedence of the circuit ?

A. 20Ω

B. 5Ω

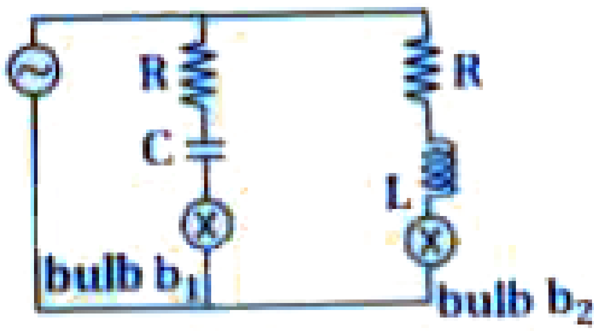
C. 10Ω

D. $14\sqrt{2}\Omega$

Answer: C

Watch Video Solution

58. Two identical incandescent light bulbs are connected as shown in figure. When the circuit is connected with an A.C. voltage source of frequency f, which of the following observation will be correct ?



A. Both bulbs will glow alternatively.

B. Both bulbs will glow with same brightness provided $f = \frac{1}{2\pi}\sqrt{\frac{1}{LC}}$

C. Bulb b_1 will light up initially and goes off, bulb b_2 will be on constantly

D. Bulb b_1 will blink and bulb b_2 will be on constantly.

Answer: B

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59. A 220 V, 50 Hz a.c. source is connected an inductance of 0.2 H and a resistance of 20 Ω in series. What is the current in the circuit ?

A. $10A$

B. $5A$

C. $33.3A$

D. $3.33A$

Answer: A

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60. The resistance of an R-L A.C. circuit is 10 Ω. An emf E_0 applied across the circuit at $\omega = 20$ rad/s . If the current in the circuit is $\frac{I_0}{\sqrt{2}}$ what is the value of L ?

A. 0.55 H

B. 0.15 H

C. 0.5 H

D. 0.4 H

Answer: C

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61. A resistor 30Ω, inductor of reactance 10Ω and capacitor of reactance 10Ω are connected in series to voltage source $E = 300\sqrt{2}\sin(\omega t)$

. Find the current in the circuit.

A. 14.14A

B. 10A

C. 30A

D. 20A

Answer: B

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62. An inductance of 1 mH, a condenser of 10 μ F and a resistance of 50 Ω are connected in series. The reactances of inductors and condensers are same. What will be the reactance of either of them ?

A. 5Ω

B. 3Ω

C. 7Ω

D. 10Ω

Answer: D

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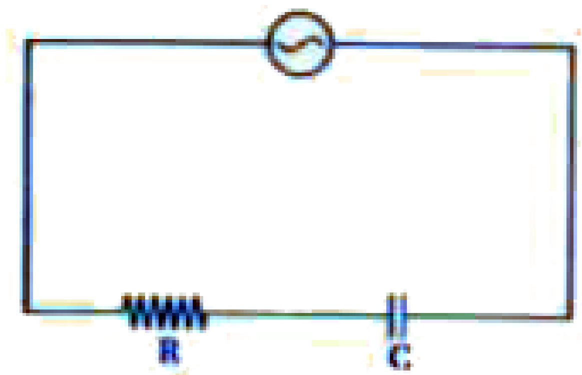
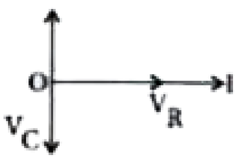
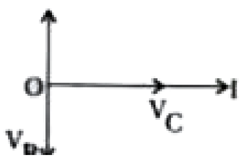
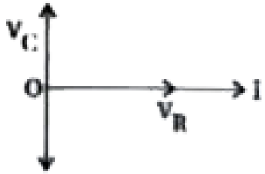
63. Phasor diagram for the following circuit

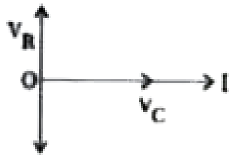
....



A. 

B. 

C. 

D. 

Answer: A

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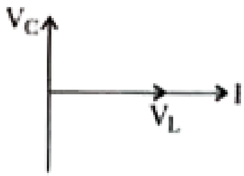
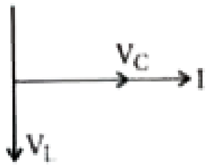
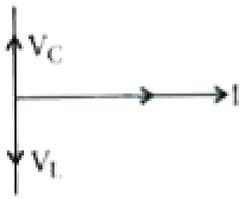
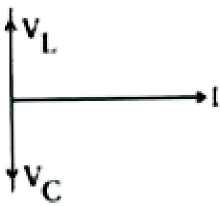
64. Phasor diagram for the following circuit is

....

A. 

B. 

C. 

D. 

Answer: C

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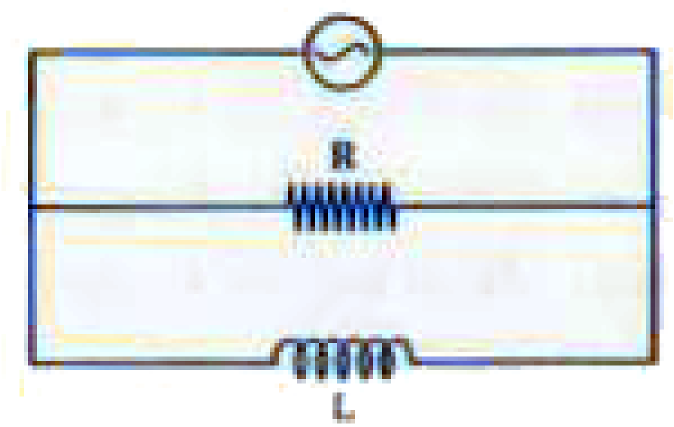
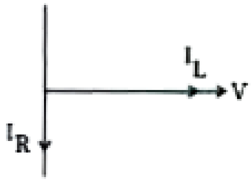
65. Phasor diagram for the following circuit is ....



A. 

B. 

C. 

D. 

Answer: A

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66. In an A.C. series circuit of L-R voltage applied is 220 V, if the potential difference across two ends on inductor is 176 V then the potential difference across two ends of the resistance will be ......

A. 44 V

B. 110 V

C. 132 V

D. 220 V

Answer: C

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67. In series L-C-R circuit, resistance, inductance and capacitance are connected in series. The value of potential difference across three are 70 V, 90 V and 65 V respectively. The value of potential difference of A.C. source is ......

A. 225 V

B. 95 V

C. 85 V

D. 74.3 V

Answer: D

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68. A coil of resistance R and inductance L is joined with a battery of E volt. The current passing through it will be ....

A. $\frac{E}{R}$

B. $\frac{E}{L}$

C. $\sqrt{\dfrac{E^2}{R^2 + L^2}}$

D. $\sqrt{\dfrac{EL}{R^2 + L^2}}$

Answer: A

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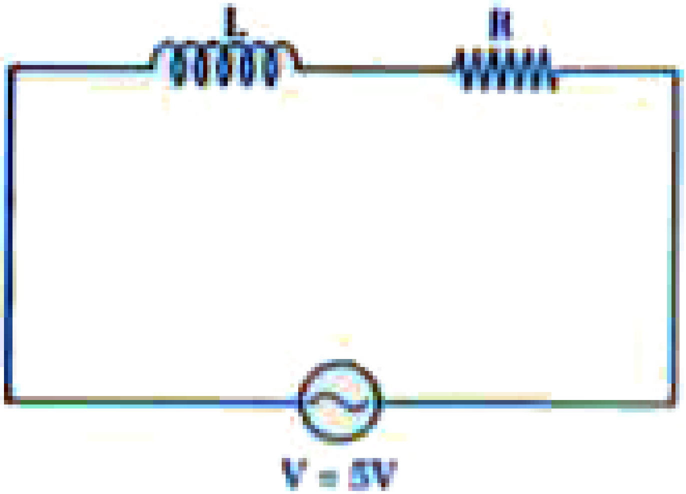
69. In a given circuit V = 5V, V_L = 3V then V_R =____



A. 0 V

B. 2 V

C. 3 V

D. 4 V

Answer: D

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70. A pure resistance and a pure inductance are connected in series across a 100 volt A.C line. A voltmeter gives same reading whether connected across resistance or inductance. It does read .... V.

A. 50 V

B. 70.7 V

C. 88.2 V

D. 100 V

Answer: B

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71. If we consider the phasor if I in positive X-direction for an A.C. circuit which has only inductor, then the phasor of V is in ....direction .

A. positive X

B. positive Y

C. negative X

D. negative Y

Answer: B

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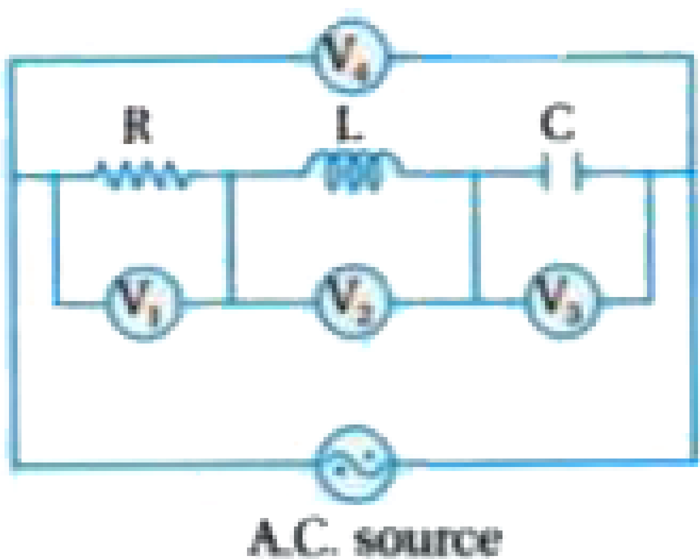

72.

When above circuit is in the condition of resonance,

A. Readings obtained in V_1 and V_3 are equal.

B. Readings obtained in V_1 and V_2 are equal.

C. Readings obtained in V_2 and V_3 are equal.

D. Readings obtained in V_2 and V_4 are equal.

Answer: C

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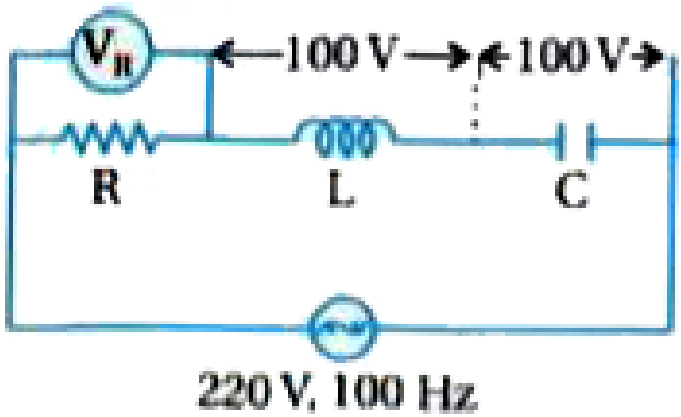
73.



Reading in voltmeter in above circuit is......

A. 300 V

B. 900 V

C. 200 V

D. 400 V

Answer: C

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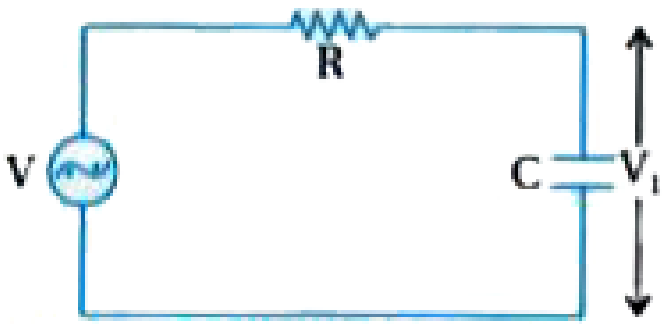
74. 

Voltage V_1 across the capacitor in above circuit is

A. in phase with source voltage V.

B. 90° ahead of source voltage V.

C. ahead of source voltage V by amount δ where $0 < \delta < 90^\circ$

D. lags behind the source voltage V by amount δ where $0 < \delta < 90^\circ$

Answer: D

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75. In Phasor's method, magnitude (or length) of vector (known as Phasor) gives ....

A. phase of harmonic function

B. magnitude of harmonic function

C. amplitude of harmonic function

D. frequency of harmonic function

Answer: A

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76. Phasor's method is used for ....

A. to obtain high A.C. voltage

B. to obtain high frequency of A.C.

C. to obtain addition of two harmonic functions

D. to obtain multiplication of two harmonic functions

Answer: C

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77. If in an A.C. L-C series circuit $X_L > X_C$.

Hence current ....

A. lags behind the voltage by $\frac{\pi}{2}$ in phase

B. lags the voltage by $\frac{\pi}{2}$ in phase

C. lags the voltage by π in phase

D. lags behind the voltage by π in phase

Answer: A

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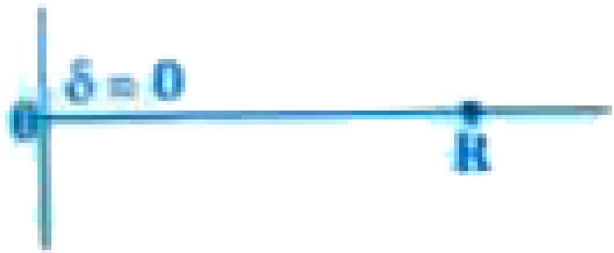
78. An A.C. source is connected to a resistive circuit, current ....



A. lags behind voltage in phase

B. and voltage are in the same phase

C. leads ahead to voltage in phase

D. in first half cycle it leads ahead to voltage and remain first half it lags behind voltage in phase.

Answer: B

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79. The relation between the phase of current and voltage in a circuit containing only inductor is ....

A. voltage leads ahead by $\frac{\pi}{2}$

B. current leads ahead by $\frac{\pi}{2}$

C. both are in same phase

D. phase difference is π

Answer: A

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80. In an A.C. circuit the value of inductive reactance connected with it, then the phase difference between current in coil and voltage = ... rad.

A. $\frac{\pi}{2}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{6}$

Answer: C

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81. In an A.C. circuit, voltage applied is V = 220 sin 100t. If the impedance is 110Ω and phase difference between current and voltage is 60°, the power consumption is equal to ....

A. 50 W

B. 110 W

C. 220 W

D. 330 W

Answer: B

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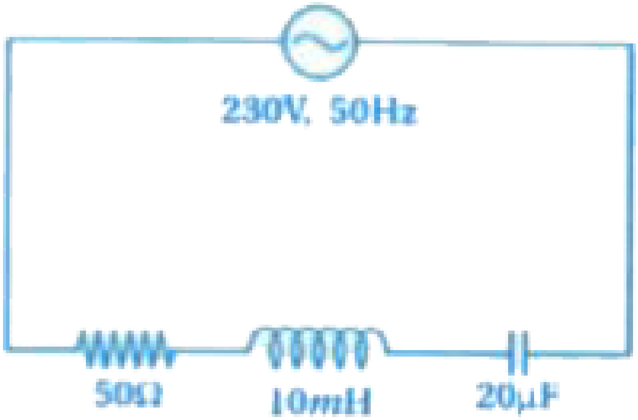
82. In an L-C-R series circuit, R = 500Ω L = 10 ml of an ideal inductor and C = 20 μF, thes components connected to A.C. source of 230 V

50Hz. The power in the circuit will be .....



A. 98 W

B. 89 W

C. 980 W

D. 98 mW

Answer: A

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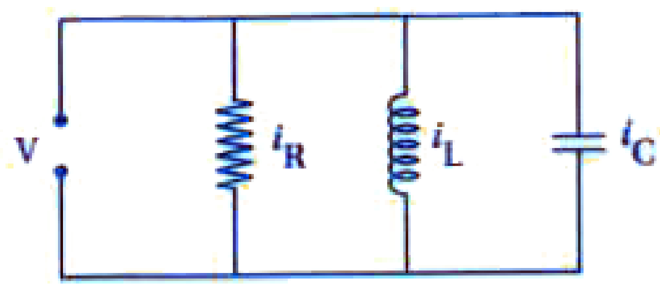
83. As shown in figure instantaneous current passing through the circuit from R, L and C are shown then the total current is ....



A. $i_R + i_L + i_C$

B. $i_A + (i_L - i_C)$

C. $\left[i_A^2 + (i_L - i_C)^2\right]^{\frac{1}{2}}$

D. $\left[i_A^2 + \left(i_L^2 - i_C^2\right)\right]^{\frac{1}{2}}$

Answer: A

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84. The potential difference between the two ends of the three mponents of L-C-R series A.C. circuit are V_L, V_C and V_R respectively. Then voltage of A.C. source is ....

A. $V_L + V_C + V_R$

B. $V_R + V_L - V_C$

C. $\sqrt{V_R^2 + (V_L + V_C)^2}$

D. $\sqrt{V_R^2 + (V_L - V_C)^2}$

Answer: A

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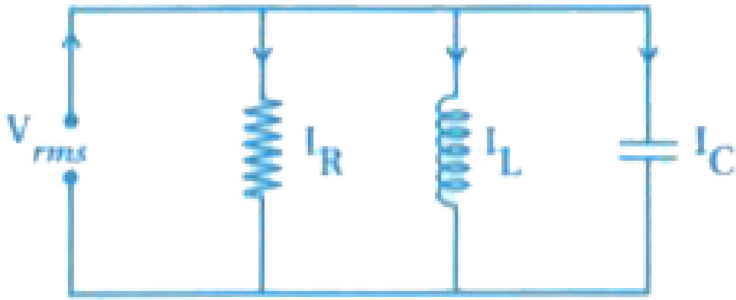
85. In the given figure, total V_{rms} and I_{rms} passing from various components in circuit are shown. Then total I_{rms}= ......



A. $I = I_R + I_L + I_C$

B. $I = I_R + I_L - I_C$

C. $I = \sqrt{I_R^2 + (I_L - I_C)^2}$

D. $I = \sqrt{I_R^2 + (I_C - I_L)^2}$

Answer: C

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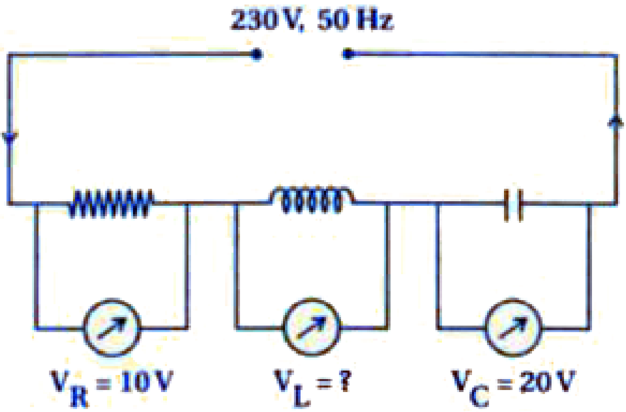
86. In the circuit given below the reading of voltmeter across L will be ....



A. 249.8 V

B. 20 V

C. 10 V

D. 200 V

Answer: A

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87. Voltage and current in an a.c. circuit are given by V=5 sin $\left(100\pi t - \frac{\pi}{6}\right)$ and I=4 sin $\left(100\pi t + \frac{\pi}{6}\right)$ then ....

A. voltage leads the current 30°

B. current leads the voltage by 30°

C. current leads the voltage by 60°

D. voltage leads the current by 60°

Answer: C

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88. An alternating voltage is connected in series with a resistor R and an inductor L. If the potential drop across the resistor is 200 V and across the inductor is 150 V, then what is the applied voltage ?

A. 350 V

B. 250 V

C. 500 V

D. 300 V

Answer: B

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89. In an a.c. circuit containing an inductor of zero resistance, the emf of the applied A.C. voltage leads the current by ....

A. 90°

B. 45°

C. 30°

D. 0°

Answer: A

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90. An alternating current source of frequency 100 Hz is joined to a series combination of a resistance, a capacitance and a coil in series. The potential difference across the coil, the resistance and the capacitor is 46, 40 and 8 volt respectively. What is the electromotive force of alternating current source in volt ?

A. 94

B. 14

C. 10

D. 76

Answer: C

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91. In an A.C. circuit, a resistance of R Ω connected in series with an inductance If phase angle between voltage and current 45°. Then what will be the value of inducti reactance ?

A. $\frac{R}{4}$

B. $\frac{R}{2}$

C. R

D. cannot be found with the given data.

Answer: C

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92. A 12 Ω resistor and a 0.21 henry inductor are connected in series to an A.C. source operating at 20 volt, 50 cycle/second. What is the phase angle between the current and the source voltage ?

A. 30°

B. 40°

C. 80°

D. 90°

Answer: C

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93. In a series L-C-R circuit, resistance R = 10 Ω and the impedance Z =20 Ω . The phase difference between the current and the voltage is .....

A. 30°

B. 45°

C. 60°

D. 90°

Answer: C

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94. An inductance of $\left(\frac{200}{\pi}\right)$ mH, a capacitance of $\left(\frac{10^{-3}}{\pi}\right)F$ and a resistance of 10Ω are connected in series with an a.c. source 220 V, 50Hz. Then what is the phase angle of the circuit ?

A. $\frac{\pi}{4}$ rad

B. $\frac{\pi}{3}$ rad

C. $\frac{\pi}{2}$ rad

D. $\frac{\pi}{6}$ rad

Answer: A

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95. At which angular frequency of source, current in series LCR A.C. circuit would be maximum ?

A. $\sqrt{LC}$

B. $\dfrac{1}{\sqrt{LC}}$

C. $\sqrt{\dfrac{L}{C}}$

D. $\dfrac{1}{\sqrt{LC}}$

Answer: B

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96. When resonance takes place in series LCR A.C. circuit,

A. current is minimum.

B. phase difference between current and voltage is 90°

C. phase difference between current and voltage is 0°

D. phase difference between current and voltage is 0°

Answer: D

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97. For one series LCR A.C. circuit, voltages across L, C and R are each 10 V. Now, if only resistance is made half, new voltages across L, C and R will be .....,.... and ... respectively.

A. 10 V , 10 V and 5 V

B. 10 V , 10 V and 10 V

C. 20 V , 20 V and 5 V

D. 20 V , 20 V and 10 V

Answer: D

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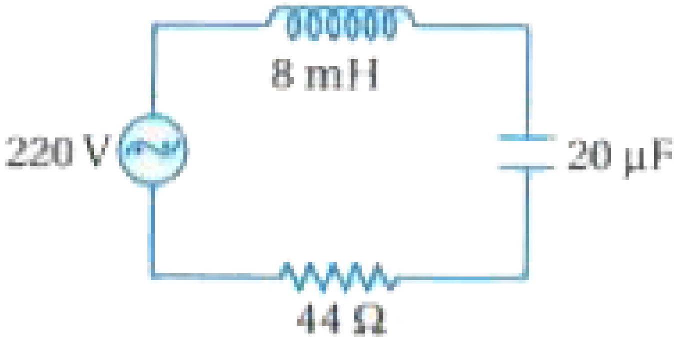
98.



For resonance in above circuit angular frequency and amplitude of current are respectively.....and ......

A. 2500 rad s^{-1} and $5\sqrt{2}A$

B. 2500 rad s^{-1} and 5A

C. 2500 rad s^{-1} and $\frac{5}{\sqrt{2}}$ A

D. 250 rad s^{-1} and $5\sqrt{2}$ A

Answer: A

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99. The value of the Q-factor in an L-C-R series circuit is ....

A. dependent on the frequency of the A source.

B. dependent on the values of all three components L, R and C.

C. dependent only on the values of L

D. it may or may not depend on the power factor .

Answer: B

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100. What is the rms value of the current for A current I=100 cos (200t + 45°) A ?

A. $50\sqrt{2}A$

B. 100A

C. $100\sqrt{2}A$

D. 0

Answer: A

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101. Resonance frequency for L-C-R, AC series circuit is f_0= ......

A. $\dfrac{1}{2\pi\sqrt{LC}}$

B. $\dfrac{2\pi}{\sqrt{LC}}$

C. $\dfrac{\sqrt{LC}}{2\pi}$

D. $\dfrac{2\pi}{LC}$

Answer: A

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102. For L-C-R, A.C. circuit resonance frequency is 600 Hz and frequencies at half power point are 550 Hz and 650 Hz. What will be the Q-factor ?

A. $\frac{1}{6}$

B. $\frac{1}{3}$

C. 6

D. 3

Answer: C

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103. For series L-C-R circuit, L = 10mH and $C = 10^{-7}$ F If resonance frequency is made double without changing inductor, the capacitance must be .... μF.

A. 0.25

B. 0.025

C. 2.5

D. 25

Answer: B

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104. The current from an A.C. source is given by $I = 2\cos(\omega t + \phi)$ then rms value of current is ......

A. zero

B. $\sqrt{2}A$

C. 2A

D. $2\sqrt{2}A$

Answer: B

Watch Video Solution

105. For an L-C-R series circuit, the Q-factor is ...

A. $Q = R\sqrt{\frac{L}{C}}$

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

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

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

Answer: B

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106. 20Ω resistor is connected with the A.C. source of V = 282sin (120 πt), the current passing through the resistor will be ....

A. 14.1 A

B. 10A

C. 7.05 A

D. 5A

Answer: B

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107. The sharpness of an L-C-R series resonance curve ......

A. is more if Q - factor is small

B. is more if Q - factor is 1

C. is more if Q - factor is large

D. is determined by resonant frequency

Answer: C

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108. The value of half power bandwidth of resonance curve of L-C-R series circuit does not depend on ....

A. R

B. L

C. C

D. both L and R

Answer: C

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109. Q - factor for resonance curve of L-C-R series circuit is defined as ....

A. $\omega_0 \Delta\omega$

B. $\frac{\omega_0}{\Delta\omega}$

C. $\frac{\Delta\omega}{\omega_0}$

D. $\sqrt{\omega_0 \Delta\omega}$

Answer: B

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110. In a series L-C-R circuit R = 100Ω, L = 1H and C= 1 μ E The half power bandwidth is ....

A. 100

B. 10

C. 0.1

D. 0.01

Answer: A

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111. A 10Ω resistance, 5mH inductor and $10\mu F$ capacitor are joined in series. When a suitable frequency of alternating current source is joined to this combination, the circuit resonates. If the resistance is halved, the resonance frequency ......

A. is halved

B. is doubled

C. remains unchanged

D. in quadrupled

Answer: C

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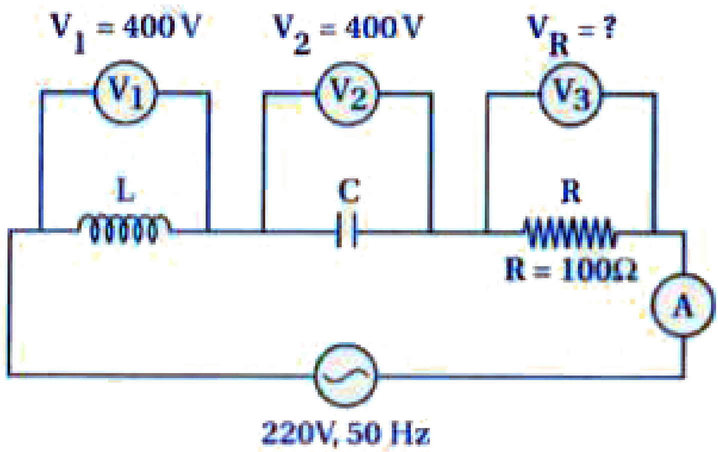
112. In a series L-C-R, A.C. circuit, V_1, V_2 and V_3 are the voltmeters connected to L, C and R respectively and ammeter A also connected as shown in figure. Reading of V_3 and A will be ......



A. 400 V, 4 A

B. 220 V , 4 A

C. 220 V , 2.2 A

D. 400 V , 2.2 A

Answer: C

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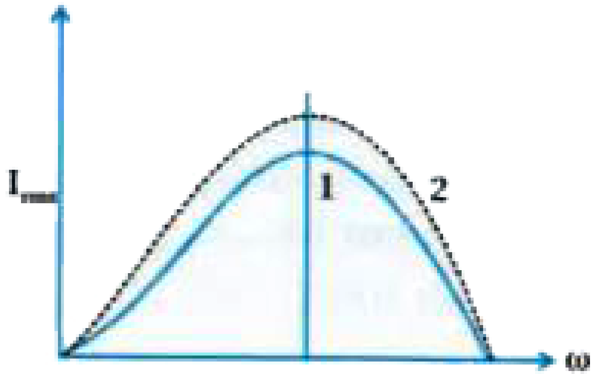
113. Figure shows two resonance current with same voltage source for L-C-R series A.C. circuit If R_1, L_1, C_1 and R_2, L_2, C_2 are the component values in two cases respectively

....



A. $R_1 = R_2$

B. $R_1 < R_2$

C. $L_1C_1 < L_2C_2$

D. $L_1C_1 = L_2C_2$

Answer: D

Watch Video Solution

114. If instantaneous current is given by i=4 cos $(\omega t+\phi)$ ampere, than the rms value of current is ...... ampere.

A. 4

B. $2\sqrt{2}$

C. $4\sqrt{2}$

D. 0

Answer: B

Watch Video Solution

115. In an a.c. circuit , peak value of voltage is 423 volt. Its effective voltage is ...... volt.

A. 400

B. 323

C. 300

D. 340

Answer: C

Watch Video Solution

116. If E_0 represents the peak value of the voltage in an a.c. circuit, the rms value of the voltage will be ......

A. $\frac{E_0}{\pi}$

B. $\frac{E_0}{2}$

C. $\frac{E_0}{\sqrt{\pi}}$

D. $\frac{E_0}{\sqrt{2}}$

Answer: D

Watch Video Solution

117. The peak value of 220 volts of a.c. mains is ...... volt.

A. 115.6

B. 22

C. 311.0

D. 440

Answer: C

Watch Video Solution

118. In an A.C. circuit of inductance 50 mH with negligible resistance and a capacitor of capacitance 500 pF are connected in series. The resonance frequency for the given circuit is ....

A. $\frac{10^5}{\pi}$ Hz

B. $\frac{1}{\pi}$ Hz

C. $\frac{100}{\pi}$ Hz

D. $\frac{1000}{\pi}$ Hz

Answer: A

Watch Video Solution

119. An alternating current is given by the equation $i = (i_1 \cos \omega t + i_2 \sin \omega t)$. The rms current is given by ....

A. $\dfrac{1}{\sqrt{2}}(i_1 + i_2)$

B. $\dfrac{1}{\sqrt{2}}(i_1 + i_2)^2$

C. $\dfrac{1}{\sqrt{2}}\left(i_1^2 + i_2^2\right)^{\frac{1}{2}}$

D. $\dfrac{1}{2}\left(i_1^2 + i_2^2\right)^{\frac{1}{2}}$

Answer: C

Watch Video Solution

120. In a circuit, the value of the alternating current is measured by hot wire ammeter as 10 ampere. What will be its peak value ?

A. $10A$

B. $20A$

C. $14.14A$

D. $7.07A$

Answer: C

Watch Video Solution

121. The frequency of an alternating voltage is 50 cycles/s and its amplitude is 120 V. Then what is the rms value of voltage ?

A. 101.3 V

B. 84.9 V

C. 70.7 V

D. 56.5 V

Answer: B

Watch Video Solution

122. For a series L-C-R a.c.circuit at resonance, the statement which is not true ?

A. Wattless current is zero

B. Power factor is zero

C. Peak energy stored by a capacitor = peak energy stored by an inductor

D. Average power = apparent power

Answer: A::B

Watch Video Solution

123. An A.C. circuit consists of an Indicator of inductance 0.5H and a capacitor of capacitance 8 μF in series. When the current in the circuit is maximum, what is the angular frequency of A.C. source ?

A. 500 rad/s

B. 2×10^5 rad/s

C. 4000 rad/s

D. 5000 rad/s

Answer: A

Watch Video Solution

124. The phase difference between the current and voltage of L-C-R circuit in series combination at resonance is ......

A. 0

B. $\frac{\pi}{2}$

C. π

D. $-\pi$

Answer: A

Watch Video Solution

125. The resonant frequency of a circuit is f. If the capacitance is made 4 times the initial values, then the resonant frequency will become ......

A. $\frac{f}{2}$

B. 2f

C. f

D. $\frac{4}{f}$

Answer: A

Watch Video Solution

126. An L-C-R series circuit with R = 100Ω is connected to a 200 V, 50 Hz A.C. source when only the capacitance is removed, the current lags the voltage by 60°. When only the inductance is removed, the current leads the voltage by 60°. Find the current in the circuit.

A. $4A$

B. $2A$

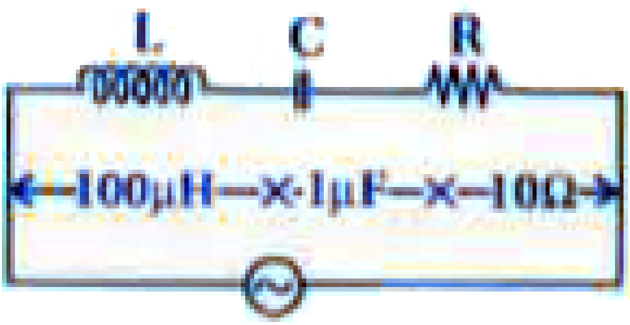
C. $6A$

D. $8A$

Answer: B

Watch Video Solution

127. As shown in figure series L-C-R circuit , when driven by an emf source of angular frequency 70 kilo-radians per second. Prove that the circuit effectively behaves like series R-C circuit .



A. 4.28Ω

B. 24.28Ω

C. 16.28Ω

D. 14.28Ω

Answer: D

Watch Video Solution

128. A transistor oscillator using a resonant circuit with an inductor L (of negligible resistance and a capacitor C in series produce oscillation of frequency f. If L is doubled and C is changed to 4C, then what will be the resonance frequency ?

A. $\frac{f}{2\sqrt{2}}$

B. $\frac{f}{3\sqrt{2}}$

C. $\frac{f}{4\sqrt{2}}$

D. $\frac{f}{1\sqrt{2}}$

Answer: A

Watch Video Solution

129. The A.C. voltage and the current in a circuit are given by the following expressions. $V = 110\sqrt{2}\cos(2000t + 25^\circ)V$ and $I = 10\sqrt{2}$ cos (2000t - 20°)A. Calculate impedance and resistance of the circuit.

A. 7.679 Ω

B. 7.579 Ω

C. 7.779 Ω

D. 7.879 Ω

Answer: C

Watch Video Solution

130. In the transmission of a.c. power through transmission lines, when the voltage is stepped up n times, the power loss in transmission ....

A. increases n times

B. decreases n times

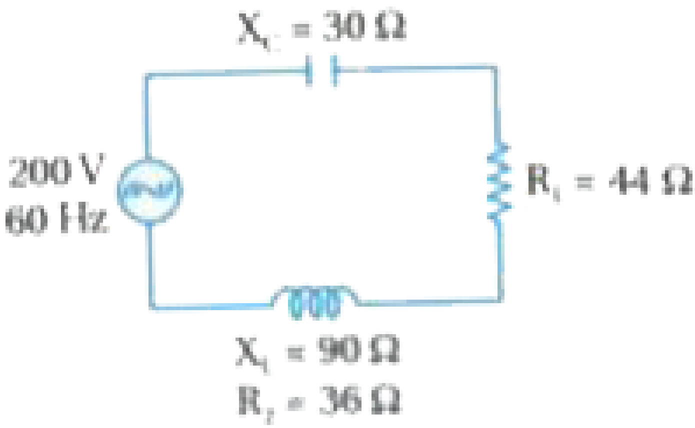
C. increases n^2 times

D. decreases n^2 times

Answer: D

Watch Video Solution

131.



As shown in the figure, series combination of ideal capacitor, pure resistor and a practical inductor are connected in series with an ac source 200 V, 60 Hz. Find power consumed in inductor.

A. 320 W

B. 176 W

C. 144 W

D. 0 W

Answer: C

Watch Video Solution

132. Three series A.C. circuits (i) RC (ii) RL and (iii) LC (where values of L and C are such that $X_L = X_C$) are connected turn by turn with a given A.C. source with angular frequency ω. If power consumed in these circuits are respectively P_1, P_2 and P_3 then ....

A. $P_1 > P_2 > P_3$

B. $P_1 = P_2 < P_3$

C. $P_1 = P_2 > P_3$

D. $P_1 = P_2 = P_3$

Answer: C

Watch Video Solution

133. For one series A.C. circuit, its reactance is equal to its resistance. Then its power factor is ....

A. 1

B. $\frac{1}{2}$

C. $\frac{1}{\sqrt{2}}$

D. 0

Answer: C

Watch Video Solution

134. Wattless current is possible in a circuit having ....

A. only R

B. R and C

C. R and L

D. L and C

Answer: D

Watch Video Solution

135. In a series LCR A.C. circuit, by keeping resistance constant, power factor can be increased by decreasing ....

A. inductance

B. capacitance

C. both (A) and (B)

D. $|X_L - X_C|$

Answer: B

Watch Video Solution

136. Ratio of power factor in two A.C. circuits (i) containing only resistance and (ii) containing only inductor is ....

A. 1

B. 0

C. ∞

D. x (where x $\in$ N)

Answer: C

Watch Video Solution

137. Total energy of one LC circuit is xJ. Then at t=0, energy of fully charged capacitor and inductor are respectively .....and ....

A. x,0

B. $\frac{x}{2}, \frac{x}{2}$

C. 0,x

D. x,x

Answer: A

Watch Video Solution

138. A circuit connected with a source of 230 V, draws a current of 2A and power consumed from it is 100 W, then power factor of the circuit is ....

A. 0.02

B. 1.2

C. 0.22

D. 2.2

Answer: C

Watch Video Solution

139. An alternating current of frequency f is flowing in a circuit containing only a inductor L. If V_0 and I_0 represent peak values of voltage and current respectively , the average power given by source to inductor is equal to ......

A. 0

B. $0.5V_0I_0$

C. $I_0^2 2\pi fL$

D. $V_0I_{02}\pi fL$

Answer: A

Watch Video Solution

140. At alternating voltage is applied across the R-L combination V =220 sin 120t V and the current I = 4sin (120t - 60°)A developes. The power consumption is ......

A. 0

B. 110 W

C. 220 W

D. 440 W

Answer: C

Watch Video Solution

141. A chock coil has negligible resistance. The alternating p.d. across it, is 220V and the current is 5 mA. The power consumed is ....

A. $220 \times \frac{5}{1000}$ W

B. $\frac{220}{5}$ W

C. 0

D. 220 x 5W

Answer: C

Watch Video Solution

142. Power factor in an L-C-R circuit is ....

A. 0

B. 0.5

C. 1

D. depends on the value of L, C, R

Answer: C

Watch Video Solution

143. If 2.2 kW of power having 22000 V is transmitted on a transmission line with 10Ω resistance then power dissipated in the form of thermal energy will be ......

A. 0.1 W

B. 1 W

C. 10 W

D. 100 W

Answer: A

Watch Video Solution

144. ...... Oscillates in LC circuit.

A. Inductor

B. Capacitor

C. Waves

D. Charge

Answer: D

Watch Video Solution

145. Charge in LC oscillations,

A. decreases continuously.

B. increases continuously.

C. changes periodically.

D. remains constant.

Answer: C

Watch Video Solution

146. In order to continue emission of electromagnetic waves from LC oscillations, we should

A. increase the capacitance of a capacitor.

B. increase the inductance of an inductor.

C. continuously supply energy to LC circuit which can compensate the energy lost in emission.

D. use silver wire in LC circuit (which has low resistance)

Answer: C

Watch Video Solution

147. In LC oscillator circuit, at t = 0, ……

A. time rate of flow of electric charge is maximum.

B. time rate of flow of electric charge is zero.

C. time rate of flow charge of electric current is zero.

D. time rate of flow charge of electric current is minimum.

Answer: B

Watch Video Solution

148. In L-C oscillator circuit ....

A. when $Q = 0$, I is maximum

B. when $Q = 0$, I is zero

C. when Q is maximum, I is maximum

D. none of these

Answer: A

Watch Video Solution

149. In L-C oscillator circuit inductor ....

A. having high resistance

B. having zero inductance

C. having zero ohmic resistance (ideally)

D. none of these

Answer: C

Watch Video Solution

150. At t = 0, time in L-C oscillator circuit ....

A. change in Q is maximum

B. rate of change of Q is zero

C. change in I is zero.

D. change in I is maximum

Answer: B

Watch Video Solution

151. In R-C circuit when charge on the plate of the capacitor is increasing, the energy obtain from the source is stored in ....

A. electric field

B. magnetic field

C. gravitational field

D. both magnetic and gravitational field

Answer: A

Watch Video Solution

152. In an L-C oscillator circuit having a completely charged capacitor, with the passage of time ....

A. the electric current increases gradually

B. the energy of the circuit continuously increases.

C. the energy of the circuit continuously decreases.

D. there is a continuous absorption of the electromagnetic wave.

Answer: C

Watch Video Solution

153. Time taken from zero to maximum for an A.C. voltage of frequency 50Hz will be .... ms.

A. 5

B. 10

C. 20

D. 50

Answer: A

Watch Video Solution

154. Initially conditions of L-C oscillator circuit

....

A. Q=0 , I=0 and t=0

B. $Q = Q_0, I = I_0$ and t=0

C. Q=0 , $I = I_0$ and t=0

D. $Q = Q_0, I = 0$ and t=0

Answer: D

Watch Video Solution

155. In R-C circuit when charge on the plate of the capacitor is increasing, the energy obtain from the source is stored in ....

A. electric field

B. magnetic field

C. gravitational field

D. none of these

Answer: A

Watch Video Solution

156. In oscillator circuit, presence of ....are necessary

A. R and C

B. R and L

C. C and R

D. both C and L

Answer: D

Watch Video Solution

157. Generally, core of transformer is made up of ....

A. steel

B. copper

C. soft iron

D. aluminium

Answer: C

Watch Video Solution

158. Which of following quantities remains constant in transformer ?

A. Frequency

B. Voltage

C. Current

D. None of above

Answer: A

Watch Video Solution

159. Working of a transformer is based upon principle of ......

A. self induction

B. mutual induction

C. electrical inertia

D. magnetic effect of electric current

Answer: B

Watch Video Solution

160. If N_P and N_S are respectively no. of turns in primary and secondary coil then for step up transformer,

A. $N_S > N_P$

B. $N_S < N_P$

C. $N_S = N_P$

D. $N_P = 2N_S$

Answer: A

Watch Video Solution

161. Transformation ratio of one transformer is 1:2. If Leclanche cell having emf 1.5 V is connected to primary coil of a transformer then voltage obtained across its secondary is ....

A. 3 V

B. 1.5 V

C. 0.75 V

D. 0

Answer: D

Watch Video Solution

162. 240 A.C. mains supply is given to one transformer which draws 0.7 A from it. This transformer is used to operate a bulb having power rating "24 V, 140 W". Then efficiency of this transformer is ......

A. 63.8%

B. 74%

C. 83.3%

D. 48%

Answer: C

Watch Video Solution

163. If the coils of a transformer are made up of thick wire, then ...

A. eddy currents loss will be more

B. magnetic flux leakage is reduced

C. joule's heating loss is increased

D. joule's heating loss is reduced

Answer: D

Watch Video Solution

164. Which device is used to increase or decrease A.C. voltage ?

A. Oscillator

B. Voltmeter

C. Transformer

D. Rectifier

Answer: C

Watch Video Solution

165. A step up transformer has transformation ratio of 3: 2. What is the voltage in secondary if voltage in primary coil is 30 V ?

A. 45 V

B. 15 V

C. 90 V

D. 300 V

Answer: A

Watch Video Solution

166. A step-up transformer operates on a 230V line and supplies 2A to a load. The ratio of primary and secondary windings is 1 : 25, then the current in primary is ....

A. 15 A

B. 25 A

C. 50 A

D. 12.5 A

Answer: C

Watch Video Solution

167. 240 A.C. mains supply is given to one transformer which draws 0.7 A from it. This transformer is used to operate a bulb having power rating "24 V, 140 W". Then efficiency of this transformer is ......

A. $90\ \%$

B. $80\ \%$

C. $70\ \%$

D. $60\ \%$

Answer: B

Watch Video Solution

168. The ratio of primary and secondary turns in a transformer is 1: 200. If 220 V A.C. is fed to primary, voltage across secondary will be ....

A. 44 V

B. 220 V

C. $\frac{220}{200}$ V

D. 44 kV

Answer: D

Watch Video Solution

169. The ratio of primary and secondary turns in a transformer is 3:2, if 30V a.c. is fed to primary, voltage across secondary will be ....

A. 15 V

B. 45 V

C. 90 V

D. 300 V

Answer: B

Watch Video Solution

170. If current is not obtained from secondary coil of an ideal transformer, then the power factor of primary coil of transformer is ....

A. 0

B. $\frac{1}{2}$

C. 1

D. infinite

Answer: A

Watch Video Solution

171. If number of turns in primary and secondary coils is increased to two times each, the mutual inductane .....

A. becomes four times

B. becomes two times

C. becomes $\frac{1}{4}$ times

D. remains unchanged

Answer: A

Watch Video Solution

172. If for an ideal step-up transformer current in primary is I_P and current in secondary is I_S, their respective voltage are V_P and V_S, then......

A. $I_S V_S = I_P V_P$

B. $I_S V_S > I_P V_P$

C. $I_S V_P < I_P V_P$

D. $I_S V_P < I_P V_S$

Answer: A

Watch Video Solution

173. A transformer has an efficiency of 80%. It works at 100V and 4kW. If secondary voltage is 240 V, the current in primary coil is ......

A. 0.4 A

B. $4A$

C. $10A$

D. $40A$

Answer: D

Watch Video Solution

174. For step-down transformer value of transformation ratio is ....

A. $r > 1$

B. $r < 1$

C. $r = 1$

D. $r = 0$

Answer: B

Watch Video Solution

175. In a step-up transformer, use of 120 V line provides a potential difference of 2400 V. If th primary coil has 75 turns, number of turns i secondary coil is ....

A. 150

B. 1500

C. 1200

D. 1575

Answer: B

Watch Video Solution

176. In a noiseless transformer, an alternating current of 2A is flowing in primary coil. The number of turns in primary and secondary coil are 100 and 20 respectively the secondary current is ....

A. 0.4 A

B. $5A$

C. 0.08 A

D. $10A$

Answer: D

Watch Video Solution

177. A low loss transformer has 250 V applied to primary and gives 4.6 V in secondary. The secondary is connected to a load which draws 5A current. The current flowing in primary is

....

A. 0.1 A

B. 1.0 A

C. $10A$

D. 250 A

Answer: A

Watch Video Solution

178. In an ideal transformer, the voltage is stepped down from 11 kV to 220 V. If the primary current be 100 A, the current in the secondary should be ......

A. 5 kA

B. 1 kA

C. 0.5 kA

D. 0.1 kA

Answer: A

Watch Video Solution

179. The ratio of number of turns in primary and secondary coil of a transformer is 1:20 the ratio of current in primary and secondary coils will be ....

A. $1:20$

B. $20:1$

C. $1:400$

D. $400:1$

Answer: B

Watch Video Solution

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180. The number of turns in primary and secondary of a transformer are 1000 and 3000 respectively. If 80 V A.C. applied to the primary, the potential difference per turn across secondary would be ......

A. 0.08V

B. 24V

C. 240V

D. 2400V

Answer: A

Watch Video Solution

181. A transformer is having 2100 turns in primary and 4200 turns in secondary. An A.C. source of 120 V, 10 A is connected to its primary, the secondary voltage and current are ....

A. 240 V, 5 A

B. 120 V, 10 A

C. 240 V , 10 A

D. 120 V, 20 A

Answer: A

Watch Video Solution

182. Transformer are used in ....

A. DC circuits only

B. AC circuits only

C. Integrated circuits

D. All above these

Answer: B

Watch Video Solution

183. A step-up transformer is used on a 120V line to provide a potential difference of 240V, if the primary coil has 75 turns the number of turns in the secondary coil is ....

A. 150

B. 1200

C. 1500

D. 1575

Answer: A

Watch Video Solution

184. The power is transmitted from a power house on high voltage a.c. because

A. electric current travels faster at higher volts.

B. it is more economical due to less power voltage.

C. it is difficult to generate power at low voltage.

D. chances of stealing transmission lines are minimized.

Answer: B

Watch Video Solution

185. Number of turns in the primary coil and the secondary coil of an ideal transformer are 500 and 2500 respectively. If current in the secondary coil is 0.2 A, calculate current in the primary coil. Also calculate transformer ratio. If voltage in the secondary coil is 750 V, calculate voltage in the primary coil.

A. 150 V

B. 160 V

C. 170 V

D. 140 V

Answer: A

Watch Video Solution

186. In one series A.C. circuit, maxima of current and voltage occur at the same moment. Then which of following component must have been connected to source ?

A. Only resistor

B. Only inductor

C. Only capacitor

D. Series connection of inductor and capacitor

Answer: A

Watch Video Solution

187. When A.C. current with frequency v is passed through series connection of inductor and capacitor, current obtained is maximum.

Now when they are connected in parallel, current would become minimum at .... frequency.

A. v

B. $\frac{v}{2}$

C. 2v

D. v^2

Answer: A

Watch Video Solution

188. If the value of potential is an a.c, circuit is 10 V. Then what is the peak value of potential ?

A. $\frac{10}{\sqrt{2}}$

B. $10\sqrt{2}$

C. $20\sqrt{2}$

D. $\frac{20}{\sqrt{2}}$

Answer: B

Watch Video Solution

1. Power factor of AC series circuit having resistance R and inductor L having angular frequency ω is ....

A. 0

B. $\frac{R}{\sqrt{R^2+\omega^2 L^2}}$

C. $\frac{\omega L}{R}$

D. $\frac{R}{\omega L}$

Answer: B

Watch Video Solution

2. A transformer has 140 turns in the primary and 280 turns in the secondary. If current in primary is 4A, then the current in secondary will be ....

A. 4A

B. 2A

C. 6A

D. 10A

Answer: B

Watch Video Solution

3. In an oscillating L-C circuit the maximum charge on the capacitor is Q. What will be the charge on the plate of the capacitor, when energy stored in magnetic field and electric field are equal ?

A. $\frac{Q}{3}$

B. $\frac{Q}{\sqrt{2}}$

C. Q

D. $\frac{Q}{2}$

Answer: B

Watch Video Solution

4. Alternating current can not be measured by D.C. ammeter because ....

A. A.C. can not pass through D.C. ammeter.

B. A.C. changes direction

C. Average value of current for complete cycle is zero.

D. D.C. ammeter will get damaged.

Answer: C

Watch Video Solution

5. In a L-C-R circuit capacitance is changed from C to 2C. For the resonant frequency to remain unchanged, the inductance should be changed from L to .....

A. 4 L

B. 2 L

C. $\frac{L}{2}$

D. $\frac{L}{4}$

Answer: C

Watch Video Solution

6. In a L-C-R series A.C. circuit, the voltage across each of the components, L, C and R is

50V. The voltage across the L-C combination will be ......

A. 50V

B. $50\sqrt{2}$ V

C. 100 V

D. 0

Answer: D

Watch Video Solution

7. The power factor of A.C. circuit of resistance 12Ω and impedance 15Ω is ......

A. 1.25

B. 125

C. 0.8

D. 0.4

Answer: C

Watch Video Solution

8. The phase difference between the alternating current and emf is $\frac{\pi}{2}$ rad. Which of the following cannot be the constituent of the circuit ?

A. L,C

B. Only L

C. Only C

D. R

Answer: D

Watch Video Solution

9. In L-C-R series circuit at resonance p.d. between two ends of resistor is 100V. $R = 1k\Omega$ and C = 2μF, if resonant angular frequency is $\omega = 200\text{rad/s}^{-1}$, p.d. between two ends of inductor of resonance is .....

A. 250 V

B. 4×10^{-3} V

C. 2.5×10^{-10} V

D. 40 V

Answer: A

Watch Video Solution

10. In an A.C. generator, a coil with N turns, all the same area A and total resistance R, rotate with frequency ω in a magnetic field B. The maximum value of emf generated in the coil is .....

A. NABR

B. ωNAB

C. $\omega NABR$

D. NAB

Answer: B

Watch Video Solution

11. In A.C. circuit, when $E = E_0 \sin \omega t$ supply applied, current is obtained in circuit $I = I_0 \sin\left(\omega t - \frac{\pi}{2}\right)$, so power consumed is circuit will be ......

A. $P=\frac{E_0 I_0}{\sqrt{2}}$

B. P=zero

C. $P=\frac{E_0 I_0}{2}$

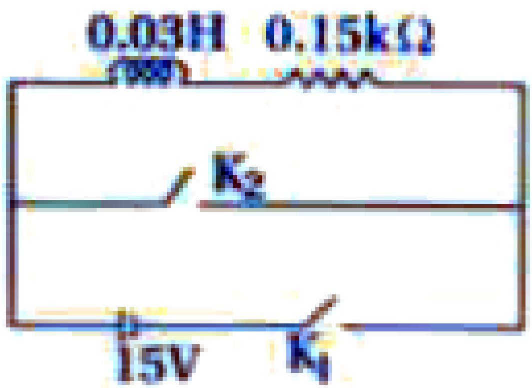
D. $P=\sqrt{2}E_0 I_0$

Answer: B

Watch Video Solution

12. An inductor (L = 0.03 H) and a resistor (R = 0.15 $k\Omega$) are connected in series to a battery of 15 V EMF in a circuit shown below The key K_1

has been kept closed for a long time. Then at t = 0, K_1 is opened and key K_2 is closed simultaneously. At t = 1 ms, the current in the circuit will be : $\left(e^5 \cong 150\right)$



A. 100 mA

B. 67 mA

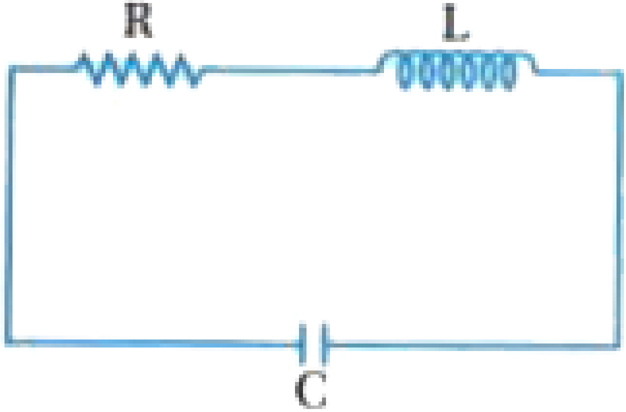
C. 6.7 mA

D. 0.67 mA

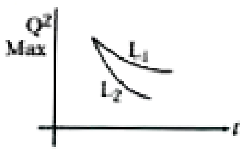
Answer: D

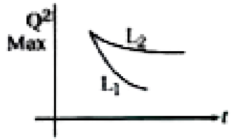
Watch Video Solution

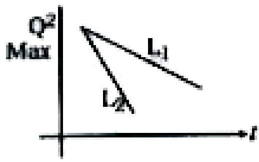
13. An LCR circuit is equivalent to a damped pendulum. In an LCR circuit the capacitor is charged to Q_0 and then connected to the L and R as shown below:



If a student plots graphs of the square of maximum charge (Q^2_{Max}) on the capacitor with time (t) for two different values L_1 and $L_2 (L_1 > L_2)$ of L then which of the following represents this graph correctly ? (plots are schematic and not drawn to scale)

A. 

B. 

C. 

D. 

Answer: A

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14. An arc lamp requires a direct current of 10 A at 80 V to function. If it is connected to a

220 V (rms), 50 Hz AC supply, the series inductor needed for it to work is closed to:

A. 80 H

B. 0.08 H

C. 0.044 H

D. 0.065 H

Answer: D

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15. For an RLC circuit driven with voltage of amplitude v_m and frequency $\omega_0 = \frac{1}{\sqrt{LC}}$ the current exibits resonance. The quality factor, Q is given by :

A. $\frac{\omega_0 L}{R}$

B. $\frac{\omega_0 R}{L}$

C. $\frac{R}{(\omega_0 C)}$

D. $\frac{CR}{\omega_0}$

Answer: A

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16. An emf of 20 V is applied at time t = 0 to a circuit containing in series 10 mH inductor and 5Ω resistor. The ratio of the currents at time t = ∞ and t = 40 s is close to (take e^2 = 7.389)

A. 1.06

B. 1.48

C. 1.15

D. 0.84

Answer: A

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17. An inductor of inductance L and resistance R is connected of A.C. circuit having angular frequency of ω . The value of quality factor Q is ......

A. $\left(\frac{\omega L^2}{R}\right)^2$

B. $\left(\frac{R}{\omega L^2}\right)^2$

C. $\frac{\omega L}{R}$

D. $\frac{R}{\omega L}$

Answer: C

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18. In an A.C circuit the current...

A. is in the phase with voltage

B. leads the voltage

C. lags the voltage

D. any of the above depending on the circumstances

Answer: D

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19. A primary of transformer has 100 turns an secondary has 500 turns. If input voltage 20 and frequency 50Hz, so the output voltage an frequency are... V and .... Hz

A. 200,500

B. 100,50

C. 20,50

D. 2,5

Answer: B

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20. If in an A.C. circuit voltage V and current is then the power dissipated in the circuit is ....

A. VIcosx

B. $\frac{1}{2}VI$

C. $\frac{1}{\sqrt{2}}VI$

D. depends on the phase difference between V and I.

Answer: D

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21. In a step-down transformer .... increases.

A. current

B. voltage

C. power

D. frequency

Answer: A

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22. The phase difference between current and voltage for L-C-R A.C. series circuit is ....

A. between 0 to $\pm \frac{\pi}{2}$

B. $\frac{\pi}{2}$

C. π

D. between 0 and $\frac{\pi}{2}$

Answer: A

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23. The value of capacitive reactance of capacitor X_C. If the values of capacitance and frequency becomes double, the value of capacitive reactance becomes ....

A. $4X_C$

B. $\frac{X_C}{2}$

C. $\frac{X_C}{4}$

D. $2X_C$

Answer: C

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24. When a wire loop is rotated in a magnetic field the direction of induced emf changes once in each .....

A. $\frac{1}{4}$ revolution

B. $\frac{1}{2}$ revolution

C. 1 revolution

D. 2 revolution

Answer: B

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25. In L-C-R circuit, the energy dissipated in ....

A. L only

B. C only

C. R only

D. all of the above

Answer: C

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26. The voltage of an A.C. source varies with time according to the equation $V = 100 \sin 100\pi t \cos 100\pi t$, where t is in second and V is in volt, then ....

A. the peak voltage of the source is 100 V

B. the peak voltage of the source is 50 V

C. the peak voltage of the source is $\frac{100}{\sqrt{2}}$V

D. the frequency of the source is 50 Hz.

Answer: B

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27. A L-C-R circuit connected to an A.C. source of frequency f. If current in phase leads by 45° then voltage, the capacitance of capacitor ....

A. $\dfrac{1}{2\pi f(2\pi fL - R)}$

B. $\dfrac{1}{2\pi f(2\pi fL + R)}$

C. $\dfrac{1}{\pi f(2\pi fL - R)}$

D. $\dfrac{1}{\pi f(2\pi fL + R)}$

Answer: A

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28. A series R-C circuit is connected to an alternating voltage source. Consider two situations :-

(a) When capacitor is air filled.

(b) When capacitor is mica filled.

Current through resistor is i and voltage across capacitor is V then :-

A. $V_a = V_b$

B. $V_a < V_b$

C. $V_a > V_b$

D. $i_a > i_B$

Answer: C

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29. Which of the following combinations should be selected for better tuning of an L-C-R circuit used for communication ?

A. R=15 Ω, L=3.5 H , C=30 μF

B. $R = 25\Omega, L = 1.5H, C = 45\mu F$

C. $R = 20\Omega, L = 1.5H, C = 35\mu F$

D. $R = 25\Omega, L = 2.4H, C = 45\mu F$

Answer: A

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30. The potential differences across the resistance, capacitance and inductance are 80 V, 40 V and 100 V respectively in an L-C-R circuit. The power factor of this circuit is

A. 0.8

B. 1.0

C. 0.4

D. 0.5

Answer: A

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31. A small signal voltage V(t) = V_0 sinωt is applied across an ideal capacitor C.

A. Over a full cycle the capacitor C does not consume any energy from the voltage source

B. Current I(t) is in phase with voltage V(t)

C. Current I(t) leads voltage V(t) by 180°

D. Current I(t) leads voltage V(t) by 90°

Answer: A

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32. An inductor 20 mH, a capacitor 50 μF and a resistor 40Ω are connected in series across a source of emf V = 10sin 340t. The power loss in A.C. circuit is

A. 0.67 W

B. 0.76 W

C. 0.89 W

D. 0.51 W

Answer: D

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33. An inductor 20 mH, a capacitor 100 μF and a resistor 50 Ω are connected in series across a source of emf, V = 10 sin 314 t. The power loss in the circuit is.

A. 1.13 W

B. 0.79 W

C. 2.74 W

D. 0.43 W

Answer: B

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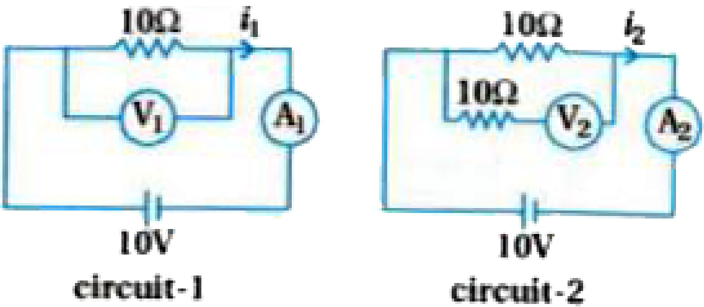
34.



For the reading obtained in ideal voltmeters and ammeters in above circuits.

A. $V_2 > V_1$ and $i_1 > i_2$

B. $V_2 < V_1$ and $i_1 = i_2$

C. $V_1 = V_2$ and $i_1 > i_2$

D. $V_1 = V_2$ and $i_1 = i_2$

Answer: D

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35. An alternating voltage $V = V_0$ sinωt is applied across a circuit. As a result the current $I = I_0 \sin\left(\omega t - \frac{\pi}{2}\right)$ flows in it. The power consumed in the circuit per cycle is ......

A. 0

B. 0.5 $V_0 I_0$

C. 0.707 $V_0 I_0$

D. 1.919 $V_0 I_0$

Answer: A

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36. In an A.C. circuit the ratio of inductive reactance and capacitive reactance is ......

A. 1

B. 0

C. $\omega^2 L$

D. $\omega^2 LC$

Answer: D

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37. A transformer has an efficiency of 80%. It works at 100 V and 4kW. If secondary voltage is 240 V, the current in primary coil is ....

A. $10A$

B. $4A$

C. $0.4A$

D. $40A$

Answer: D

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38. In an A.C. circuit, a resistor of RΩ is connected in series with an inductor of self inductance L. If phase angle between voltage and current be 45°, the value of inductance (X_L) will equal to ....

A. R

B. $\frac{R}{8}$

C. $\frac{R}{4}$

D. $\frac{R}{2}$

Answer: A

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39. At time t = 0 s, voltage of an A.C. generator starts from 0 V and becomes 2V at time $t = \frac{1}{100\pi}$ s. The voltage keeps on increasing up to 100 V, after which it starts to decrease. Find the frequency of the generator.

A. 2 Hz

B. 5 Hz

C. 100 Hz

D. 1 Hz

Answer: D

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40. In a series resonant circuit, the A.C. voltages across resistance R, inductor L and capacitor C are 5V, 10V and 10V respectively. The A.C. voltage applied to the circuit will be ....

A. 25 V

B. 20 V

C. 10 V

D. 5 V

Answer: D

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41. What is the average power dissipation in an ideal capacitor in A.C. circuit ?

A. $\frac{1}{2}CV^2$

B. CV^2

C. $2CV^2$

D. Zero

Answer: D

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42. A coil has self inductance L = 0.04 H and resistance R = 12 Ω. When it is connected to 220 V, 50 Hz supply, what will be current flowing through the coil ?

A. 12.7 A

B. 14.7 A

C. 11.7 A

D. 10.7 A

Answer: A

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43. Find the time required for a 50 Hz alternating current to become its value from zero to the rms value.

A. 2.5 ms

B. 5.0 ms

C. 10.0 ms

D. 15.0 ms

Answer: A

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44. The quantity that remains unchanged in the output with respect to the input in an ideal transformer is ....

A. frequency

B. current

C. voltage

D. none of these

Answer: A

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45. A resistor of R = 6Ω, an inductor of L=1 H and C = 17.36 μF are connected in series with an A.C. source. Find the Q-factor.

A. 2.37

B. 80

C. 3.72

D. 40

Answer: D

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46. What is the average value of the A.C. voltage over one complete cycle ?

A. $\frac{2V_{\max}}{\pi}$

B. $\frac{V_{\max}}{2}$

C. zero

D. $V_{\max}$

Answer: C

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47. A lamp consumes only 50% of maximum power applied in an A.C. circuit. What will be the phase difference between applied voltage and circuit current ?

A. $\frac{\pi}{6}$ rad

B. $\frac{\pi}{3}$ rad

C. $\frac{\pi}{4}$ rad

D. $\frac{\pi}{2}$ rad

Answer: C

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48. The output power in step-up transformer used in practice is .....

A. greater than the input power.

B. greater than the input power.

C. less than the input power.

D. none of these.

Answer: C

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49. An electric current has both D.C. and A.C. components D.C. component of 8A and A.C. component is given as $I = 6\sin\omega t A$. So l_{rms} value of resultant current is .....

A. 8.05 A

B. 9.05 A

C. 11.58 A

D. 13.58 A

Answer: B

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50. A current of $\frac{25}{\pi}$ Hz frequency is passing through an A.C. circuit having series combination of R = 100 Ω and L =2 H, the phase difference between voltage and current is ...

A. 90°

B. 60°

C. 30°

D. 45°

Answer: D

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51. In A.C. circuit having only capacitor, the current ......

A. lags behind the voltage by $\frac{\pi}{2}$ in phase

B. leads the voltage by $\frac{\pi}{2}$ in phase

C. leads the voltage by π in phase

D. lags behind the voltage by π in phase

Answer: B

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52. For a Step-Down Transformer which of the following Is correct.

A. Output voltage $>$ Input voltage

B. Output power $<$ Input power

C. No. of turns in primary coil = No. of turn in the secondary coil

D. None of these

Answer: B

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53. For L-C-R A.C. circuit resonance frequency is 5000 Hz and frequencies at half power points are 4950 Hz and 5050 Hz. The Q-factor is ......

A. 100

B. 0.02

C. 50

D. 0.01

Answer: C

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54. For an A.C. L-C-R series circuit at resonant frequency, which of the following is wrong ?

A. Value of resistance is zero

B. Magnitude of reactance due to L and C are equal

C. Phase change due to L is equal and opposite to phase change due to C

D. Impedance has only real component.

Answer: A

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55. Current of $50/\pi$ Hz frequency is passing | through an A.C. circuit having series combination of resistance R = 100Ω and inductor $L = \sqrt{3}H$. The phase difference between the voltage and current is .....

A. 30°

B. 45°

C. 60°

D. 90°

Answer: C

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56. In an AC circuit current is 3 A and voltage 210 V and power is 63 W. The power factor is ....

A. 0.09

B. 0.10

C. 0.08

D. 0.11

Answer: B

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57. For an AC given by I = 50cos(100 t + 45°)A.

The value of rms = ... A.

A. $50\sqrt{2}$

B. $25\sqrt{2}$

C. 25

D. 0

Answer: B

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58. An AC voltage V = 5 cos (1000 t) V is applied to a L-R series circuit of inductance 3 mH and resistance 4Ω . The value of maximum current in the circuit is .... A.

A. 1

B. $\frac{5}{\sqrt{7}}$

C. $\frac{5}{7}$

D. 0.8

Answer: A

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59. A lamp consumes only 50% of maximum power applied in an A.C. circuit. What will be the phase difference between applied voltage and circuit current ?

A. $\frac{\pi}{6}$ rad

B. $\frac{\pi}{3}$ rad

C. $\frac{\pi}{4}$ rad

D. $\frac{\pi}{2}$ rad

Answer: C

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60. In L-C-R, A.C. series circuit, $L = 9H$, $R = 10\ \Omega$ and $C = 100\ \mu F$. Hence Q factor of the circuit is ......

A. 25

B. 45

C. 35

D. 30

Answer: D

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61. A 15 μF capacitor is connected to a 220 V, 50 Hz a.c. source. Value of capacitive reactance is ..... Ω .

A. 106

B. 424

C. 212

D. 21.2

Answer: C

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62. Electric quantity ...... is equivalent to mechanical quantity, force constant (k)

A. charge (Q)

B. inductance (L)

C. reciprocal of inductance $\left(\frac{1}{L}\right)$

D. reciprocal of capacitance $\left(\frac{1}{C}\right)$

Answer: D

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63. In L-C oscillator, at ... time, energy in capacitor and energy in inductor are equal.

A. $\frac{T}{8}$

B. $\frac{T}{4}$

C. $\frac{T}{2}$

D. T

Answer: A

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64. A power transmission line feeds input power a 3300 V to a step down transformer with it primary windings having 2000 turns. Wha should be the number of turns in th secondary in order to get output power a 330 V ?

A. 400

B. 200

C. 33

D. 40

Answer: B

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