PHYSICS

BOOKS - MODERN PUBLICATION

ALTERNATING CURRENTS

Example

1. The electric main in a house are marked 220 V, 50Hz. Write down the equation for instantneous voltage?

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2. Calculate the capacitive reactance of $5\mu F$ capacitor for a frequency of 50 Hz

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3. A coil of inductance of $4/\pi$ henry is joined in series with a resistance of 30 ohm. Calculate the current flowing in the circuit, when

connected to a.c. mains of 200 volt and frequency 50 Hz.

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4. A series circuit contains a resistor of 20Ω, a capacitor and an ammeter of negligible resistance. It is connected to a source of 200 V, 50 Hz. If the reading of ammeter is 2.5 A, calculate the reactance of the capacitor.

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5. A capacitor of capacitance $100\mu F$ and a coil of resistance 50Ω and inductance 0.5 H are connected in series with a 110 V, 50 Hz AC source. Find the rms value of the current.

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6. A capacitor, a 15Ωresistor and 101.5 mH inductor are placed in series with 50 Hz. AC source. Calculate the capacitance of the capacitor, if the current is observed in phase with the voltage.

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7. Calculate the wavelength of radio waves radiated out by a circuit consisting of 0.02 μF capacitor and $8\mu H$ inductor in series.

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8. What is the power dissipation in an a.c. circuit in which voltage and current are given by $V = 300\sin\left(\omega t + \frac{\pi}{2}\right)$ and $i = 5\sin\omega t$?

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9. How much current is drawn by the priary of a transformer connectede to 220V supply, when it delivers power to a 110 V and 550 W refrigerator?

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10. The electric main in a house are marked 220 V, 50Hz. Write down the equation for instantneous voltage?

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11. A sinusodial voltage E = 200 sin 314 t is applied to a resistor of 10 ohm resistance. Calculate power dissipated as heat in watt.

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12. A sinusodial voltage E = 200 sin 314 t is applied to a resistor of 10 ohm resistance. Calculate power dissipated as heat in watt.

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13. A sinusodial voltage E = 200 sin 314 t is applied to a resistor of 10 ohm resistance. Calculate r.m.s. value of the voltage

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14. A pure inductance of 1.0 H is connected across a 110V - 70Hz source. Find current

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15. A pure inductance of 1.0 H is connected across a 110V - 70Hz source. Find peak value of current

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16. A $15\mu F$ capacitor is connected to a 220 V, 50 Hz source. Find the capacitive reactance and the current (r.m.s. and peak value) in the circuit.

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17. The equation of alternating current for a circuit is given by $I = 50 \cos 100\pi t$ find frequency of a.c. applied

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18. The equation of alternating current for a circuit is given by $I = 50 \cos 100\pi t$ find mean value of current during positive half of the cycle.

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19. The equation of alternating current for a circuit is given by $I = 50\cos 100\pi t$ find the value of current 1/300 second after it was zero.

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20. The equation of alternating current for a circuit is given by $I = 50\cos 100\pi t$ find virtual value of current

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21. An a.c. source of 200 V , 50 Hz is connected across a 400 ohm resistor and an inductor of $3/\pi$ H in series. Calculate current in the circuit

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22. An a.c. source of 200 V , 50 Hz is connected across a 400 ohm resistor and an inductor of 3 H in series. Calculate impedance.

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23. An a.c. source of 200 V , 50 Hz is connected across a 400 ohm resistor and an inductor of $3/\pi$ H in series. Calculate current in the circuit

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24. An inductance coil has a impedance of 100 ohm. When a.c. signal of frequency 1,000 hz is applied to the coil, the applied voltage leads the current by 45°. Calculate the self inductance of the coil.

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25. When 100" volt" dc is applied across a coil, a current of 1 amp flows through it, when 100 V ac of 50 Hz is applied to the same coil, only 0.5 amp flows. Calculate the resistance and inductance of the coil.

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26. A circuit consists of a resistance 10 ohm and a capacitance $0.1\mu F$. If an alternating

e.m.f. of 100V, 50Hz is applied, calculate the current in the circuit.

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27. An a.c. source of 200 V, 50 Hz is conneted across a 300 ohm resistor and a capacitor of $25/\pi\mu F$ in series. Calculate the current in the circuit.

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28. An a.c. source of 200 V, 50 Hz is conneted across a 300 ohm resistor and a capacitor of $25/\pi\mu F$ in series. Calculate the impedance

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29. An a.c. source of 200 V, 50 Hz is conneted across a 300 ohm resistor and a capacitor of $25/\pi\mu F$ in series. Calculate the impedance

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30. In a series RC circuit, R = 30 ohm, C = $0.25\mu F$, V= 100 V, $\omega = 10000 rad/s$. Find the current in the circuit and calculate the voltage across the resistor and capacitor. Is the algebraic sum of these voltages more than the source voltage ? If yes, resolve the paradox.

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31. When a circuit element X is conneted across a.c. sourceof emf $220\sqrt{2}V$, a current $\sqrt{2}A$ flows through it and this current is in

phase with applied voltage. When another element Y is connected across same a.c. source, the same current flows in the circuit, but it leads the voltages by $\pi/2$. Name the circuit elements X and Y.

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32. When a circuit element X is conneted across a.c. sourceof emf $220\sqrt{2}V$, a current $\sqrt{2}A$ flows through it and this current is in phase with applied voltage. When another

element Y is connected across same a.c. source, the same current flows in the circuit, but it leads the voltages by $\pi/2$. Find current that flows in the circuit when series combination of X and Y is connected acorss same a.c. voltage.

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33. When a circuit element X is conneted across a.c. sourceof emf $220\sqrt{2}V$, a current $\sqrt{2}A$ flows through it and this current is in

phase with applied voltage. When another element Y is connected across same a.c. source, the same current flows in the circuit, but it leads the voltages by $\pi/2$. Plot a graph showing variation of net impedance of series combination of X and Y as a function of angular frequency of applied voltage.

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34. A $25(\mu)F$ capacitor, a0.1 H inductor and a 25Ω resistorare connected in series with an ac

source of emf E=310 sin 314 t. Find

the phases angel .

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35. A $25(\mu)F$ capacitor, a0.1 H inductor and a

25Ω resistorare connected in series with an ac

source of emf E=310 sin 314 t. Find

The reactance of the circuit.

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36. A $25(\mu)F$ capacitor, a0.1 H inductor and a 25Ω resistorare connected in series with an ac source of emf E=310 sin 314 t. Find the current in the circuit.

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37. A $25(\mu)F$ capacitor, a0.1 H inductor and a 25Ω resistorare connected in series with an ac source of emf E=310 sin 314 t. Find the phases angel .

Watch Video Solution

38. A $25(\mu)F$ capacitor, a0.1 H inductor and a 25Ω resistorare connected in series with an ac source of emf E=310 sin 314 t. Find the frequency of he emf

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39. A $25(\mu)F$ capacitor, a0.1 H inductor and a 25Ω resistorare connected in series with an ac

source of emf E=310 sin 314 t. Find

The reactance of the circuit.

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40. A series LCR-circuit having L = 10 mH, $C = \left(400/\pi^2\right)\mu F$ and R = 55 ohm is connected to a 220 V variable frequency a.c. supply. Calculate the value of maximum current amplitude.

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41. A series LCR-circuit having L = 10 mH, $C = \left(400/\pi^2\right)\mu F$ and R = 55 ohm is connected to a 220 V variable frequency a.c. supply. Find the frequecy of the source, for which the average power absorbed by the circuit is maximum.

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42. An LCR circuit has $L = 10mH, R = 3\Omega$ and $C = 1\mu F$ and is connected in series to a source of $(15\cos\omega t)$

volt. Calculate the current amplitude at a frequency 10 % lower than the resonance frequency of the circuit.

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43. A $2\mu F$ capacitor 100 ohm resistor and 8 H inductor are connected in series with an a.c. source. What should be the frequency of soure for which the current drawn in the circuit is maximum? If peak value of emf of the source is

200 V, What is the phase relation between voltages across inductor and resistor ?

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44. A $2\mu F$ capacitor 100 ohm resistor and 8 H inductor are connected in series with an a.c. source. What should be the frequency of soure for which the current drawn in the circuit is maximum? If peak value of emf of the source is 200 V, find the maximum current, inductive reactance, capactive reactance,

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45. A $2\mu F$ capacitor 100 ohm resistor and 8 H inductor are connected in series with an a.c. source. What should be the frequency of soure for which the current drawn in the circuit is maximum? If peak value of emf of the source is 200 V, give the phase relation between voltages acorss inductor and capacitor.

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46. A $2\mu F$ capacitor 100 ohm resistor and 8 H inductor are connected in series with an a.c. source. What should be the frequency of soure for which the current drawn in the circuit is maximum? If peak value of emf of the source is 200 V, peak value of current in the circuit.

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47. A $2\mu F$ capacitor, 100 ohm resistor and 8 H inductor are connected in series with an a.c.

source. What should be the frequency of soure for which the current drawn in the circuit is maximum? If peak value of emf of the source is 200 V ,calculate the total impedance

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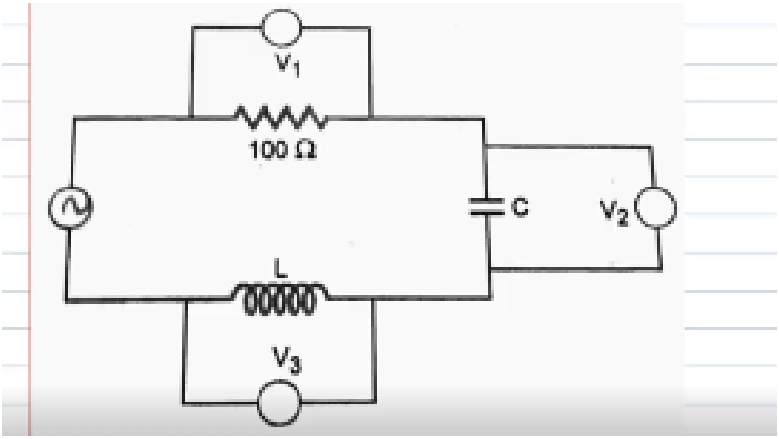
48. A series LCR circuit is connected to an a.c. source 220 V - 50 Hz as shown in fig. If the reading of the three voltemeters V_1, V_2, V_3 are 65 V, 415 V and 204 V respectively.

Calculate value of capacitor C.



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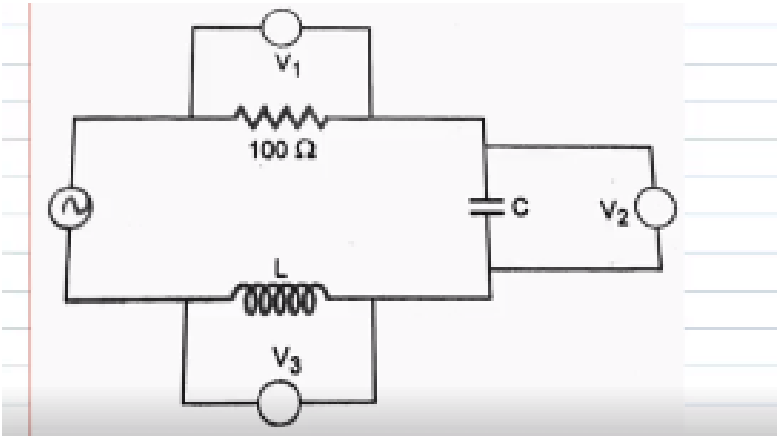
49. A series LCR circuit is connected to an a.c. source 220 V - 50 Hz as shown in fig. If the reading of the three voltmeters V_1, V_2, V_3 are 65 V, 415 V and 204 V respectively. Calculate

value of inductor L .



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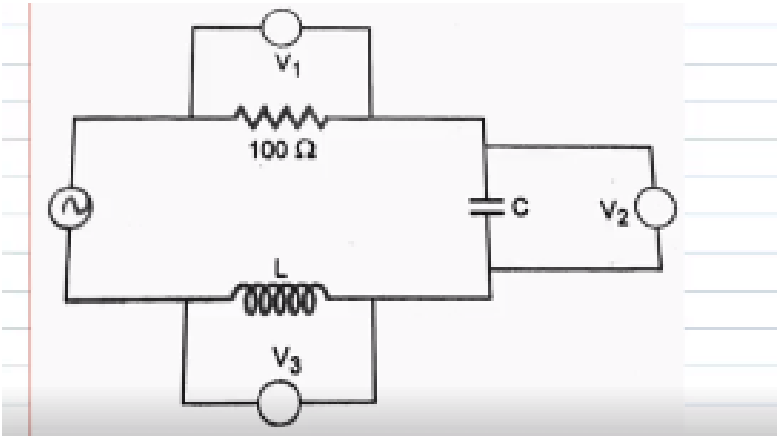
50. A series LCR circuit is connected to an a.c. source 220 V - 50 Hz as shown in fig. If the reading of the three voltemeters V_1, V_2, V_3 are 65 V, 415 V and 204 V respectively.

Calculate current in the circuit.



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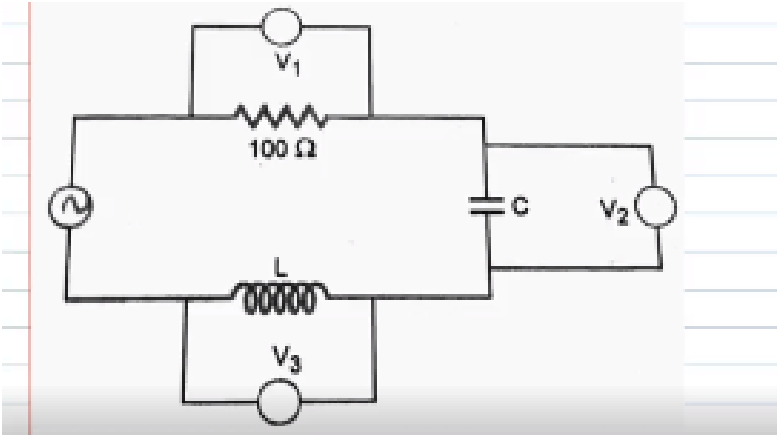
51. A series LCR circuit is connected to an a.c. source 220 V - 50 Hz as shown in fig. If the reading of the three voltemeters V_1, V_2, V_3 are 65 V, 415 V and 204 V respectively R=100

ohm. Calculate value of C for same L required to produce resonance.



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52. A $10\mu F$ capacitor is charged to a potential difference of 50 V and is connected to another uncharged capacitor in parallel. Now the

common potential difference becomes 20 volt.

The capacitance of second capacitor.

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53. Obtain the resonant frequency and Q-factor of a series LCR circuit ith L = 3.0 H, $C = 27\mu F$, 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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54. A 60 volt , 10 watt lamp is to be run on 100 volt-60 hertz a.c. mains. Calculate if resistance is to be used instead of choke, what wil be its value?

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55. A 60 volt , 10 watt lamp is to be run on 100 volt-60 hertz a.c. mains. Calculate the inductance of the choke required

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56. A 60 volt , 10 watt lamp is to be run on 100 volt-60 hertz a.c. mains. Calculate the inductance of the choke required

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57. A capacitor of capacity $100\mu F$ is charged to a potential difference of 12 V. It is then connected across an inductor of inductance

$6\mu H$. What is the current (in A) in the circuit at a time when the potential difference across the capacitor is 6.0 V?

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58. A resistor and a capacitor are connected to an ac supply of 200 V, 50 Hz, in series. The current in the circuit is 2A. If the power consumed in the circuit is 100 W then the resistance in the circuit

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59. An alternating e.m.f of 100 V(r.m.s) 50 Hz is applied across a capacitor of $10\mu F$ and a resistance of 100 ohm in series. Calculate the average power supplied

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60. An alternating e.m.f of 100 V(r.m.s) 50 Hz is applied across a capacitor of $10\mu F$ and a resistance of 100 ohm in series. Calculate the average power supplied

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61. An alternating e.m.f of 100 V(r.m.s) 50 Hz is applied across a capacitor of $10\mu F$ and a resistance of 100 ohm in series. Calculate the reactance of the capacitor.

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62. A 20 watt, 50 volt filament is connected in series to an a.c. mains of 250 volt - 50 hertz.

Calculate the value of the capacitor required to run the lamp.

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63. A 200 V varialbe frequency a.c. source is connected to a series combination the $L = 5H, C = 80\mu F$ and $R = 40\Omega$. Calculate the angular frequency of the soucre to get maximum current in the cicuit, the current amplitude at resonance and power dissipated in the circuit.

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64. A circuit consists of a noninductive resistor of 50Ω, a coil of inductance 0.3 H and resistance 2Ω, and a capacitor of $40\mu F$ in series and is supplied with 200 volt rms at 50 cycles / sec.

A. the current lag or lead by an angle $15\circ 51$

B. the power in the circuit is 710.4W

C. the power in th circuit is 640W

D. the current lag or lead by an angle $12\circ 51$

Answer:

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65. How much current is drawn by the primary coil of a transformer, which steps down 220V to 22 V to operate a device with an impedance of 220 ohm?

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66. 11 kW of electric power can be transmitted to a distant station at (i)220 V. (ii) 22000 V. Which of the two transmission modes be preferred and why ? Support your answer with calculations.

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67. 11 kW of electric power can be transmitted to a distant station at (i)220 V. (ii) 22000 V. Which of the two transmission modes be

preferred and why ? Support your answer with calculations.

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68. A transformer whose efficiency is 90%, draws 5 A when 200 V is applied to its primary coil. If output is drawn at 300 V, what is the current in secondary coil ? If number of turns in primary coil is 500, what is the number of turns in secondary coil?

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69. In an ideal transformer, number of turns in primary and secondary are 200 and 1000 respectively. If the power input to the primary is 10 kW at 200 V, calculate current in parimary.

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70. In an ideal transformer, number of turns in primary and secondary are 200 and 1000 respectively. If the power input to the primary is 10 kW at 200 V, calculate output voltage

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71. The primary coil of an ideal stepup transformer has 100 turns and the transformer ratio is also 100. The input voltage and power are 220 V and 1100 W. Calculate nuber of turns in the secondary.

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72. The primary coil of an ideal stepup transformer has 100 turns and the transformer ratio is also 100. The input voltage and power are 220 V and 1100 W. Calculate the current in the secondary

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73. The primary coil of an ideal stepup transformer has 100 turns and the transformer ratio is also 100. The input

voltage and power are 220 V and 1100 W. Calculate the current in the primary

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74. The primary coil of an ideal stepup transformer has 100 turns and the transformer ratio is also 100. The input voltage and power are 220 V and 1100 W. Calculate the current in the secondary

Watch Video Solution

75. The primary coil of an ideal stepup transformer has 100 turns and the transformer ratio is also 100. The input voltage and power are 220 V and 1100 W. Calculate voltage across the secondary

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76. When a voltage of 120 V is impressed across the primary of a transformer, the current in the primary is 1.85 mA. Find the voltage across the secondary, when it delivers

150 mA. The transformer has an efficiency of 95 %.

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77. a 750 hz 20v source is connected to a resistance of 100 . an inductance of 0.1803 H and a capacitance of $10\mu F$ all in series. Calculate the time in which the resistance (thermal capacity $=2J^{\circ}C^{-1}$) will get heated by $10^{\circ}C$

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78. A lamp having a resistance of 25 ohm is not allowed to pass current more than 5 A. Find the value of the inductance, which must be used in series with the lamp, which is supplid by an a.c. of maximum r.m.s. 325 V at 50 Hz.

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79. An LCR circuit has $L = 10mH, R = 3\Omega$ and $C = 1\mu F$ and is connected in series to a source of $(15\cos\omega t)$

volt. Calculate the current amplitude at a frequency 10 % lower than the resonance frequency of the circuit.

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80. An inductor of inductance 2.0 mH s connected across a charged capacitor of capacitance 5.0 mu F and the resulting LC circuit is set oscillating at its natural frequency. Let Q denote the instantaneous charge on the capacitor and I the current in

the circuit. It is found that the maximum value of charge Q is $200\mu C$.

When $Q = 200\mu c$, what is the value of I?

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81. An inductor of inductance 2.0 mH s connected across a charged capacitor of capacitance 5.0 mu F and the resulting LC circuit is set oscillating at its natural frequency. Let Q denote the instantaneous charge on the capacitor and I the current in

the circuit. It is found that the maximum value of charge Q is $200\mu C$.

Find the maximum value of I

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82. An inductor of inductance 2.0 mH s connected across a charged capacitor of capacitance 5.0 mu F and the resulting LC circuit is set oscillating at its natural frequency. Let Q denote the instantaneous charge on the capacitor and I the current in

the circuit. It is found that the maximum value of charge Q is $200\mu C$.

When I is equal to one-half its maximum value, what is the value of Q?

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83. A galvanometer connected in an a.c. circuit does not show any deflection . Why?

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84. Define root mean square value of an alternating current.

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85. Define mean value of an alternating current.

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86. Peak value of an a.c. source is E_0. What is its r.m.s. value?

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87. The instantaneous current from a.c. source is I = sin 314 t. What is the peak value of current?

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88. The instantaneous current from an a.c. source is $I = 6 \sin 314\ t$. What is the r.m.s. value of the current?

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89. What is the frequency of direct current?

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90. Define mean value of an alternating current.

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91. What is root mean square value of alternating current? Derive a relation between peak value and virtual value of alternating current.

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92. Why do d.c. voltmeter and d.c. ammeter cannot read a.c.?

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93. A capacitor behaves like a perfect condcutor for high frequency a.c. Explain, why?

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94. A capacitor blocks d.c. but allows a.c. to pass through it. Explain why.

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95. A reactive element, in an a.c. circuit, causes the current flowing to lag in phase by $\frac{\pi}{2}$ w.r.t applied voltage. Identify the element in this case.

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96. A reactive element, in an a.c. circuit, causes the current flowing to lead in phase by $\frac{\pi}{2}$ w.r.t applied voltage. Identify the element in this case.

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97. An electrical element X when connected to an alternating voltage source has current through it leading the voltage by $\pi/2$ radian.

Identify X and write an expression for its reactance.

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98. An inductor acts as a conductor for d.c., why?

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99. Discuss the behaviour of a capacitor in a.c. circuit .

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100. Discuss the behaviour of an inductor in d.c. and high frequency a.c. circuits.

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101. At very high frequency of a.c. a capacitor behaves like conductor. Why?

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102. Why an inductor is an easy path for d.c. and resistive path for a.c?

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103. Show that resistance offered by an ideal inductor to the flow of direct current is zero.

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104. Sketch a graph showing the variation of inductive reactance with frequency o the applied voltage.

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105. Sketch a graph showing the variation of inductive reactance with frequency o the applied voltage.

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106. The division marked on the scale of an a.c. ammeter is not equally spaced. Why?

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107. The frequency of a.c. is doubled, what happens to inductive reactance?

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108. What is a phasor?

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109. What is capacitive reactance?

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110. What is meant by the statement that the current through an inductor lags e.m.f. across it by $\frac{\pi}{2}$.

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111. What is the phase relationship between current and voltage in an inductor?

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112. What is the resistance offered by an inductance to d.c.?

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113. What value of a.c. is given by an a.c. ammeter?

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114. Distinguish between resistance and reactance.

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115. Why transformer cannot be used the step up D.C. voltage?

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116. Define power factor.

Watch Video Solution

117. Does a step up tranformer contradict the principle of conservation of energy?

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118. When are the voltage and current in LCR circuit in LCR- circuit in same phase?

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119. Give two reasons for power loss in a transformer.

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120. In a series LCR-circuit, what is the value of power factor at resonacne?

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121. Average power dissipated in pure capacitor in a.c. circuit is:

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122. How much power is consumed in a purely inductive

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123. Define resonant frequency of LCR series circuit.

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124. In a series LCR-circuit, what is the value of power factor at resonacne?

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125. Is power dissipated across each element of an a.c. circuit containing L,C and R?

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126. Mention the two characteristic properties of the material suitable for making core of a transformer.

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127. The algebraic sum of potential drops across the various elements in LCR-circuit is not equal to the applied voltage. Why?

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128. What are the dimensios of $\sqrt{LC}$?

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129. The minimum and maximum values of poewr factor in an a.c. circuit are respectively.

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130. What do you mean by the admittance of LCR-circuit?

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131. What do you mean by the impedance of LCR-circuit?

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132. What is the phase difference between voltage across the inductance and a capacitor in an a.c. circuit?

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133. Name the various lossed in a transformer.

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134. What do you mean by wattless current?

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135. What role does the resistance of inductor play in LC-circuit?

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136. When are the voltage and current in LCR circuit in LCR- circuit in same phase?

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137. When does a series LCR circuit have minimum impedance?

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138. Where does the energy reside in an inductor through which current has attained its maximum value?

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139. Why cannot transformer work on d.c?

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140. Write the advantages of AC over DC.

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141. Write any two factors responsible for energy losses in actual transformers?

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142. Give the principle of a transformer, construction of a stepdown transformer. Give any two energy losses of a transformer.

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143. A 110 V d.c. heater is used on an a.c. source, such that the heat produced is the same. What would be the r.m.s. value of the alternating voltage?

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144. A capacitor blocks d.c. but allows a.c. to pass through it. Explain why.

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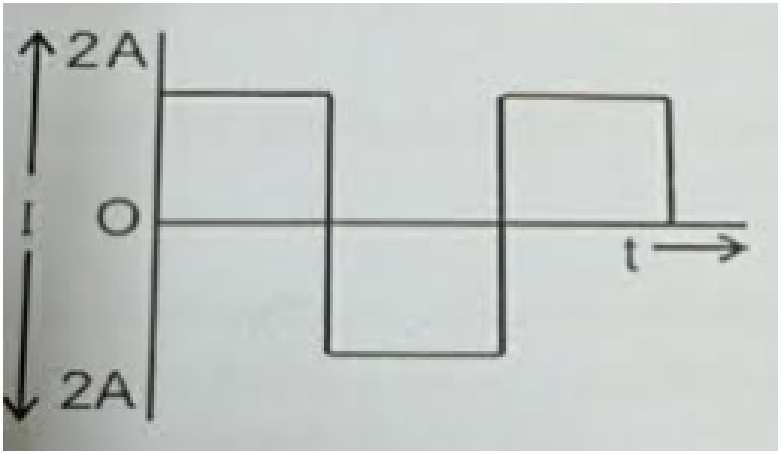
145. Calculate the r.m.s. value of alternating current shown in the figure



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146. A transformer is used to step down a.c. voltage. What appliance will you used to step

down a d.c.voltage?

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147. A coil has an inductive reactance of 160 ohm at frequency of 50 hz. Calculate the self inductance of the coil.

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148. Distinguish between 'average value' and 'r.m.s value' of an alternating current.

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149. Give expression for the average value of the a.c. voltage $V = V_0 \sin \omega t$ over the time interval $t = 0$ and $t = \frac{\pi}{\omega}$.

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150. Name the two useful devices based on the pheno-menon of mutual induction.

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151. What is meant by mean or average value of alternating current ? Show that mean value of ac over a complete cycle is zero.

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152. State the principle on which induction coil is construced.

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153. If the rms current ina 50 Hz a.c. circuit is 5 A, the value of the current 1/300 seconds after its value becomes zero is:

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154. What causes the core of a transformer to get heated up under operation?

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155. What are copper loss, iron loss and hysteresis loss in transformer?

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156. What is the fucntion of a choke coil in fluorescent tube?

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157. Why is the core of a transformer laminated? explain.

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158. What is difference between ohmic resistance and impedance of an a.c. circuit.

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159. What is the capacitive reactance of a capacitor used in a circuit having d.c. e.m.f.? Explain.

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160. A lamp and a resistance are connected in series to a 220 V d.c. source. What will happen to glow of the lamp, when same combination is connected to a 220 V - 50 Hz a.c. supply?

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161. A lamp is connected in series with an inductor to a d.c. source. What will happen to its glow, when it is connected directly to the same source? Explain your answer.

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162. An electric lamp connected in series with a variable capacitor and an a.c. source is glowing with some brightness. How will the brightness

change on increasing the value of capacitance and why?

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163. What is difference between ohmic resistance and impedance of an a.c. circuit.

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164. Draw the graphs showing variations of inductive reactance and capative reactance

with frequency of applied a.c. source.

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165. Draw the graph showing the variation of reactance an inductor with the frequency of an a.c. circuit.

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166. What is difference between ohmic resistance and impedance of an a.c. circuit.

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167. frequency of a.c. source is doubled. How do R, X_1 , X_c get affected?

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168. What is difference between ohmic resistance and impedance of an a.c. circuit.

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169. What is the capacitive reactance of a capacitor used in a circuit having d.c. e.m.f.? Explain.

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170. A man is given a shock with 220 volt d.c. and thereafter with 220 volt (r.m.s.) a.c. will he feel the same intensity of shock in the two cases? Give reasons in support of your answer.

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171. Find the time required for a 50 Hz alternating current to change its value from zero to the r.m.s. value.

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172. A resistance of 20 ohm is connected to a source of alternating current rated 110 V - 50 Hz. Find the r.m.s of current.

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173. A resistance of 20 ohm is connected to a source of alternating current rated 110 V - 50 Hz. Find the maximum instantaneous current in the resistor.

Watch Video Solution

174. A 100 ohm iron is connected to a 220 volt, 50 cycles wall plug. What is its peak potential difference.

Watch Video Solution

175. A 100 ohm iron is connected to a 220 volt, 50 cycles wall plug. What is its average potential difference.

Watch Video Solution

176. A 100Ω resistor is connected to a 220 V, 50 Hz ac supply. What is the rms value of current in the circuit?

Watch Video Solution

177. A light bulb is rated 50 W for a 220 V supply. Find resistance of the bulb.

Watch Video Solution

178. A light bulb is rated 50 W for a 220 V supply. Find peak voltage of the source

Watch Video Solution

179. A light bulb is rated 50 W for a 220 V supply. Find r.m.s. current through the bulb.

Watch Video Solution

180. A light bulb is rated 200 W for a 220 V supply of 50 Hz. Calculate resistance of the bulb.

Watch Video Solution

181. A light bulb is rated 200 W for a 220 V supply of 50 Hz. Calculate r.m.s. current through the bulb.

Watch Video Solution

182. An alternating voltage given by $E = 280 \sin 50\pi t$ is connected across pure resistor of 40Ω. Find frequency of the source.

Watch Video Solution

183. An alternating voltage given by $E = 280 \sin 50\pi t$ is connected across pure resistor of 40Ω. Find r.m.s. current through the bulb.

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184. A 100 Hz a.c. is flowing in a 14 millihenry coil. Find the reactance of the coil.

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185. At what frequency will a 0.5 H inductor have a reactance of 1,000 ohm?

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

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187. Find the value of current through an inductor of 2.0 H and negligible resistance, when connected to an a.c. source of 150 V and 50 Hz.

Watch Video Solution

188. Find the maximum value of current, when inductance of 3.5 henry is connected to 250 volt, 50 cycles supply.

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189. A pure inductor of 50 mH is connected to an a.c. supply of 220 V and frequency 50 Hz. Find its inductive reactance

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190. A pure inductor of 50 mH is connected to an a.c. supply of 220 V and frequency 50 Hz. Find its r.m.s. current and peak current.

Watch Video Solution

191. A pure inductor of 50 mH is connected to an a.c. supply of 220 V and frequency 50 Hz. Find its inductive reactance

Watch Video Solution

192. An inductance of negligible resistance, whose reactance is 22 ohm at 200 hertz is connected to a 220 volt, 50 hertz power line, what is the value of the inductance and reactance?

Watch Video Solution

193. what is expression for the capacitive reactance of a capacitor. Also write the r.m.s. current through the capacitor.

Watch Video Solution

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

Watch Video Solution

195. A $30\mu F$ capacitor is connected to a 220V , 50 Hz source Find its impedance of the circuit.

Watch Video Solution

196. A $30\mu F$ capacitor is connected to a 220V , 50 Hz source Find its r.m.s. current and peak current.

Watch Video Solution

197. A $30\mu F$ capacitor is connected to a 220V , 50 Hz source Find its impedance of the circuit.

Watch Video Solution

198. A capacitor of $1\mu F$ is connected to a source of a.c. having e.m.f. given by equation. $E = 200\cos 120\pi t$ Find the value of r.m.s. current through the capacitor.

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199. A bulb of resistance of 10 ohm, connected to an inductor of inductance L, is in series with an a.c. source marked 100 V-50 Hz. If the phase angle between the voltage and current is $\pi/4$ radian, calculate the value of L.

Watch Video Solution

200. An a.c. source of 100 V (r.m.s.), 50 Hz is connected across a 20 ohm resistance and a 50 mH inductor in series Calculate impedance of the circuit

Watch Video Solution

201. An a.c. source of 100 V (r.m.s.), 50 Hz is connected across a 20 ohm resistance and a 50 mH inductor in series Calculate r.m.s. current in the circuit.

Watch Video Solution

202. A current of 1.1 A flows through a coil, when connected to a 110 V d.c. when 110 V a.c.

of 50 Hz is applied to the same coil, only 0.5 A current flows. Calculate the resistance.

Watch Video Solution

203. A current of 1.1 A flows through a coil, when connected to a 110 V d.c. when 110 V a.c. of 50 Hz is applied to the same coil, only 0.5 A current flows. Calculate the impedance

Watch Video Solution

204. A current of 1.1 A flows thorugh a coil, when connected to a 110 V d.c. when 110 V a.c. of 50 Hz is applied to the same coil, only 0.5 A current flows. Calculate the inductance of the coil.

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

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206. A 100 V - 50 Hz a.c. source is connected to a series combination of an inductance of 100 mH and a resistance of 25 ohm. Calculate the magnitude and phase of the current.

Watch Video Solution

207. An alternating e.m.f. of 110 V is applied to a circuit containing a resistance of 40 ohm and an inductance L, in an agle

$\phi = \tan^{-1} 3/4$. Find the impedance of the circuit

Watch Video Solution

208. An alternating e.m.f. of 110 V is applied to a circuit containing a resistance of 40 ohm and an inductance L, in an agle $\phi = \tan^{-1} 3/4$. Find the impedance of the circuit

Watch Video Solution

209. An alternating e.m.f. of 110 V is applied to a circuit containing a resistance of 40 ohm and an inductance L, in an agle $\phi = \tan^{-1} 3/4$. If the inductance has a value of 0.1 H, find the frequency of the applied e.m.f.

Watch Video Solution

210. A n a.c. circuit that contians an inductance and a resistance has an impedance of 50 ohm at 100 Hz and an impedance of 100 ohm at 500

Hz. What are the values of inductance and the resistance of the circuit?

Watch Video Solution

211. When an inductor L and a resistor R in series are connected across a 12V, 50Hz supply of current of 0.5 A flows in a circuit. The current differs in phase from applied voltage to $\frac{\pi}{3}$ radins calculate the value of R.

Watch Video Solution

212. When a series combination of inductance and resistance are conneted with a 10 V, 50 Hz a.c. source, a current of 1 A flows in the circuit. The voltage leads the current by a phase angle of $\pi / 3$ radian. Calculate the values of resistance and inductance.

Watch Video Solution

213. A coil of negligible resistance and inductance 0.02 henry is connected in series with a wire of zero inductance and resistance

12 ohm. An alternaitng e.m.f of 130 volt and 40 Hz is applied. Calculate the current, potential difference across the resistance and the angle of lag.

Watch Video Solution

214. An electric lamp, which runs at 100 volt d.c. and 10 ampere current, is to be run on 220 volt - 50 cycles a.c. mains. Calculate the inductance of the required choke coil.

Watch Video Solution

215. An electric device, which runs at 80 volt d.c. and consumes 10 A current , is connected to 100 vol-50 Hz a.c. supply through a choke. Calculate the inducance of the choke coil for the safe working of the device.

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216. An electric lamp marked 220 V d.c. consumes a current 10A. It is connected to a 250 V - 50 Hz a.c. mains through a choke.

Calculate the inductance of the choke required.

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217. an 80V-800 W heater is to be operated on a 100V - 50 Hz supply. Calculate the inductance of the choke required.

Watch Video Solution

218. A series circuit contains a resistor of20Ω, a capacitor and an ammeter of negligible resistance. It is connected to a source of 200 V, 50 Hz. If the reading of ammeter is 2.5 A, calculate the reactance of the capacitor.

Watch Video Solution

219. What is the value of current in the ac. Circuit containing R = 10 ohm, $C = 50\mu C$ in series across 200 V - 50 Hz a.c. source?

Watch Video Solution

220. An alternating current of 1.5 mA and angular frequency $300 rads^{-1}$ flows through 10 kohm resistor and a $0.5\mu F$ capacitor in series. Find the r.m.s. voltage across the capacitor and impedence of the circuit.

Watch Video Solution

221. In a series RC circuit, R = 30 ohm, C = $0.25\mu F$, V= 100 V, $\omega = 10000 rad/s$. Find the

current in the circuit and calculate the voltage across the resistor and capacitor. Is the algebraic sum of these voltages more than the source voltage ? If yes, resolve the paradox.

Watch Video Solution

222. When a circuit element X is conneted across a.c. sourceof emf $220\sqrt{2}V$, a current $\sqrt{2}A$ flows through it and this current is in phase with applied voltage. When another element Y is connected across same a.c.

source, the same current flows in the circuit, but it leads the voltages by $\pi/2$. Name the circuit elements X and Y.

Watch Video Solution

223. When an electric device X is connected to a 220 volt, 50 hertz a.c. supply, the current is 0.5 amp, and is in same phase as the applied voltage. When another device Y is connected to the same supply, the electric current is again 0.5amp, but it leads the potential

difference by $\pi/2$. When X and Y are connected in serices across the same source, what will be the current ?

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224. A resistor of 50 ohm, an inductor of $20/\pi$ henry and a capacitor of $5/\pi$ microfarad are connected in series to a voltage source 230V-50Hz. Find the impedence of the circuit.

Watch Video Solution

225. A resistor of 12Ω, a capacitor of reactance 14Ω and a pure inductor of inductance $0.1H$ are joined in series and placed across a 200 V, 50 Hz a.c. supply. Calculate The phase angle between the current and the voltage. Take $\pi = 3$.

Watch Video Solution

226. A resistor of 12Ω, a capacitor of reactance 14Ω and a pure inductor of inductance $0.1H$ are joined in series and placed across a 200 V,

50 Hz a.c. supply. Calculate (i) The current in the circuit Take $\pi = 3$.

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227. A series circuit with L = 0.12H, C = 0.48 mF and R = 25 ohm, is connected to a 220V variable frequency power supply. At what frequency is the circuit current maximum ?

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228. A series LCR circuit with L=0.12H, C = 480 nF, $R = 23\Omega$ is connected to a 230 V variable frequency supply. What is the source frequency for which current amplitude is maximum. Obtain this maximum value.

Watch Video Solution

229. A resistor, a capacitor of $100\mu F$ capacitance and an inductance are in sereis with an a.c. source of frequency 50 Hz. If the

current in the circuit is in phase with the voltage, calculate the inductance of the inductor used.

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230. An inductor L, a capacitor $20\mu F$ and a resistor 10 ohm are connected in series with an a.c. source of frequency 50 Hz. If the current is in phase with the voltage. Calculate the inductance of the inductor.

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231. A capacitor, resistor of 5 ohm and an inductor of 50 mH are in series with an a.c. source marked 100V-50hz. It is found that voltage is in phase with the current. Calculate the capacitance of the capacitor and the impedance of the circuit.

Watch Video Solution

232. Find the capacitive reactance of a $10\mu F$ capacitor at 1,000 cycles s^{-1}.

Watch Video Solution

233. A 100 mH inductor a$25\mu F$ capacitor and a 15 ohm resistor are connected in series to a 120 V. 50 Hz a.c. source. Calculate impedance of the cirucit at resonance.

Watch Video Solution

234. A 100 mH inductor a$25\mu F$ capacitor and a 15 ohm resistor are connected in series to a

120 V. 50 Hz a.c. source. Calculate current at resonance

Watch Video Solution

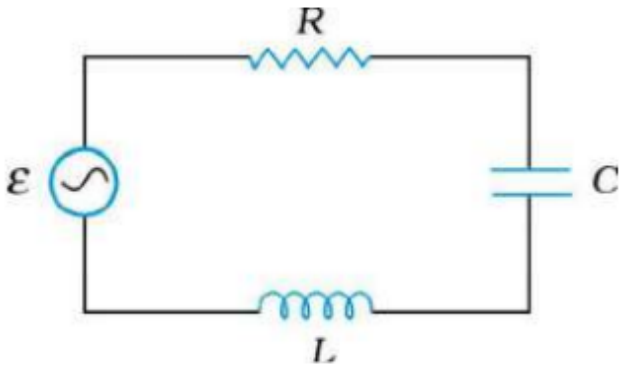
235. A 100 mH inductor a$25\mu F$ capacitor and a 15 ohm resistor are connected in series to a 120 V. 50 Hz a.c. source. Calculate resonant frequency.

Watch Video Solution

236. A 200 V varialbe frequency a.c. source is connected to a series combination the $L = 5H, C = 80\mu F$ and $R = 40\Omega$. Calculate the angular frequency of the soucre to get maximum current in the cicuit, the current amplitude at resonance and power dissipated in the circuit.

Watch Video Solution

237. Figure shows a series LCR circuit connected to a variable frequency 230 V source. L = 5.0 H, $C = 80\mu F$, $R = 40\Omega$. Obtain the impedance of the circuit and the amplitude of current at the resonating frequency. :



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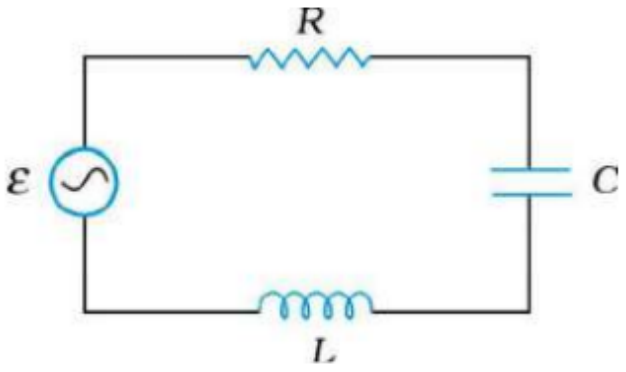
238. Figure shows a series LCR circuit connected to a variable frequency 230 V source. L = 5.0 H, $C = 80\mu F$, $R = 40\Omega$. Determine the rms potential drops across the three elements of the circuit. Show that the potential drop across the LC combination is zero at the resonating frequency. :



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239. A resistance of 2 ohm a coil of inductance 0.01 H are connected with a capacitor and put across a 200 V and 50 Hz supply. Calculate the current and voltage across the capacitor at resonance.

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240. A resistance of 2 ohm a coil of inductance 0.01 H are connected with a capacitor and put across a 200 V and 50 Hz supply. Calculate the

current and voltage across the capacitor at resonance.

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241. A coil of inductance of 0.4 millihenry is connected to a capacitor of capacitane 400 pF. To what wavelength is the circit tuned?

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242. Find the natural frequency of a circuit containing inductance of $100\mu H$ and a capacity of $0.01\mu F$. To which wavelength, tis response will be maximum? For how long the oscillatios will continues?

Watch Video Solution

243. A capacitor of 10 microfarad is connected in series with a resistance of 2.2×10^5 ohm. Determine the time constant for the circuit.

Can we think of oscillations in this circuit, such that the frequency is equal to the inverse of the time constant? Justify your answer with proper explanation.

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244. Give the expression for the energy stored in a capacitor and an indicator.

Watch Video Solution

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

Watch Video Solution

246. A 100 ohm iron is connected to a 220 volt, 50 cycles wall plug. What is its peak potential difference.

Watch Video Solution

247. A 100 ohm geyser is connected to 220 Volt, 50 cycles s^{-1} what is its average powe delivered

Watch Video Solution

248. A 100 ohm geyser is connected to 220 Volt, 50 cycles s^{-1} what is its peak power

Watch Video Solution

249. A 100 ohm geyser is connected to 220 Volt, 50 cycles s^{-1} what is its energy delivered in 10 minutes?

Watch Video Solution

250. A group of electric lamps having total power rating of 1000 watt is supplied an a.c. voltage. $E = 200\cos(314t + 60^\circ)$ Find r.m.s. value of a.c. current.

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251. An alternating voltage E = 200 sin 300 t is applied across a series combination of resistance of 10 ohm and an inductor of 800 mH. Calculate impedance of the circuit.

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252. An alternating voltage E = 200 sin 300 t is applied across a series combination of resistance of 10 ohm and an inductor of 800

mH. Calculate peak value of current in the circuit

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253. An alternating voltage E = 200 sin 300 t is applied across a series combination of resistance of 10 ohm and an inductor of 800 mH. Calculate power factor of the circuit.

Watch Video Solution

254. An electric lamp, which runs at 100 volt d.c. and 10 ampere current, is to be run on 220 volt - 50 cycles a.c. mains. Calculate the inductance of the required choke coil.

Watch Video Solution

255. Find the capacitance of a capacitor, which when put in series with a resistance of 10 ohm makes the power factor equal to 0.5 . Assme an 80 volt-100 Hz a.c. supply.

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256. A choke of 0.5 henry, a capacitor of $15\mu F$ and resistance of 100 ohm are connected in series across 200 volt, 50 hertz main. Find current in the ciruit.

Watch Video Solution

257. A choke of 0.5 henry, a capacitor of $15\mu F$ and resistance of 100 ohm are connected in

series across 200 volt, 50 hertz main. Find power factor of the circuit.

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258. A resistor of 12Ω, a capacitor of reactance 14Ω and a pure inductor of inductance $0.1H$ are joined in series and placed across a 200 V, 50 Hz a.c. supply. Calculate (i) The current in the circuit Take $\pi = 3$.

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259. A resistor of 12Ω, a capacitor of reactance 14Ω and a pure inductor of inductance $0.1H$ are joined in series and placed across a 200 V, 50 Hz a.c. supply. Calculate The phase angle between the current and the voltage. Take $\pi = 3$.

Watch Video Solution

260. A resistor of 12 ohm, a capacitor of reactance 14 ohm and an idcutor of reactance

30 ohm are joined in series and placed across a 230 V, 50 Hz. Supply. Calculate power factor.

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261. Calculate the value of an inductance, which should be connected in series with a capacitance of $5\mu F$ resistance of 10 ohm and a.c. source of 50 Hz. So that the power factor of the circuit is unity.

Watch Video Solution

262. An inductor 200 mH, capacitor $500\mu F$, resistor 10Ω are connected in series with a 100V, variable frequency a.c. source. Calculate the frequency at which the power factor of the circuit is unity.

Watch Video Solution

263. An inductor 200 mH, capacitor $500\mu F$, resistor 10Ω are connected in series with a 100V, variable frequency a.c. source. Calculate the current amplitude at resonance .

Watch Video Solution

264. An inductor 200 mH, capacitor $500\mu F$, resistor 10Ω are connected in series with a 100V, variable frequency a.c. source. Calculate the Q-factor.

Watch Video Solution

265. A series LCR circuit with $R = 20\Omega$,L=1.5H and $C = 35\mu F$ is connected to a variable-

frequency 200 V 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?

Watch Video Solution

266. An a.c. voltage of 200 V is applied to the primary of a transformer and voltage of 2,000 V is obtained form the secondary. Calculate

the ratio of the currents through the primary and secondary coils.

Watch Video Solution

267. In an ideal transformer, the number of turns in primary and secondawry coils are 2,000 and 100 respectively. If maximum votlage in primary is 120 V, what is maximum voltage in secondary?

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268. The output voltage of an ideal transformer, connected to a 240 V a.c mains, is 24 V. When this transformer is used to light a bulb with rating 24V - 24W, calculate the current in the primary coil of the circuit.

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269. A step up transformer is used on a 120 volt line to provide a potential difference of 2,400 volt at 2 ampere current . If primary has

1,000 turns, find the number of turns in secondary and current in the primary coil.

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270. How much current is drawn by the primary coil of a transformer, which steps down 220V to 22 V to operate a device with an impedance of 220 ohm?

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271. A step-up transformer operates on a 200 volt line and supplies a load of 2 ampere. The ratio of primary and secondary windings is 1:5. Determine the secondary voltge, primary current and power output. Assume efficiency to be 100%.

Watch Video Solution

272. A step-down transformer is used at 220 volt line to provided a current of 0.5 ampere

to a 15 watt bulb. If the secondary has 20 turns, find the current and number of turns in the primary coil.

Watch Video Solution

273. A transformer has an efficiency of 80%. It works at 4 kilowatt and 100 volt. If the secondary voltage is 240 volt, calculate the primary and secondary currents.

Watch Video Solution

274. A transformer has an efficiency of 80%. It works at 4 kilowatt and 100 volt. If the secondary voltage is 240 volt, calculate the primary and secondary currents.

Watch Video Solution

275. Calculate the current draws by the primary of a transformer, which stpeps down 200V to 20V to operate a device of resistance 20 ohm. Assume the efficiency of the transformer to be 80%.

Watch Video Solution

276. Calculate the current drawn by the primary windlings of a step-down transformer, whose primary and secondary voltages are 220V and 22V rspectively. A load resistance of 22 ohm is connected to its secondary windings and it operates at an efficiency of 75%.

Watch Video Solution

277. A step -down transformer converts a voltageof 2,200 V into 220 V in the transmission line. Number of turns in primary coil is 5,000. Efficiency of transformer is 90% and its output power is 8 kW. Calculate number of turns in secodnary coil.

Watch Video Solution

278. A step -down transformer converts a voltageof 2,200 V into 220 V in the

transmission line. Number of turns in primary coil is 5,000. Efficiency of transformer is 90% and its output power is 8 kW. Calculate input power.

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279. In an a.c. circuit, the potential diffeence across an inductance and resistance joined in series is respectively 12 V and 16 V. Find the total potential difference across the circuit.

Watch Video Solution

280. A $20\mu F$ capacitor is charged to 30 V of potential. The battery is then disconnected and a 200 mH of coil is connected across it, so that LC oscillations are set up. Calculate the frequency of the oscillations are set up. Calculate the frequecy of the oscillatios set up and the maxium current in the coil.

Watch Video Solution

281. A circuit containing a 80 mH inductor and a $60\mu F$ capacitor in series is connected to a 230 V, 50 Hz supply. The resistance of the circuit is negligible. What is the average power transferred to the inductor?

Watch Video Solution

282. A coil has an inductance 0.7 H and is joined in series with a resistance of 220 ohm. Find the wattles component of the current in

the circuit, when an alternating e.m.f. of 220 V at a frequency of 50 hz is supplied to it.

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Exercise

1. A lamp is connected in series with a capacitor to a high frequency a.c. source. How will the glow of the lamp change, when it is connected directly to the same source? Explain your answer.

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2. An air core coil and an electric bulb are connected in series across a 220V-50Hz a.c. source. The bulb glows with some brightness. How will the glow of the bulb be affected on introducing a capacitor in series in the circuit? Justify your answer.

Watch Video Solution

3. Answer the following questions: 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.

Watch Video Solution

4. A lamp is connected in series with a capacitor. What will happen if d.c.or a.c. is connected to current?

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5. Explain : voltages across L and C in series are 180° out of phase, while for L and C in parallel, current in L and C are 180° out of phase.

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6. The total impedance of a circuit decreases, when a capacitor is added in series with L and R . Explain. Why.

Watch Video Solution

7. When an a.. Circuit with a series combination of inductance, capacitance and resistance is brought into resonance, the current in the circuit increases to a large value. Why?

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8. When a capacitor is connected in series LR circuit the alternating current flowing in the circuit increases. Explain why.

Watch Video Solution

9. An alternating voltage of frequency f is applied across LCR circuit. Let f_r be the resonance frequency for the circuit. Will the

current in the circuit lag, lead or remain in phase with the applied voltage when $f > f_r$? Explain your answer in each case.

Watch Video Solution

10. An alternating voltage of frequency f is applied across LCR circuit. Let f_r be the resonance frequency for the circuit. Will the current in the circuit lag, lead or remain in phase with the applied voltage when $f > f_r$? Explain your answer in each case.

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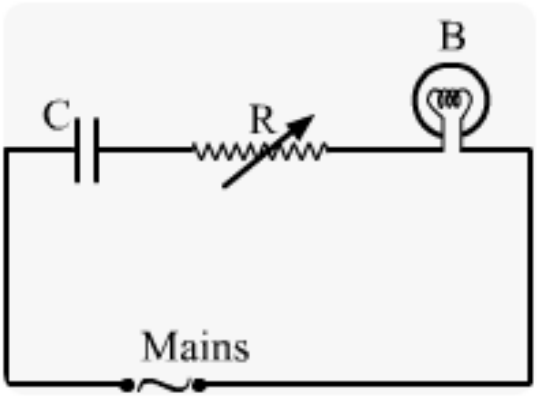
11. Give applications of resonance in series LCR circuit.

Watch Video Solution

12. An capacitor C, a variable resistor R and a bulb B are connected in series to the ac mains in circuits as shown in Fig. The bulb glows with some brightness. How will the glow of the bulb change if the resistance R is increased

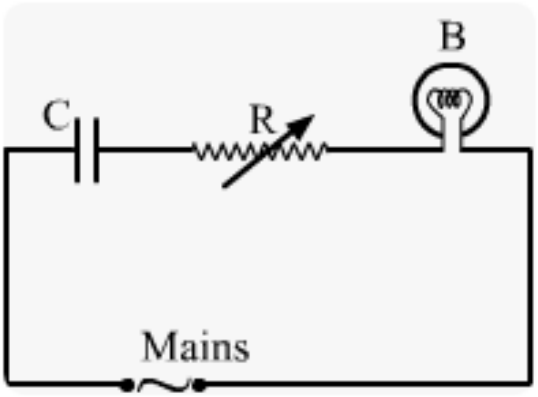
keeping the same capacitance.



Watch Video Solution

13. An capacitor C, a variable resistor R and a bulb B are connected in series to the ac mains in circuits as shown in Fig. The bulb glows with some brightness. How will the glow of the

bulb change if a dielectric slab is introduced between the plates of the capacitor, keeping resistance R to be the same.



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14. A capacitor with capacitance C and a coil with active resistance R and inductance L are

connected in series to a source of sinusoidal voltage of frequency ω. Find the phase difference between the current fed to the circuit and the source voltage.

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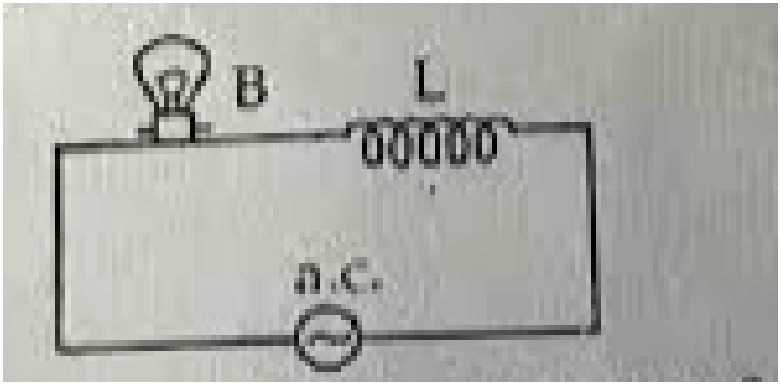
15. An inductor L of inductance X_L is connected in series with a bulb B and an AC source . How would brightness of the bulb change when number of turns in the inductor

is reduced



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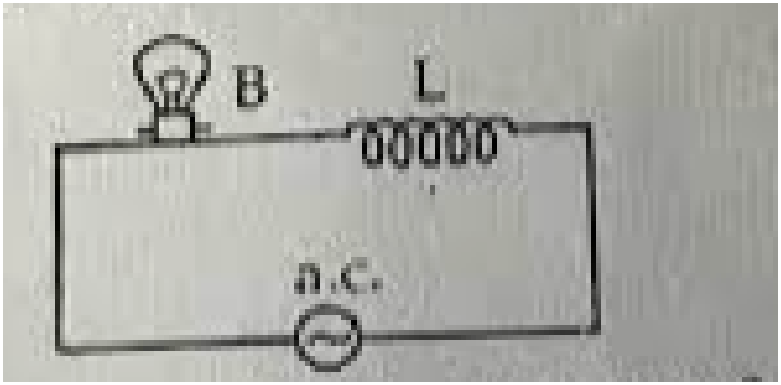
16. An inductor L of inductance X_L is connected in series with a bulb B and an AC source . How would brightness of the bulb change when a capacitor of reactance

$X_C = X_L$ is inserted in series .



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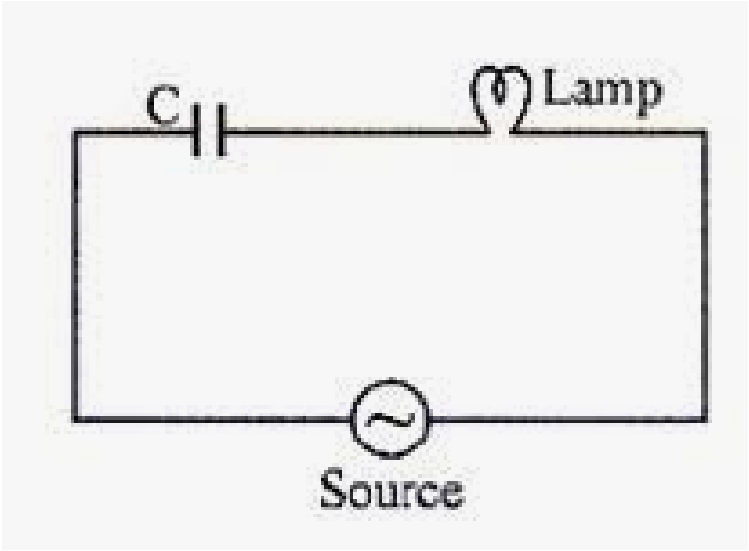
17. As shown in figure an electric lamp having coil of negligible inductance conneted in series with a capacitor and an a.c. source is glowing certain brightness. How does the brightness of the lamp change on reducing



the capacitance. Justify your answer.

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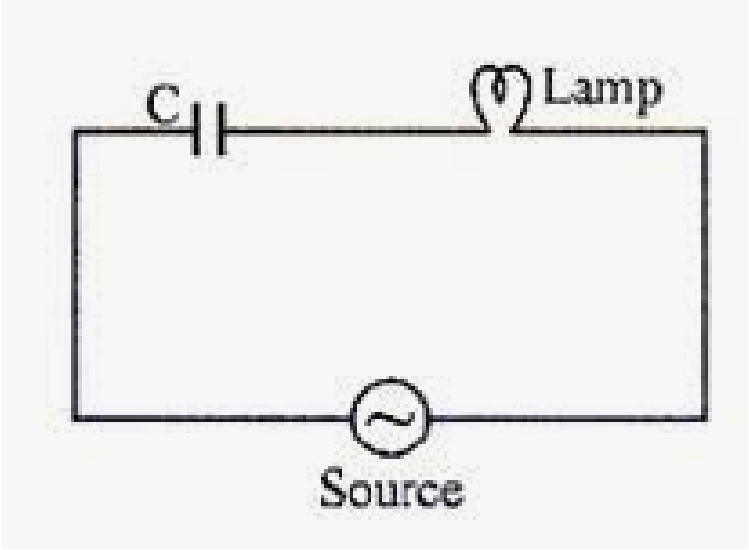
18. As shown in figure an electric lamp having coil of negligible inductance conneted in series with a capacitor and an a.c. source is

glowing certain brightness. How does the brightness of the lamp change on reducing



the frequency. justify your answer.

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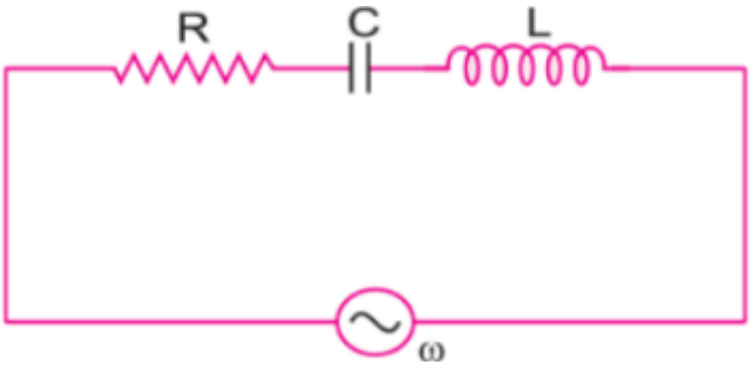
19. In the circuit shown below R represents an electric bulb. If the frequency $\left(v = \frac{\omega}{2\pi}\right)$ of the supply is doubled, how should the value of C and L should be changed so that the glow of bulb remains unchnged?



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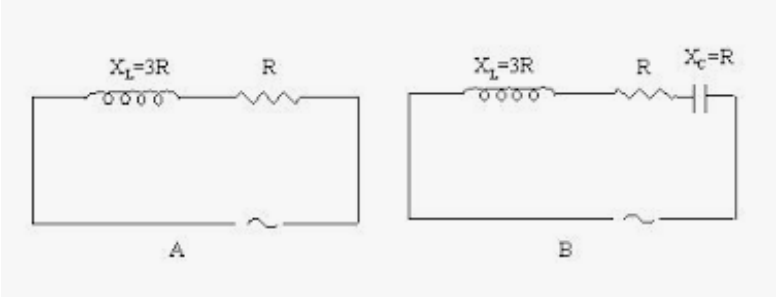
20. Show in the figure, two electric circuits A and B. Calculate the ratio of power factor of the circuit B to the power factor of the circuit A.



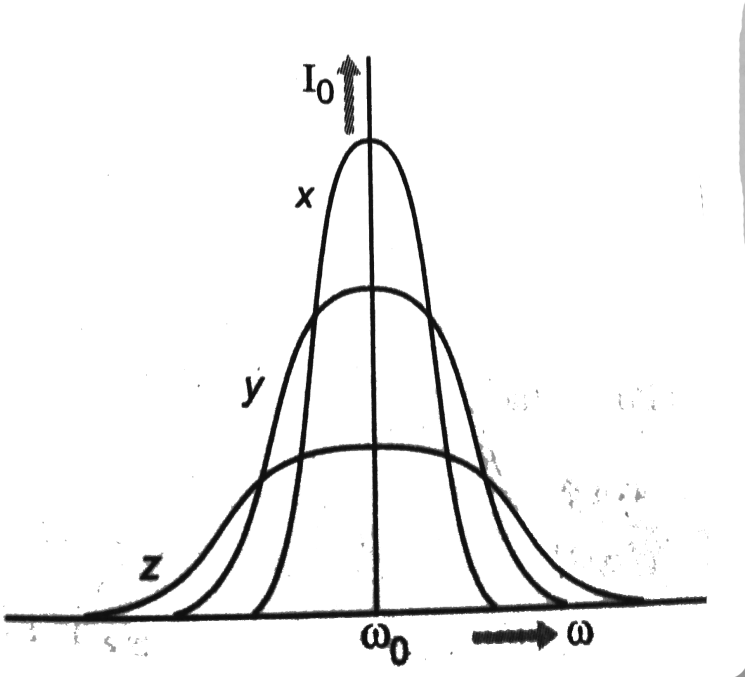
Watch Video Solution

21. What is the quality factor (Q) in an a.c. circuit?

Watch Video Solution

22. Three students X,Y and Z performed an experiment for studying the variation of alternating currents with angular frequency in a series LCR-circuit and obtained the graphs shown in the figure

They all used a.c sources of the same r.m.s. value and inductances of the same value. What can we conclude about the

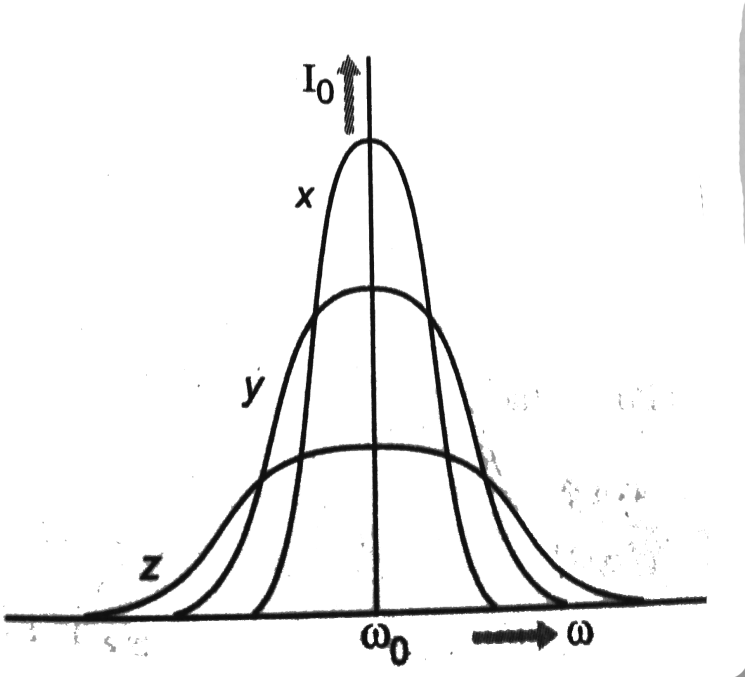


capacitance value. What can we conclude about nature of the impedance of the set up at frequency ω_0?

Watch Video Solution

23. Three students X,Y and Z performed an experiment for studying the variation of alternating currents with angular frequency in a series LCR-circuit and obtained the graphs shown in the figure

They all used a.c sources of the same r.m.s. value and inductances of the same value. What can we conclude about the



resistance values used by them

Watch Video Solution

24. What is sharpness of resonance?

Watch Video Solution

25. Why does an LC circuit produce oscillations?

Watch Video Solution

26. Why does an LC circuit produce oscillations?

Watch Video Solution

27. Explain briefly, how the pehnomenon of resonance in the circuit can be used in the tuning mechanism of a radio or a TV set.

Watch Video Solution

28. In an a.c. circuit, why is there no power consumption for an ideal inductor?

Watch Video Solution

29. Prove mathematically that the average power over a complete cycle of alternating current through an ideal inductor is zero.

Watch Video Solution

30. Prove that in an a.c. circuit, an ideal capacitor does nt dissipate power.

Watch Video Solution

31. The instantaneous current and voltage in an a.c. circuit given by $I = 10 \sin 300t (\in A)$ and $E = 200 \sin 300t$ (in V)What is the averagepower dissipated in the circuit?

Watch Video Solution

32. What do you mean by power factor? On what factors does it depend?

Watch Video Solution

33. Explain the importance of power factor.

Watch Video Solution

34. For circuit used for transporting electric power, a low power factor implies large power loss in transmission.

Watch Video Solution

35. Why power factor correction is must in heavy machinery?

Watch Video Solution

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

Watch Video Solution

37. Which is more dangerous in use a.c. or d.c.?

Explain, why?

Watch Video Solution

38. Why 200 V a.c. more dangerous than 220 V d.c.?

Watch Video Solution

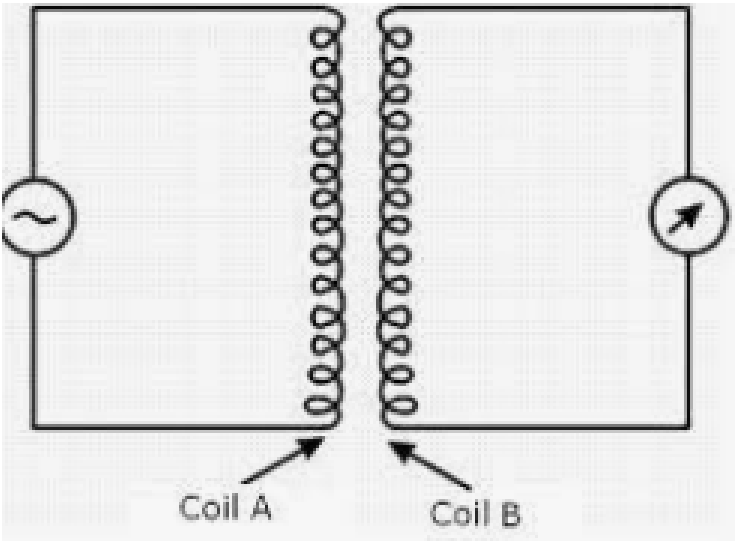
39. Why 200 V a.c. more dangerous than 220 V d.c.?

Watch Video Solution

40. Why is the use of A.C. voltage preferred over D.C. voltage? Give two reasons.

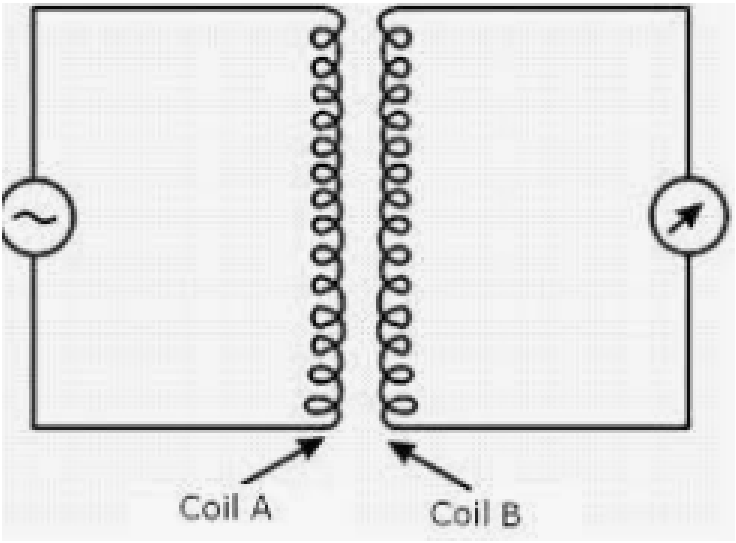
Watch Video Solution

41. The circuit arrangement given in the figure shows that when an ac. passes through the coil A, the current starts flowing in the coil B. State the underlying principle involved.



Watch Video Solution

42. The circuit arrangement given in the figure shows that when an ac. passes through the coil A, the current starts flowing in the coil B. Mention two factors on which the current produced in the coil B depends.



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43. In India domestic power supply is at 220 V, 50Hz. While in USA it is 110 V, 50 Hz. Given one advantage and one disadvantage of 220 V supply over 110 V supply.

Watch Video Solution

44. What are the factors which reduce the efficiency of a transformer ?

Watch Video Solution

45. How are the energy losses reducedin a transformer ?

Watch Video Solution

46. What are the factors which reduce the efficiency of a transformer ?

Watch Video Solution

47. Why the core of a transformer made of a magnetic material of high permeability?

Watch Video Solution

48. Why the core of a transformer made of a magnetic material of high permeability?

Watch Video Solution

49. A step up transformer converts a low input voltage into a high output voltage. Does it violate law of conservation of energy? Explain.

Watch Video Solution

50. Describe the use of transformer for long distance transmission of a.c.

Watch Video Solution

51. A transformer of 100% efficiency has 500 turns in the primary and 10,000 turns in the secondary coil. If the primary is connected to 220V mains supply, what is the voltage across the secondary coil?

Watch Video Solution

52. Can a trasnformer be helpful in reducing the cost of transmission of electrical energy to long distances? Explain.

Watch Video Solution

53. What is the fucntion of a choke coil in fluorescent tube?

Watch Video Solution

54. Show that an ideal inductor does not dissipate power in an ac circuit.

Watch Video Solution

55. Answer the following questions: 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?

Watch Video Solution

56. Why is choke preferred to rheostat in controlling a.c. supply.

Watch Video Solution

57. Which of the best method of reducing current in an a.c. circuit and why?

Watch Video Solution

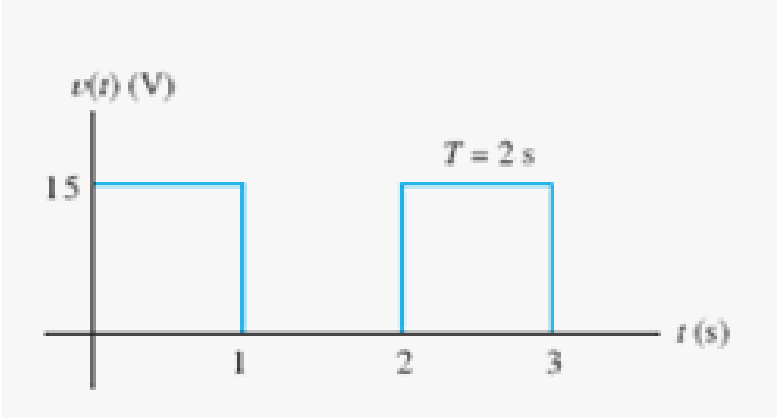
58. Why choke coil cannot be used in d.c.?

Watch Video Solution

59. Radio frequency choke is air cored, whereas as audio frequency choke is iron cored, Explain.

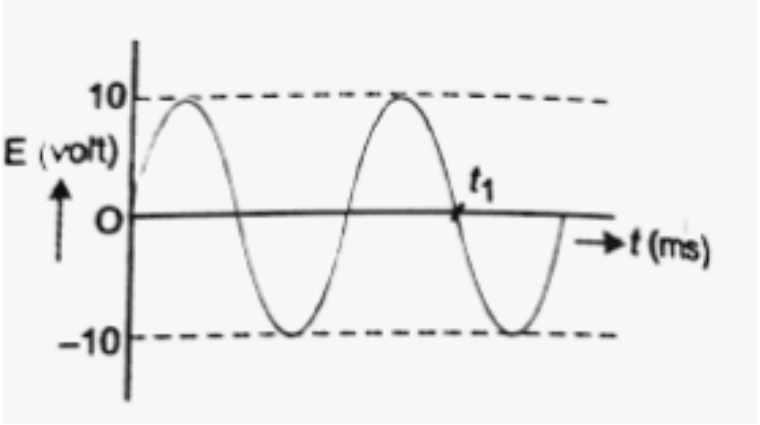
Watch Video Solution

60. Find r.m.s value of voltage give in the figure.



Watch Video Solution

61. The variation with time t of the output E of an alternating voltage supply of frequency 50 Hz is shown in the figure.

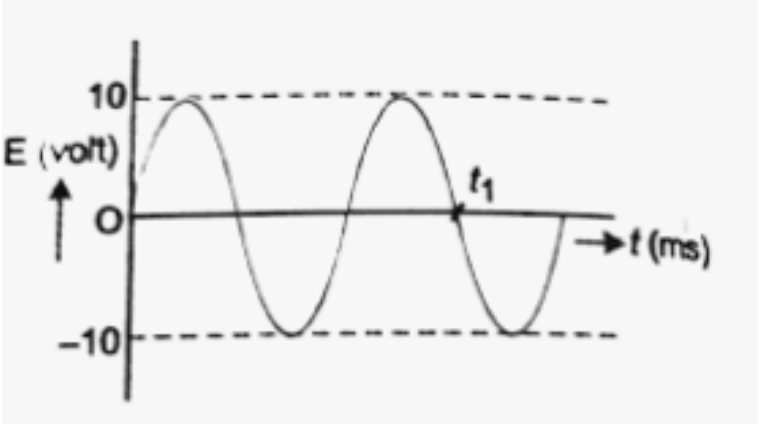


State the time t_1, the peak value E_0 of the voltage, the root mean square voltage E_{rms}, the mean (Average) voltage E_{av}

Watch Video Solution

62. The variation with time t of the output E of an alternating voltage supply of frequency 50

Hz is shown in the figure.



The alternating supply is connected in series with a resistor of resistance 2.4 ohm. Calculate the mean power dissipated in the resistor.

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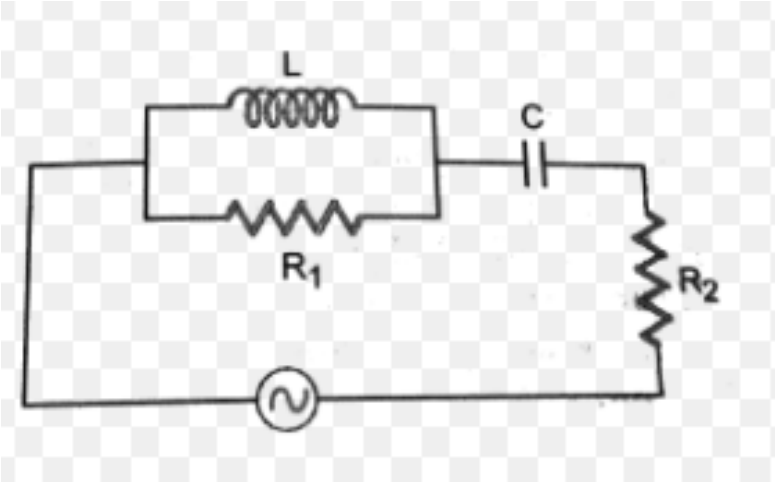
63. In the circuit shows find the phase difference between the currents through L and R_I



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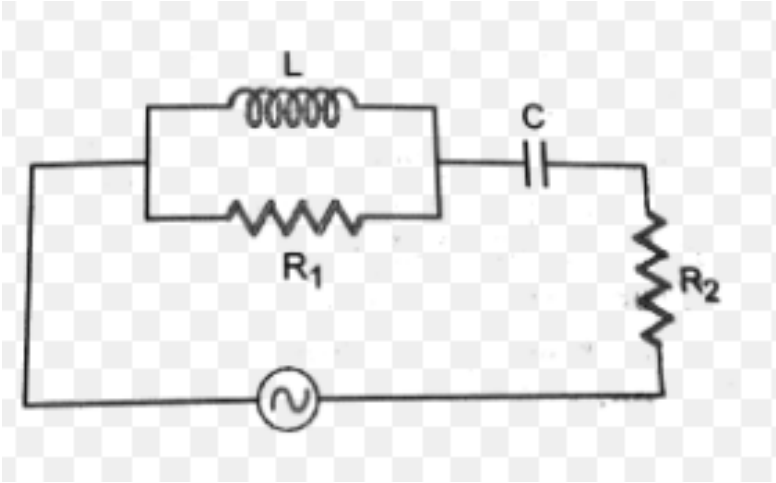
64. In the circuit shows find the phase difference between the potential differences across C and R_2



Watch Video Solution

65. Can a capacitor of suitable capacitance replace a choke coil in an ac circuit?

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66. What do you mean by the average value of a.c. ? Derive the expression for it.

Watch Video Solution

67. What is meant by average value of alternating current? Obtain an expression for it. Prove that the average value of alternating current over one complete cycle is zero.

Watch Video Solution

68. What is meant by mean or average value of alternating current ? Show that mean value of ac over a complete cycle is zero.

Watch Video Solution

69. Define root mean square value of an alternating current.

Watch Video Solution

70. Define root mean square value of an alternating current.

Watch Video Solution

71. Define root mean square value of an alternating current.

Watch Video Solution

72. Define virtual e.m.f. and find the relation between virtual e.m.f. and maximum e.m.f. n a.c.

Watch Video Solution

73. Define root mean square value of an alternating current.

Watch Video Solution

74. What do you mean by the average value of a.c. ? Derive the expression for it.

Watch Video Solution

75. Derive the relation for mean value of alternating current.

Watch Video Solution

76. The instantaneous current form an a.c. source is $I = 5 \sin (314t)$ A. What are the average and r.m.s. values of the current.

Watch Video Solution

77. Define root mean square value of an alternating current.

Watch Video Solution

78. An alternating e.m.f. is supplied to a pure resistance investigate the phase relationship between current flowing through it and the applied e.m.f.

Watch Video Solution

79. Show mathematically that in an a.c. circuit containing only inductance, the current lags behind the e.m.f. by a phase of $\frac{\pi}{2}$.

An a.c. voltage $E = E_0 \sin \omega t$ is applied across an inductor L. Obtain an expression for current I.

Watch Video Solution

80. Show that in an inductane, the voltage leads the current by $\pi / 2$.

Watch Video Solution

81. Derive an expression for impedance of an a.c. circuit with an induct L, capacitor C and a resistor R in series. What is condition of resonance?

Watch Video Solution

82. An alternating e.m.f. is supplied to a pure inductor investigate the phase relationship

between current flowing through it and the applied e.m.f.

Watch Video Solution

83. An a.c. voltage $E = E_0 \sin \omega t$is applied across an inductance L. Obtain an expression for the current in the circuit and hence obtain inductive reactance of the circuit .

Watch Video Solution

84. An a.c. voltage $E = E_0 \sin \omega t$is applied across an inductance L. Obtain an expression for the current in the circuit and hence obtain the phse of the current flowing w.r.t the applied voltage.

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85. An alternating e.m.f is applied across a capacitor. Show that current in it leads the applied e.m.f. by 90° what is capacitive

reactance of such a circuit? Write down the units of capacitive reactance.

 Watch Video Solution

86. Finda phase relation between current and voltage in an a.c. circuit containing a pure capacitance. A pure capacitor blocks directcurrent, why ?

 Watch Video Solution

87. An alternate e.m.f. is applied to pure capacitance. Investigate the phase relationship between the current flowing through it and e.m.f. applied.

Watch Video Solution

88. Derive the expression for the impedance of an a.c. circuit with an inductor L and a resistor R in series.

Watch Video Solution

89. An alternating source of e.m.f is applied to an inductor and resistor in series Investigate the phase relationship between current and e.m.f. what is the impedance of the circuit?

Watch Video Solution

90. Prove that high frequency a.c. cannot pass through a pure inductor, but can pass through a pure capacitor.

Watch Video Solution

91. Prove that high frequency a.c. cannot pass through a pure inductor, but can pass through a pure capacitor.

Watch Video Solution

92. Derive the expression for the impedance of an a.c. circuit with a capacitor and a resistor in sereis.

Watch Video Solution

93. An a.c. source generating a voltage $E = E_0 \sin \omega t$ is connected to a capacitor of capacitance C. Find the expression for current I, flowing through it. Plot a graph of E and I versus ωt to show that the current is $\pi / 2$ ahead of the voltage.

Watch Video Solution

94. An alternating source of e.m.f is applied to an inductor and resistor in series Investigate

the phase relationship between current and e.m.f. what is the impedance of the circuit?

 Watch Video Solution

95. What do you mean by inductive reactance, capacitive reactance and impedance? Show that a capacitor is a block for d.c., and an inductor, a block for a.c.

 Watch Video Solution

96. What is the impedance of a circuit ?

Watch Video Solution

97. Derive the expression for the impedance of an a.c. circuit with an inductor L and a resistor R in series.

Watch Video Solution

98. For the current in LCR circuit to be maximum.

Watch Video Solution

99. Derive a relation for the impedance of LCR circuit. What is the relationship between the current and e.m.f. in LCR circuit.

Watch Video Solution

100. With the help of phasor diagram derive an expression for impedance in LCR circuit.

Watch Video Solution

101. What do you mean by the impedance of LCR-circuit?

Watch Video Solution

102. Define resonant frequency of LCR series circuit.

Watch Video Solution

103. Explain the term resonance for a series LCR-circuit. Calculate the resonant frequancy.

Watch Video Solution

104. What is a sereis resonant circuit? Derive an expression for resonance frequency.

Watch Video Solution

105. What is the condition of resonance?

Watch Video Solution

106. In a series LCR-circuit, what is the value of power factor at resonacne?

Watch Video Solution

107. What do you mean by quality factor or Q value of resonance circuit?

Watch Video Solution

108. When a lead storage battery is discharged:

Watch Video Solution

109. What do you mean by LC oscillations?

Watch Video Solution

110. Show that when capacitor is discharged through an inductor the electrical oscillations are produced (LC- oscillations). Find te frequency of oscillations.

Watch Video Solution

111. For a given a.c., $I = I_0 \sin \omega t$, show that the average power dissipated in a resistor R over a complete cycle is $\frac{1}{2} I_0^2 R$.

Watch Video Solution

112. Show that an ideal inductor does not dissipate power in an ac circuit.

Watch Video Solution

113. Prove that in an a.c. circuit, an ideal capacitor does nt dissipate power.

Watch Video Solution

114. Prove that in an a.c. circuit, an ideal capacitor does nt dissipate power.

Watch Video Solution

115. What is difference between ohmic resistance and impedance of an a.c. circuit.

Watch Video Solution

116. Obtain an expression for the power in a.c. circuit containing a resistance and capacitance in series.

Watch Video Solution

117. Show that the average power transferred to an a.c. circuit is in general given by $P = V_{r.m.s} I_{r.m.s} R / Z$. Where R is the resistance in the circuit.

Watch Video Solution

118. Determine the condition so that current in the circuit may be wattless.

Watch Video Solution

119. Derive an expression for average power of an AC (alternating current) circuit.

Watch Video Solution

120. What is a sereis resonant circuit? Derive an expression for resonance frequency.

Watch Video Solution

121. Describe principle, construction and uses of a choke coil.

Watch Video Solution

122. Explain the construction and working of a choke. Explain, why is it preferred to resistance in a.c. circuits.

Watch Video Solution

123. Explain the function of a choke coil.

Watch Video Solution

124. Explain principle and theory of Transformer with the help of diagram.

Watch Video Solution

125. With the help of labelled diagram, describe the principle,construction and

working of a transformer.

Watch Video Solution

126. Why is the core of a transformer laminated? explain.

Watch Video Solution

127. State the underlying principle of a transformer.

Watch Video Solution

128. Explain principle and theory of Transformer with the help of diagram.

Watch Video Solution

129. Explain principle and theory of Transformer with the help of diagram.

Watch Video Solution

130. Describe the use of transformer for long distance transmission of a.c.

Watch Video Solution

131. What is the principle of a transformer ? Explain the theory and its application for long distance transmission of electrical energy.

Watch Video Solution

132. What is root mean square value of alternating current? Derive a relation between peak value and virtual value of alternating current.

Watch Video Solution

133. Derive an expression for mean value of first half cycle of a.c. Also find an expression for virtual value of a.c.

Watch Video Solution

134. Derive the relation for mean value of alternating current.

Watch Video Solution

135. Distinguish between 'average value' and 'r.m.s value' of an alternating current.

Watch Video Solution

136. Define mean value of an alternating current.

Watch Video Solution

137. What are mean value and RMS values of AC?

Watch Video Solution

138. An alternating e.m.f. is supplied to a pure resistance investigate the phase relationship between current flowing through it and the applied e.m.f.

Watch Video Solution

139. An alternating e.m.f. is supplied to a pure inductor investigate the phase relationship between current flowing through it and the applied e.m.f.

Watch Video Solution

140. An alternate e.m.f. is applied to pure capacitance. Investigate the phase relationship between the current flowing through it and e.m.f. applied.

Watch Video Solution

141. Find a phase relation between current and voltage in an a.c. circuit containing a pure

inductor. Why high frequency current can not passthrough a pure inductor easily ?

Watch Video Solution

142. Finda phase relation between current and voltage in an a.c. circuit containing a pure capacitance. A pure capacitor blocks directcurrent, why ?

Watch Video Solution

143. How does the term ohmic resistance differ from impedance? With the help of a suitable phasor diagram, obtain the relation between impedance and resistance in an a.c. series LCR circuit.

Watch Video Solution

144. What do you mean by the impedance of LCR-circuit?

Watch Video Solution

145. When does a series LCR circuit have minimum impedance?

Watch Video Solution

146. A series LCR circuit is connected to a source having voltage $v = v_m \sin \omega t$.Derive the expression for the instantaneous current I and its phase relationship to the applied voltage. Obtain the condition for resonance to

occur.Define 'power factor'.State the conditions under which it is maximum

Watch Video Solution

147. A series LCR circuit is connected to a source having voltage $v = v_m$ sin omegat.Derive the expression for the instantaneous current I and its phase relationship to the applied voltage.

Obtain the condition for resonance to

occur.Define 'power factor'.State the conditions under which it is minimum.

Watch Video Solution

148. An a.c. voltage $E = E_0 \sin \omega t$ is applied across a series combination of an inductor L, a capacitance C and a resistor R. Use the phasor diagram solution to obtain expressions for the impedance of the circuit.

Watch Video Solution

149. An a.c. voltage $E = E_0 \sin \omega t$ is applied across a series combination of an inductor L, a capacitance C and a resistor R. Use the phasor diagram solution to obtain expressions for the impedance of the circuit.

Watch Video Solution

150. An a.c. voltage $E = E_0 \sin \omega t$ is applied across a series combination of an inductor L, a capacitance C and a resistor R. Use the phasor

diagram solution to obtain expressions for the impedance of the circuit.

Watch Video Solution

151. Write expression for current in a series LCR circuit with a.c. source?

Watch Video Solution

152. What do you mean by the impedance of LCR-circuit?

Watch Video Solution

153. Define resonant frequency of LCR series circuit.

Watch Video Solution

154. What do you mean by the impedance of LCR-circuit?

Watch Video Solution

155. What is difference between ohmic resistance and impedance of an a.c. circuit.

Watch Video Solution

156. Derive an expression for impedance of an a.c. circuit with an induct L, capacitor C and a resistor R in series. What is condition of resonance?

Watch Video Solution

157. What do you mean by the impedance of LCR-circuit?

Watch Video Solution

158. Define resonant frequency of LCR series circuit.

Watch Video Solution

159. With the help of phasor diagram derive an expression for impedance in LCR circuit.

Watch Video Solution

160. Define resonant frequency of LCR series circuit.

Watch Video Solution

161. Define impedance of an electric circuit. How it differs from ohmic resistance ? Find an expression for the impedance of an a.c. circuit containing L-C-R in series.

Watch Video Solution

162. Derive the expression for the impedance of an a.c. circuit with a capacitor and a resistor in sereis.

Watch Video Solution

163. Draw the graphs showing variations of inductive reactance and capative reactance with frequency of applied a.c. source.

Watch Video Solution

164. Can the voltage drop across the inductor or the capacitor in a seris LCR-circuit be greater than the applied voltage of the a.c. source? Jusitfy your answer.

Watch Video Solution

165. Define power in an a.c. circuit and obtain expression for instantanoues power.

Watch Video Solution

166. Derive an expression for average power of an AC (alternating current) circuit.

Watch Video Solution

167. Derive an expression for average power is an A.C. circuit containing resistor only.

Watch Video Solution

168. Derive an expression for average power is an A.C. circuit containing resistor only.

Watch Video Solution

169. Is power dissipated across each element of an a.c. circuit containing L,C and R?

Watch Video Solution

170. Obtain an expression for the power in a.c. circuit containing a resistance and capacitance in series.

Watch Video Solution

171. Derive an expression for true power and virtual power of an a.c. circuit. How will you differentiate between true power and virtual power?

Watch Video Solution

172. A voltage $V = V_0 \sin \omega t$ is applied to a series LCR-circuit. Derive the expression for the average power dissipated over a cycle. Under what condition no power is dissipated even though the current flows through the circuit.

Watch Video Solution

173. A voltage $V = V_0 \sin \omega t$ is applied to a series LCR-circuit. Derive the expression for the average power dissipated over a cycle. Under

what condition maximum power is dissipated in the circuit?

Watch Video Solution

174. Derive an expression for average power of an AC (alternating current) circuit.

Watch Video Solution

175. Derive an expression for average power of an AC (alternating current) circuit.

Watch Video Solution

176. Derive an expression for average power of an AC (alternating current) circuit.

Watch Video Solution

177. What do you mean by power factor? On what factors does it depend?

Watch Video Solution

178. What is a sereis resonant circuit? Derive an expression for resonance frequency.

Watch Video Solution

179. Derive an expression for average power is an A.C. circuit containing resistor only.

Watch Video Solution

180. What is the quality factor (Q) in an a.c. circuit?

Watch Video Solution

181. Why choke coil cannot be used in d.c.?

Watch Video Solution

182. Explain the function of a choke coil.

Watch Video Solution

183. Draw a schematic diagram of a cyclotron. Explain the underlying principle and working , stating clearly the function of the electric and magnetic fields applied to the charged particle. Deduce an expression for the period of revolution and show that it does not depend upon the speed of the charged particle.

Watch Video Solution

184. With the help of labelled diagram, describe the principle,construction and working of a transformer.

Watch Video Solution

185. Derive the relationship between peak and the rms value of current in an a.c. circuit.

Watch Video Solution

186. Describe briefly, with the help of a lablled diagram, working of a step-up transformer. A step up transformer converts a low voltage in to high voltage. Does it not violate the principle of conservation of energy?

Watch Video Solution

187. What are the factors which reduce the efficiency of a transformer ?

Watch Video Solution

188. Establish relation between voltage and current in primary and secondary coils of transformer.

Watch Video Solution

189. With the help of labelled diagram, describe the principle,construction and working of a transformer.

Watch Video Solution

190. Explain the principle, construction and working of a step down transformer. Can it be used with a d.c. circuit?

Watch Video Solution

191. With the help of labelled diagram, describe the principle,construction and working of a transformer.

Watch Video Solution

192. What are copper loss, iron loss and hysteresis loss in transformer?

Watch Video Solution

193. What are copper loss, iron loss and hysteresis loss in transformer?

Watch Video Solution

194. What are copper loss, iron loss and hysteresis loss in transformer?

Watch Video Solution

195. What is a transformer? Explain its theory and give its main uses?

Watch Video Solution

196. Give the principle of a transformer, construction of a stepdown transformer. Give any two energy losses of a transformer.

Watch Video Solution

197. Establish relation between voltage and current in primary and secondary coils of transformer.

Watch Video Solution

198. Show diagramatically two different arrangements used for winding the primary and secondary coils in a transformer. Assuming the transformer to be an ideal one write expressions fo rthe ratio of its output current to input current in terms of the number of turns in the primary and secondary coils. Mention two reasons for energy losses in an actual transformer.

Watch Video Solution

199. State the underlying principle of a transformer.

Watch Video Solution

200. Can a trasnformer be helpful in reducing the cost of transmission of electrical energy to long distances? Explain.

Watch Video Solution

201. Can a trasnformer be helpful in reducing the cost of transmission of electrical energy to long distances? Explain.

Watch Video Solution