PHYSICS

BOOKS - CHETANA PUBLICATION

AC CIRCUITS

Example

1. Which are the two types of supplies of electricity?

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2. Define DC supply of electricity

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3. Define AC supply of electricity .

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4. Name a device which converts AC to DC.

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5. Name some devices which use DC supply of electricity.

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6. Name domestic appliances which run on AC supply of electricity.

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7. State the expression for emf of an AC source.

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8. State the expression for current of AC source.

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9. What is peak value of AC.

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10. What is average or mean value of AC .

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11. What is the average value of full cycle of AC? Why.

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12. What is the relation between peak value and average value of AC .

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13. What does an ammeter or voltmeter measure? Average value or peak value.

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14. Why can moving coil instruments not be used to measure alternating currents voltages

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15. Which is more dangerous,AC or DC?

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16. An alternating current measuring instrument have linear or non-linear

scale.Why?

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17. What is the $vo < a \geq /equency$ cycle of AC supply India.

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18. What is peak value and r.m.s. value of alternating current?

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19. What is peak value and r.m.s. value of alternating e.m.f.in the electric circuit?

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20. Derive expression for heat produced by the AC source in time t.

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21. An alternating voltage is given by e=6 sin 314t.Find:- the peak value

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22. An alternating voltage is given by e=6 sin 314t.Find:- frequency

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23. An alternating voltage is given by e=6 sin 314t.Find:- time period and

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24. An alternating voltage is given by e=6 sin 314t.Find:-instantaneous value at time t=2ms

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25. An alternating voltage given by e=140 sin 3142t is connected across a pure resistor of 50Ω.Find:- the frequency of the source

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26. An alternating voltage given by e=140 sin 3142t is connected across a pure resistor of 50Ω.Find:- the rms current through the resistor.

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27. An alternating e.m.f. is given by 100 sin 100 πt o a pure resistance of50Ω. calculate:- peak value of e.m.f

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28. An alternating e.m.f. is given by 100 sin 100πt to a pure resistance of50Ω. calculate:- frequency

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29. An alternating e.m.f. is given by 100 sin 100πt to a pure resistance of50Ω. calculate:- r.m.s current through the circuit.

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30. The r.m.s. value of current is$(2)\sqrt{2}$ A.Calcutate its peak value of current.

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31. An e.m.f. of peak value 100 V and frequency 60 r.p.s is supplied to the bulb.Write down the equation of supplied voltage.

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32. The A.C. current passing through 60Ω resistor causes a power loss of 6000 W. Find the r.m.s current and its maximum value . What are maximum value and r.m.s value of

D.C? What is the value of D.C.current that produces same power loss as the A.C. current?

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33. If the effective current in a 50 cycle AC circuit is 5A, what is the peak value of current? What is the current $1/600$sec.after it was Zero?

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34. A light bulb is rated 100 W for 220V ACsupply of 50 Hz.Calculate:-resistance of the bulb.

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35. A light bulb is rated 100 W for 220V ACsupply of 50 Hz.Calculate:-the rms current through the bulb.

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36. What is a phasor ?What is phasor diagram?

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37. How is the phasor of alternating emf or current represented ?

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38. Explain the theory of an A.C.circuit with resistor. Draw the phasor diagram for it.

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39. An alternating e.m.f. is applied to a circuit containing resistance. Discuss the behaviour of current in the circuit. Also discuss the phase diagram for it.

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40. Explain the theory of A.C. circuit with pure inductor .Draw the phasor digram for voltage and current in the circuit.

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41. Define inductive reactance and state its SI unit.

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42. How does inductive reactance vary with frequency f and inductance L ?

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43. Show graphically the variation of X_L with frequency f.

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44. What is SI unit and dimension of X_L.

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45. Why does a pure inductor pass DC and block AC of high frequency

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46. An inductor of inductance 200 mH is connected to an AC source of peak emf 210 V and frequency 50 Hz.Calculate the peak current. What is the instantaneous voltage of the source when the current is at its peak value?

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47. An AC circuit consists of only an inductor of inductance 2 H. If the current is represented by a sine wave of amplitude 0.25 A and frequency 60Hz,calculate the effective potential difference across the inductor

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48. Alternating emf of e=220 sin 100 $\pi t$is applied to a circuit containing an inductance of $\left(\frac{1}{\pi}\right)$henry. Write an equation for

instantaneous current through the circuit. What will be the reading of the AC galvenometer connected in the circuit?

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49. Find the reactantance of a coil of inductance 100mH at a frequency 50 Hz and 1000 Hz.

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50. An inductor of 500 mH is connected across a 100 V,50 Hz suppy. Calculate its reactance.

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51. Explain the theory of an A.C. circuit in a purely capacitive circuit. Draw the Phasor diagram for voltage and current in it

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52. Define capacitive reactane X_C.

Watch Video Solution

53. How does capacitive reactance vary with frequency and capacitance?

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54. A device Y is connected across an AC source of emf e =$e_o \sin \omega t$.the current through

y is given as i $=i_o \sin\left(\omega t + \left(\frac{\pi}{2}\right)\right)$:-Identify the device Y and write the expression for its reactance.

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55. A device Y is connected across an AC source of emf e $=e_o \sin \omega t$.the current through y is given as i $=i_o \sin\left(\omega t + \left(\frac{\pi}{2}\right)\right)$:-Draw graphs showinh variation of emf and current with time over one cycle of AC for Y.

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56. A device Y is connected across an AC source of emf e =$e_o \sin \omega t$.the current through y is given as i =$i_o \sin\left(\omega t + \left(\frac{\pi}{2}\right)\right)$:-How doesthe reactance of the device Y vary with the frequency of the AC? Show graphically.

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57. A device Y is connected across an AC source of emf e =$e_o \sin \omega t$.the current through y is

given as i $=i_o \sin\left(\omega t + \left(\frac{\pi}{2}\right)\right)$:-Draw the phasor diagram for the device Y.

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58. Draw the graph of capacitive reactance against frequency of a.c. source. Hence discuss its conclusion.

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59. State SI unit and dimensions of X_c.

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60. A capacitor of $2\mu F$ is connected to an AC source of emf e = 250 $\sin 100\pi t$. Write an equation for instantaneous current through the circuit and give reading of AC ammeter connected in the circuit.

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61. A capacitor draws 20 A current at 240 V, 50 Hz. Findthe capacitive reactance and the capacitance of the capacitor.

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62. A $100\mu F$capacitor is charged with a 50 V source supply. Then source supply is removed and the capacitor is connected across an inductance of reactance10Ω, as a result of which 5A current flows through the

inductance. Calculate thevalue of the inductance.

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63. A $15.0\mu F$ capacitor is connected to a 220 V 50 Hz source. Find the capacitive reactance and the current (rms and peak) in the circuit. If the frequency is doubled, what will happen to the capacitive reactance and the current?

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64. Obtain an expression for impedance of resistor, pure inductor and capacitor connected in series across alternating e.m.f. State formula for phase difference.

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65. Define impedance. State its SI unit.

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66. State SI unit and dimensions of impedance.

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67. What do you mean by reactance and impedance?

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68. Define admittance, State its SI unit.

Watch Video Solution

69. What happens in LCR circuit when` X_L=X_C ,X_L>X_C,X_L

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70. Draw and explain impedance triangle.

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71. A 100 mH incftictor, a$25\mu F$ capacitor and a 15Ω resistor is connected in series to a 120 V, 50 Hz. AC source. Calculate:-impedance of the circuit at resonance

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72. A 100 mH incftictor, a 25 pF capacitor and a 15 Q resistor is connected in series to a 120 V, 50 Hz. AC source. Calculate:-current at resonance

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73. A 100 mH incftictor, a 25 pF capacitor and a 15 Q resistor is connected in series to a 120 V, 50 Hz. AC source. Calculate:-Resonant frequency

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74. A coil of 0.01 H inductance and $I\Omega$ resistance is connected to 200 V, 50 Hz AC supply. Find the impedance of the circuit and

time lag between maximum alternating voltage and current.

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75. In LCR circuit, inductance $L = \frac{2}{\pi} H$, capacitance $C = \frac{10}{\pi}$ F and resistance 10 Omega are connected in series to A.C. source of frequency = 50 Hz. Find:-inductive reactance

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76. In LCR circuit, inductance $L = \frac{2}{\pi} H$, capacitance $C = \frac{10}{\pi}$ F and resistance 10 Omega are connected in series to A.C. source of frequency = 50 Hz. Find:-capacitive reactance

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77. In LCR circuit, inductance $L = \frac{2}{\pi} H$, capacitance $C = \frac{10}{\pi}$ F and resistance 10 Omega are connected in series to A.C. source

of frequency = 50 Hz. Find:-impedance of the circuit.

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78. When 100 V D.C. is applied across a coil, a current of 1A flows through it. When 100 V A.C. of frequency 50 Hz is applied to the same coil only 0.5 A current flows through it. Calculate resistance, and self inductance of the coil

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79. A capacitor of$20\mu F$ is connected in series with a 25Ω resistance to peak e.m.f. 240 V, 50 Hz A.C. Calculate:-the capacitive reactance of the coil

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80. A capacitor of$20\mu F$ is connected in series with a 25Ω resistance to peak e.m.f. 240 V, 50 Hz A.C. Calculate:-impedance of the circuit

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

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82. An alternating e.m.f. of peak value 110 V andfrequency 50 Hz is connected across LCR series circuit with R = 100Ω, L = 10 mH, C = $25\mu F$. Calculate the inductive reactance, capacitive reactance and impedance.

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83. A capacitor of $25\mu F$, inductor of 0.1 H and resistor of resistance 25Ω are connected in series with an A.C. source of e.m.f., e = 310 sin (314 t) volt. What is the :-reactance

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84. A capacitor of $25\mu F$, inductor of 0.1 H and resistor of resistance 25Ω are connected in series with an A.C. source of e.m.f., e = 310 sin

(314 t) volt. What is the:- impedance and current of the circuit

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85. A capacitor of $25\mu F$, inductor of 0.1 H and resistor of resistance 25Ω are connected in series with an A.C. source of e.m.f., e = 310 sin (314 t) volt. What is the:-phase angle between current and applied e.m.f.

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86. A capacitor of $25\mu F$, inductor of 0.1 H and resistor of resistance 25Ω are connected in series with an A.C. source of e.m.f., e = 310 sin (314 t) volt. What is the :-reactance

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87. An A.C. supply of frequency 50 Hz is supplied to a series combination of $25\mu F$ condenser, 0.1H inductor and 24Ω resistor. Calculate inductive and capacitive reactance. Also find impedance of the circuit.

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88. A capacitor of $100\mu F,$ a coil of resistance 50Ω and an inductance 0.5 H are connected in series with a 110 V-50 HZ source. Calculate the mis value of current in the circuit.

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89. A $10\mu F$ capacitor is charged to a 25 volt of potential.The battery is disconnected and a

pure 100 mH coil is connected across the capacitor so that LC oscillations are set up. Calculate the maximum current in the coil.

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90. An electric lamp is connected in series with a capacitor and an AC source is glowing with a certain brightness. How does the brightness of the lamp change on increasing the capacitance?

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91. The total impedance of a circuit decreases when a capacitor is added in series with L and R. Explain why?

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92. For very high frequency AC supply, a capacitor behaves like a pure conductor. Why?

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93. A $25\mu F$ capacitor, a 0.10 H inductor and a 25Ω resistor are connected in series with a AC source whose emf is given by e = 310 sin 314 t (volt). What is the frequency, reactance, impedance, current and phase angle of the circuit?

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94. Derive an expression for the average power associated with resistance in AC circuit.

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

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96. A 100Ω resistor is connected to a 220 V, 50 Hz supply:- What is the net power consumed over a full cycle?

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97. Show that average power over a complete cycle of AC through an ideal inductor is zero.

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98. Show that the average power supplied to an ideal capacitor by the source over a complete cycle is zero.

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99. Find the capacity of a capacitor which when put in series with a 10Ω resistor makes the power factor equal to 0.5. Assume an 80 V -100 Hz AC supply.

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100. Obtain an expression for power consumed in a LCR series circuit. Hence obtain an expression for power factor of the circuit.

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101. Define power factor

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102. What is wattless current?

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103. In a series LR circuit X_L = R and power factor of the circuit is P_1. When capacitor with capacitance C such that X_L = X_C is p ut in

series the power factor becomes P_2. Calculate P_1 / P_2.

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104. A sinusoidal voltage of peak value 283V and frequency 50 Hz is applied to a series LCR circuit in which R = 3Ω, L = 25.48 mH and C = $796\mu f$. Find:-The impedance of the circuit

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105. A sinusoidal voltage of peak value 283V and frequency 50 Hz is applied to a series LCR circuit in which R = 3Ω, L = 25.48 mH and C = $796\mu f$. Find:-The phase difference between the voltage across source and the currents

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106. A sinusoidal voltage of peak value 283V and frequency 50 Hz is applied to a series LCR

circuit in which R = 3Ω, L = 25.48 mH and C = $796\mu f$. Find:-The power factor

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107. A sinusoidal voltage of peak value 283V and frequency 50 Hz is applied to a series LCR circuit in which R = 3Ω, L = 25.48 mH and C = $796\mu f$. Find:-The power dissipated in the surface.

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108. An alternating voltage of 240V, 50 Hz is applied to 20H inductance coil and resistance 300Ω. Calculate, inductive reactance power factor and power absorbed.

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109. How oscillations are produced usingan inductor and a capacitor?

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110. Why are LC oscillations usually damped?

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111. Calculate the value of capacity in picofarad, which will make 101.4 micro henry inductance to oscillate with frequency of one megahertz.

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112. What is natural frequency of oscillation of a system?

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113. What is electric resonance?

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114. What is resonant circuit?

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115. Which are the different types of electric resonance circuits?

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116. Explain series resonance in LCR circuit.

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117. Define series resonant frequency.

Watch Video Solution

118. State the applications of series resonant circuit.

Watch Video Solution

119. State the condition for series resonance. Obtain an expression for resonant frequency.

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120. Draw series resonance curve and discuss its importance.

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121. State the characteristics of series resonance circuit.

Watch Video Solution

122. What are acceptor circuits?

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123. What is parallel resonance circuit? Obtain condition for parallel resonance.

Watch Video Solution

124. Define resonance frequency in parallel resonance. Obtain an expression for resonance frequency in parallel LC circuit. Also

discuss the variation of current with frequency.

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125. What are rejector circuits?

Watch Video Solution

126. State the characteristics of parallel resonance circuit

Watch Video Solution

127. An A.C. voltage is applied to parallel combination of inductance 2 mH and a capacitor $3.2\mu F$. Calculate the resonant frequency.

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128. A series LCR circuit has capacitor of $0.2\mu F$ and inductor of 8 mH. Find its resonant frequeiucy.

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129. In series LCR circuit, the inductor of inductance . 100 mH, a resistor of 10Ω, and a variable. capacitor are connected across 20 V, 50 Hz supply. At what capacitance will resonance occur? Find the corresponding current.

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130. An A.C. voltage of r.m.s. value 1 V is applied to a parallel combination of inductor L = 10 mH, and capacitor$4\mu F$. Calculate the resonant frequency and current through each branch and resonance.

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131. A coil of resistance 5μ and self inductance 0.2 H is connected in series with a variable capacitor across 30 V, 50 Hz supply. At what

value of capacitor resonance will occur? Find the corresponding current.

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132. In a resonant circuit, inductance of the coil is 3 mH and resonant frequency is 1000 kHz. What is the value of capacitor in the circuit?

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133. An A.C. circuit consists of a resistor of 5Ω and inductor of 10 mH connected in series with 50 V, 50 Hz supply. What capacitance should be connected in series with the circuit to obtain maximum current? What will be the maximum current?

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134. In LCR series combination R = 10Ω, L = 1 mH, C = $2\mu F$. Determine :- resonant frequency,

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135. In LCR series combination R = 10Ω, L = 1 mH, C = $2\mu F$. Determine :- the current in the circuit when an alternating voltage of 10 mV operating at the resonant frequency is applied to the series combination.

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136. An A.C. circuit consists of inductor of inductance 125 mH connected in parallel with

a capacitor of capacity $50\mu F$. Determine the resonant frequency.

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137. The LCR series circuit has an inductance 50 mH and a capacitor $0.1 \times 10^{-6} F$ and a resistance 200Ω. Find the impedance at resonance and resonant frequency

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138. What is half power frequency in series LCR circuit.

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139. Define Q factor of series resonant circuit and state formula

Watch Video Solution

140. Draw the sharpness resonance curve of series LCR circuit to explain the Q-factor.

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141. State the units and dimensions of Q factor

Watch Video Solution

142. What happens if Q factor of LCR circuit is large.

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143. What is a choke coil?

Watch Video Solution

144. Where is a choke coil used ?

Watch Video Solution

145. Write a short note on choke coil.

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146. Distinugish between Resistance and Reactance.

Watch Video Solution

147. Differences between series and parallel resonance.

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Exercise

1. A LCR series circuit has the impedance of 240 ohm. If R = 120Ω, find the power factor of the circuit.

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2. In LCR series circuit a voltmeter is connected in turn acrosstheendsof R,LandC, and the voltages are found to be 192 V, 200V and 56 V

respectively. Find the phase angle and hence the power factor of the circuit

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3. What inductive reactance will $a\frac{1}{\pi}$H inductor have at the 50 Hz frequency?

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4. What is the period of a 50 Hz voltage wave?

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5. An inductor draws 5A of current at 230 V, 50 Hz. Find the value of inductive reactance and the inductance.

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6. A capacitor draws 10 Aof current at 230 V, 50 Hz. Find the capacitive reactance and the capacitance of the capacitor.

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7. A circuit connected to a 200 V supply takes a current of 4.8 A. If the angle of lag is 25°, find the power absorbed.

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8. A voltage e = $50\sqrt{2}$sin 314.0 t volt is applied across a 10 ohm resistor. Find:- peak value of emf

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9. A voltage e = $50\sqrt{2}$sin 314.0 t volt is applied across a 10 ohm resistor. Find:-frequency

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10. A voltage e = $50\sqrt{2}$sin 314.0 t volt is applied across a 10 ohm resistor. Find:-rms current (i.e. an ac ammeter reading) through the circuit.

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11. A 2H inductor of negligible resistance is connected to a 50 V, 50 Hz power line:- What is the inductive reactance?

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12. A 2H inductor of negligible resistance is connected to a 50 V, 50 Hz power line:- What isthe current in the coil?

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13. A peak value of alternating voltage is 494.97 V. Find reading on voltmeter used to measure it?

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14. In a purely inductive ac circuit L = 25 mH and peak voltage of ac supply is150 V. Find inductive reactance and maximum current if the frequency is 50 Hz.

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15. An inductor has a reactance of 125.6Ω at 200 Hz. What is the inductance?

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16. An alternating e.m.f. given by e = 50 sin 314t is applied to a pure resistance of 100 ohm. Find:-peak value of e.m.f.

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17. An alternating e.m.f. given by e = 50 sin 314t is applied to a pure resistance of 100 ohm. Find:-frequency

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18. An alternating e.m.f. given by e = 50 sin 314t is applied to a pure resistance of 100 ohm. Find:-r.m.s. current through the circuit

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19. An alternating e.m.f. given by e = 50 sin 314t is applied to a pure resistance of 100 ohm. Find:- power dissipated in the circuit.

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20. A 60 watt lamp is connected to an alternating e.m.f. of peak value 230 volt. Find the peak value of current flowing through the lamp.

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21. When an a.c. current passes through a 14Ω resistor, the power loss is 224 W. Find the r.m.s. values of current and voltage. Also find the maximum values of current and voltage. Find the steady value of current which when passed through this resistor will produce the same power loss as the a.c. current.

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22. Calculate the reactance of a 2H inductance in an a.c. circuit of frequency 50 Hz.

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23. Calculate the reactance of a $1\mu F$ capacitance in an a.c. circuit of frequency 50 Hz.

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24. A coil has an inductance of 0.5H. Calculate:-

its inductive reactance when connected to 240 V (peak), 50 Hz A.C.

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25. A coil has an inductance of 0.5H. Calculate:-

its impedance if the resistance of the circuit is $50\Omega$and

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26. A coil has an inductance of 0.5H and a resistance of 100 ohm are connected in series to 240v, 50 Hz supply. Calculate:- the maximum current in the circuit.

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27. An a.c. e.m.f. of peak value 240 V and frequency 50 Hz is connected to a circuit with R = 12Ω, L = 2.5 H and a capacitor all in series. Find the capacitance for the current in the

circuit to be maximum. Find the maximum current.

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28. Find the current in a circuit consisting of a coil and a capacitor in series with an A.C. source of 110 V (r.m.s.), 60 Hz. The inductance of the coil is 0.80 H and its resistance is 50Ω. The capacitance of the capacitor is $8\mu F$.

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29. In a series LCR circuit, R = 20Ω, C = $10\mu F$ and L = 25 mH.The frequency of applied a.c. e.m.f. of 240 volt (peak) is 50 Hz. Calculate :- impedance of the circuit

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30. In a series LCR circuit, R = 20Ω, C = $10\mu F$ and L = 25 mH.The frequency of applied a.c. e.m.f. of 240 volt (peak) is 50 Hz. Calculate :- maximum current

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31. In a series LCR circuit, R = 20Ω, C = $10\mu F$ and L = 25 mH.The frequency of applied a.c. e.m.f. of 240 volt (peak) is 50 Hz. Calculate :- phase angle between the current and the voltage

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32. In a series LCR circuit, R = 20Ω, C = $10\mu F$ and L = 25 mH.The frequency of applied a.c.

e.m.f. of 240 volt (peak) is 50 Hz. Calculate :-

maximum current

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33. In a series LCR circuit, R = 20Ω, C = $10\mu F$ and L = 25 mH.The frequency of applied a.c. e.m.f. of 240 volt (peak) is 50 Hz. Calculate :-

average power delivered to the circuit.

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34. In a series resonant circuit, the inductance coil is of 0.2 H and the resistance coil is of 50Ω. What is the value of capacitance in the circuit for resonance to occur at a frequency of 1500 kHz? The source has an e.m.f. of 100 V r.m.s.?

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35. Find the reactance of a 0.8Hinductance call on an A.C. line of frequency 50 Hz.

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36. Find the impedance of a LR circuit with R = 50Ω in series with an inductive reactance of 30Ω.

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37. An A.C. circuit of maximum e.m.f. 100 volt and of frequency 50 Hz contains an inductance of 0.2 mH. What is the inductive reactance of the circuit? What is the maximum current in the circuit?

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38. An A.C.source of r.m.s. value85V and frequency 50Hz is connected in series with an inductance of 2H and a resistance of 10Ω. Find the maximum current in the circuit.

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39. A resistance of 160Ω is used in series with an inductance L and an a.c. of 230 V, 50 Hz. If

the current in the circuit is 0.25A, find L.

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40. An A.C. e.m.f. of peak 220 V, 50 Hz is connected to an inductance of 253 mH and a resistance of 9Ω series calculate the impedance of the circuit and the r.m.s. current in the circuit.

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41. A circuit has a resistance and a reactance each equal to 100Ω.Find its power factor. If the circuit draws a current of 1.5 A for an applied voltage of 200 V, what is the average power consumed in the circuit?

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42. An A.C. circuit of peak e.m.f. 200 V and of frequency 50 Hz contains an inductive of 0.1 H

and resistance 10Ω in series. Find the power factor and the power consumed in the circuit

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43. Find the capacitive reactance of a $100\mu F$ capacitor used on a A.C.source of 50 Hz.

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44. A capacitance of $0.4\mu F$ is connected to an alternating e.m.f. of frequency 100 Hz. What is

the capacitive reactance ?

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45. A capacitor of $50\mu F$ is connected across a 100 V, 50 Hz a.c. supply. Find the reactance and the r.m.s. current.

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46. An a.c. series circuit has a source of maximum e.m.f. 220 V at a frequency of 50 Hz

connected to a capacitor of 8pF, an inductor of 0.8 H and a non-inductive resistor of 50Ω. What is the maximum current in the circuit?

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47. The resonant frequency of a parallel LC circuit is 1000 kHz. If L = 3mH, find the capacitance used.

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48. Find the capacitance to be connected in parallel with a 100 mH inductance to achieve a resonance frequency of 50 Hz.

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49. An A.C. voltage of r.m.s. value IV is applied to a parallel combination of inductor L = 10mH and capacitor C = $4\mu F$. Calculate the resonant frequency and current through each branch at resonance.

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50. A capacitor is used with an A.C. source of 110 V and frequency 50 Hz. If the maximum current in the circuit is 4.89 A, calculate the capacitance

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51. An a.c. consists of a resistor of 10W, inductor of 0.1 H and capacitor of 50 mF in

series across a 50 V, 50 Hz supply. Determine power factor of the circuit.

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52. An A.C. circuit consists of inductor of inductance 125 mH connected in parallel with a capacitor of capacity $50\mu F$. Determine the resonant frequency.

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53. In an ac circuit, V and I are given by V = $100\sin(100t)$ volts,I =$100\sin\left(100t+\frac{\pi}{3}\right)$ mA.The power dissipated in circuit is

A. $10^4 wa$

B. 10 watt

C. 2.5 watt

D. 5 watt

Answer:

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54. The frequency of ac mainsin India is

A. $30c/s$ or Hz

B. $50c/s$ or Hz

C. $60c/s$ or Hz

D. $120c/s$ or Hz

Answer:

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55. The peak value of 220 volts of ac mainsis

A. 155.6 volts

B. 220.0 volts

C. 311.0 volts

D. 440 volts

Answer:

56. If a current I given by $I_o \sin\left(\omega - \frac{\pi}{2}\right)$ flowsin an ac circuit across which an potential of e= $e_0 \sin \omega t$ has been applied, then the power consumption P in the circuit will be.

A. P=$\frac{e_o i_0}{\sqrt{2}}$

B. P=$\sqrt{2} e_o i_o$

C. P=$\frac{e_o i_0}{2}$

D. P=0

Answer:

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57. In an ac circuit, the current is given by I = $5\sin\left(100t - \frac{\pi}{2}\right)$ and the ac potential is V=200sin(100)volt.Thenthepower consumption is

A. 20 watts

B. 40 watts

C. 1000 watts

D. 0 watts

Answer:

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58. The frequency of an alternating voltage is 50 cycles//sec and its amplitude is 120V. Then the r.m.s. value of voltage is

A. 101.3 V

B. 84.8 V

C. 70.7V

D. 56.5 V

Answer:

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59. The ratio of peak value and r.m.s. value of an alternating current is

A. 1

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

C. $\sqrt{2}$

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

Answer:

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60. The power factor of LCR circuit at resonance is

A. 0.707

B. 1

C. zero

D. 0.5

Answer:

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61. Power delivered by the source of the circuit becomes maximum, when

A. $\omega L - \omega C$

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

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

D. $\omega L = \sqrt{\omega} C$

Answer:

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62. In a circuit containing an inductance of zero resistance, the e.m.f. of the applied ac voltage leads the current by

A. 90°

B. 45°

C. 30°

D. 0°

Answer:

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63. An alternating e.m.f. is applied to purely capacitive circuit. The phase relation between e.m.f. and current flowing in the circuit is

A. e.m.f. is ahead of current by $\frac{\pi}{2}$

B. current is ahead of e.m.f. $by \frac{\pi}{2}$

C. current is ahead of e.m.f. by π

D. current is ahead of e.m.f. by π

Answer:

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64. An alternating current of frequency 'f isflowing in a circuit containing a resistance R and a choke L in series. The impedance of this circuit is

A. $R + 2\pi fL$

B. $\sqrt{R^2 + 4\pi^2 f^2 L^2}$

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

D. $\sqrt{R^2 + 2\pi fL}$

Answer:

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65. The average power dissipation in a pure capacitance in ac circuit is

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

B. CV^2

C. $\frac{1}{4}CV^2$

D. Zero

Answer:

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66. An alternating voltage e = $200\sqrt{2}$ sin (100 t) is connected to a 1microfarad capacitor through an ac ammeter. The reading of the ammetershall be

A. 10mA

B. 20 mA

C. 40 mA

D. 80 mA

Answer:

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67. L, C and R denote inductance, capacitance and resistance respectively. Pick out the combination which does not have the dimensions of frequency

A. $\frac{1}{R}C$

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

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

D. C/L

Answer:

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68. What will be the phase difference between virtual voltage and virtual current, when the current in the circuit is wattless

A. 90°

B. 45°

C. 180°

D. 60°

Answer:

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69. Power factor is maximum in an LCR circuit when

A. $X_L = X_C$

B. R=0

C. $X_L = 0$

D. $X_C = 0$

Answer:

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70. The capacity of a pure capacitor is1Farad.

In DC circuits, its effective resistance will be

A. zero

B. infinite

C. 1 ohm

D. $\frac{1}{2}ohm$

Answer:

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71. A 220 V, 50 Hz as source is connected to an inductance of 0.2 H and a resistance of 20 ohm in series. What is the current in the circuit.

A. 10 A

B. 5 A

C. 33.3 A

D. 3.33 A

Answer:

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72. For high frequency, a capacitor offers

A. More reactance

B. Less reactance

C. Zero reactance

D. Infinite reactance

Answer:

Watch Video Solution

73. In LCR circuit the pd between the terminals of the inductance is 60 V, between the terminals of the capacitor is 30 V and that

between the terminals of resistance is 40 V. The supply voltage will be equal to

A. 50V

B. 70V

C. 130V

D. 10 V

Answer:

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

A. 4 L

B. 2L

C. $L/2$

D. $L/4$

Answer:

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75. An oscillator circuit consists of an inductance of 0.5 mH and a capacitor of $20\mu F$. The resonant frequency of the circuit is nearly

A. 15.92 Hz

B. 159.2 Hz

C. 1592 Hz

D. 15910 Hz

Answer:

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76. Which of the following components of an LCR circuit with ac supply, dissipates energy

A. L

B. R

C. C

D. All of these

Answer:

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77. The phase difference between the ac and emf is $\frac{\pi}{2}$. Which of the following cannot be the constituent of the circuit

A. LC

B. L alone

C. R alone

D. R,L

Answer:

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78. In an A.C. circuit the current

A. Always leads the voltage

B. Always lags behind the voltage

C. It is alwaysin phase with the voltage

D. May lead or lag behind or be in phase with the voltage

Answer:

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79. Acoil of inductive reactance 31Ωhas a resistance of 8Ω. It is placed in series with a condenser of capadtative reactance 25Ω. The combination is connected to an a.c.source of 110 volt. The power factor of the circuit is

A. 0.8

B. 0.33

C. 0.56

D. 0.64

Answer:

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80. A light bulb is rated 100 W for a 220 V supply. The resistance of the bulb and the peak voltage of the source respectively are

A. 242Ω and 311V

B. 484Ω and 311V

C. 484Ω and 440 V

D. 242Ω and 440 V

Answer:

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81. A 50 volt a.c. is applied across an RC (series) network. The rms voltage across the resistance is 40 volt, then the potential across the capadtance would be

A. 10 V

B. 20 V

C. 30 V

D. 40 V

Answer:

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82. Apure inductor of 25 mHis conneded to a source of 220 V. Given the frequency of the source as 50 Hz, the rms current in the circuit is

A. 7 A

B. 14 A

C. 28 A

D. 42A

Answer:

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83. If the rms current in a 50 Hz AC rircuit is 5A the value of the current $\frac{1}{300}$ seconds after its value becomes zero is

A. $5\left(\sqrt{2}\right)A$

B. $\frac{5\left(\sqrt{3}\right)}{2}$

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

D. 5/(sqrt2)A

Answer:

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84. A resistor of 500Ω and an indudance of 0.5 H are in series with an AC source which is

given by V = $100\sqrt{2}$ sin (1000 t). The power fador of the combination is

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

B. $\frac{1}{s}qtr3$

C. 0.5

D. 0.6

Answer:

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85. Thedisplacement currentisgivenby the expression

A. $\mu_o\left(1+\varepsilon_o\frac{d\phi_E}{dt}\right)$

B. $\varepsilon_o\frac{d\phi_E}{dt}$

C. $\mu_o\varepsilon_o\frac{d\phi_E}{dt}$

D. $\mu_o\varepsilon_o$

Answer:

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86. An alternating e.m.f. is given by e = 100 sin 314 t, the time within which the e.m.f. will half of its maximum value is

A. 0.16 sec.

B. 0.016 sec.

C. 0.0016 sec.

D. 1.6 sec.

Answer:

87. A sinusoidal voltage e = 200 sin (100 t) is applied acrossaresistanceof 100Ω then current measured by D.C. ammeter is

A. 2 A

B. 2.828 A

C. 0.2 A

D. 0

Answer:

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88. Relation between e_rms and $e_o$is

A. $\frac{e_{rms}}{e_o} = \frac{1}{\sqrt{2}}$

B. $e_{rms} = e_o\sqrt{2}$

C. $e_{rms} = 2e_o$

D. $e_o = e_{rms}\sqrt{2}$

Answer:

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89. A6Ω resistanceand 8Ω inductance are connected in series then power factor of the circuit is

A. 0.06

B. 0.6

C. 0.8

D. $\frac{1}{8}$

Answer:

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90. A current that does not perform any work is

A. peak current

B. r.m.s. current

C. ideal current

D. eddy currents

Answer:

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91. In LCR series drcuit apparent power is

A. $e_{r.m.s.} \cdot i_{r.m.s.}$

B. $\frac{e_{r.m.s.}}{i_{r.m.s.}}$

C. $\frac{i_{r.m.s.}}{e_{r.m.s.}}$

D. $(e_{r.m.s.})^2(i_{r.m.s.})$

Answer:

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92. Seled true statement for purely inductive circuit

A. current and voltage are in phase

B. current lags behind the e.m.f. by phase of $\frac{\pi}{2} rad$

C. e.m.f. lags behind the current by phase of $\frac{\pi}{2} rad$

D. current lags behind the e.m.f. by phase of πrad

Answer:

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93. Resonance frequency for parallel LC circuit is given by

A. $\left(L\frac{C}{2\pi}\right.$

B. `1/(2pisqrt(LC)

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

D. $\frac{\sqrt{LC}}{2\pi}$

Answer:

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94. In LCR series drcuit, at resonance the applied e.m.f. and current

A. out of phase

B. differ by π radians

C. in phase

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

Answer:

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95. In series LCR circuit, at resonance impedance

A. maximum

B. minimum

C. zero

D. infinite

Answer:

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96. In series LCR circuit R = 4Ω, L = 0.2 H and C = 0.1 F, at resonance impedance is

A. 4Ω

B. 15.99Ω

C. 0.2Ω

D. 19

Answer:

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97. The impedance of LCR circuit increases with frequency when

A. $L > C$

B. $C > L$

C. $X_L > X_C$

D. $X_C > X_L$

Answer:

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98. Which of the following depends upon frequency?

A. inductance

B. capacitance

C. resistance

D. C and B

Answer:

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99. In an R.C. circuit resistance = 4 Omega and XC = 3Ω, then power factor is

A. 0.8

B. 8

C. 0

D. 1

Answer:

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100. In a circuit L,Cand R are connected in series with an alternating voltage of frequency f the current leads the voltage by 45^@. The value of C is

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

B. $\frac{1}{2\pi f(2\pi fL - R)}$

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

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

Answer:

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101. In an AC circuit, e and i are given by e = 150 sin 150 t V and i = 150 sin $\left(150t+\frac{\pi}{3}\right)$ A. The 1 power dissipated in the circuit is

A. 106 W

B. 150 W

C. 5625 W

D. zero

Answer:

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102. In a series LCR circuit the phase difference between the v oltage and the current is 45°. Then the power factor will be

A. 0.607

B. 0.707

C. 0.808

D. 1

Answer:

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103. Select and write the most appropriate answer. The instantaneous current in an A.C. circuit is given by I = 2 sin $(\omega t + \theta)$ ampere. The r.m.s. value of the current is

A. 2 ampere

B. 2sqrt2 ampere

C. sqrt2 ampere

D. 1/sqrt2 ampere

Answer:

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104. An L- C - R series circuit is joined to a source of alternating e.m.f. If R = 9Ω, X_L = 28Ω

, X_c = 16 W, then the impedance of the circuit will be

A. 10Ω

B. 15Ω

C. 20Ω

D. 30Ω

Answer:

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105. In an A.C. circuit I =10 cos (100t) ampere and V = 20 sin (100t). The power loss in the circuit will be

A. 20 watt

B. 200watt

C. 0 watt

D. 50 watt

Answer:

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106. An alternating e.m.f. is applied to a series L - C - R circuit. It the frequency of the applied e.m.f. is more than the resonant frequency of the circuit then the circuit will act as

A. a resistive circuit

B. an inductive circuit

C. a capacitive circuit

D. an oscillatory circuit

Answer:

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107. Answer the following in short. What isthe power factor for a purely resistive circuit?

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108. State the condition for series resonance. Obtain an expression for resonant frequency.

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109. What is the phase difference between current and e.m.f. in a purely capacitive circuit?

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110. A alternating e.m.f. e = 200 sin $(100\pi t)$ is connected across a resistor of resistance 10Ω. Calculate the r.m.s. current flowing through the circuit.

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111. Define: inductive reactance capacitive.

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112. Define peak and r.m.s. value of alternating signal.

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113. Distinugish between Resistance and Reactance.

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114. A radio can tune over a frequency range 400 kHz to 600 kHz of the medium wave band. If the L - C tuner circuit has an effective inductance of 0.2 mH, what must be the range of its variable capacitance of the capacitor?

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115. Distinguish between acceptor circuit and rejector circuit.

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116. An A.C. circuit consists of a resistor of 5Ω and inductor of 10 mH connected in series with 50 V, 50 Hz supply. What capacitance should be connected in series with the circuit to obtain maximum current? What will be the maximum current?

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117. Attempt the following . What is a series LCR resonant circuit?State the condition forseriesresonance and obtain an expression for the resonant frequency of the circuit.

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118. A capacitor of $25\mu F$, inductor of 0.1 H and resistor of resistance 25Ω are connected in series with an A.C. source of e.m.f., e = 310 sin (314 t) volt. What is the :-reactance

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119. A $25\mu F$ capacitor, 0.1 H inductor and 25W resistor are connected in series with an ac source of emf e = 310 sin 314 t volt. What is :- impedance

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120. A $25\mu F$ capacitor, 0.1 H inductor and 25W resistor are connected in series with an ac

source of emf e = 310 sin 314 t volt. What is:-

current in the circuit

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121. A capacitor of $25\mu F$, inductor of 0.1 H and resistor of resistance 25Ω are connected in series with an A.C. source of e.m.f., e = 310 sin (314 t) volt. What is the:-phase angle between current and applied e.m.f.

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122. A $25\mu F$ capacitor, 0.1 H inductor and 25W resistor are connected in series with an ac source of emf e = 310 sin 314 t volt. What is:- current in the circuit

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