PHYSICS

BOOKS - A2Z PHYSICS (HINGLISH)

ALTERNATING CURRENT

Properties Of Alternating Current

1. Alternating current can not be measured by D.C. Ammeter because

A. AC voltage pass through DC ammeter

B. Average value of complete cycle is zero

C. AC is virtual

D. AC change its direction

Answer: B

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2. An AC generator produced an output voltage $E = 170 \sin 377t$ volts , where t is in seconds. The frequency of AC voltage is

A. $50Hz$

B. $110Hz$

C. $60Hz$

D. $230Hz$

Answer: C

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3. An electron lamp is connected to $220V, 50Hz$ supply. Then the peak value of voltage is

A. $210V$

B. $211V$

C. $310V$

D. $320V$

Answer: C

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4. The r.m.s. voltage of domestic electricity supply is 220 volt. Electrical appliances should be designed to withstand an instantaneous voltage of

A. $220V$

B. $311V$

C. $330V$

D. $440V$

Answer: B

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5. 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. $101.3V$

B. $84.8V$

C. $70.7V$

D. $56.5V$

Answer: B

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6. A resistance of $20 ohms$ is connected to a source of an alternating potential $V = 220\sin(100\pi t)$. The time taken by the current to change from its peak value to r.m.s. value is

A. 0.2 sec

B. 0.25 sec

C. 25×10^{-3} sec

D. 2.5×10^{-3} sec

Answer: D

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7. Voltage and current is an AC circuit are given by $V = \sin\left(100\pi t - \frac{\pi}{6}\right)$ and $I = 4\sin\left(100\pi t + \frac{\pi}{6}\right)$

A. Voltage leads the current by 30°

B. Current leads the voltage by 30°

C. Current leads the voltage by 60°

D. Voltage leads the current by 60°

Answer: C

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8. If an AC main supply is given to be $220V$. What would be the average e.m.f during a positive half cycle?

A. $198V$

B. $386V$

C. $256V$

D. None of these

Answer: A

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9. In an AC circuit $I = 100 \sin 200\pi t$. The time required for the current to achieve its peak value of will be

A. $\frac{1}{100}$ sec

B. $\frac{1}{200}$ sec

C. $\frac{1}{300}$ sec

D. $\frac{1}{400}$ sec

Answer: D

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10. The peak value of Alternating current is 6amp, then r.m.s. value of current will be

A. $3A$

B. $3\sqrt{3}A$

C. $3\sqrt{2}A$

D. $2\sqrt{3}A$

Answer: C

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11. A generator produces a time varying voltage given by $V = 240 \sin 120t$, where t is in second. The rms voltage and frequency are

A. $60Hz$ and $240V$

B. $19Hz$ and $120V$

C. $19Hz$ and $170V$

D. $754Hz$ and $70V$

Answer: C

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12. The peak voltage in a $220V\,AC$ source is

A. $155.6volts$

B. $220.0volts$

C. $311.0volts$

D. $440 volts$

Answer: C

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13. A 40Ω electric heater is connected to a $200V, 50Hz$ main supply. The peak value of electric current flowing in the circuit is approx.

A. $2.5A$

B. $5A$

C. $7A$

D. $10A$

Answer: C

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14. The rms value of an ac of 50Hz is 10A. The time taken by an alternating current in reaching from zero to maximum value and the peak value will be

A. 2×10^{-2} sec and $14.14 amp$

B. 1×10^{-2} sec and $7.07 amp$

C. 5×10^{-3} sec and $7.07 amp$

D. 5×10^{-3} sec and $14.14 amp$

Answer: D

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15. The peak value of an alternating emf E given by

$E = (E_0) \cos \omega t$

is 10V and frequency is 50 Hz. At time

$t = (1/600)s$ the instantaneous value of emf is

A. $10V$

B. $5\sqrt{3}V$

C. $5V$

D. $1V$

Answer: B

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16. An alternating current is given by

$I = i_1 \cos \omega t + i_2 \sin \omega t.$

The rms current is given by

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

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

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

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

Answer: C

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17. An AC is given by the equation $I = I_1 \cos \omega t + I_2 \sin \omega t$. The r.m.s. current is given by

A. $\frac{I_1 + I_2}{2}$

B. $\frac{(I_1 + I_2)^2}{\sqrt{2}}$

C. $\frac{1}{\sqrt{2}}\sqrt{I_1^2 + I_2^2}$

D. $\frac{I_1^2 + I_2^2}{2}$

Answer: C

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18. Two alternating voltage generators produce emfs of the same amplitude(E_0) but with a phase difference of $(\pi)/3$. The resultant emf is

A. $E_0 \sin(\omega t + \pi/3)$

B. $E_0 \sin(\omega t + \pi/6)$

C. $\sqrt{3}E_0 \sin(\omega t + \pi/6)$

D. $\sqrt{3}E_0 \sin(\omega t + \pi/2)$

Answer: C

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19. The phase difference between the voltage and the current in an AC circuit is $\pi/4$. If the frequency is $50Hz$ then this phase difference will be equivalent to a time of

A. $0.02s$

B. $0.25s$

C. $2.5ms$

D. $25ms$

Answer: C

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20. Instantaneous values of current and e.m.f in an AC circuit are $I = I / \sqrt{2} \sin 314t$ amp and $E = \sqrt{2} \sin(314t - \pi / 6)V$ respectively. The phase difference between E and I will be

A. $-\pi/6rad$

B. $-\pi/3rad$

C. $\pi/6rad$

D. $\pi/3rad$

Answer: A

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

A. $10mA$

B. $20mA$

C. $40mA$

D. $80mA$

Answer: B

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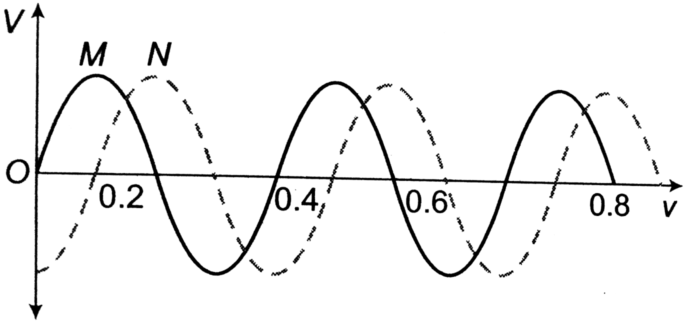
22. Two sinusoidal voltage of the same frequency are shown in the diagram. What is the frequency, and the phase relationship between the voltage?



Frequency in Hz phase lead of N over M in radius

A. $0.4 = \ - \pi / 4$

B. $2.5 = \ - \pi / 2$

C. $2.5 = \ + \pi / 2$

D. $2.5 = \ - \pi / 2$

Answer: B

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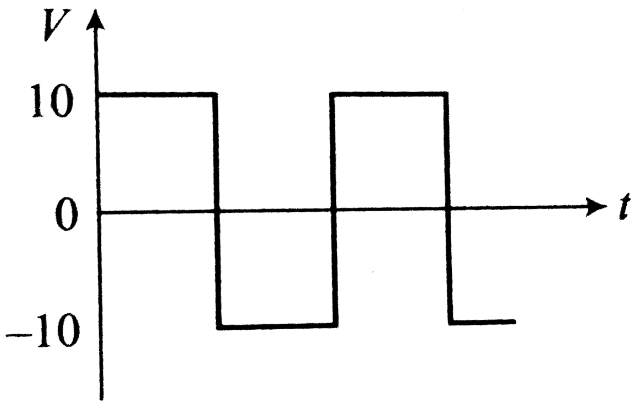
23. The r.m.s. voltage of the wave form shown is



A. $10V$

B. $7V$

C. $6.63V$

D. None of these

Answer: A

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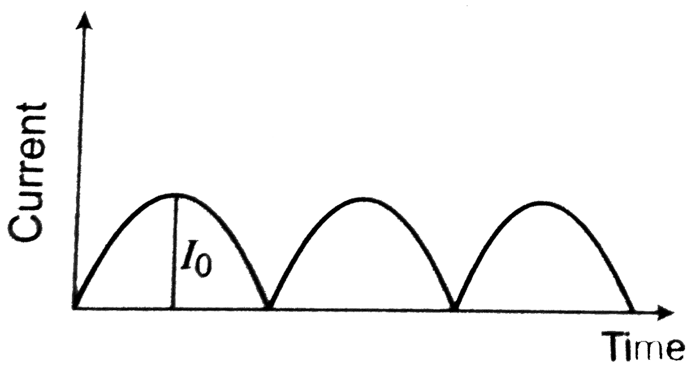
24. The output current versus time curve of a rectifier is shown in the figure. The voltage value of output current in this case is



A. 0

B. $\frac{I_0}{2}$

C. $\frac{2I_0}{\pi}$

D. I_0

Answer: C

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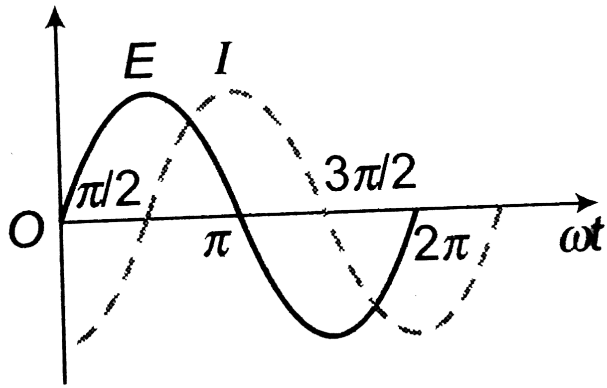
25. The variation of the instantaneous current (I) and the instantaneous e.m.f (E) in a circuit is as shown in figure. Which of the following statement is correct?



A. The voltage lags behind the current by $\pi / 2$

B. The voltage leads the current by $\pi / 2$

C. The voltage and the current are in phase

D. The voltage leads the current by π

Answer: B

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26. If $i = t^2, 0 < t < T$ then $r.m.s.$ value of current is

A. $\frac{T^2}{\sqrt{2}}$

B. $\frac{T^2}{2}$

C. $\frac{T^2}{\sqrt{5}}$

D. None of these

Answer: C

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27. In a certain circuit current changes with time accroding to $i = 2\sqrt{t}$. r.m.s. value of current between $t = 2$ to $t = 4s$ will be

A. $3A$

B. $3\sqrt{3}A$

C. $2\sqrt{3}A$

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

Answer: C

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28. The voltage of an AC source varies with time according to the equation $V = 100 \sin 100\pi t \cos 100\pi t$ where t is in seconds and V is in volts. Then

A. The peak voltage of the source is 100 volts

B. The peak voltage of the source is 50volts

C. The peak voltage of the source is $100\sqrt{2}$ volts

D. The frequency of the source is $50 Hz$

Answer: B

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29. The capacitance of a pure capacitance is 1 farad. In DC circuits, its effective resistance will be

A. Zero

B. Infinite

C. $1 ohm$

D. $1/2 ohm$

Answer: B

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Connected With Ac

1. A capacitor becomes a perfect insulator for

A. Alternatinc currents

B. Direct current

C. Both AC and DC

D. None of these

Answer: B

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2. 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 or in a circuit containing capacitance only

A. e.m.f. is ahead of current by $\pi / 2$

B. Current ahead of e.m.f by $\pi / 2$

C. Current lags behind e.m.f. by π

D. Current is ahead of e.m.f. by π

Answer: B

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3. In a circuit containing an inductance of zero resistances, the e.m.f of the applied AC voltage leads the current by

A. 90°

B. 45°

C. 30°

D. 0°

Answer: A

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4. The instantaneous values of current and voltage in an AC circuit are $i = 100 \sin 314t$ amp and $e = 200 \sin(314t + \pi / 3)V$ respectively. If the resistance is 1Ω then the reactance of the circuit will be

A. $-200\sqrt{3}\Omega$

B. $\sqrt{3}\Omega$

C. $-200 / \sqrt{3}\Omega$

D. $100\sqrt{3}\Omega$

Answer: B

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5. A 120 volt AC source is connected across a pure inductor of inductance 0.70 henry. If the frequency of the source is $60Hz$, the current passing through the inductor is

A. $4.55 amps$

B. $0.355 amps$

C. $0.455 amps$

D. $3.55 amps$

Answer: C

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6. The reactance of a coil when used in the domestic AC power supply $(220V, 50cycles)$ is $100ohm$. The self inductance of the coil is nearly

A. 3.2 henry

B. $0.32henry$

C. $2.2henry$

D. $0.22henry$

Answer: B

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7. The reactance of a $25\mu F$ capacitor at the AC frequency of $4000Hz$ is

A. $\frac{5}{\pi}ohm$

B. $\sqrt{\frac{5}{\pi}}ohm$

C. $10ohm$

D. $\sqrt{10}ohm$

Answer: A

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8. The frequency for which a $5\mu F$ capacitor has a reactance of $\frac{1}{100}$ ohm is given by

A. $\frac{100}{\pi} MHz$

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

C. $\frac{1}{1000} Hz$

D. $1000 Hz$

Answer: A

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9. The value of the current through an inductance of $1H$ and of negligible resistance, when connected through an AC source of $200V$ and $50Hz$ is

A. $0.637A$

B. $1.637A$

C. $2.637A$

D. $3.637A$

Answer: A

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10. The reactance of a coil when used in the domestic AC power supply $(220V, 50 cycles)$ is $50 ohm$. The inductance of the coil is nearly

A. 2.2 henry

B. 0.22 henry

C. 1.6 henry

D. 0.16 henry

Answer: D

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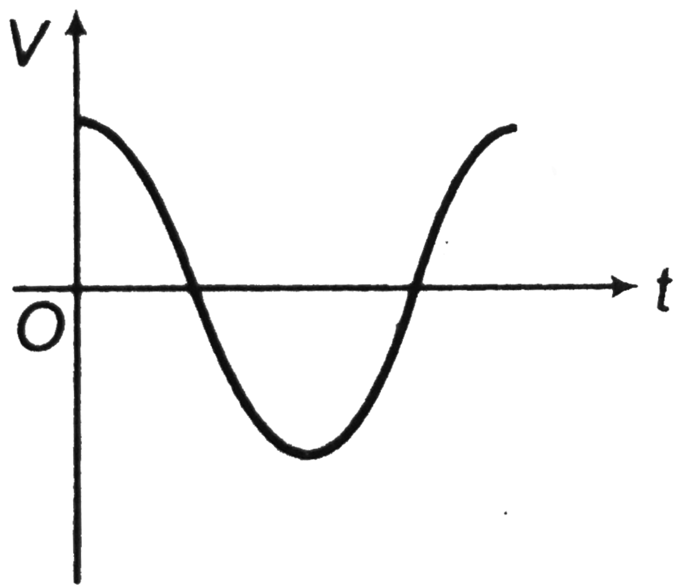
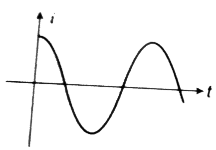
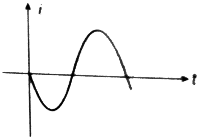
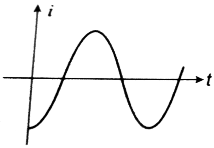
11. The figure represents the voltage applied across a pure inductor. The diagram which correctly represents the variation of current i with time t is given by

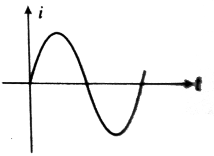


A. (a



B. (b) 

C. (c) 

D. (d) 

Answer: D

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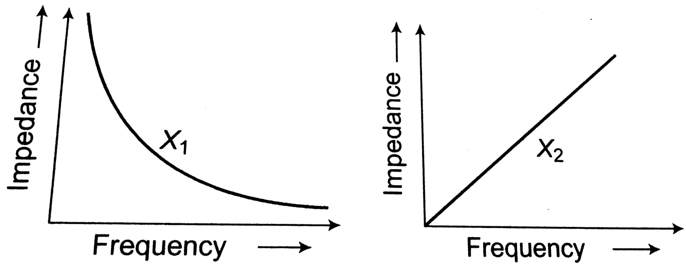
12. The graphs given below depict the dependence of two reactive impedances X_1 and X_2 on the frequency of the alternating e.m.f. applied individually to them. We can then say that



A. X_1 is an inductor and X_2 is a capacitor

B. X_1 is an resistor and X_2 is a capacitor

C. X_1 is an capacitor and X_2 is ainductor

D. X_1 is an inductor and X_2 is a resistor

Answer: C

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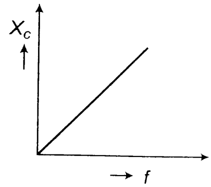
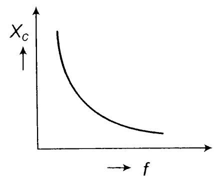
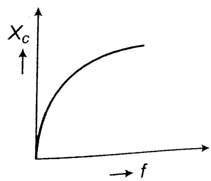
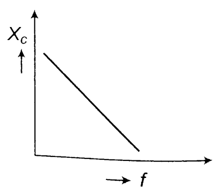
13. Identify the graph which correctly represents the variation of capacitive reactance X_C with frequency

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer: B

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14. A resistance of 40 ohms and an inductance of 95.5 millihenry are connected in series in a 50 cycle/sec AC circuit. The impedance of this combination is very nearly

A. $30 ohm$

B. $40 ohm$

C. $50 ohm$

D. $60 ohm$

Answer: C

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15. For high frequency, a capacitor offers

A. More reactance

B. Less reactance

C. Zero reactance

D. Infinite reactance

Answer: B

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16. Reactance of an inductor of $\frac{1}{\pi}$ henry at $50Hz$ frequency is

A. $\frac{50}{\pi}ohm$

B. $\frac{\pi}{50}ohm$

C. $100ohm$

D. $50ohm$

Answer: C

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17. The resistance of a coil for DC is in ohms. In AC, the resistance

A. Will remain same

B. Will increases

C. Will decrease

D. Will be zero

Answer: B

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18. An alternating current of frequency $'f'$ is flowing in a circuit containing a resistance R and a choke L in series. The impedence of this circuit is

A. $R+2\pi fL$

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

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

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

Answer: B

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19. An inductance of $1 mH$ a condenser of 0.5 henry and capacitance of $10 \times 10^{-6} F$ are connected in series through $50 Hz$ AC supply, then impedence is

A. 100Ω

B. 30Ω

C. 3.2Ω

D. 10Ω

Answer: D

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20. If resistance of 100Ω , inductance of 0.5 henry and capacitor of $10 \times 10^{-6} F$ are connected in series through $50 Hz$ AC supply, then impedence is

A. 1.876

B. 18.76

C. 189.72

D. 101.3

Answer: C

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21. An inductive circuit a resistance of $10 ohm$ and an inductance of 2.0 henry. If an AC voltage of 120 volt and frequency of $60 Hz$ is applied to this circuit, the current in the circuit would be nearly

A. $0.32 amp$

B. $0.16 amp$

C. $0.48 amp$

D. $0.80 amp$

Answer: B

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22. An inductive circuit a resistance of $10 ohm$ and an inductance of 2.0 henry. If an AC voltage of 120 volt and frequency of $60 Hz$ is applied to this circuit, the current in the circuit would be nearly

A. $0.32 amp$

B. $0.16 amp$

C. $0.48 amp$

D. $0.80 amp$

Answer: B

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23. Same current is flowing in two alternating circuits. The first circuit contains only inductances and the other contains only a capacitor, if the frequency of the e.m.f of AC is increased, the effect on the value of the current will be

A. Increases in the first circuit and decreases in the other

B. Increases in both the circuits

C. Decreases in both the circuits

D. Decreases in the first circuit and increases in the other

Answer: D

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24. In a series circuit $R = 300\Omega, L = 0.9H, C = 2.0\mu F$ and $\omega = 1000 rad / \sec$. The impedence of the circuit is

A. 1300Ω

B. 900Ω

C. 500Ω

D. 400Ω

Answer: C

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25. In a $L-R$ circuit, the value of L is $\left(\frac{0.4}{\pi}\right)$ henry and the value of R is 30 ohm. If in the circuit, an alternating e.m.f of 200 vol at 50 cycles per sec is connected, the impendence of the circuit will be

A. $11.4\Omega, 17.5A$

B. $30.7\Omega, 6.5A$

C. $40.7\Omega, 5A$

D. $50\Omega, 4A$

Answer: D

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26. An e.m.f. $E = 4\cos(1000t)$volt is applied to an LR circuit of inductance $3mH$ and resistance $4ohm$. The amplitude of current in the circuit is

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

B. $1.0A$

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

D. $0.8A$

Answer: D

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27. In an AC circuit, a resistance of $Rohm$ is connected is series with an inductance L. If phase angle between volage and current be 45°, the value of inductive reactance will be

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

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

C. R

D. Cannot be found with the given data

Answer: C

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28. If an 8Ω resistance and 6Ω reactance are present in an AC series circuit then the impedence of the circuit will be

A. $20 ohm$

B. $5 ohm$

C. $10 ohm$

D. $14\sqrt{2} ohm$

Answer: C

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29. A $220V, 50Hz$ Ac source is connected to an inductance of $0.2H$ and a resistance of $20ohm$ in series. What is the current in the current?

A. $10A$

B. $5A$

C. $33.3A$

D. $3.33A$

Answer: D

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30. When 100volts DC is applied across a coil, a current of $1amp$ flows through it. When 100 volt AC at 50 cycles s^{-1} is applied to the same coil, only 0.5 ampere current follows.

A. 100Ω

B. 200Ω

C. 300Ω

D. 400Ω

Answer: B

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31. A circuit has a resistance of 11Ω, an inductive reactance of 25Ω, and a capacitive resistance of 18Ω. It is connected to an AC source of $260V$ and $50Hz$. The current through the circuit (in amperes) is

A. 11

B. 15

C. 18

D. 20

Answer: D

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32. A 0.7 henry inductor is connected across a $120V - 60HzAC$ source. The current in the inductor will be very nearly

A. $4.55amp$

B. $0.355amp$

C. $0.455amp$

D. $3.55amp$

Answer: C

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33. There is a 5Ω resistance in an AC, circuit. Impedence of $0.1H$ is connected with it in series. If equation of AC emf is $5\sin 50t$ then the phase difference between current and e.m.f. is

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

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

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

D. 0

Answer: C

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34. The coefficient of induction of a choke coil is $0.1H$ and resistance is 12Ω. If it is connected to an alternating current source of frequency $60Hz$, then power factor will be

A. 0.32

B. 0.30

C. 0.28

D. 0.24

Answer: B

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35. In a series LCR circuit, resistance $R = 10\Omega$ and the impedence $Z = 20\Omega$ the phase difference between the current and the voltage is

A. 30°

B. 45°

C. 60°

D. 90°

Answer: C

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36. A $12 ohm$ resistor and a 0.21 henry inductor are connected in series to an AC source operating at 20volts,50 cycle/second. The phase angle between the current and the source voltage is

A. 30°

B. 40°

C. 80°

D. 40°

Answer: C

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37. A coil of inductance L has an inductive reactance of X_L in an AC circuit in which the effective current is I. The coil is made from a super-conducting material and has no resistance.

The rate at which power is dissipated in the coil is

A. 0

B. IX_L

C. I^2X_L

D. IX_L^2

Answer: A

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38. The impedence of a consists of $3 ohm$ resistance and $4 ohm$ reactance. The power factor of the circuit is across the coil to the current thruogh the coil will be

A. 0.4

B. 0.6

C. 0.8

D. 1.0

Answer: B

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39. In an AC circuit the reactance of a coil is $\sqrt{3}$ times its resistance, the phase difference between the voltage across the current through the coil will be

A. $\pi/3$

B. $\pi/2$

C. $\pi/4$

D. $\pi/6$

Answer: A

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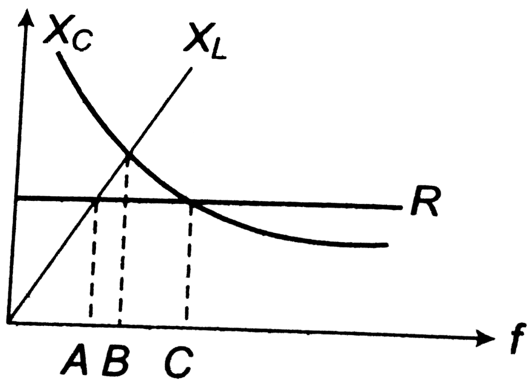
40. The figure shows variation of R, X_L and X_C with frequency f in a series L, C, R circuit. Then for what frequency point, the circuit is inductive ?



A. A

B. B

C. C

D. All points

Answer: C

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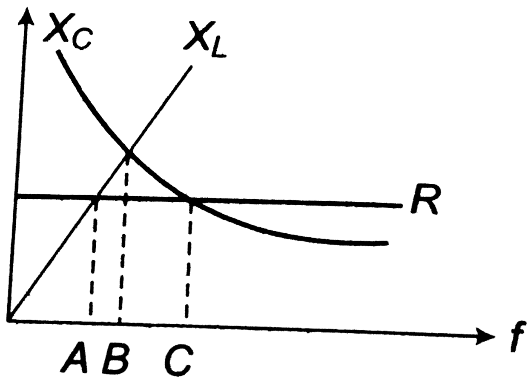
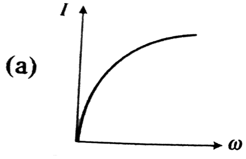
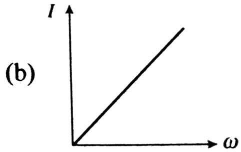
41. A constant voltage at different frequencies is applied across a capacitance C as shown in the figure.

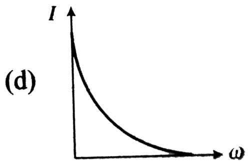


Which of the following graphs correctly depicts the variation of current with frequency?

A. 

B. 

C. 

D. 

Answer: B

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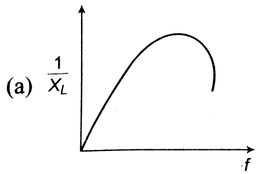
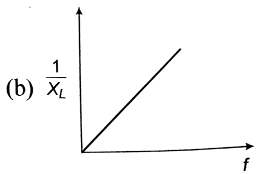
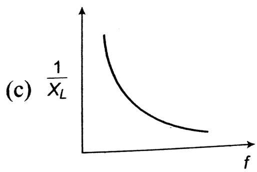
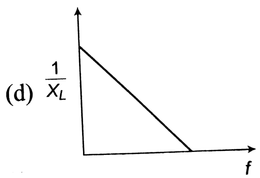
42. In pure inductive circuit, the curves between frequency f and reciprocal of inductive reactance $1/X_L$ is

A. 

B. 

C. 

D. 

Answer: C

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Different Ac Circuits

1. A bulb and a capacitor are connected in series to a source of alternating current. If its frequency is increased, while keeping the voltage of the source constant, then

A. Bulb will give more intense light

B. Bulb will give less intense light

C. Bulb will give light of same intensity as before

D. Bulb will stop radiating light

Answer: A

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2. Choke coil is used to control

A. AC

B. DC

C. Both AC and DC

D. Neither AC nor DC

Answer: A

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3. A choke coil is preferred to a rheostate in AC circuit as

A. It consumes almost zero power

B. It increases current

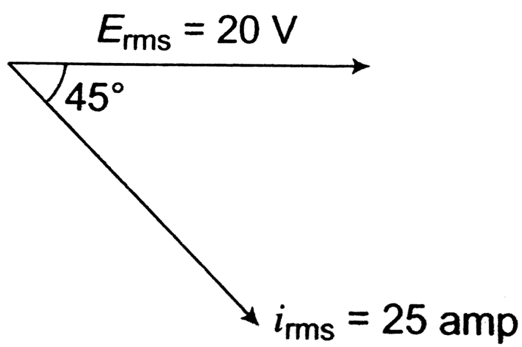
C. It increases power

D. It increasases voltage

Answer: A

Watch Video Solution

4. The vector diagram of current and voltage for a circuit as shown. The components of the circuit will be



A. LCR

B. LR

C. LCR or LR

D. None of these

Answer: C

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5. A resonant AC circuit contains a capacitor of capacitance $10^{-6}F$ and an inductor of $10^{-4}H$. The frequency of electrical oscillation will be

A. $105Hz$

B. $10Hz$

C. $\frac{10^5}{2\pi}Hz$

D. $\frac{10}{2\pi}Hz$

Answer: C

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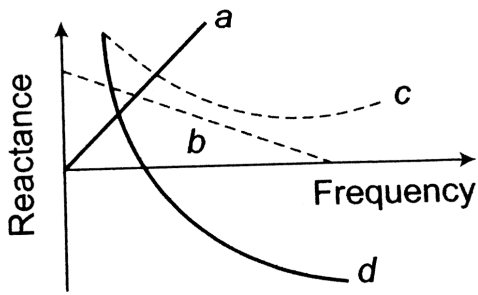
6. Which of the following plots may represent the reactance of a series LC combination?



A. a

B. b

C. c

D. d

Answer: D

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7. An alternating voltage is connected in series with a resistance R and inductance L if the potential drop across the resistance is $200V$ and across the inductance is $150V$, then the applied voltage is

A. $350V$

B. $250V$

C. $500V$

D. $300V$

Answer: B

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8. A 20volts AC is applied to a circuit consisting of a resistance and a coil with negligible resistance. If the voltage across the resistance is $12V$, the voltage across the coil is

A. 16 volts

B. 10 volts

C. 8 volts

D. 6 volts

Answer: A

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9. A resistance of 300Ω and an inductance of $\frac{1}{\pi}$ henry are connected in series to an AC voltage of 20volts and $200Hz$ frequency. The phase angle between the voltage and current is

A. $\tan^{-1}\left(\frac{4}{3}\right)$

B. $\tan^{-1}\left(\frac{3}{4}\right)$

C. $\tan^{-1}\left(\frac{3}{2}\right)$

D. $\tan^{-1}\left(\frac{2}{5}\right)$

Answer: A

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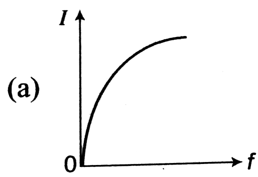
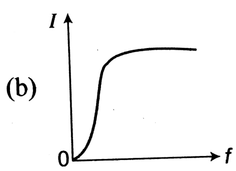
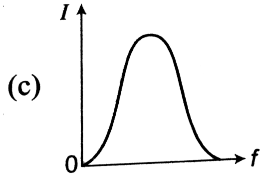
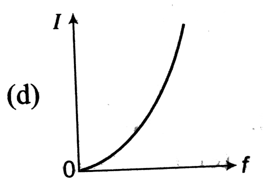
10. An AC source of variable frequency f is connected to an LCR series circuit. Which one of the graphs in figure represents the variation of current of current I in the circuit with frequency f?

A. 

B. 

C. 

D. 

Answer: C

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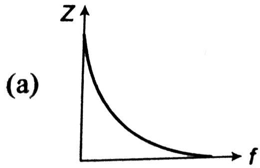
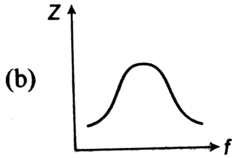
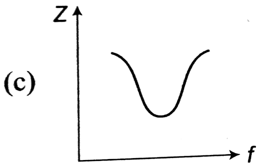
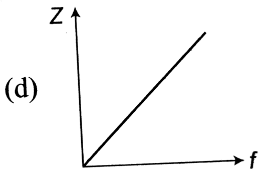
11. Which of the following curves represents the variation of impedance (Z) with frequency f in series LCR circuit?

A. 

B. 

C. 

D. 

Answer: C

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12. An AC circuit consists of an inductor of inductance $0.5H$ and a capacitor of capacitance $8\mu F$ in series. The current in the circuit is maximum when the angular frequency of AC source is

A. $500 rad / \sec$

B. $2 \times 10^5 rad / \sec$

C. $4000 rad / \sec$

D. $5000 rad / \sec$

Answer: A

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13. L, C and R represent the physical quantities, inductance, capacitance and resistance respectively. The combination(s) which have the dimensions of frequency are

A. LC

B. $(LC) - 1/2$

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

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

Answer: B

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14. The phase difference between the current and voltage of LCR circuit in series combination at resonance is

A. 0

B. $\pi / 2$

C. π

D. $-\pi$

Answer: A

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15. In a series resonant circuit, the AC voltage across resistance R, inductance L, and capacitance C are $5V$, $10V$ and $10V$ respectively. The AC voltage applied to the circuit will be

A. $20V$

B. $10V$

C. $5V$

D. $25V$

Answer: C

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

A. $f/2$

B. $2f$

C. f

D. $f/4$

Answer: A

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17. In the non-resonant circuit, what will be the nature of the circuit for frequencies heigher than the resonant frequency?

A. Resistive

B. Capacitive

C. Inductance

D. None of the above

Answer: B

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18. In an ac circuit the potential differences across an inductance and resistance joined in series are, respectively, 16 V and 20 V. The total potential difference across the circuit is

A. $20.0V$

B. $25.6V$

C. $31.9V$

D. $53.5V$

Answer: B

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19. An LCR circuit contains $R = 50\Omega$, $L = 1mH$ and $C = 0.1\mu F$. The impedence of the circuit will be minimum for a frequency of

A. $\frac{10^5}{2\pi}s^{-1}$

B. $\frac{10^6}{2\pi}s^{-1}$

C. $2\pi \times 10^5 s^{-1}$

D. $2\pi \times 10^6 s^{-1}$

Answer: A

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20. A series AC circuit consists of an inductor and a capacitor. The inductance and capacitance is respectively 1henry and $25\mu F$ if the current is maximum in circuit then angular frequency will be

A. 200 rad/s

B. 100 rad/s

C. 50 rad/s

D. $200/2\pi$ rad/s

Answer: A

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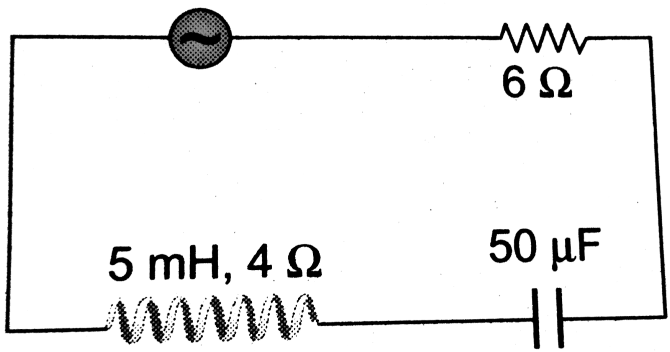
21. In the circuit below, the AC source the voltage $V = 20\cos(\omega t)$ volts with $\omega = 2000 rad/\sec$. The amplitude of the current will be nearest to



A. $2A$

B. $3.3A$

C. $2/\sqrt{5}A$

D. $\sqrt{5}A$

Answer: A

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

A. $15.92Hz$

B. $159.2Hz$

C. $1592Hz$

D. $15910 Hz$

Answer: C

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23. A coil of 200Ω resistance and $1.0H$ inductance is conneted to an AC source of frequency $200/2\pi Hz$. Phase angle between potential and current will be

A. 30°

B. 90°

C. 45°

D. 0°

Answer: C

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24. In a LCR circuit the $P.D$ between the terminals of the inductance is $60V$, between the terminals of the capacitor is $30V$ and that between the terminals of resistance is $40V$. The supply voltage will be equal to......

A. $50V$

B. $70V$

C. $130V$

D. $10V$

Answer: A

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25. A coil has $L = 0.04H$ and $R = 12\Omega$. When it is connected to $220V, 50Hz$ supply the current flowing through the coil, in ampere is

A. 10.7

B. 11.7

C. 14.7

D. 12.7

Answer: D

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26. A virtual current of $4A$ and $50Hz$ flows in an AC circuit contaning a coil. The power consumed in the coil is $100V$ its inductance will be

A. $\frac{1}{3\pi}H$

B. $\frac{1}{5\pi}H$

C. $\frac{1}{7\pi}H$

D. $\frac{1}{9\pi}H$

Answer: B

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27. For a series RLC circuit $R = X_L = 2X_C$. The impedance of the current and phase different (between) V and i will be

A. $\frac{\sqrt{5}R}{2}, \tan^{-1}(2)$

B. $\frac{\sqrt{5}R}{2}, \tan^{-1}\left(\frac{1}{2}\right)$

C. $\sqrt{5}X_C, \tan^{-1}(2)$

D. $\sqrt{5}R, \tan^{-1}\left(\frac{1}{2}\right)$

Answer: B

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28. The current in series LCR circuit will be the maximum when ω is

A. As large as possible

B. Equal o natural frequency of LCR system

C. $\sqrt{LC}$

D. $\sqrt{1/LC}$

Answer: D

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29. One $10V, 60W$ bulb is to be connected to $100V$ line. The required inductance coil has self-inductance of value $(f = 50Hz)$

A. $0.052H$

B. $2.42H$

C. $16.2mH$

D. $1.62mH$

Answer: A

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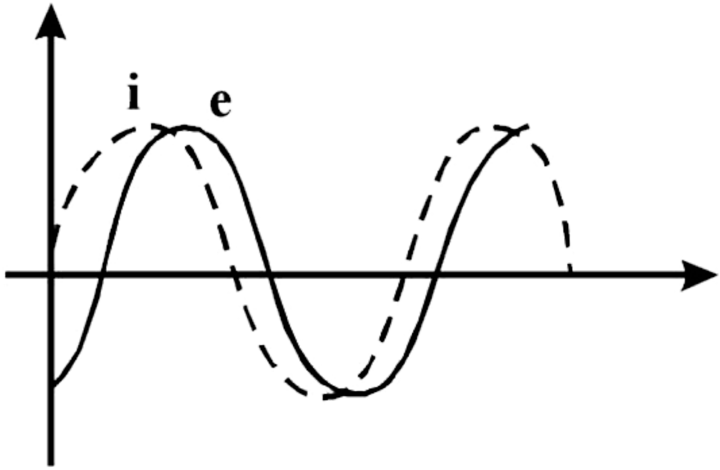
30. When an AC source of emf $e = E_0 \sin(100t)$ is connected across a circuit i in the circuit, the phase difference between the emf e and the current i in the circuit is observed to be $(\pi / 4)$, as shown in the diagram. If the circuit consists possibly only of R-C or R-L or L-C in series, find the relationship between the two elements



A. $R = 1k\Omega, C = 10\mu F$

B. $R = 1k\Omega, C = 1\mu F$

C. $R = 1k\Omega, L = 10H$

D. $R = 1k\Omega, L = 1H$

Answer: A

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Power In Ac Circuits

1. The power is transmitted from a power house on a voltage AC because

A. Electric current travels faster at higher volts

B. It is more economical due to less power wastage

C. It is difficult to less power voltage

D. Chance of stealing transmission lines are minimize

Answer: B

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2. Current in the circuit is wattless, if

A. Inductance in the circuit is zero

B. Resistance in the current is zero

C. Current is alternating

D. Resistance and inductance both are zero

Answer: B

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

A. 10^4 watt

B. 10 watt

C. 2.5 watt

D. 5 watt

Answer: C

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4. A sinusoidal alternating current of peak value (I_0) passes through a heater of resistance R. What is the mean power output of the heater?

A. $I_0^2 R \cos\theta$

B. $\frac{1}{2} I_0^2 R$

C. $\frac{4}{\pi} I_0^2 R$

D. $\frac{1}{\pi} I_0^2 R$

Answer: B

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5. In an a.c. Circuit the voltage applied is $E = E_0 \sin(\omega)t$. The resulting current in the circuit is $I = I_0 \sin\left((\omega)t - \left(\frac{\pi}{2}\right)\right)$. The power consumption in the circuit is given by

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

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

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

D. $P = 0$

Answer: D

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6. In an AC circuit, the instantaneous values of e.m.f and current are $e = 200 \sin 314t$ volt and $i = \sin\left(314t + \frac{\pi}{3}\right)$ ampere. The average power consumed in watt is

A. 200

B. 100

C. 50

D. 25

Answer: C

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7. In an AC circuit, the current is given by $i = 5\sin\left(100t - \frac{\pi}{2}\right)$ and the AC potential is $V = 200\sin(100)$volt. Then the power consumption is

A. 20 watt

B. 40 watt

C. 1000 watt

D. 0 watt

Answer: D

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8. What is the r.m.s. value of an alternating current which when passed through a resistor produces heat which is thrice of that produced by a direct current of 2 amperes in the same resistor?

A. 6 amp

B. 2 amp

C. 3.46 amp

D. 0.66 amp

Answer: C

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9. In an AC circuit with voltage V and current I, the power dissipated is

A. VI

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

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

D. Depened on the phase between V and I

Answer: D

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10. For an AC circuit $V = 15\sin\omega t$ and $I = 20\cos\omega t$ the average power consumed in this circuit is

A. 300 watt

B. 150 watt

C. 75 watt

D. zero

Answer: D

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11. An alternating e.m.f. of angular frequency ω is applied across an inductance. The instantaneous power developed in the circuit has an angular frequency

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

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

C. ω

D. 2ω

Answer: D

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12. The power factor of a good choke coil is

A. Nearly zero

B. Exectly zero

C. Nearly one

D. Exactly one

Answer: A

Watch Video Solution

13. For wattless power is an AC circuit, the phase angle between the current and voltagge is

A. 90°

B. 45°

C. 180°

D. 60°

Answer: A

Watch Video Solution

14. The r.m.s current in an AC circuit is $2A$. If the wattless current be $\sqrt{3}A$, what is the power factor?

A. $\frac{1}{\sqrt{3}}$

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

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

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

Answer: C

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15. In an LR-circuit, the inductive reactance is equal to the resistance R of the circuit. An e.m.f $E = E_0 \cos(\omega t)$ applied to the circuit. The power consumed in the circuit is

A. $\frac{E_0^2}{R}$

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

C. $\frac{E_0^2}{4R}$

D. $\frac{E_0^2}{8R}$

Answer: C

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16. An $L-C-R$ series circuit with 100Ω resistance is connected to an AC source of $200V$ and angular frequency $300rad/s$. When only the capacitance is removed, the current lags behind the voltage by 60°. When only the inductance is removed the current leads the voltage by 60°.

Calculate the power dissipated in the $L - C - R$

circuit

A. $50W$

B. $100W$

C. $200W$

D. $400W$

Answer: D

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17. An rms voltage of 110 V is applied across a series circuit having a resistance 11Ω and an impedance 22Ω. The power consumed is

A. $275W$

B. $366W$

C. $550W$

D. $1100W$

Answer: A

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18. $\frac{2.5}{\pi}\mu F$ capacitor and $3000-$ ohm resistance are joined in series to an AC source of 200volts and $50\sec^{-1}$ frequency. The power factor of the circuit and the power dissipated in it will respectively

A. $0.6, 0.06W$

B. $0.06, 0.6W$

C. $0.6, 4.8W$

D. $4.8, 0.6W$

Answer: C

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19. The self-inductance of a choke coil is $10 mH$. When it is connected with a $10 V DC$ source, then the loss of power is $20 \mathrm{watt}$. When it is connected with $10 \mathrm{volt} AC$ source loss of power is $10 \mathrm{watt}$. The frequency of AC source will be

A. $50 Hz$

B. $60 Hz$

C. $80 Hz$

D. $100 Hz$

Answer: C

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20. A group of electric lamps having a total power rating of 1000 watt is supplied by an AC voltage $E = 200\sin(310t + 60^\circ)$. Then the r.m.s value of the circuit current is

A. $10A$

B. $10\sqrt{2}A$

C. $20A$

D. $20\sqrt{2}A$

Answer: B

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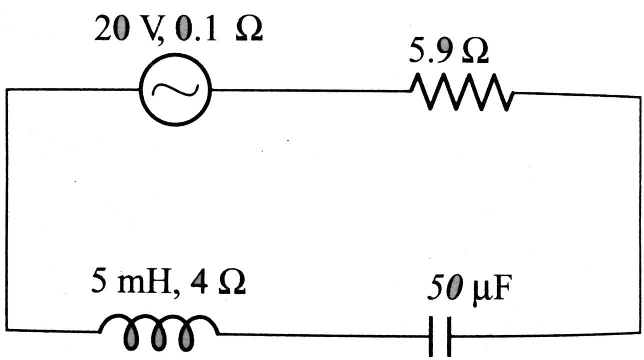
21. In the circuit of fig, the source frequency is $\omega = 2000 rads^{-1}$. The current in the circuit will be



A. $2A$

B. $3.3A$

C. $2/\sqrt{5}A$

D. $\sqrt{5}A$

Answer: A

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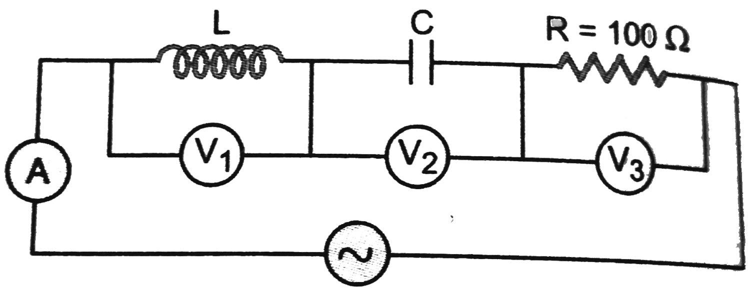
Problems Based On Mixed Concepts

1. In the given circuit, Fig., the reading of voltmeter V_1 and V_2 300 votls each. The reading of the voltemeter V_3 and ammeter A are respectively



A. $800V, 2A$

B. $300V, 2A$

C. $220V, 2.2A$

D. $100V, 2A$

Answer: C

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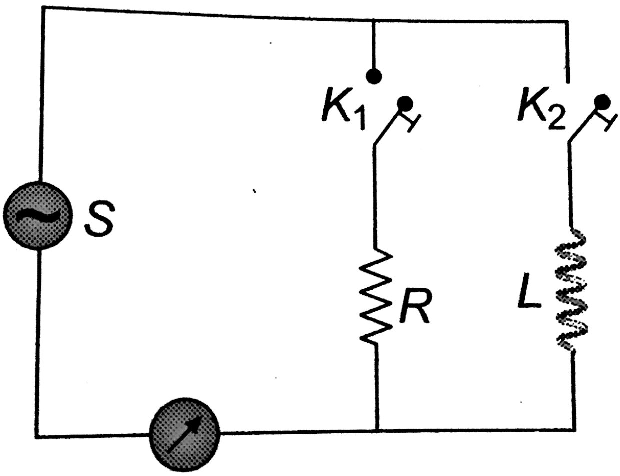
2. In the circuit shown here, R is pure resistor, L is an inductor of negligible resistance (as compared to R), S is a $100V, 50HzAC$ source of negligible resistance. With either key K_1 alone or K_2 alone closed, the current is I_0. if the source is changed to $100V, 150Hz$ the current with K_1, alone closed and with K_2 alone closed will be respectively.



A. $I_0, \dfrac{I_0}{3}$

B. $I_0, 3I_0$

C. $3I_0, I_0$

D. $3I_0, \dfrac{I_0}{3}$

Answer: A

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3. A transmitter transmits at a wavelength of 30 meter. A condenser or capacitance $2.4\mu F$ is being used. The value of the inductance for the resonant circuit is approximately.

A. $10^{-4}H$

B. $10^{-6}H$

C. $10^{-8}H$

D. $10^{-10}H$

Answer: D

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4. A resistor and an inductor are conneted in sires to a $220 \text{volt} AC$ supply. When measured with an AC is 123 volts. Then the potential difference across the terminals of the inductor is

A. 88 volt

B. 352 volt

C. 176 volt

D. $\sqrt{220 \times 132}$ volt

Answer: C

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5. In a step-up transformer the turn ratio is $1:10$. A resistance of 200 ohm connected across the secondary is drawing a current of $0.5A$. What is the primary voltage and current?

A. $50V, 1A$

B. $10V, 5A$

C. $25V, 4A$

D. $20V, 2A$

Answer: B

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6. A 50 Hz a.c. current of crest value 1A flows through the primary of a transformer. If the mutual inductance between the primary and secondary be $1.5H$, the crest voltage induced in secondary is-

A. $75V$

B. $150V$

C. $225V$

D. $300V$

Answer: D

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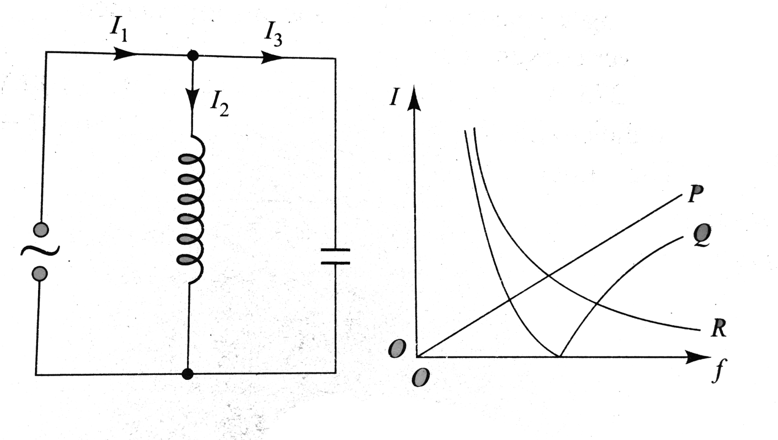
7. In the circuit shown if fig, the rms currents $(I_1), (I_2)$ and (I_3) are altered by varying the frequency f of the oscillator. The output voltage of the oscillator remains sinusoidal and has a fixed amplitude.

When curves in figure correctly indicate the variation with frequency of the currents $(I_1), (I_2),$ and (I_3).



A. $\begin{matrix} I_1 & I_2 & I_3 \\ q & q & q \end{matrix}$

B. $\begin{matrix} I_1 & I_2 & I_3 \\ r & q & q \end{matrix}$

C. $\begin{matrix} I_1 & I_2 & I_3 \\ q & p & r \end{matrix}$

D. $\begin{matrix} I_1 & I_2 & I_3 \\ q & r & p \end{matrix}$

Answer: D

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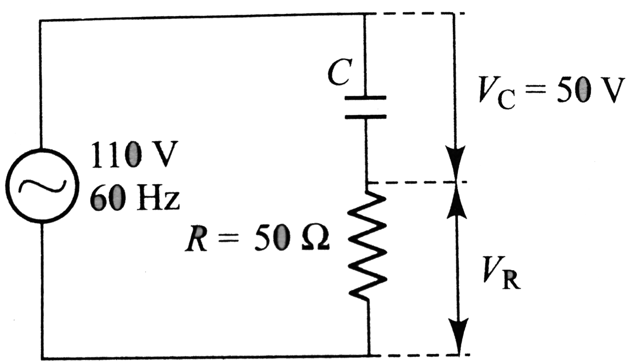
8. In the circuit given in fig. $(V_C) = 50V$ and $R = 50\Omega$. The values of C and (V_R) are



A. $3.3\mu F, 60V$

B. $3.3\mu F, 98V$

C. $1.6\mu F, 30V$

D. $2\mu F, 60V$

Answer: B

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9. A power transformer is used to set up an alternating e.m.f of $220V$ to $4.4kV$ to transmits $6.6kW$ of power. The primary coil has 1000 turns. What is current rating of secondary? (Assume efficiency is 100%)

A. $2.5A$

B. $1.5A$

C. $1.0A$

D. $0.75A$

Answer: B

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10. A 220-V, 50 Hz, ac generator is connected to an inductor and a 50Ω resistance in series. The current in the circuit is $1.0A$. What is the PD across inductor?

A. $102.2V$

B. $186.4V$

C. $213.6V$

D. $302V$

Answer: C

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11. An $8\mu F$ capacitor is connected across a 220 V, 50 Hz line. What is the peak value of charge through the capacitor?

A. $2.5 \times 10^{-3} C$

B. $2.5 \times 10^{-4} C$

C. $5 \times 10^{-5} C$

D. $7.5 \times 10^{-2} C$

Answer: A

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12. A coil of inductance $0.1H$ is connected to $50V, 100Hz$ generator and current is found to be $0.5A$. The potential difference across resistance of coil is:

A. $15V$

B. $20V$

C. $25V$

D. $39V$

Answer: D

Watch Video Solution

13. A dc ammeter and a hot wire ammeter are connected to a circuit in series. When a direct current is passed through circuit, the dc ammeter shows 6 A. When ac current flows through circuit, the ac ammeter shows 8A. What will be reading of each ammeter if dc and ac current flow simulataneously through the circuit?

A. $DC = 6A, AC = 10A$

B. $DC = 3A, AC = 5A$

C. $DC = 5A, AC = 8A$

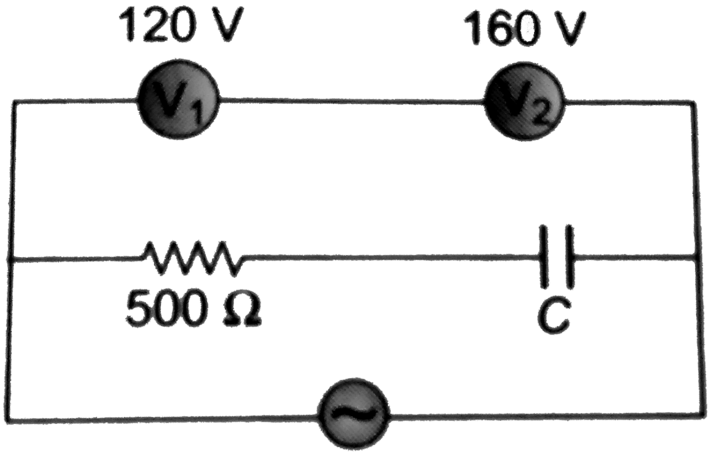
D. $DC = 2A, AC = 3A$

Answer: A

Watch Video Solution

14. A 500Ω resistor and a capacitor C are connected in series across $50 Hz AC$ supply mains. The r.m.s potential difference recorded on voltmeter V_1 and V_2 are $V_1 = 120V$ and

$V_2 = 160V$. The power taken for the mains is:



A. $480W$

B. $240W$

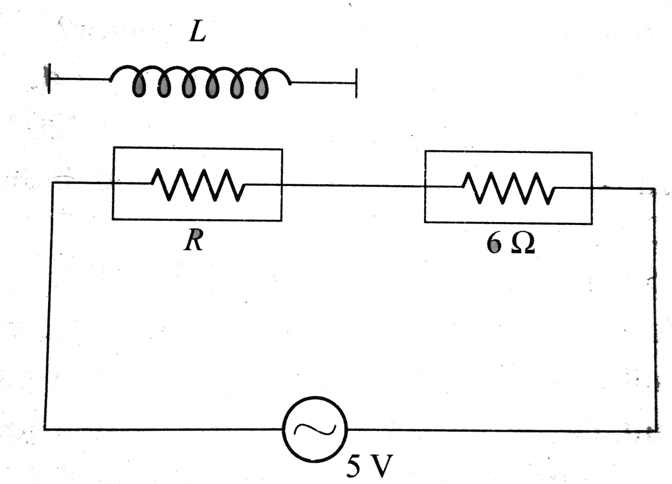
C. $28.8W$

D. $14.4W$

Answer: C

Watch Video Solution

15. Two resistor are connected in series across a $5V$ rms source of alternating potential. The potential difference across 6Ω resistor is $3V$. If R is replaced by a pure inductor L of such magnitude that current remains same. Then the potential difference across L is



A. $1V$

B. $2V$

C. $3V$

D. $4V$

Answer: D

Watch Video Solution

16. A coil has an inductance of 0.7 H and is joined in series with a resistance of 220 ohm. Find the wattless component of current in the circuit, when an alternating e.m.f. of 220 V at a frequency of 50 Hz is supplied to it.

A. $0.2A$

B. $0.4A$

C. $0.5A$

D. $0.7A$

Answer: C

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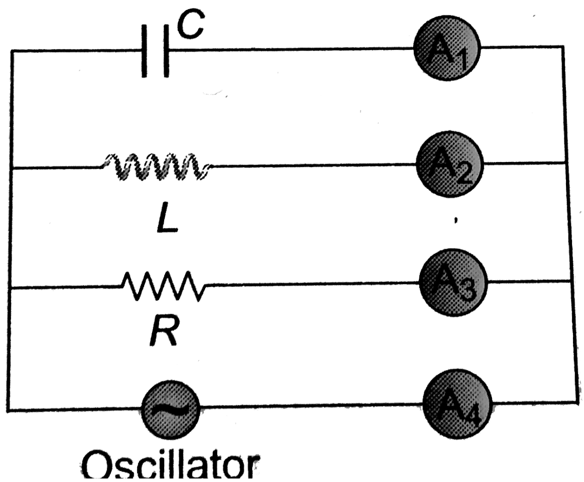
17. In the circuit shown in figure when the frequency of oscillator is increased, the reading of ammeter A_4 is same as that of ammeter.



A. A_1

B. A_2

C. A_3

D. A_1 and A_2

Answer: C

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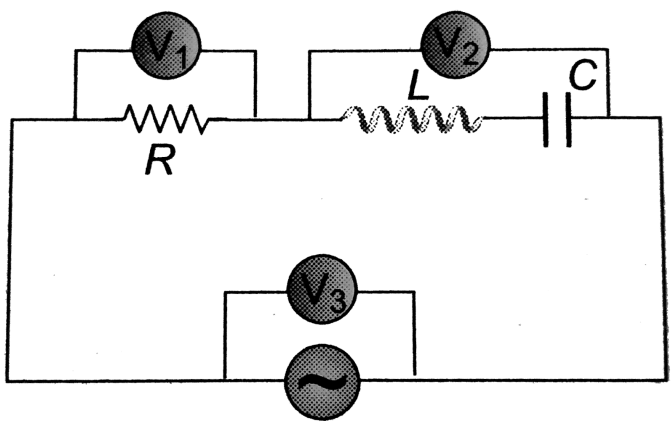
18. In the figure shown, three AC voltmeters have been connected. At resonance, the reading of



A. V_1 is zero

B. V_2 is zero

C. V_3 is zero

D. $V_1 = V_2 = V_3 = zero$

Answer: B

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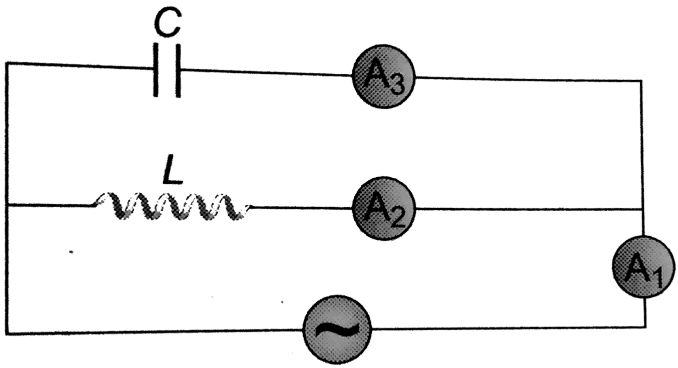
19. An inductor L, a capacitor C and AC ammeters A_1, A_2 and A_3 are connected in the circuit as shown. When the frequency of the oscillators is increased, then at resonant frequency, the reading of ammeter ?



A. A_1 zero

B. A_2 zero

C. A_3 zero

D. is same in A_1, A_2 and A_3

Answer: A

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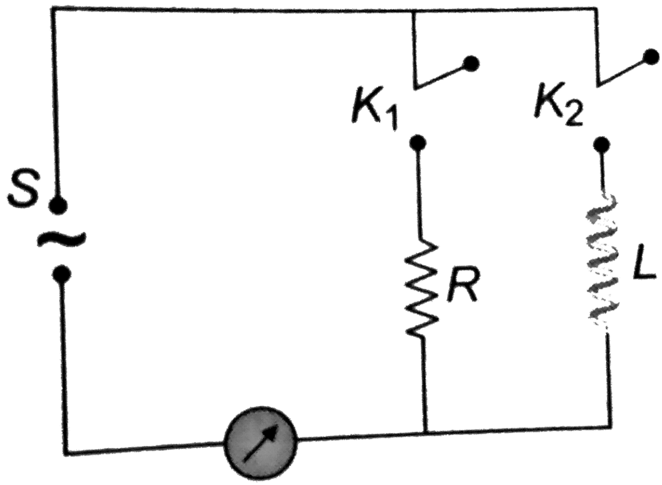
20. In the circuit shown, R is a pure resistor, L is an inductor of negligible resistance (as compared to R) and S is a$100V, 50HzAC$ source of negligible resistance. With eigther key k_1 alone or k_2 alone closed, the current is I_0. if the source is changed to $100V, 100Hz$, the current with k_1 alone closed and with k_2 alone closed will be respectively



A. $I_0, \frac{1}{2} I_0$

B. $2I_0, \frac{1}{2} I_0$

C. $2I_0, I_0$

D. $2I_0, \frac{1}{2} I_0$

Answer: A

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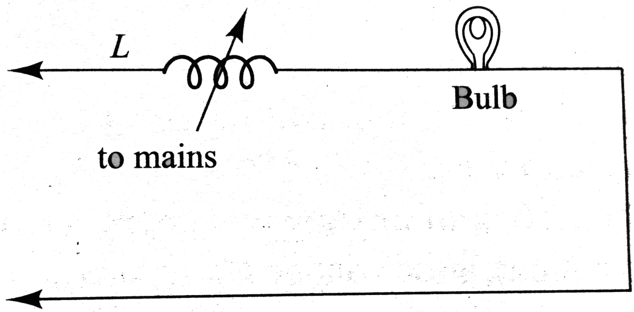
21. A typical light dimmer used to dim the stage lights in a theater consists of a variable induction for L (where inductance is adjustable between zero and $L_{\max}$) connected in series with a light bulb B as shown in fig. the mains electrical supply is 220 V at 50 Hz, the light bulb is rated at 220 V, 1100 W. What $(L_{\max})$ is required if the rate of energy dissipated in the light bulb is to be varied by a factor of 5 from its upper limits of 1100 W?



A. $0.69H$

B. $0.28H$

C. $0.38H$

D. $0.56H$

Answer: B

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22. If the instantaneous current in a circuit is given by $i = 2\cos(\omega t - \phi)$ampere, the r.m.s. value of the current is

A. 2 ampere

B. $\sqrt{2}$ ampere

C. $2\sqrt{2}$ ampere

D. zero ampere

Answer: B

Watch Video Solution

23. A coil has an inductance of 0.7 H and is joined in series with a resistance of 220 ohm. Find the wattless component of current in the circuit, when an alternating e.m.f. of 220 V at a frequency of 50 Hz is supplied to it.

A. 5 ampere

B. 0.5 ampere

C. 0.7 ampere

D. 7 ampere

Answer: B

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24. In a region of uniform magnetic inductance $B = 10^{-2}$tesla. A circular coil of radius $30cm$ and resistance $\pi^2 ohm$ is rotated about an axis which is perpendicular to the direction of B and which forms a diameter of the coil. If the coil rotates at 200 r.p.m the amplitude of the alternating current induced in the coil is

A. $4\pi^2 mA$

B. $30mA$

C. $6mA$

D. $200mA$

Answer: C

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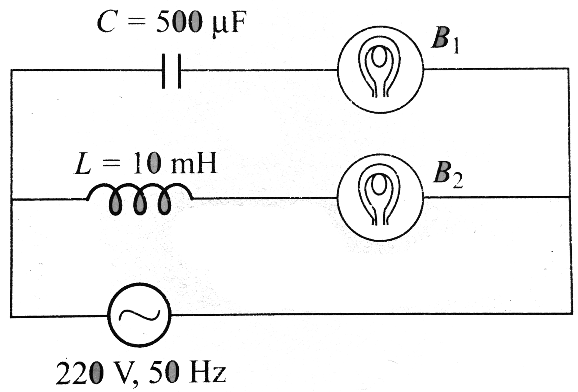
25. In the circuit shown in fig. if both the bulbs (B_1) and (B_2) are identical



A. their brightness will be the same

B. B_2 will be brighter than B_1

C. As frequency and that of B_2 will decreases

D. Only B_2 will glow because the capacitor has infinite impedence

Answer: B

Watch Video Solution

26. In a region of uniform magnetic inductance $B = 10^{-2}$tesla. A circular coil of radius $30cm$ and resistance $\pi^2 ohm$ is rotated about an axis which is perpendicular to the direction of B and which forms a dimater of the coil. If the coil rotates at 200 r.p.m the amplitude of the alternatic current induced in the coil is

A. $4\pi^2 mA$

B. $30mA$

C. $6mA$

D. $200mA$

Answer: C

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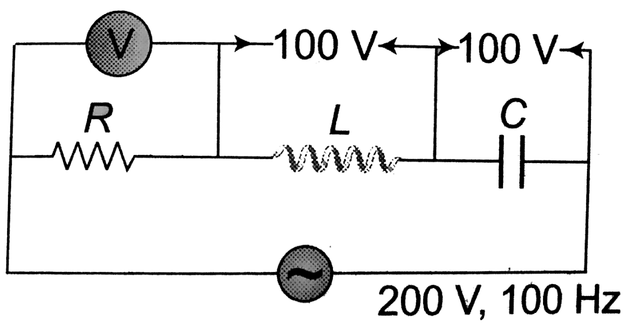
27. In the circuit given below, what will be the reading of the voltmeter?



A. $300V$

B. $900V$

C. $200V$

D. $400V$

Answer: C

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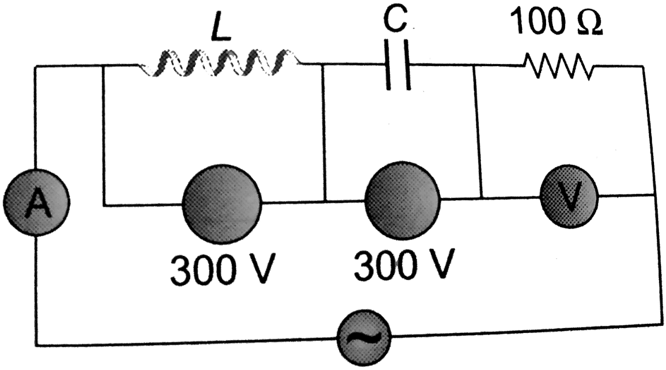
28. In the circuit shown below, what will be the reading of the voltmeter and ammeter?



A. $800V, 2A$

B. $300V, 2A$

C. $220V, 2.2A$

D. $100V, 2A$

Answer: C

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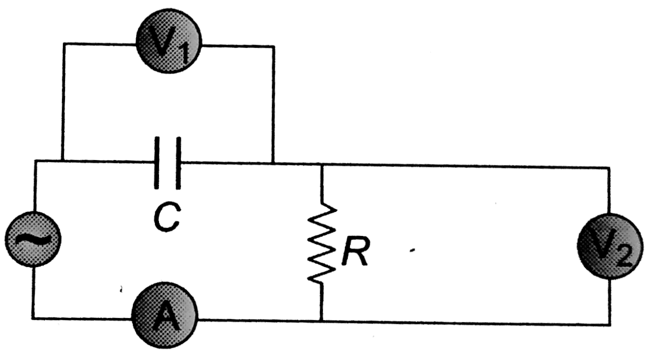
29. The diagram shows a capacitor C and a resistor R connected in series to an AC source. V_1 and V_2 are voltmeters and A is ammeter



Now, consider the following statements :

(I) Reading in A and V_2 are always in phase.

(II) Reading in V_1 is ahead in phase with reading in V_2,

(III) Reading in A and V_1 are always in phase.

Which of these statements are/is correct

A. I only

B. II only

C. I and II only

D. II and III only

Answer: A

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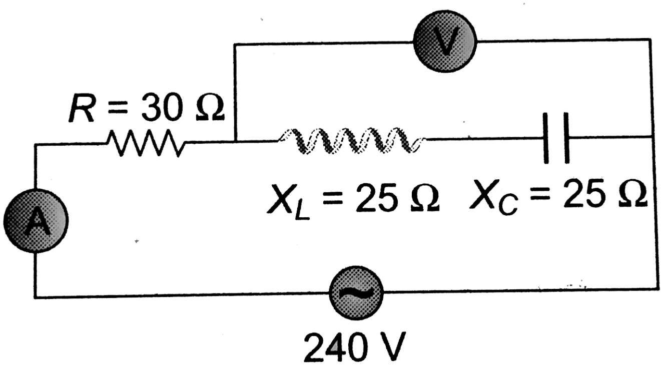
30. In the circuit shown in figure neglecting source resistance the voltmeter and ammeter reading will respectively, will be



A. $0V, 3A$

B. $150V, 3A$

C. $150V, 6A$

D. $0V, 8A$

Answer: D

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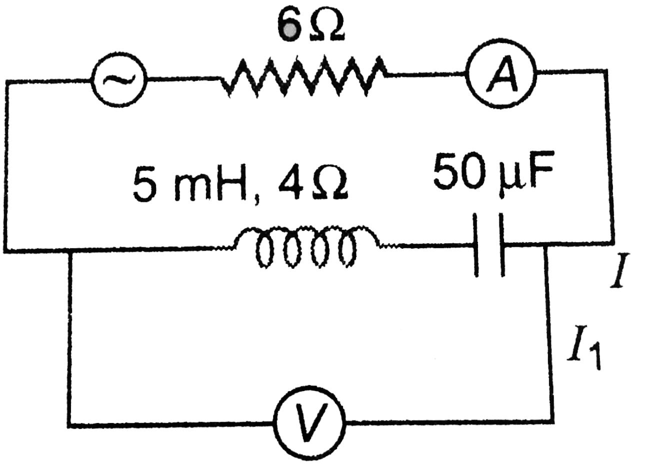
31. In the circuit shown in figureure the AC source gives a voltage $V = 20\cos(2000t)$. Neglecting source resistance, the voltmeter and and ammeter readings will be



.

A. $0V, 0.47A$

B. $1.68V, 0.47A$

C. $0V$, $1.4A$

D. $5.6V$, $1.4A$

Answer: D

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32. A telephone wire of length $200km$ has a capacitance of $0.014\frac{\mu F}{km}$. If it carries an AC of frequency $5kHz$ what should be the value of an inductor required to be connected in series so that impedence of the circuit is minimum ?

A. $0.35mH$

B. $35mH$

C. $3.5mH$

D. Zero

Answer: A

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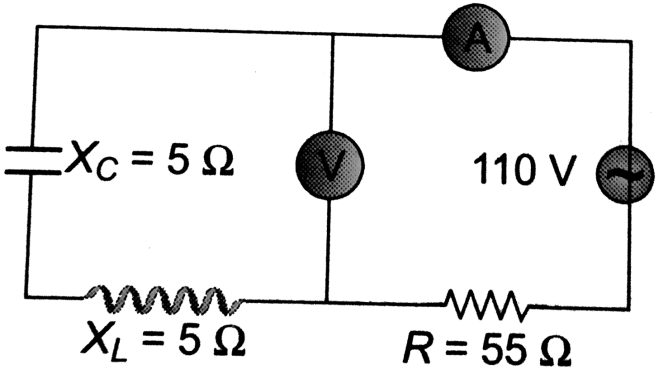
33. The reading of ammeter in the circuit shown will be



A. $2A$

B. $2.4A$

C. zero

D. $1.7A$

Answer: A

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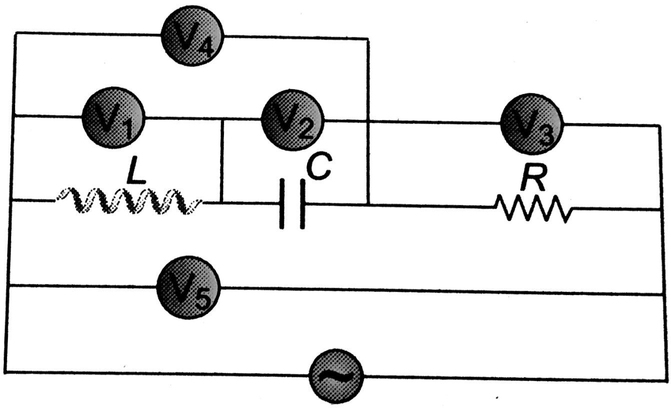
34. In the adjoining AC circuit the voltmeter whose reading will be zero at resonance is



A. V_1

B. V_2

C. V_3

D. V_4

Answer: D

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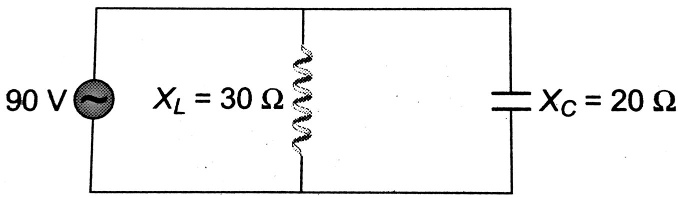
35. In the adjoining figure the impedence of the circuit will be



A. 120 ohm

B. 50 ohm

C. 60 ohm

D. 90 ohm

Answer: C

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36. In a series circuit $C = 2\mu F, L = 1mH$ and $R = 10\Omega$, when the current in the circuit is maximum, at that time the ratio of the energies stored in the capacitor and the inductor will be

A. $1:1$

B. $1:2$

C. $2:1$

D. $1:5$

Answer: D

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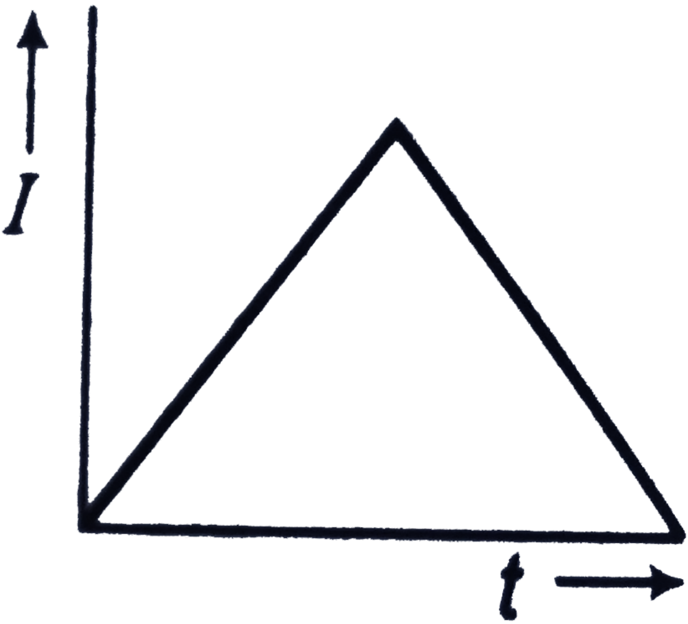
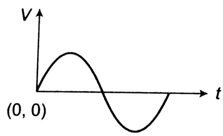
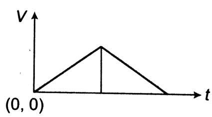
37. An alternating current I in an inductance coil varies with time t according to the graph as shown: Which one of the following graph gives the variation of voltage with time?



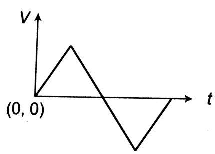
A. (a)

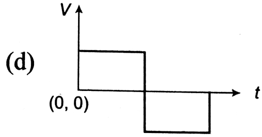


B. (b)



C. (c)



D. 

Answer: B

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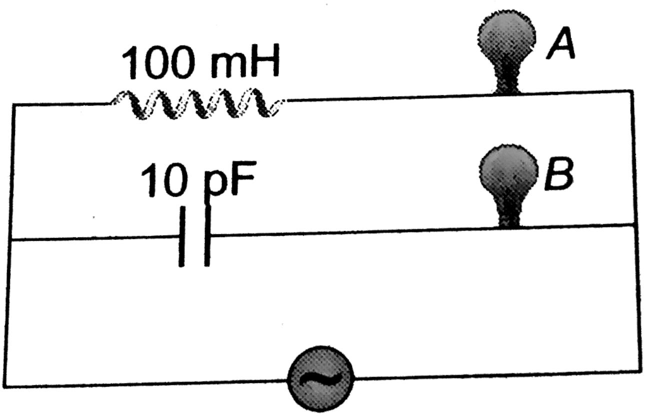
38. If A and B are identical bulbs, which bulb glows brighter?



A. A

B. B

C. Both equally bright

D. Cannot say

Answer: A

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39. In an LCR circuit $R = 100\Omega$. When capacitance C is removed, the current lags behind the voltage by $\pi/3$. When inductance L is removed, the current leads the voltage by $\pi/3$.

The impedance of the circuit is

A. 50Ω

B. 100Ω

C. 200Ω

D. 400Ω

Answer: B

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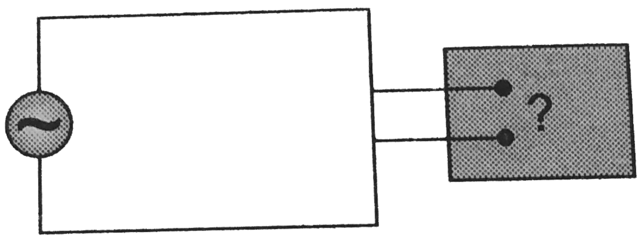
40. Following figure shows an AC generator connected to a "block box" through a pair of terminals. The box contains possible R, L, C or their combination, whose elements and arrangements are not known to us.



Measurements, outside the box reveals that $e = 75\sin(\omega t)$volts, $i = 1.5\sin(\omega t + 45^\circ)$ ampere. Then the wrong statement is

A. There must be a capacitor in the box.

B. There must be an inductor in the box.

C. There must be a resistance in the box.

D. The power factor is 0.70.

Answer: B

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Section B - Assertion Reasoning

1. STATEMENT-1: By only knowing the power factor for a given LCR circuit it is not possible to tell whether the applied alternating emf leads or lags the current.

STATEMENT-2: $\cos\theta = \cos(-\theta)$

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: A

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2. Statement 1: In the purely resistive element of a series LCR, ac circuit the maximum value of rms current increase with increase in the angular frequency of the applied emf.

Statement 2:

$$I_{\max} = \frac{\varepsilon_{\max}}{Z}, Z = \sqrt{R^2 + \left(\omega L - \frac{1}{(\omega C)^2}\right)},$$

where $(I_{\max})$ is the peak current in a cycle.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: D

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3. Statement 1: In a series LCR circuit at resonance condition power consumed by ciccuit is maximum.

Statement 2 : At resonance condition, the effective resistance of circuit is maximum.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: C

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4. Assertion: In series $L-R$ circuit voltage leads the current.

Reason: In series $L-C$ circuit leads the voltage.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: B

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5. Assertion: Average value of AC over a complete cycle is always zero.

Reason: Average value of AC is always defined over half cycle.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: B

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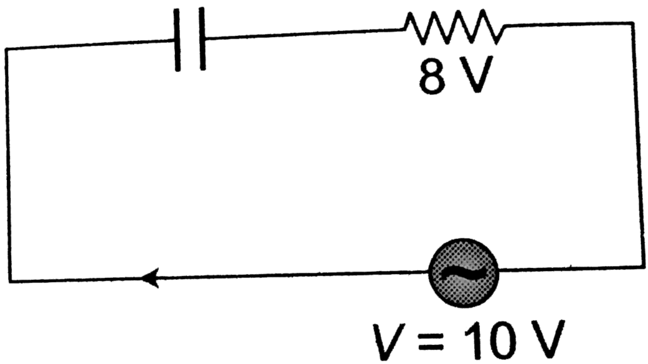
6. Assertion: KVL rule is also being applied in AC circuit shown below.



V_C in the circuit $= 2V$.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: C

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7. Assertion: AC generators are based upon EMI principle.

Reason: Resistance offered by capacito for alternating current is zero.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: C

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8. Assertion: Rate of heat generated when resistance is connected with AC source depends on time.

Reason : $R.M.S.$ voltage may be greater than maximum AC voltage.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: C

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9. An inductor, a capacitor, and a resistor are connected in series. The combination is connected across an ac source.

Statement 1: Peak current through each remains same.

Statement 2: Average power dielivered by source is equal to average power developed across resistance.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: B

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10. Asserition: In alternating current direction of motion free electron changes periodically.

Reason: Alternating current changes its direction after certain time interval.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: B

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11. Assertion: When frequency is greater than resonace frequency is a series LCR circuit, it will the an inductive circuit.

Reason : Resultant voltage will lead the current.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: A

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12. Assertion: When capacitive reactance is smaler than the inductive reactance is LCR circuit, e.m.f.

leads the current.

Reason : The phase angle is the angle between the alternating e.m.f. and alternating current of the circuit.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: C

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13. Statement 1: An alternating current shown magnetic effect.

Statement 2: Alternating current varies with time .

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: B

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14. Assertion: The alternating current lags behined the e.m.f. by a phase angle of $\pi / 2$, when

AC flows through an inductor.

Reason: The inductive reactance increases as the frequency of AC source decreases.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: C

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15. Assertion: Capacitance serves as a block for DC and offers an easy path to AC.

Reason: Capacitance reactance is inversely proportional to frequency.

A. If both the assertion and reason are true and reason is a true explanation of the assertion.

B. If both the assertion and reason are true but the reason is not the correct explanation of the assertion.

C. If the assertion is true but reason is false

D. If both the assertion and reason are false.

Answer: A

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16. Assertion: When capacitive reactance is smaler than the inductive reactance is LCR circuit, e.m.f.

leads the current.

Reason : The phase angle is the angle between the alternating e.m.f. and alternating current of the circuit.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: B

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17. Assertion: Chock coil is the prefered over a resistor to adjust current in an AC circuit.

Reason: Power factor for inductance is zero.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: A

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18. Statement 1: An alternating current shown magnetic effect.

Statement 2: Alternating current varies with time .

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: B

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19. Statement 1: Both dc and ac can be measured by a hot wire instrument.

Statement 2: the hot wire instrument is based on the principle of magnetic effect of current.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: C

Watch Video Solution

20. Assertion: AC is more dangerous than DC

Reason: Frequency of AC is dangerous for humban body.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: A

Watch Video Solution

21. Assertion: Average value of AC over a complete cycle is always zero.

Reason: Average value of AC is always defined over half cycle.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: B

Watch Video Solution

22. Assertion: The division are equaly marked on the scale of AC ammeter.

Reason: Heat produced is directely proportional to the current

A. If both the assertion and reason are true and reason is a true explantion of the

assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: D

Watch Video Solution

23. Assertion: When AC circuit contain resistor only, its power is minimum.

Reason: Power of a circuit is independent of phase angle.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: D

Watch Video Solution

24. Assertion: An electric lamp connected in series with a variable capacitor and AC source, its brightness increases with increases in capacitance.

Reason: Capacitive reactance decrease with increases in capacitance of capacitor.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: A

Watch Video Solution

25. Assertion: An inductance and a resistance are connected in series with an AC circuit. In this circuit the current and the potential difference across the resistance lag behind potential difference across the inductance by an angle $\pi / 2$.

Reason: In LR circuit voltage leads the current by phase angle which depends on the value of inductance and resistance both.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: B

Watch Video Solution

26. Assertion: A capacitor of suitable capacitance can be used in an AC circuit in place of the choke coil.

Reason: A capacitor blocks DC and allows AC

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: B

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AIPMT/NEET Questions

1. In an AC circuit, the current is given by $i = 5\sin\left(100t - \frac{\pi}{2}\right)$ and the AC potential is $V = 200\sin(100t)$volt. Then the power consumption is

A. 20 watts

B. 40 watt

C. 1000 watt

D. 0 watt

Answer: D

Watch Video Solution

2. In a circuit, the value of the alternating current is measured by hot wire ammeter as 10 ammeter. Its peak value will be

A. $10A$

B. $20A$

C. $14.14A$

D. $7.07A$

Answer: C

Watch Video Solution

3. If the value of potential in an ac, circuit is $10V$, then the peak value of potential is

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

B. $10\sqrt{2}$

C. $20\sqrt{2}$

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

Answer: B

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4. A coil of $40H$ inductance is connected in series with a resistance of 8 ohm and the combination is joined to the terminals of a $2V$ battery. The time constant of the circuit

A. $5s$

B. $1/5s$

C. $40s$

D. $20s$

Answer: A

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5. In a circuit L, C and R are connected in series with an alternating voltage source of frequency f. The current lead the voltages by 45°. The value of C is :

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

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

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

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

Answer: C

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6. A coil of inductive reactance 31Ω has a resistance of 8ω. It is placed in series with a condenser of capacitive reactance 25Ω. The combination is connected to an ac source of $110V$. The power factor of the circuit is

A. 0.56

B. 0.64

C. 0.80

D. 0.33

Answer: C

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7. The core of any transformaer is laminated so as to

A. energy losses due to Eddy currents may be minimised

B. the weight of the transformer may be reduced

C. rusting of the core may be prevented

D. ratio of voltage in primary and secondary may be increased

Answer: A

Watch Video Solution

8. A transistor -oscillator using a resonant circuit with an inductor L (of negligible resistance) and a capacitor C in series produce oscillations of frequency f. If L is doubled and C is changed to $4C$, the frequency will be

A. $f / 4$

B. $8f$

C. $f / 2\sqrt{2}$

D. $f / 2$

Answer: C

Watch Video Solution

Watch Video Solution

9. The primary and secondary coils of a transmformer have 50 and 1500 turns respectively. If the magnetic flux ϕ linked with the primary coil is given by $\phi = \phi_0 + 4t$, where ϕ is in weber, t is time in second and ϕ_0 is a constant, the output voltage across the secondary coil is

A. $90V$

B. $120V$

C. $220V$

D. $30V$

Answer: B

Watch Video Solution

10. A transformer is used to light a $100W$ and $110V$ lamp from a $220V$ mains. If the main current is $0.5A$, the efficiency of the transformer is approximately:

A. 30%

B. 50%

C. 90%

D. 10%

Answer: C

Watch Video Solution

11. What is the value of inductance L for which the current is a maximum in series LCR circuit with $C = 10\mu F$ and $\omega = 1000s^{-1}$?

A. $100mH$

B. $1mH$

C. Cannot be calculated unless R is known

D. $10mH$

Answer: A

Watch Video Solution

12. In any AC circuit the emf (e) and the current (i) at any instant are given respectively by

$e = E_0 \sin \omega t$

$i = I_0 \sin(\omega t - \phi)$

The average power in the circuit over one cycle of AC is

A. $\frac{E_0 I_0}{2}$

B. $\frac{E_0 I_0}{2} \sin \phi$

C. $\frac{E_0 I_0}{2} \cos \phi$

D. $E_0 I_0$

Answer: C

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13. Power dissipated in an $L - C - R$ series circuit connected to an AC source of emf ε is

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

B. $\dfrac{\varepsilon^2\sqrt{R^2+\left(L\omega-\frac{1}{C\omega}\right)^2}}{R}$

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

D. $\dfrac{\varepsilon^2 R}{\sqrt{R^2+\left(L\omega-\frac{1}{C\omega}\right)^2}}$

Answer: A

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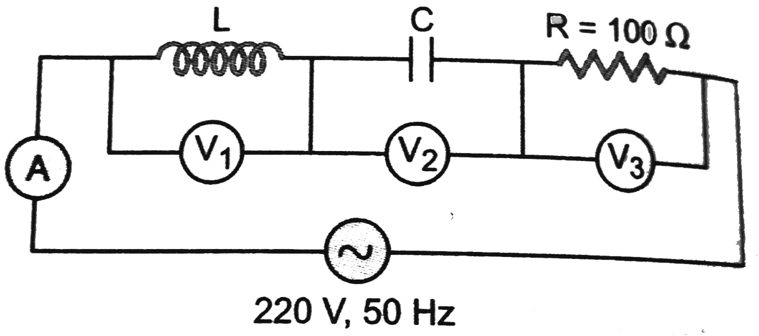
14. In the given circuit, Fig., the reading of voltmeter V_1 and V_2 300 votls each. The reading of the voltemeter V_3 and ammeter A are respectively



A. $150V, 2.2A$

B. $220V, 2.2A$

C. $220V, 2.0A$

D. $100V, 2.0A$

Answer: B

Watch Video Solution

15. A $220V$ input is supplied to a transformer. The output circuit draws a current of $2.0A$ at $440V$. If the efficiency of the transformer is $80\,\%$, the current drawn by the primery winding of the transformer is

A. $3.6A$

B. $2.8A$

C. $2.5A$

D. $5.0A$

Answer: D

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16. An AC voltage is applied to a resistance R and an inductance L in series. If R and the inductive reactance are both equal to 3Ω, the phase difference between the applied voltage and the current in the circuit is

A. $\pi/4$

B. $\pi/2$

C. zero

D. $\pi/6$

Answer: A

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17. In an ac circuit , an alternating voltage $e = 200\sqrt{2}\sin 100t$ volts is connected to a capacitor of capacitance $1\mu F$. The rms value of the current in the circuit is :

A. $100mA$

B. $200mA$

C. $20mA$

D. $10mA$

Answer: C

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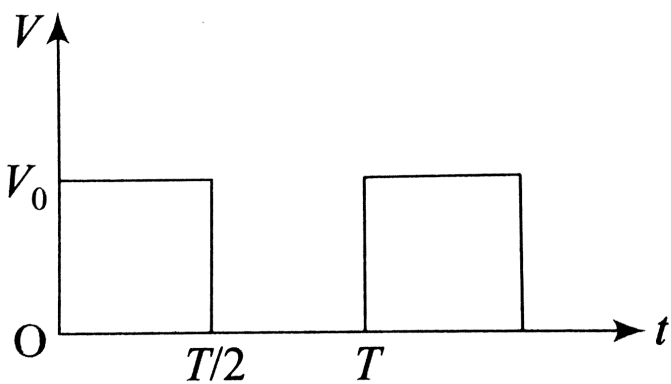
18. The rms value of potential difference V shown in the figure is



A. V_0

B. $\frac{V_0}{\sqrt{2}}$

C. $\frac{V_0}{2}$

D. $\frac{V_0}{\sqrt{3}}$

Answer: B

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19. A coil has resistance $30 ohm$ and inductive reactance $20 ohm$ at $50 Hz$ frequency. If an ac source of 200 volts. $100Hz$, is connected across the coil, the current in the coil will be

A. $4.0A$

B. $8.0A$

C. $\frac{20}{\sqrt{13}}A$

D. $2.0A$

Answer: A

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20. In an electrical circuit R, L, C and an AC voltage source are all connected in series. When L is removed from the circuit, the phase difference between the voltage and the current in the circuit is $\pi / 3$. If instead, C is removed from the circuit, difference the phase difference is again $\pi / 3$. The factor of the circuit is

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

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

C. 1

D. $\frac{\sqrt{3}}{2}$

Answer: C

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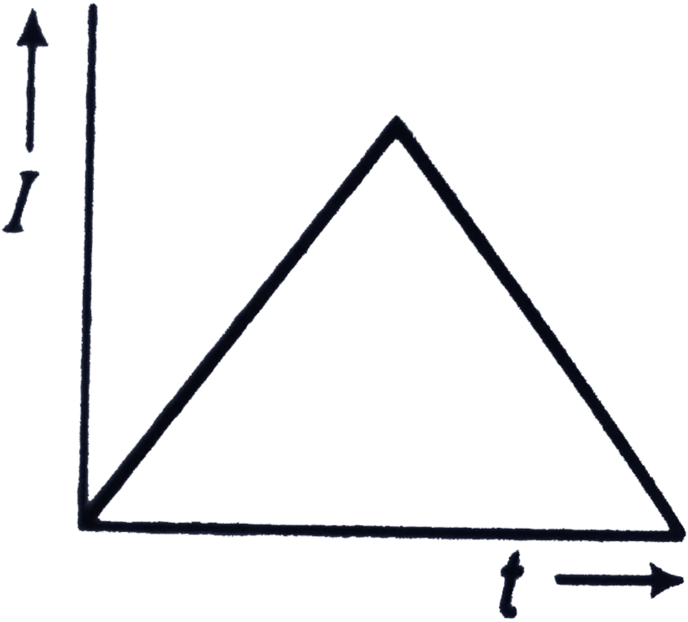
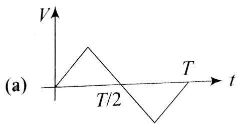
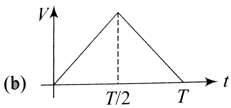
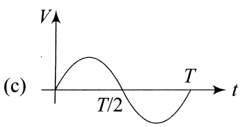
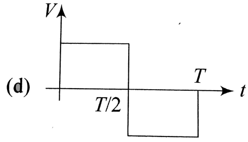
21. An alternating current I in an inductance coil varies with time t according to the graph as shown: Which one of the following graph gives the variation of voltage with time?



A. 

B. 

C. 

D. 

Answer: D

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22. The instatanteous value of alternating current and voltages in a circuit are given as

$i = \frac{1}{\sqrt{2}} \sin(100\pi t)$ ampere

$e = \frac{1}{\sqrt{2}} \sin(100\pi t + \pi / 3)$ volt

The average power in watts consumed in the circuit is

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

B. $\frac{\sqrt{3}}{4}$

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

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

Answer: D

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23. A coil of self-inductance L is connected in series with a bulb B and an AC source. Brightness of the bulb decreases when

A. Frequency of the AC source is decreased

B. Number of turns in the coil is reduced

C. A capacitance of reactance $X_C = X_L$ is included in the same circuit

D. An iron rod is inserted in the coil

Answer: D

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24. A transformer having efficiency of 90% is working on $200V$ and $3kW$ power supply. If the current in the secondary coil is $6A$, the voltage across the secondary coil and current in the primary coil respectively are

A. $300V, 15A$

B. $450V, 15A$

C. $450V, 13.5A$

D. $600V, 15A$

Answer: B

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25. A resistance R draws power P when connected to an AC source. If an inductance is now placed in series with the resistance, such that the impedence of the circuit becomes Z, the power drawn will be

A. $P\left(\frac{R}{Z}\right)^2$

B. $P\sqrt{\frac{R}{Z}}$

C. $P\left(\frac{R}{Z}\right)$

D. P

Answer: A

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

(a) When capacitor is air filled.

(b) When capacitor is mica filled.

current through resistor is i and voltage across capacitor is V then

A. $V_a = V_b$

B. $V_a < V_b$

C. $V_a > V_b$

D. $i_a = i_b$

Answer: C

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27. The input signal given to a CE amplifier having a voltage gain of 150 is $V_i = 2\cos\left(15t + \frac{\pi}{3}\right)$. The corresponding output signal will be

A. $300\cos\left(15t + \frac{4\pi}{3}\right)$

B. $300\cos\left(15t + \frac{\pi}{3}\right)$

C. $75\cos\left(15t+\frac{2\pi}{3}\right)$

D. $2\cos\left(15t+\frac{5\pi}{3}\right)$

Answer: A

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28. An inductor $20mH$, a capacitor $50\mu F$ and a resistor $40\Omega$are connected in series across of emf $V=10\sin 340t$. The power loss in $A.C.$ circuit is

A. $0.89W$

B. $0.51W$

C. $0.67W$

D. $0.76W$

Answer: B

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29. A small signal voltage $V(t) = V_0 \sin \omega t$ is applied across an ideal capacitor C:

A. Current $I(t)$, lags voltage $V(t)$ by 90°

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

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

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

Answer: B

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

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

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

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

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

Answer: A

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31. The potential differences across the resistance, capacitance and inductance are $80V, 40V$ and

$100 V$ respectively in an $L-C-R$ circuit. The power factor of this circuit is

A. 0.8

B. 1.0

C. 0.4

D. 0.5

Answer: A

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AIIMS Questions

1. In a circuit, the current lags behind the voltage by a phase difference of $\pi/2$, the circuit will contain which of the following ?

A. Only R

B. Only L

C. R and C

D. only C

Answer: B

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2. A lamp consumes only 50% of peak power in an $a.c.$ circuit. What is the phase difference between the applied voltage and the circuit current

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

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

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

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

Answer: B

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3. An an ideal parallel LC circuit, the capacitor is charged by connecting it to a DC source which is then disconnected. The current in the circuit

A. becomes zero instantaneously

B. oscillates instantaneously

C. grows monotonically

D. decays monotonically

Answer: B

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4. A capacitor of capacitance $2\mu F$ is connected in the tank circuit of an oscillator oscillating with a frequency of 1 kHz. If the current flowing in the circuit is $2mA$, the voltage across the capacitor will be

A. $0.32V$

B. $0.16V$

C. $79.5V$

D. $159V$

Answer: B

Watch Video Solution

5. A short-circuited coil is placed in a time-varying magnetic field. Electrical power is dissipated due to the current induced in the coil. If the number of turns were to be quadrupled and the wire radius halved, the electrical power dissipated would be

A. halved

B. the same

C. doubled

D. quadrupled

Answer: B

Watch Video Solution

6. Power factor is maximum in an LCR circuit when

A. $X_L = X_C$

B. $R = 0$

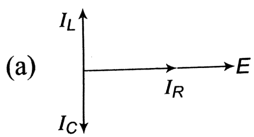
C. $X_L = 0$

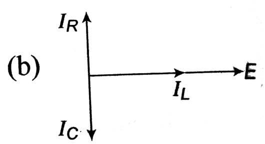
D. $X_C = 0$

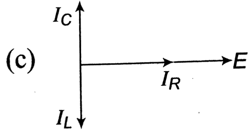
Answer: A

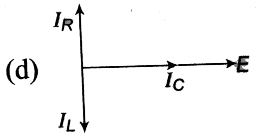
Watch Video Solution

7. An alternating emf is applied across a parallel combination of a resistance R, capacitance C and an inductance L. If I_R, I_L, I_C are the currents through R, L and C respectively. Then the diagram which correctly represents, the phase relationship among I_R, I_L, I_C and source emf E is given by

A. 

B. 

C. 

D. 

Answer: C

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8. An ac source of angular frequency ω is fed across a resistor R and a capacitor C in series. The current registered is I. If now the frequency of source is changed to $\omega/3$ (but maintaining the same voltage), the current in the circuit is found to be halved. Calculate the ratio of the reactance to resistance at the original frequency ω.

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

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

C. $\sqrt{\frac{1}{5}}$

D. $\sqrt{\frac{4}{5}}$

Answer: B

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9. A circuit has a resistance of 11Ω, an inductive reactance of 25Ω, and a capacitive resistance of 18Ω. It is connected to an AC source of $260V$ and $50Hz$. The current through the circuit (in amperes) is

A. 11

B. 15

C. 18

D. 20

Answer: D

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10. A coil of 200Ω resistance and $1.0H$ inductance is conneted to an AC source of frequency $200/2\pi Hz$. Phase angle between potential and current will be

A. 30°

B. 90°

C. 45°

D. 0°

Answer: C

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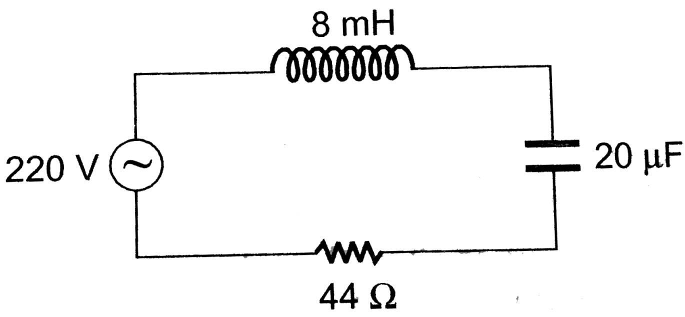
11. For the series LCR circuit shown in the figure, what is the resonance frequency and the amplitude of the current at the resonating frequency



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

B. $2500 rads^{-1}$ and $5A$

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

D. $25 rads^{-1}$ and $5\sqrt{2}A$

Answer: B

Watch Video Solution

12. A coil of inductance 8.4 mH and resistance $6(\Omega)$ is connected to a 12 V battery. The current in the coil is 1.0 A at approximately the time

A. 500 sec

B. 20sec

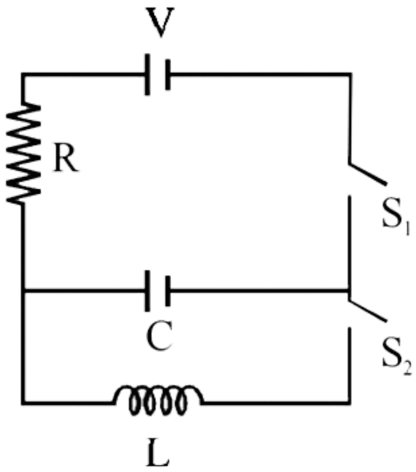
C. 35 milli sec

D. 1milli sec

Answer: D

Watch Video Solution

13. In an LCR circuit as shown below both switches are open initially. Now switch S_1 kept open. (q is charge on the capacitor and $\tau = RC$ is Capacitive time constant). Which of the following statement is correct?



A. At $t = \tau / 2, q = CV\left(1 - e^{-1}\right)$

B. Work done by the battery is half of the energy dissipated in the resistor

C. At $t = 2\tau, q = CV\left(1 - e^{-2}\right)$

D. At $t = \tau, q = CV / 2$

Answer: C

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14. A step-down transformer is used on a $1000V$ line to deliver $20A$ at $120V$ at the secondary coil. If the efficiency of the transformer is 80% the current drawn from the line is.

A. $3A$

B. $30A$

C. $0.3A$

D. $2.4A$

Answer: A

Watch Video Solution

15. In a LCR series resonating circuit. Give the value of average power loss.

A. VI

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

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

D. $\frac{VI}{\sqrt{3}}$

Answer: B

Watch Video Solution

16. Assertion: If the frequency of alternating current in an AC is circuit consisting of an inductance coil is increased then current gets decreased.

Reason: The current is inversely proportional to frequency of alternating current.

A. If both the assertion and reason are true and reason is a true explantion of the

assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: A

Watch Video Solution

17. Assertion: The quantity L/R possesses dimensions of time.

Reason: To reduce the rate of increases of current through a solenoide should increase the time constant (L/R).

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: B

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18. Assertion: Faraday's laws are consequences of conservation of energy.

Reason: In a purely resistive AC circuit, the current lags behind the e.m.f. in phase

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: C

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19. Assertion: An electric lamp connected in series with a variable capacitor and AC source, its brightness increases with increases in capacitance.

Reason: Capacitive reactance decrease with increases in capacitance of capacitor.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: A

Watch Video Solution

20. Assertion: The probability of an electric bulb fusing is higher at the time of switching ON and OFF.

Reason: Inductive effects produce a surge at the time of switch OFF and switch ON.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: A

Watch Video Solution

21. Assertion : An electric motor will have maximum efficiency when back emf becomes equal to half of applied emf.

Reason : Efficiency of electric motor depends only on magnitude of back emf.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: C

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22. Assertion: In electric circuits, wires carrying currents in opposite directions are often twised together.

Reason: If the wires are not twisted together, the combination of the wires formes a current loop, the magnetic field generated by the loop might affect adjacent circuits of components.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: A

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23. Assertion: Eddy current is produced in any metallic conductor when magnetic flux is changed around it.

Reason: Electric potential determines the flow of charges

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: B

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24. Assertion: Only a charge in magnetic flux will maintain an induced current in the coil.

Reason: The presence of large magnetic flux through a coil maintains a current in the coil if the circuit is continuous.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: C

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25. Assertion: In series LCR circuit resonance can take place.

Reason: Resonance takes place if inductance and capacitive reactance are equal and opposite.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: A

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26. Assertion: The alternating current lags behined the e.m.f. by a phase angle of $\pi / 2$, when

AC flows through an inductor.

Reason: The inductive reactance increases as the frequency of AC source decreases.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If both the assertion and reason are false.

Answer: C

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Section D - Chapter End Test

1. A 280 ohm electric bulb is connected to $200V$ electric line. The peak value of current in the bulb will be

A. About one ampere

B. Zero

C. About two ampere

D. About four ampere

Answer: A

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2. An AC source is rated at $220V, 50Hz$. The time taken for voltage to change from its peak value to zero is

A. $50 \sec$

B. $0.02 \sec$

C. $5 \sec$

D. $5 \times 10^{-3} \sec$

Answer: D

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3. If the value of potential in an ac, circuit is $10V$, then the peak value of potential is

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

B. $10\sqrt{2}$

C. $20\sqrt{2}$

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

Answer: B

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4. The maximum value of AC voltage in a circuit is $70V$. Its $r.\ m.\ s.$ value is

A. $70.7V$

B. $100V$

C. $500V$

D. $707V$

Answer: C

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5. If instantaneous current is given by $i = 4\cos(\omega t + \varphi)$ amperes, then the $r.m.s.$ value of current is

A. 4 ampere

B. $2\sqrt{2}$ ampere

C. $4\sqrt{2}$ ampere

D. Zero ampere

Answer: B

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6. In an AC circuit, peak value of voltage is 423 volts. Its effective voltage is

A. 400 volts

B. 323 volts

C. 300 volts

D. 340 volts

Answer: C

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7. The power factor of an AC circuit having resistance (R) and inductance (L) connected in series and an angular velocity ω is

A. $R / \omega L$

B. $R / \left(R^2 + \omega^2 L^2\right)^{1/2}$

C. $\omega L / R$

D. $R / \left(R^2 - \omega^2 L^2\right)^{1/2}$

Answer: B

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8. An inductor of inductance L and ressistor of resistance R are joined in series and connected by a source of frequency ω. Power dissipated in the circuit is

A. $\frac{(R^2+\omega^2 L^2)}{V}$

B. $\frac{V^2 R}{(R^2+\omega^2 L^2)}$

C. $\frac{V}{(R^2+\omega^2 L^2)}$

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

Answer: B

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9. Alternating current can not be measured by D.C. Ammeter because

A. AC voltage pass through DC ammeter

B. Average value of complete cycle is zero

C. AC is virtual

D. AC change its direction

Answer: B

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10. 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. $4L$

B. $2L$

C. $L/2$

D. $L/4$

Answer: C

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11. In an LCR series a.c. Circuit the voltage across each of hte components L,C and R is 50V. The voltage across the LC combination will be

A. $50V$

B. $50\sqrt{2}V$

C. $100V$

D. $0V$ (Zero)

Answer: D

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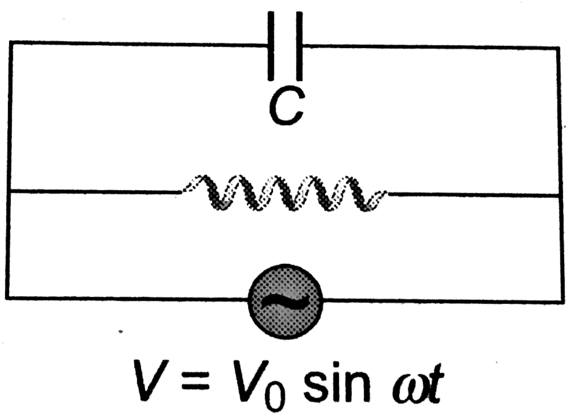
12. For the circuit shown in the figure, the current through the inductor is $0.9A$ while the current through the condenser is $0.4A$. hence the current drawn from the generator is



A. $I = 1.13$ amp

B. $I = 0.9$ amp

C. $I = 0.5$ amp

D. $I = 0.6$ amp

Answer: C

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13. In a series LCR circuit, the voltage across the resistance, capacitance and inductance is 10 V each. If the capacitance is short circuited, the voltage across the inductance will be

A. $10V$

B. $10/\sqrt{2}V$

C. $10\sqrt{2}V$

D. $20V$

Answer: B

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14. An ideal choke takes a current of 10 A when connected to an ac supply of 125 V and 50 Hz. A pure resistor under the same conditions takes a current of 12.5 A. If the two are connected to an ac supply of 100 V and 40 Hz, then the current in series combination of above resistor and inductor is

A. 10 amp

B. 12.5 amp

C. 20 amp

D. 25 amp

Answer: A

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15. A direct current of 5 amp is superimposed on an alternating current $I = 10 \sin \omega t$ flowing through a wire. The effective value of the resulting current will be:

A. $(15/2)$ amp

B. $5\sqrt{3}$ amp

C. $5\sqrt{5}$ amp

D. 15amp

Answer: B

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16. A group of electric lamps having a total power rating of 1000 watt is supplied by an AC voltage $E = 200 \sin(310t + 60^\circ)$. Then the r.m.s value of the circuit current is

A. 10 amp

B. $10\sqrt{2}$

C. 20 amp

D. $20\sqrt{2}$ amp

Answer: B

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17. In a LCR circuit having $L = 8.0 Henry$, $C = 0.5 \mu F$ and $R = 100 ohm$ in series. The resonance frequency in per second is

A. $600 radians$

B. $600 Hz$

C. $500 radians$

D. $500 Hz$

Answer: C

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

A. 94

B. 14

C. 10

D. 76

Answer: C

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

A. Is halved

B. Is doubled

C. Remain unchanged

D. In quadrupled

Answer: C

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20. A resistor R, an inductor L and a capacitor C are connected in series to an oscillator of frequency n. If the resonant frequency is n_r, then the current lags behind voltage, when

A. $n = 0$

B. $n < n_r$

C. $n = n_r$

D. $n > n_r$

Answer: D

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21. If power factor is $1/2$ in a series RL circuit, $R = 100\Omega$. AC mains is used then L is

A. $\frac{\sqrt{3}}{\pi} Henry$

B. $\pi Henry$

C. $\frac{\pi}{\sqrt{3}} Henry$

D. None of these

Answer: A

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22. A bulb is connected first with DC and the then AC of same voltage then it will shine brightly with

A. AC

B. DC

C. Brightness will be in ratio $1/1.4$

D. Equally with both

Answer: D

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23. An AC supply gives $30V_rms$which passes through a 10Ω resistance. The power dissipated in it is

A. $90\sqrt{2}W$

B. $90W$

C. $45\sqrt{2}W$

D. $45W$

Answer: B

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24. 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: D

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25. In a series LCR circuit, at resonance, power factor is ....

A. 0.707

B. 1

C. Zero

D. 0.5

Answer: B

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26. A bulb and a capacitor are in series with an AC source. On increasing frequency how will glow of the bulb change

A. The glow decreases

B. The glow increases

C. The glow remain the same

D. The bulb quench

Answer: B

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27. What will be the self-inductance of a coil, to be connected in a series with a resistance of $\pi\sqrt{3}\Omega$ such that the phase difference between the e.m.f. and the current at $50Hz$ frequency is 30°?

A. 0.5 Henry

B. 0.03 Henry

C. 0.05 Henry

D. 0.01 Henry

Answer: C

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28. The potential differences V and the current i flowing through an instrument in an AC circuit of frequency f are given by $V = 5\cos\omega t$ and $I = 2\sin\omega t$ amperes (where $\omega = 2\pi f$). The power dissipated in the instrument is

A. zero

B. $10W$

C. $5W$

D. $2.5W$

Answer: A

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29. Assertion: A bulb connected in series with a solenoid is connected to AC source. If a soft iron core is introduced in the solenoid, the bulb will glow brighter.

Reason: On introducing soft iron core in the solenoid, the inductance increases.

A. If both the assertion and reason are true and reason is a true explantion of the

assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If assertion false but reason is true.

Answer: D

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30. Assertion: In series LCR circuit resonance can take place.

Reason: Resonance takes place if inductance and capacitive reactance are equal and opposite.

A. If both the assertion and reason are true and reason is a true explantion of the assertion.

B. If both the assertion and reason are true but the reason is not true the correct explantion of the assertion.

C. If the assertion is true but reason false

D. If assertion false but reason is true.

Answer: A

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