PHYSICS

BOOKS - DISHA PHYSICS (HINGLISH)

ALTERNATING CURRENT

Physics

1. in a LCR circuit capacitance is chagned from C to 2C. For the resomat frequency to remain unchaged, the inductance should be chagned from L to

A. L/2

B. 2L

C. 4L

D. L/4

Answer:

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2. The power factor of LCR circuit at resonance is-

A. 0.707

B. 1

C. Zero

D. 0.5

Answer:

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3. An alternating current source of frequency $100Hz$ 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 $46, 8 \text{ and } 40$ volt respectively. The

electromotive force of alternating current source in volt is

A. 94

B. 14

C. 10

D. 76

Answer:

4. 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. os quadrupled

Answer:

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

A. 0^0

B. $\pi/2$

C. π

D. $-\pi$

Answer:

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6. 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. 0.4

B. 0.3

C. 0.2

D. 0.1

Answer:

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7. 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:

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8. 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. Inductive

D. None of the above

Answer:

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9. 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:

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10. An alternating EMF of frequency $\frac{1}{2\pi\sqrt{LC}}$ is applied to a series LCR circuit. For this frequency of the applied EMF,

A. The circuit is at resonance and its impedance is made up only of a reactive part

B. The current in the circuit is not in phase with the applied e.m.f. and the voltage across R equals this applied emf

C. The sum of the p.d.'s across the inductance and capacitance equals the applied e.m.f.

which is 180° ahead of phase of the current in the circui

D. The quality factor of the circuit is $\omega L/R$ or $1/\omega CR$and this is a measure of the voltage magnification (produced by the circuit at resonance) as well as the sharpness of resonance of the circuit

Answer:

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11. 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. `(1)/(2pif(2pifL+R))

B. `(1)/(2pif(2pifL+R))

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

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

Answer:

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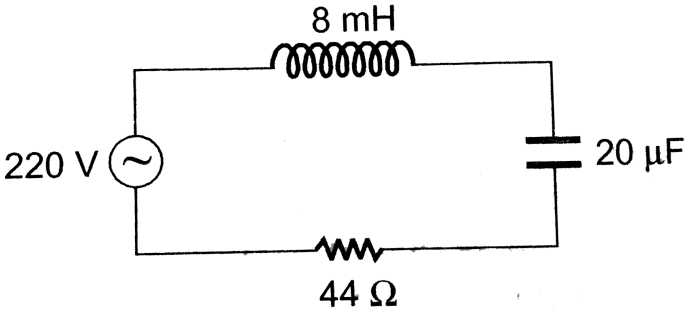
12. For the series LCR circuit shown in the figure, what is the resonance frequency and the amplitude of the current at the resonating frequency



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:

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

A. 10^4

B. 10 watt

C. 0.025

D. 2.5 watt

Answer:

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

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

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

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

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

Answer:

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

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

B. $P = \sqrt{2} E_0 l_0$

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

D. p = 0

Answer:

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16. An AC supply gives $30V_{rms}$ which passes through a 10Ω resistance. The power dissipated in it is

A. $90\sqrt{2}W$

B. 90 W

C. $45\sqrt{2}W$

D. 45 W

Answer:

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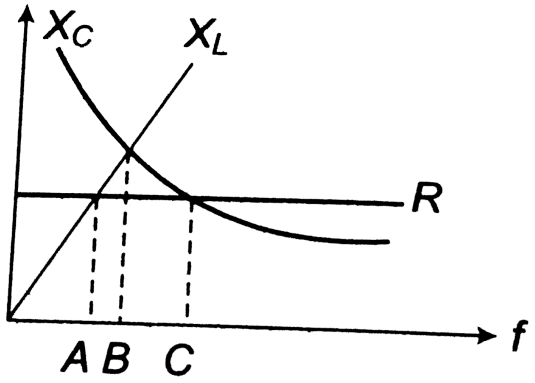
17. The figure shows variation of R, X_L and X_C with frequency f in a series L, C, R circuit. Then for what frequency point, the circuit is inductive ?



A. A

B. B

C. B

D. All point

Answer:

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18. 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:

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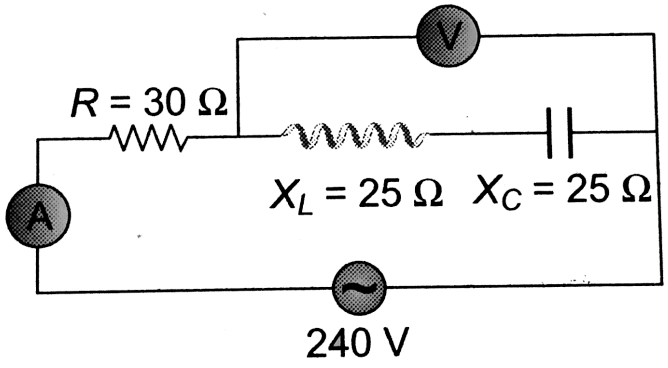
19. In the circuit shown in figure neglecting source resistance the voltmeter and ammeter reading will respectively, will be



A. 0V, 3A

B. 150V, 3A

C. 150V, 6A

D. 0V, 8 A

Answer:

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20. In an LCR circuit, the sharpness of resonance depends on

A. Inductance (L)

B. Capacitance (C)

C. Resistance (R)

D. All of these

Answer:

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21. For series LCR circuit, correct statements are

A. Applied e.m.f. and potential difference across resistance may be in phase

B. Applied e.m.f. and potential difference at inductor coil have phase difference of $\pi / 2$

C. Potential difference across resitance and capacitor have phase difference of $\pi/2$

D. Potential difference at capacitor and inductor have phase difference of $\pi/2$

Answer:

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22. An ac source is connected to a resistive circuits. Which of the following statements are false ?

A. Current leads the voltage

B. Current lags behind the voltage

C. Any of (1) or (2) may be true depending upon the value of resistance

D. Current and voltage are in same phase

Answer:

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23. A series LCR arrangement with $X_L = 80\Omega, X_c = 50\Omega, R = 40\Omega$ is applied across a.c. source of 200 V. Choose the correct options.

A. Wattless current =3.2 A

B. Power current =3.2 A

C. Power factor =0.6

D. Impedance of circuit $=50\Omega$

Answer:

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24. In RLC circuit, at a frequency v, the potential difference across each device are $(\Delta V_R)_{\max} = 8.8V, (\Delta V_L)_{\max} = 2.6V$ and $(\Delta V_C)_{\max} = 7.4V$. The composed potential

difference $(\Delta V_C + \Delta V_L)_{\max}$ across inductor and capacitor is

A. 10.0 V

B. 7.8 V

C. 7.4 V

D. 4.8 V

Answer:

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25. In RLC circuit, at a frequency v, the potential difference across each device are $(\Delta V_R)_{\max} = 8.8V, (\Delta V_L)_{\max} = 2.6V$ and $(\Delta V_C)_{\max} = 7.4V$. The composed potential difference $(\Delta V_C + \Delta V_L)_{\max}$ across inductor and capacitor is

A. 18.8 V

B. 13.6 V

C. 10.0 V

D. 4.0 V

Answer:

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26. What will happen to the value of (ΔV_L) if the frequency is adjusted to increase the current the current through the circuit ?

A. (ΔV_L) will increase.

B. (ΔV_L) will decrease.

C. (ΔV_L) will remain the same regardless of any changes to f.

D. There is not enough information to answer the question.

Answer:

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27. 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. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement -1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement -1 is False, Statement-2 is True.

D. Statement -1 is True, Statement-2 is False.

Answer:

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28. 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. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement -1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1.

C. Statement -1 is False, Statement-2 is True.

D. Statement -1 is True, Statement-2 is False.

Answer:

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

Reason: Power factor for inductance is zero.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement -1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for

Statement-1.

C. Statement -1 is False, Statement-2 is True.

D. Statement -1 is True, Statement-2 is False.

Answer:

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

A. remain same

B. increase

C. decrease

D. be zero

Answer:

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31. 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:

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32. 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. $\frac{1}{100}\text{sec}$

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

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

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

Answer:

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33. The frequency of ac mains in India is

A. $30\frac{c}{s}$ or Hz

B. $50\frac{c}{s}$ or Hz

C. $60\frac{c}{s}$ or Hz

D. $120\frac{c}{s}$ or Hz

Answer:

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34. 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. 10 V

B. $5\sqrt{3}V$

C. 5 V

D. 1 V

Answer:

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35. An ac is given by equation $I = (I_1)\cos\omega t + (I_2)\sin\omega t$. The rms value of 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:

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36. 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:

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37. 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:

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38. A resistance of 20Ω is connected to a source of an alternating potential $V = 220\sin(100\pi t)$. The time taken by the current to change from the peak value to rms value is

A. $0.2\,\text{sec}$

B. $0.25\,\text{sec}$

C. $25 \times 10^{-3}\,\text{sec}$

D. $2.5 \times 10^{-3}\,\text{sec}$

Answer:

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

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

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

Answer:

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40. 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:

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

A. $0.32A$

B. $0.016A$

C. $0.48A$

D. $0.80A$

Answer:

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42. 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 volt

B. 10 volt

C. 8 volt

D. 6 volt

Answer:

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43. 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:

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44. A resistor and a capacitor are connected in series with an a.c. source. If the potential drop across the capacitor is 5 V and that across resistor is 12 V, applied voltage is

A. $13V$

B. $17V$

C. $5V$

D. $12V$

Answer:

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45. 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. $4.55amp$

B. $0.355amp$

C. $0.455amp$

D. $3.55amp$

Answer:

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

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

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

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

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

Answer:

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47. 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. 11.4Ω, $17.5A$

B. 30.7Ω, $6.5A$

C. 40.4Ω, $5A$

D. 50Ω, $4A$

Answer:

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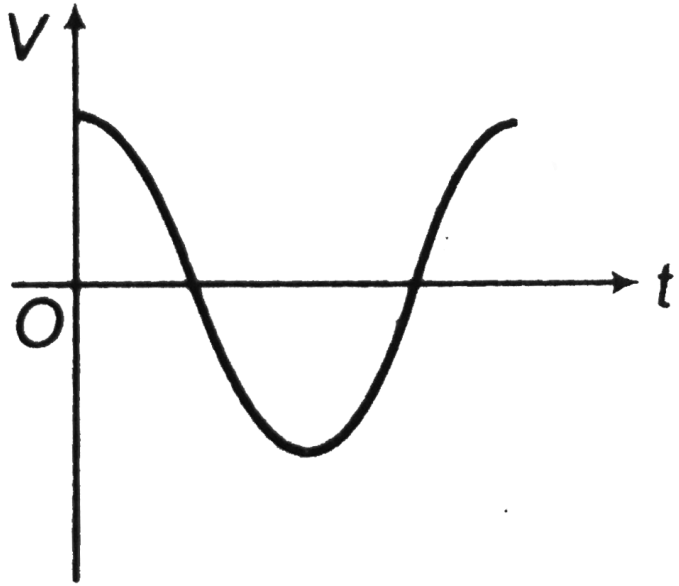
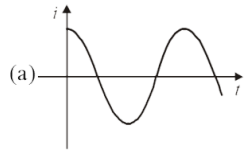
48. The figure represents the voltage applied across a pure inductor. The diagram which correctly represents the variation of curent i with time t is

given by



A.



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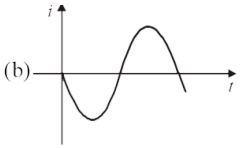

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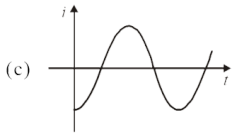
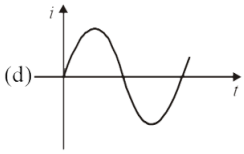


D. 

Answer:

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49. 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:

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50. 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. $\tan^{-1}.\frac{4}{3}$

B. $\tan^{-1}.\frac{3}{4}$

C. $\tan^{-1}.\frac{3}{2}$

D. $\tan^{-1}.\frac{2}{5}$

Answer:

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51. If an alternating voltage is represented as $E = 141\sin(628t)$, then

(1) the rms voltage is $141V$

(2) the rms voltage is $100V$

(3) the frequency is $50Hz$

(4) the frequency is $100Hz$

A. 1, 2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer:

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52. The r.m.s. value of an ac of 50 Hz is 10 A. (1) The time taken by the alternating current in reaching from zero to maximum value is 5×10^{-3} sec (2) The time taken by the alternating current in

reaching from zero to maximum value is 2×10^{-3} sec (3) The peak current is 14.14 A (4) The peak current is 7.07 A

A. 1, 2 and 3 are correct

B. 1 and 2 are correct

C. 2 and 4 are correct

D. 1 and 3 are correct

Answer:

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53. If the voltage in an ac circuit is reparesented by the equation $V = 220\sqrt{2}\sin(314t - \phi)$, calculate rms value of the voltage

A. $220V$

B. $314V$

C. $220\sqrt{2}V$

D. $200 / \sqrt{2}V$

Answer:

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54. If the voltage in an ac circuit is reparesented by the equation $V = 220\sqrt{2}\sin(314t - \phi)$, calculate average voltage

A. $220V$

B. $622/\pi V$

C. $220\sqrt{2}V$

D. $200/\sqrt{2}V$

Answer:

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55. If the voltage in an ac circuit is represented by the equation.

$V = 220\sqrt{2}\sin(314t - \phi)$ volt calculate (a) peak and rms value of the voltage, (b) average voltage, (c) frequency of ac.

A. $50Hz$

B. $50\sqrt{2}Hz$

C. $50\sqrt{2}Hz$

D. $75Hz$

Answer:

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56. 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. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for

Statement-1

C. Statement -1 is False, Statement-2 is True.

D. Statement -1 is True, Statement-2 is False.

Answer:

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

Statement 2: Alternating current varies with time .

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1.

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1

C. Statement -1 is False, Statement-2 is True.

D. Statement -1 is True, Statement-2 is False.

Answer:

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58. 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. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1

C. Statement -1 is False, Statement-2 is True.

D. Statement -1 is True, Statement-2 is False.

Answer: