PHYSICS

BOOKS - MTG GUIDE

ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENTS

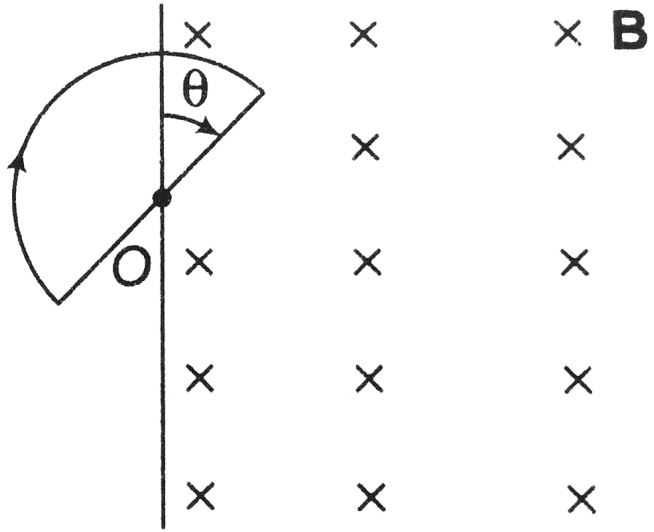
Illustration

1. Find the direction of current flowing in the following circuits.

View Text Solution

2. A wire loop enclosing as semicircle of radius R is located on the boudary of uniform magnetic field B. At the moment $t = 0$, the loop is set into rotation with a costant angular acceleration α about an axis O coinciding with a line of vector B on the boundary. Find the emf induced in the loop as a function of time. Draw the approximate plot

of this function.The arrow in the figure shows the emf direction taken to be positive.



Watch Video Solution

3. The self inductance of a solenoid of length L, area of cross-section A and having N turns is-

Watch Video Solution

4. A solenoid S_1 is placed coaxially inside another solenoid S_2 . The radii of the inner and outer solenoids are r_1 and r_2 respectively. If N_1 and N_2 are the number of turns of coil in solenoid S_1 and S_2 respectively and l is the length of solenoid S_2 carrying current I , then calculate the mutual inductance between the two solenoids.

View Text Solution

5. The peak value of alternating current is 5A and its frequency is 60Hz. Find its rms value. How long will the current take to reach the peak starting from zero?

Watch Video Solution

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

capacitive reactance and the current?

View Text Solution

7. An LCR series circuit with $L = 100mH, C = 100\mu F, R = 120\Omega$ is connected to an AC source of $emf \varepsilon = (30V)\sin\left(100s^{-1}\right)t.$ Find the impedane, the peak current and the resonant frequency of the circuit.

Watch Video Solution

8. A series AC circuit contains an inductor $(20mH)$, a capacitor $(100\mu F)$, a resistor (50Ω) and an AC source of $12V, 50Hz$. Find the energy dissipated in the circuit in $1000s$.

Watch Video Solution

9. An emf $E = 100\sin 314tV$ is applied across a pure capacitor of $637\mu F$. Find

(a) the instantaneous current I

(b) the instantaneous power P

(c) the frequency of power

(d) the maximum energy stored in the capacitor.

 Watch Video Solution

10. A transformer of 100 % efficiency has 200 turns in the primary and 40,000 turns in the secondary. It is connected to a 200 V a.c. mains and the secondary feeds to a $100k\Omega$ resistance. Calculate the output potential

difference per turn and the power delivered to the load.

Watch Video Solution

Neet Cafe Topicwise Pratice Questions Magnetic Flux

1. What is magnetic flux linked with a coil of N turns and cross section area A held with its plane parallel to the field?

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

B. NAB

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

D. 0

Answer: D

Watch Video Solution

Neet Cafe Topicwise Pratice Questions Faraday S Law Induced Emf And Current

1. A circular coil of radius 0.1 m has 80 turns of wire. If the magnetic field through the coil increases from 0 to 2 tesla in 0.4 sec and the coil is connected to a 11 ohm resistor, what is the current (in A) flow through the resistor during the 0.4 sec?

A. (8/7)

B. (7/8)

C. 8

D. 7

Answer: A

View Text Solution

2. A rectangular coil of 20 turns and area of cross-section $25cm^2$ has a resistance of $100ohm$. If a magnetic field which is perpendicular to the plane of the coil changes at the rate of 1000 telsa per second, the current in the coil is

A. 1A

B. 50A

C. 0.5A

D. 5A

Answer: C

Watch Video Solution

3. Faraday's law are consequence of conservation

A. charge

B. energy

C. magnetic field

D. both (b) and (c)

Answer: B

Watch Video Solution

4. A coil having 500 square loops each of side $10cm$ is placed normal to a magnetic flux which increase at the rate of $1.0\frac{\text{tesla}}{\text{second}}$. The induced r.m.f. in volts is

A. 0.1 V

B. 0.5 V

C. 1V

D. 5V

Answer: D

Watch Video Solution

5. The magnetic flux ϕ (in weber) in a closed circuit of resistance 10Ω varies with time t (in secnod) according to equation

$\phi = 6t^2 - 5t + 1$. The magnitude of induced current at $t = 0.25$ s is

A. 0.2A

B. 0.6A

C. 1.2A

D. 0.8A

Answer: A

Watch Video Solution

6. A copper rod of length l is rotated about one end perpendicular to the uniform magnetic field B with constant angular velocity ω . The induced e.m.f. between its two ends is

A. $2B\omega l^2$

B. $B\omega l^2$

C. $\frac{1}{2}B\omega l^2$

D. $\frac{1}{4}B\omega l^2$

Answer: C

Watch Video Solution

Watch Video Solution

7. The magnitude of the earth's magnetic field at a place is B_0 and angle of dip is δ. A horizontal conductor of lenth/lying along the magnetic north-south moves eastwards with a velocity v. The emf induced acroos the coductor is

A. zero

B. B_0 / v

C. $B_0 / v \sin \partial$

D. $B_0 / v \cos \partial$

Answer: C

Watch Video Solution

8. A square metal wire loop PORS of side 10 cm and resistance 1Ω is moved with a constant velocity v in a uniform magnetic field of $B = 2Wbm^{-2}$, as shown in the figure. The magnetic field lines are perpendicular to the plane of the loop (directed into the paper).

The loop is connected to network ABCD of resistors each of value 3Ω. The resistance of the lead wires SB and RD are negligible. The speed of the loop so as to have a steady current of 1 mA in the loop is

A. $2ms^{-1}$

B. $2 \times 10^{-2}ms^{-1}$

C. $20ms^{-1}$

D. $200ms^{-1}$

Answer: B

View Text Solution

9. A Conducting ring of radius 1 meter is placed in an uniform magnetic field B of 0.01 tesla oscillating with frequency $100Hz$ with its plane at right angles to B. What will be the induced electric field?

A. $\pi V/m$

B. $0.5V/m$

C. $10V/m$

D. $62V/m$

Answer: B

Watch Video Solution

10. A coil of area 10 cm^2 has 200 turns. Magnetic field of 0.1 Wb/m^2 is perpendicular to the plane of the coil. The field is reduced to zero in 0.1 s, the induced emf in the coil is

A. 1V

B. 0.2V

C. 2V

D. 0

Answer: B

11. An infinitely long cylinder is kept parallel to an uniform magnetic field B directed along positive z-axis. The direction of induced current as seen from the z-axis will be

A. clockwise of the +ve z-axis

B. anticlockwise of the +ve z-axis

C. zero

D. along the magnetic field.

Answer: C

Watch Video Solution

12. The flux linked with a coil at any instant 't' is given by $\phi = 10t^2 - 50t + 250$

The induced emf at $t = 3s$ is

A. $-10V$

B. 10V

C. 190V

D. $-190V$

Answer: A

Watch Video Solution

13. A metal rod of resistance 20Ω is fixed along a diameter of a conducting ring of radius $0.1m$ and lies on $x-y$ plane. There is a

magnetic field $\vec{B} = (50T)\vec{k}$. The ring rotates with an angular velocity $\omega = 20rads^{-1}$ about its axis. An external resistance of 10Ω is connected across the center of the ring and rim. The current external resistance is

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

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

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

D. 0

Answer: B

Watch Video Solution

14. A coil has $1,000$ turns and $500cm^2$ as its area. The plane of the coil is placed at right angles to a magnetic induction field of $2 \times 10^{-5} web/m^2$. The coil is rotated through 180° in 0.2 second. The average emf induced in the coil, in milli volts, is :

A. 5

B. 10

C. 15

D. 20

Answer: B

Watch Video Solution

15. A magentic flux through a statinary loop with a resistance R varies during the tiem interval τ as $\Phi = at(\tau - t)$. Find the amount of heat generated in the loop during that time. The inductance of the loop is to be neglected.

A. $\frac{a^2\tau^3}{4R}$

B. $\frac{a^2\tau^3}{3R}$

C. $\frac{a^2\tau^3}{6R}$

D. $\frac{a^2\tau^3}{2R}$

Answer: B

Watch Video Solution

16. A conducting ring of radius r is placed in a varying magnetic field perpendicular to the plane of the ring. If the rate at which the

magnetic field varies is x, the electric field intensity at any point of the ring is

A. rx

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

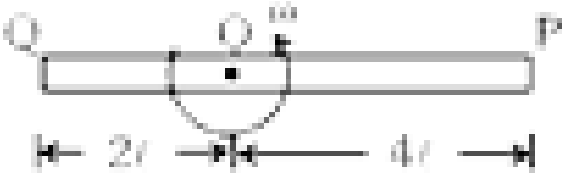
C. $2rx$

D. $\frac{4r}{x}$

Answer: B

View Text Solution

17. A conducting rod rotates with a constant angular velocity $'\omega'$ about the axis which passes through point 'O' and perpendicular to its length . A uniform magnetic field 'B' exists parallel to the axis of the rotation . Then potential difference between the two ends of the rod is :-



A. $\frac{Bl^2\omega}{2}$

B. 0

C. $\left(\frac{Bl^2\omega}{8}\right)$

D. $2Bl^2\omega$

Answer: B

Watch Video Solution

18. A metal conductor of length 1m rotates vertically about one of its ends at angular velocity 5 radians per second. If the horizontal component of earth's magnetic field is

$0.2 \times 10^{-4}T$, then the emf developed between the two ends of hte conductor is

A. $5\mu V$

B. $5mV$

C. $50\mu V$

D. $50mV$

Answer: C

Watch Video Solution

19. A $0.1m$ long conductor carrying a current of $50A$ is perpendicular to a magentic field of $1.25mT$. The mechanical power to move the conductor with a speed of $1ms^{-1}$ is

A. 62.5 mW

B. 625 mW

C. 6.25 mW

D. 12.5 mW

Answer: C

Watch Video Solution

Watch Video Solution

20. A 2 m long metallic rod rotates with an angular frequency $200 \text{ rod } s^{-1}$ about on axis normal to the rod passing through its one end. The other end of the rod is in contact with a circular metallic ring. A constant megnetic field of 0.5 T parallel to axis exises everywhere. The emf developed between the centre and the ring is

A. 50V

B. 100V

C. 150V

D. 0V

Answer: B

Watch Video Solution

21. A copper wire of length 50.0 cm and total resistance of $1.1 \times 10^{-2}\Omega$ is formed into a circular loop and placed perpendicular to a uniform magnetic field that is increasing at

the constant rate of 10.0 mT/s. At what rate is thermal energy generated in the loop?

A. $1.32 \times 10^{-8} W$

B. $2.36 \times 10^{-4} W$

C. $3.62 \times 10^{-6} W$

D. $4.23 \times 10^{-5} W$

Answer: C

View Text Solution

22. A square loop of wire with side length 10 cm is placed at angle of 45° with a magnetic field that changes uniformly from 0.1 T to zero in 0.7s. The induced current in the loop (its resistance is 1Ω) is

A. 1.0 mA

B. 2.5 mA

C. 3.5 mA

D. 4.0 mA

Answer: A

Watch Video Solution

23. A time varying magnetic flux passing through a coil is given by $\phi = xt^2$, if at $t = 3s$, the emf induced is 9 V, then the value of x is

A. $0.66Wbs^{-2}$

B. $1.5Wbs^{-2}$

C. $-0.66Wbs^{-2}$

D. $-1.5Wbs^{-2}$

Answer: D

Watch Video Solution

24. The magnetic flux across a loop of resistance 10Ω is given by $\phi = 5t^2 - 4t^2 + 1Wb$. How much current is induced in the loop after 0.2 s?

A. 0.4A

B. 0.2A

C. 0.04A

D. 0.02A

Answer: B

Watch Video Solution

25. A circular coil of radius 10 cm, 500 turns and resistance 2 Omega is placed with its plane prependicular to the horizontal component of the earth's magnetic field. It is rotated about its vertical diameter through 180° in 0.25 s. Estimate the magnitude of the e.m.f and current induced in the coil. Horizotal

component of earth's magnetic field at the place is $3 \times 10^{-5} T$.

A. 0.5 mA

B. 1.0 mA

C. 1.5 mA

D. 3.0 mA

Answer: B

Watch Video Solution

26. As shown in the figure, a metal rod makes contact with a partial circuit and completes the circuit. The circuit area is perpendicular to a magnetic field with B = 0.15 T. If the resistance of the total circuit is 3Ω, the force needed to move the rod as indicated with a constant speed of 2 m/s will be equal to

A. $3.75 \times 10^{-3} N$

B. $2.75 \times 10^{-3} N$

C. $6.57 \times 10^{-4} N$

D. $4.36 \times 10^{-4} N$

Answer: A

View Text Solution

27. What rule do we use to find the direction of induced current in a conductor moving in a magnetic field?

A. Fleming's left hand rule

B. Fleming's right hand rule

C. Ampere's rule

D. Right hand clasp rule

Answer: B

Watch Video Solution

Neet Cafe Topicwise Pratice Questions Lenz S Law

1. Two circular, similar, coaxial loops carry equal currents in the same direction. If the loops are

brought nearer, what will happen?

A. P increases while in Q decreases

B. Q increases while in P decreases

C. both P and Q increases

D. both P and Q decreases

Answer: D

Watch Video Solution

1. If $'N'$ is the number of turns in a coil, the value of self inductance varies as

A. N^0

B. N

C. N^2

D. N^{-2}

Answer: C

Watch Video Solution

2. A circular coil with a cross-sectional area of $4cm^2$ has 10 turns. It is placed at the centre of a long solenoid that has 15 turns/cm and a cross-sectional area of $10cm^2$, as shown in the figure. The axis of the coil coincides with the axis of the solenoid. What is their mutual inductance?

A. $7.54\mu H$

B. $8.54\mu H$

C. $9.54\mu H$

D. $9.54\mu H$

Answer: A

View Text Solution

3. A coil having an inductance of 0.5 H carries a current which is uniformly varying from zero to 10 ampere in 2 second. The e.m.f. (in volts) generated in the coil is

A. 10

B. 5

C. 2.5

D. 1.25

Answer: C

 Watch Video Solution

4. When the current change from $+2A$ to $2A$ in 0.05 second, an e.m.f. of $8V$ is induced in a coil. The coefficient of self-induction of the coil is

A. 0.1H

B. 0.2H

C. 0.4H

D. 0.8H

Answer: B

Watch Video Solution

5. The self inductance of a solenoid that has a cross-sectional area of $1cm^2$, a length of 10 cm and 1000 turns of wire is

A. 0.86 mH

B. 1.06 mH

C. 1.26 mH

D. 1.46 mH

Answer: C

Watch Video Solution

6. In an inductor of self-inductance L=2 mH, current changes with time according to relation $i = t^2 e^{-t}$. At what time emf is zero ?

A. 4s

B. 3s

C. 2s

D. 1s

Answer: C

 Watch Video Solution

7. By a change of current from 5 A to 10 A in 0.1 s, the self induced emf is 10 V. The change in

the energy of the magnetic field of a coil will be

A. 5J

B. 6J

C. 7.5J

D. 9J

Answer: C

Watch Video Solution

8. Consider a long solenoid of radius R which has n turns per unit length. A time dependent current $I = I_0 \sin \omega t$ flows solenoid, magnitude of electric field at a perpendicular distance $r < R$, from the axis of symmetry of solenoid is found to be $E = \frac{\alpha}{4} \omega \mu_0 n I_0 r \cos \omega t$, where α is pure number and μ_0 is permability of free space. Find α

A. $\mu_0 \pi b^2 n_1 n_2 L$

B. $\mu_0 \pi a^2 n_1 n_2 L^2$

C. $\mu_0 \pi a^2 n_1 n_2 L$

D. $\mu_0 \pi b^2 n_1 n_2 L^2$

Answer: C

Watch Video Solution

9. Find the energy stored in the magnetic field if current of 5A produces a magnetic flux of 2×10^{-3} Wb through a coil of 500 turns.

A. 2.5J

B. 0.25J

C. 250J

D. 1.5J

Answer: A

Watch Video Solution

10. Two conducting circular loops of radii R_1 and R_2 are placed in the same plane with their centres coincidingt. Find the mutual inductane between them assuming $R_2 < < R_1$.

A. $\frac{R_1}{R_2}$

B. $\frac{R_2}{R_1}$

C. $\frac{R_1^2}{R_2}$

D. $\frac{R_2^2}{R_1}$

Answer: D

Watch Video Solution

11. A small square loop of wire of side l is placed inside a large square loop of wire of side $L(L > > l)$. The loops are coplanar and

their centre coincide. What is the mutual inductance of the system ?

A. $2\sqrt{2}\frac{\mu_0}{\pi}\frac{l^2}{L}$

B. $8\sqrt{2}\frac{\mu_0}{\pi}\frac{l^2}{L}$

C. $2\sqrt{2}\frac{\mu_0}{2\pi}\frac{l^2}{L}$

D. $2\sqrt{2}\frac{\mu_0 L^2}{\pi l}$

Answer: A

Watch Video Solution

12. The inductance between A and D as shown in figure is

A. 1H

B. 9H

C. 0.66H

D. 0.99H

Answer: A

View Text Solution

13. A solenoid of lenght 30 cm with 10 turns per centimetre and area of cross-section $40cm^2$ completely surrounds another co-axial solenoid of same length, area of cross-section $20cm^2$ with 40 turns per centimetre. The mutual inductance of the system is

A. 10H

B. 8H

C. 3mH

D. 30mH

Answer: C

Watch Video Solution

14. The equivalent inductance of two inductors is $2.4H$ when connected in parallel and $10H$ when connected in series then the value of inductance of two inductors ?

A. 8H, 2H

B. 6H, 4H

C. 5H, 5H

D. 7H, 3H

Answer: B

Watch Video Solution

15. A $50Hz$ alternating current of peak value 1 ampere flows through the primary coil of a transformer. If the mutual inductance between the primary secondary be 1.5 henry, then the peak value of the induced voltage is

A. $30\pi V$

B. $60\pi V$

C. $15\pi V$

D. $300\pi V$

Answer: A

Watch Video Solution

16. Two solenoids of equal number of turns have their lengths and the radii in the same ratio 1:2. The ratio of their self inductances will be

A. $1:2$

B. $2:1$

C. $1:1$

D. $1:4$

Answer: A

Watch Video Solution

17. The energy stored in an inductor of self-inductance L henry carrying a current of I ampere is

A. $\frac{1}{2}L^2I$

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

C. LI^2

D. L^2I

Answer: B

Watch Video Solution

18. The self inductance of a long solenoid cannot be increased by

A. increasing its area of cross section

B. increasing its length

C. increasing the current through it

D. increasing the number of turns in it

Answer: C

Watch Video Solution

19. The equivalent inductance between A and B is

A. 1H

B. 4H

C. 0.8H

D. 16H

Answer: A

View Text Solution

Neet Cafe Topicwise Pratice Questions Instantaneous Average And Rms Value Of Alternating Current Voltage

1. The amplitude of an alternating voltage is 120 V. What will be its rms value?

A. 84.8V

B. 70.7V

C. 56.5V

D. 101.3V

Answer: A

Watch Video Solution

2. An ac source is of $\frac{200}{\sqrt{2}}$ V, 50 Hz. The value of voltage after $\frac{1}{600}s$ from the start is

A. 200 volt

B. $\frac{200}{\sqrt{2}}$volt

C. 100 volt

D. 50 volt

Answer: C

Watch Video Solution

3. The voltage over a cycle varies as

$$V = V_0 \sin \omega t \text{ for } 0 \leq t \leq \frac{\pi}{\omega}$$

$$= -V_0 \sin \omega t \text{ for } \frac{\pi}{\omega} \leq t \leq \frac{2\pi}{\omega}$$

The average value of the voltage one cycle is

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

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

C. 0

D. $\frac{2V_0}{\pi}$

Answer: D

Watch Video Solution

4. If V=100sin (100t)V and I =100sin $\left(100t + \frac{\pi}{3}\right)$ mA are the instantaneous values of voltage and current, respectively

A. 70.7 V, 70.7 mA

B. 70.7 V, 70.7 A

C. 141.4 V, 141.4 mA

D. 100 V, 100 mA

Answer: A

Watch Video Solution

5. The relation between an ac voltage source and time in SI units is $V = 120\sin(100\pi t)\cos(100\pi t)V$. The value of peak voltage and frequency will be respectively

A. 120 V and 100 Hz

B. $\frac{120}{\sqrt{2}}V$ and 100 Hz

C. 60V and 200 Hz

D. 60 V and 100Hz

Answer: D

Watch Video Solution

Neet Cafe Topicwise Pratice Questions Ac Circuits Containing Resistor Inductor Or Capacitor

1. Reactance of a capacitor of capacitance $1/\pi$ farad at 50 Hz is

A. 100Ω

B. 10Ω

C. 50Ω

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

Answer: D

 Watch Video Solution

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

A. 7A

B. 14A

C. 28A

D. 42A

Answer: C

 Watch Video Solution

3. 120 V AC voltage is applied to 10 ohm resistance. The peak voltage across the resistor is

A. 120 V

B. $120\sqrt{2}V$

C. $\frac{120}{\sqrt{2}}V$

D. none of these

Answer: B

Watch Video Solution

Neet Cafe Topicwise Pratice Questions Lc Oscillations

1. A charged 30 μF capacitor is connected to a 27 mH inductor. What is the angular frequency of free oscillations of the circuit ?

A. 1.1×10^3rad/s

B. 2.1×10^2rad/s

C. 3.1×10^3 rad/s

D. 4.1×10^3 rad/s

Answer: A

Watch Video Solution

2. An Lc circuit contains a 40 mH inductor and a $25\mu F$ capacitor. The resistance of the circuit is negligible.The time is measured from the instant the circuit is closed. The energy stored in the circuit is completely magnetic at time (in milliseconds)

A. 0, 3.14, 6.28

B. 0,1.57, 4.71

C. 1.57, 4.71, 7.85

D. 1.57, 3.14, 4.71

Answer: C

Watch Video Solution

3. A capacitor of capacitance $1\mu F$ is charged to a potential of $1V$, it is connected in parallel to an inductor of inductance $10^{-3}H$. The maximum current that will flow in the circuit has the value

A. $\sqrt{1000}mA$

B. $1mA$

C. $10mA$

D. $1000mA$

Answer: A

 Watch Video Solution

4. A capacitor of capacity $2\mu F$ is charged to a potential difference of $12V$. It is then connected across an inductor of inductance $6\mu H$. What is the current (in A) in the circuit

at a time when the potential difference across the capacitor is $6.0V$?

A. 0.6A

B. 1.2A

C. 2.2A

D. 3.2A

Answer: A

Watch Video Solution

5. 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. 8A

B. 4A

C. 0.8A

D. 0.4A

Answer: C

Watch Video Solution

Watch Video Solution

6. 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. $R/4$

B. $R/2$

C. R

D. cannot be found with given data

Answer: C

Watch Video Solution

7. A pure resistive circuit element X when connected to an ac supply of peak voltage 400 V gives a peak current of 5 A which is in phase with the voltage. A second circuit element Y, when connected to the same ac supply also gives the same value of peak current but the current lags behind by 90°. If the series combination of X and Y is connected to the

same suply, what will be the rms value of current?

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

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

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

D. $5A$

Answer: C

Watch Video Solution

8. A charged capacitor discharges through a resistance R with time constant τ. The two are now placed in series across an AC source of angular frequency $\omega = \frac{1}{\tau}$. The impedance of the circuit will be

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

B. R

C. $\sqrt{2}R$

D. 2R

Answer: C

Watch Video Solution

9. An inductor of inductance 2H and a resistance of 10Ω are connected in series to an ac source of 1109 V, 60 Hz. The current in the circuit will be

A. 0.32A

B. 0.15A

C. 0.48A

D. 0.80A

Answer: B

Watch Video Solution

10. In the circuit shown, the voltage V_1 , across capacitor C

A. is in phase with the source voltage V

B. leads the source voltage V by 90°

C. leads the source voltage V by an angle between 0° and 90°

D. lags behind the source voltage V by an angle between 0° and 90°

Answer: D

View Text Solution

11. When a DC voltage of 200 V is applied to a coil of self inductance $(2/\sqrt{3}/\pi)$H a current of 1A flows through it . But by replacing DC source with AC source of 200 V , the current in

the coil is reduced to 0.5A . Then the frequency of AC supply is

A. 100Hz

B. 75Hz

C. 60Hz

D. 50Hz

Answer: D

 Watch Video Solution

12. When an ac source of voltage $V = V_0$ sin 100t is connected across a circuit, the phase difference between the voltage V and current I in the circuit is observed to be $\pi/4$, as shown in figure. If the circuit consists possibly only of RC or LR or LC in series, find possible values of two elements.

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

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

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

D. $R = 10k\Omega, L = 10mH$

Answer: A

View Text Solution

13. Switch S is closed at t = 0. After sufficiently long time, an iron rod is inserted into the inductor L. Then, the light bulb

A. glows more brightly

B. gets dimmer

C. glows with the same brightness

D. gets momentarily dimmer and then glows more brightly

Answer: B

View Text Solution

14. A 50 Hz ac source of 20 V is connected across R and C as shown in figure. The voltage

across R is 12 V. The voltage across C is

A. 8V

B. 16V

C. 10V

D. not possible to determine unless value of R and Care given.

Answer: B

View Text Solution

15. For the series LCR circuit shown in 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. 250 rad s^{-1} and $5\sqrt{2}$ A

Answer: A

View Text Solution

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

The impedance of the circuit

A. 4π

B. 5Ω

C. 6Ω

D. 7Ω

Answer: B

Watch Video Solution

17. A condenser of capacitance of $2.4\mu F$, is used in a transmitter to transmit a λ wavelength. If the inductor of $10^{-8}H$ is used for resonant circuit, then value of λ is

A. 292 m

B. 400 m

C. 334 m

D. 446 m

Answer: A

Watch Video Solution

18. In the circuit shown in figure, what will be the reading of the voltmeter?

A. 300V

B. 900V

C. 200V

D. 400V

Answer: C

View Text Solution

19. 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. $\left(10/\sqrt{2}\right)V$

D. $20V$

Answer: C

Watch Video Solution

20. In an L-C-R series circuit, the potential difference between the terminals of the inductance is 60 V, between the terminals of the capacitor is 30 V and that across the resistance is 40 V. Then, the supply voltage will be equal to

A. 130V

B. 10V

C. 50V

D. 70V

Answer: C

Watch Video Solution

21. A series LCR circuit has $R = 5\Omega, L = 40mH$ and $C = 1\mu F,$ the bandwidth of the circuit is

A. 10Hz

B. 20Hz

C. 30Hz

D. 40Hz

Answer: B

Watch Video Solution

22. A transmitting station transmits radiowave of wavelength 360 m. What is the inductance of a coil required with a condenser of capacity 1.20 μF in the resonant circuit to receive the radiowaves ? (Use π^2=10)

A. $3.04 \times 10^{-8} H$

B. $2.04 \times 10^{-8} H$

C. $4.04 \times 10^{-8} H$

D. $6.04 \times 10^{-8} H$

Answer: A

Watch Video Solution

23. In a series resonant LCR circuit the voltage across R is 100 volts and R = $1k(\Omega) with C = 2(\mu)F.$ The resonant frequency (ω) is $200 rad/s.$ At resonance the voltage across L is

A. 40V

B. 250V

C. $4 \times 10^{-3} V$

D. $2.5 \times 10^{-2} V$

Answer: B

Watch Video Solution

24. An ideal resistance R, ideal inductance L, ideal capacitance C and ac voltmeters V_1, V_2, V_3 and V_4 are connected to an ac

source as shown. At resonance,

A. reading in V_3 = reading in V_1

B. reading in V_1 = reading in V_2

C. reading in V_2 = reading in V_4

D. reading in V_2 = reading in V_3

Answer: D

View Text Solution

25. A Capacitor and a coil in series are connected to a 6volt ac source. By varying the frequency of the source, maximum current of 600mA is observed. If the same coil is now connected toa cell of emf 6volt dc and internal resistance of 2ohm, the current h through it will be

A. 0.5A

B. 0.6A

C. 1.0A

D. 2.0A

Answer: A

Watch Video Solution

26. In the series LCR circuit as shown in the figure, the voltmeter V and ammeter A readings are

A. $V = 100V, I = 2A$

B. V = 100 V, I= 5 A

C. V = 400 V, I=2A

D. V = 300 V, I = 2A

Answer: A

View Text Solution

27. An inductance of $\frac{200}{\pi} mH$ a capacitance of $\frac{10^{-3}}{\pi}$ and a resistance of 10Ω are connected in series with an AC source of $220V, 50Hz$.

The phase angle of the circuit is

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

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

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

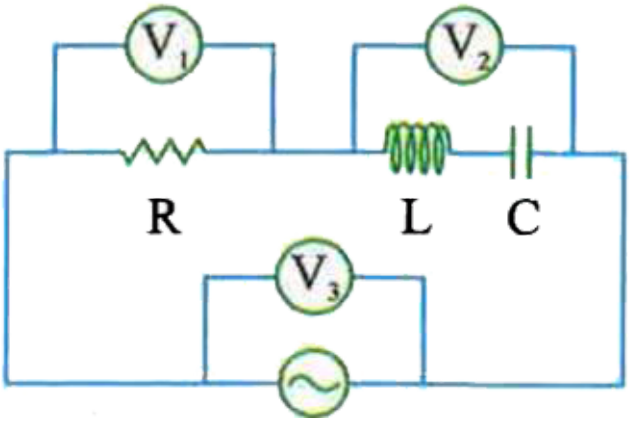
D. $\frac{\pi}{3}$

Answer: B

Watch Video Solution

28. An LCR series ac circuit is at resonance with 10 V each across L.C and R. If the resistance is halved, the respective voltages across L,C and

R are



A. 10 V, 10 V and 5 V

B. 10 V, 10 V and 10 V

C. 20 V, 20 V and 5 V

D. 20 V, 20 V and 10 V

Answer: D

Watch Video Solution

29. In a series LCR circuit, at resonance the

A. the phase difference between current and voltage is 90°

B. the phase difference between current and voltage is 45°

C. its impedance is purely resistive

D. the current is minimum

Answer: C

Watch Video Solution

30. In the figure shown, three ac voltmeters are connected. At resonance,

A. $V_2 = 0$

B. $V_1 = 0$

C. $V_3 = 0$

D. $V_1 = V_2 \neq 0$

Answer: A

View Text Solution

31. In the series LCR circuit shown, the impedance is

A. 200Ω

B. 100Ω

C. 300Ω

D. 500Ω

Answer: D

View Text Solution

32. The figure shows a LCR network connected to 300 V ac supply. The circuit elements are such that $R = X_L = X_C = 10\Omega$. V_1, V_2 and V_3 are three ac voltmeters connected as shown in the figure. Which of the following represents the correct set of readings of the voltmeters?

A. $V_1 = 100V, V_2 = 100V, V_3 = 100V$

B. $V_1 = 150V, V_2 = 0, V_3 = 150V$

C. $V_1 = 300V, V_2 = 100V, V_3 = 100V$

D. $V_1 = 300V, V_2 = 300V, V_3 = 300V$

Answer: D

View Text Solution

33. 200 V ac source is fed to series LCR circuit having $X_L = 50\Omega, X_C = 50\Omega$ and $R = 25\Omega$. Potential drop across the inductor is

A. 100V

B. 200V

C. 400V

D. 10V

Answer: C

Watch Video Solution

34. A series LCR circuit, has equal resistance capacitive reactance. What is the phase angle

between voltage across generator and resistor

?

A. 0°

B. 45°

C. 60°

D. 90°

Answer: A

Watch Video Solution

35. A series resonant LCR circuit has a quality factor (Q-factor)=0.4. If $R = 2k\Omega, C = 0.1\mu F$ then the value of inductance is

A. 0.1H

B. 0.064 H

C. 2H

D. 5H

Answer: B

Watch Video Solution

Neet Cafe Topicwise Pratice Questions Series Lr And Cr Circuits

1. If a circuit made up of a resistance 1 Ω and inductance 0.01 H, an alternating emf of 200 voit at 50 Hz is connected, then find the phase difference between the current and the emf in the circuit.

A. $\tan^{-1}(\pi)$

B. $\tan^{-1}\left(\frac{\pi}{2}\right)$

C. $\tan^{-1}\left(\frac{\pi}{4}\right)$

D. $\tan^{-1}\left(\frac{\pi}{3}\right)$

Answer: A

Watch Video Solution

Neet Cafe Topicwise Pratice Questions Power In Ac Circuits

1. A series LCR circuit is connected to an ac source of variable frequency. When the

frequency is increased continuously, starting from a small value, the power factor

A. goes on increasing continuously

B. goes on decreasing continuously

C. becomes maximum at a particular frequency

D. remains constant

Answer: C

Watch Video Solution

2. In an AC circuit, the reactannce is equal to the resistance. The power factor of the circuit will be

A. 1

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

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

D. 0

Answer: C

Watch Video Solution

3. An inductance L, a cpacitance C and a resistance R may be connected to an AC souorce of angular frequency ω in three different combinations of RC, RL and LC in series. Assume that $\omega L = \dfrac{1}{\omega C}$. The power drawn by the three combinatios are P_1, P_2, P_3 respectively. THen

A. $P_1 > P_2 > P_3$

B. $P_1 - P_2 < P_3$

C. $P_1 = P_2 > P_3$

D. $P_1 = P_2 = P_3$

Answer: C

Watch Video Solution

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

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

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

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

D. 0

Answer: C

Watch Video Solution

5. An alternating supply of 220 V is applied across a circuit with resistance 22Ω and impedance 44Ω. The power dissipated in the circuit is

A. 1100W

B. 550W

C. 2200 W

D. (2200/3)W

Answer: B

Watch Video Solution

6. 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. 200 watt

B. 500 watt

C. 1000 watt

D. zero

Answer: D

Watch Video Solution

7. If E_0 is the peak emf , l_0 is the peak current and ϕ is the phase difference between them, then the average power dissipation in the circuit is

A. $\frac{1}{2}E_0I_0$

B. $\frac{E_0I_0}{\sqrt{2}}$

C. $\frac{1}{2}E_0I_0\sin\phi$

D. $\frac{1}{2}E_0I_0\cos\phi$

Answer: D

Watch Video Solution

Watch video solution

8. An alternating voltage (in volts) given by $V = 200\sqrt{2}\sin(100t)$ is connected to $1\mu F$ capacitor through an ideal ac ammeter in series. The reading of the ammeter and the average power consumed in the circuit shall be

A. 20 mA, 0

B. 20 mA, 4 W

C. $20\sqrt{2}mA, 8W$

D. $20\sqrt{2}mA, 4\sqrt{2}W$

Answer: A

Watch Video Solution

9. In an a.c. circuit V and I are given by V=50 sin50t volt and I = 100 sin$(50t + \pi/3)$ mA. The power dissipated in the circuit

A. 106W

B. 150W

C. 5625W

D. 0

Answer: C

Watch Video Solution

10. A voltage of peak value 283 V and varying frequency is applied to series LCR combination in which $R = 3\Omega, L = 25mH$ and $C = 400\mu F$. Then the frequency (in Hz) of the

source at which maximum power is dissipated in the above is

A. 51.5

B. 50.7

C. 51.1

D. 50.3

Answer: D

 Watch Video Solution

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

A. 0

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

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

D. 1

Answer: D

Watch Video Solution

12. As given in the figure, a series circuit connected across a 200 V, 60 Hz line consists of a capacitor of capacitive reactance 30Ω, a non-inductive resistor of 44Ω, and a coil of inductive reactance 90 Ω and resistance 36Ω. The power dissipated in the coil is

A. 320W

B. 176W

C. 144W

D. 0 W

Answer: C

View Text Solution

13. A resistor of 500Ω and an inductance of 0.5 H are in series with an ac source which is given by $V = 100\sqrt{2}\sin(1000t)$. The power factor of the combination is

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

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

C. 0.5

D. 0.6

Answer: A

Watch Video Solution

Neet Cafe Topicwise Pratice Questions Wattless Current

1. A coil has an inductance of $0.7H$ and is joined in series with a resistance of 220Ω. When an alternating e.m.f of $220V$ at 50 c.p.s.

is applied to it, then the wattless component of the current in the circuit is

A. 7A

B. 5A

C. 0.7A

D. 0.5A

Answer: D

Watch Video Solution

Neet Cafe Topicwise Pratice Questions Ac Generator And Transformer

1. The core of a transformer is made of a material having norrow hysterisis loop. Why ?

A. steel

B. copper

C. soft iron

D. aluminium

Answer: C

Watch Video Solution

2. A transformer with efficiency $80\,\%$ works at $4kW$ and $100V$. If the secondary voltage is $200V$, then the primary and secondary currents are respectively

A. 40 A, 16 A

B. 16 A, 40 A

C. 20 A, 40A

D. 40 A, 20 A

Answer: A

 Watch Video Solution

3. A transformer is used to light a 140 W, 24 V lamp from 240 V AC mains. The current in mains cable is 0.7 A, find the efficiency of transformer.

A. 0.638

B. 0.74

C. 0.833

D. 0.48

Answer: C

 Watch Video Solution

4. The number of turns in the primary coil of a transformer is 200 and the number of turns in the secondary coil is 10 if 240 volt AC is applied to the primary, the output from the secondary will be

A. 48V

B. 24V

C. 12V

D. 6V

Answer: C

Watch Video Solution

5. Quantity that remains unchanged in a transformer is

A. voltage

B. current

C. frequency

D. none of these

Answer: C

Watch Video Solution

6. A transformer has 100 turns in the primary coil and carries $8A$ current. If input power is one kilowatt, the number of turns required in the secondary coil to have $500V$ output will be

A. 100

B. 200

C. 400

D. 300

Answer: C

Watch Video Solution

7. 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

8. A power transmission line feeds input power at 2300 V to a step down trnasformer with it primary windings having 4000 turns. What should be the number of turns in the seconday windings in order to get output power at 230 V?

A. 200

B. 400

C. 600

D. 800

Answer: B

Watch Video Solution

9. The core of a transformer is laminated to reduce

A. flux leakage

B. hysteresis

C. copper loss

D. eddy current

Answer: D

 Watch Video Solution

10. In an A.C. generator, when the plane of the armature is perpendicular to the magnetic field

A. both magnetic flux and emf are maximum

B. both magnetic flux and emf are zero

C. magnetic flux is maximum and emf is zero

D. magnetic flux is zero and emf is maximum

Answer: C

Watch Video Solution

11. A transformer works on

A. self induction

B. electrical inertia

C. mutual induction

D. magnetic effect of the electrical current

Answer: C

Watch Video Solution

12. In step-up transfomer, the relation between number of turns in primary (N_p) and number of turns in secondary (N_S) coils is

A. N_S is greater than N_P

B. N_P is greater than N_S

C. N_S is equal to N_P

D. $N_P = 2N_S$

Answer: A

Watch Video Solution

13. In a transformer, the number of turns in primary coil and secondary coil are 5 and 4 respectively. If 240 V is applied on the primary

coil, then the ratio of current in primary and secondary coil is

A. $4:5$

B. $5:4$

C. $5:10$

D. $8:12$

Answer: A

Watch Video Solution

14. in a step-up transformer, the turn ratio is $1:2$ leclanche cell (e.m.f. 1.5V) is connected across the primary. The voltage devloped in the secondary would be

A. 3V

B. 1.5V

C. 0.75A

D. 0

Answer: D

Watch Video Solution

Watch Video Solution

Check Your Neet Vitals

1. Two coils have a mutual inductance 0.005 H, The current changes in the first coil according to the equation $i = i_m \sin \omega t$ where $i_m = 10A$ and $\omega = 100\pi rads^{-1}$. The maximum value of the emf induced in the second coil is

A. 2π

B. 5π

C. 6π

D. 12π

Answer: D

 Watch Video Solution

2. Magadh express takes 16 hors to cover the distance of 960km between patna and Gaziabad. The rails are separated by 130 cm and the vertical component of the earth's magnetic field is `4.0 X 10^(-5) T. (a) Find the

average emf induced across the witdh of the train. (b) If the leakage resistance between the rails is 100 Omega, find the retarding force on the train due to magnetic field.

A. $5 \times 10^{-10} N$

B. $8 \times 10^{-10} N$

C. $15 \times 10^{-5} N$

D. $5 \times 10^{-5} N$

Answer: A

Watch Video Solution

3. An inductor of inductance L = 400 H and resistors of resistances $R_1 = 2\Omega$ and $R_2 = 2\Omega$ are connected to a battery of emf 12 V as shown in figure. The internal resistance of the battery is negligible. The switch S is closed at t = 0. The potential drop across L as a function of time is

A. $6e^{-5t}V$

B. $\frac{12}{t}e^{-3t}V$

C. $6\left(1-e^{-t/0.2}\right)V$

D. $12e^{-5t}V$

Answer: D

View Text Solution

4. A uniform magnetic field B exists in a direction perpendicular to the plane of a square frame made of copper wire. The wire has a diameter of 2 mm and a total length of 40cm. The magntic field changes with time at

a steady rate $\frac{dB}{dt} = 0.02Ts^{-1}$. Find the current induced in the frame. Resistivity of copper $= 1.7X10^{-8}Wm.$

A. 0.1A

B. 0.2A

C. 0.3A

D. 0.4A

Answer: A

Watch Video Solution

5. In a uniform magneitc field of induced B a wire in the form of a semicircle of radius r rotates about the diameter of hte circle with an angular frequency ω. The axis of rotation is perpendicular to hte field. If the total resistance of hte circuit is R, the mean power generated per period of rotation is

A. $\frac{B\pi r^2\omega}{2R}$

B. $\frac{\left(B\pi r^2\omega\right)^2}{8R}$

C. $\frac{\left(B\pi r\omega\right)^2}{2R}$

D. $\frac{\left(B\pi r\omega^2\right)^2}{8R}$

Answer: B

Watch Video Solution

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

A. 1.87Ω

B. 101.3Ω

C. 18.7Ω

D. 189.7Ω

Answer: D

 Watch Video Solution

7. Two circular loops of equal radii are placed coaxially at some separation. The first is cut and a battery is inserted in between to drive a current in it. The current changes slightly because of the variation in resistance with temperature. Durig this period, the two loops

A. attract each other

B. repel each other

C. do not exert any force on each other

D. attract or repel each other depending on the sense of the current.

Answer: A

 Watch Video Solution

8. In a circuit, the instantaneous values of alternating current and voltages in a circuit is given by

$I = \frac{1}{\sqrt{2}}\sin(100\pi t)A$ and

$E = \frac{1}{\sqrt{2}}\sin\left(100\pi t + \frac{\pi}{3}\right)V.$

The average power in watts consumed in the circui is

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

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

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

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

Answer: B

Watch Video Solution

9. An alternating current is given by

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

The rms current is given by

A. $\sqrt{2} I_0$

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

C. I_0

D. $2I_0$

Answer: C

Watch Video Solution

10. A series LCR circuit is connected to an ac source of frequency v and a voltage V. At this frequency, reactance of the capacitor is 350 Ω while the resistance of the circuit is 180Ω . Current in the circuit leads the voltage by 54°

and power dissipated in the circuit is 140 W. Then the voltage V is

A. 250V

B. 260V

C. 270V

D. 280V

Answer: C

View Text Solution

11. In a series LCR circuit $R = 200(\Omega)$ and the voltage and the frequency of the main supply is 220V and 50 Hz respectively. On taking out the capacitance from the circuit the current lags behind the voltage by $30(\circ)$. On taking out the inductor from the circuit the current leads the voltage by $30(\circ)$. The power dissipated in the LCR circuit is

A. 0

B. 210W

C. 242W

D. 305W

Answer: C

Watch Video Solution

12. Two solenoids of equal number of turns have their lengths and the radii in the same ratio 1:4. The ratio of their self inductances will be

A. $1:2$

B. $2:1$

C. $1:1$

D. $1:4$

Answer: D

Watch Video Solution

13. If the number of turns per units length of a coils of solenoid is doubled , the self-inductance of the soleniod will

A. remain unchanged

B. be halved

C. be doubled

D. become four times

Answer: D

Watch Video Solution

14. A circular coil of radius 6 cm and 20 turns rotates about its vertical diameter with an angular speed of $40 \mathrm{rad} s^{-1}$ in a uniform

horizontal magnetic field of magnitude $2 \times 10^{-2} T$. If the coil form a closed loop of resistance 8ω, then the average power loss due to joule heating is

A. $2.07 \times 10^{-3} W$

B. $1.23 \times 10^{-3} W$

C. $3.14 \times 10^{-3} W$

D. $1.80 \times 10^{-3} W$

Answer: A

Watch Video Solution

15. A pair of adjacent coils has a mutual inductance of 2.5 H. If the current in one coil changes from 0 of 40 A in 0.8 s, then the change in flux linked with the other coil is.

A. 100 Wb

B. 120 Wb

C. 200 Wb

D. 250Wb

Answer: A

Watch Video Solution

16. A wheel with 20 metallic spokes each of length 8.0 m long is rotated with a speed of 120 revolution per minute in a plane normal to the horizontal component of earth magnetic field H at a place. If $H = 0.4 \times 10^{-4}$ T at the place, then induced emf between the axle the rim of the wheel is

A. $2.3 \times 10^{-4} V$

B. $3.1 \times 10^{-4} V$

C. $2.9 \times 10^{-4} V$

D. $1.61 \times 10^{-4} V$

Answer: D

Watch Video Solution

17. A metal conductor of length 1m rotates vertically about one of its ends at angular velocity 5 radians per second. If the horizontal component of earth's magnetic field is

$0.2 \times 10^{-4}T$, then the emf developed between the two ends of hte conductor is

A. $5\mu V$

B. $5mV$

C. $50\mu V$

D. $50mV$

Answer: C

Watch Video Solution

18. An alternating current in a circuit is given by I = 20 sin ($100\pi t + 0.05\pi$) A. The rms value and the frequency of current respectively are

A. 10 A and 100Hz

B. 10 A and 50 Hz

C. $10\sqrt{2}A$ and 50Hz

D. $10\sqrt{2}$ A and 100 Hz

Answer: C

Watch Video Solution

19. A capacitor of capacitance $10\mu F$ is connected to an AC source and an AC Ammeter. If the source voltage varies as $V = 50\sqrt{2}\sin 100t$, the reading of the ammeter is

A. 50 mA

B. 70.7 mA

C. 5.0 mA

D. 7.07 mA

Answer: A

Watch Video Solution

20. A 50 Hz AC signal is applied in a circuit of inductance of $(1/\pi)$H and resistance 2100Ω. The impedance offered by the circuit is

A. 1500 ohm

B. 1700 ohm

C. 2102 ohm

D. 2500 ohm

Answer: C

Watch Video Solution

21. An ac source of 50 V (r.m.s value) is connected across a series R - C circuit. If the r.m.s voltage across the resistor is 40 V, then the r.m.s voltage across the capacitor is

A. 10V

B. 20V

C. 30V

D. 40V

Answer: C

Watch Video Solution

22. In series LCR circuit $R = 18\Omega$ and impedance is 33Ω . An r.m.s. voltage $220V$ is applied across the circuit.The true power consumed in a.c. circuit is

A. 220W

B. 400W

C. 600W

D. 800W

Answer: D

Watch Video Solution

23. In a series L.C.R. circuit alternating emf (v) and current (i) are given by the equation $v = v_0 \sin \omega t, \quad i = i_0 \sin\left(\omega t + \frac{\pi}{3}\right)$ The average power dissipated in the circuit over a cycle of AC is

A. $\frac{v_0 i_0}{2}$

B. $\frac{v_0 i_0}{4}$

C. $\frac{\sqrt{3}}{2} v_0 i_0$

D. 0

Answer: B

Watch Video Solution

24. Alternating current of peak value $\left(\frac{2}{\pi}\right)$ ampere flows through the primary coil of the transformer. The coefficient of mutual inductance between primary and secondary

coil is 1 henry. The peak e.m.f. induced in secondary coil is (Frequency of AC= 50 Hz)

A. 100V

B. 200V

C. 300V

D. 400V

Answer: B

 Watch Video Solution

25. 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. 0.6

B. 0.35

C. 0.5

D. 0.9

Answer: D

Watch Video Solution

Watch Video Solution

Aipmt Neet Mcqs

1. A conducting circular loop is placed in a uniform magnetic field, $B = 0.025T$ with its plane perpendicular to the loop. The radius of the loop is made to shrink at a constant rate of $1mms^{-1}$. The induced emf when the radius is $2cm$ is

A. $2\pi\mu V$

B. $\pi\mu V$

C. $\frac{\pi}{2}\mu V$

D. $2\mu V$

Answer: B

Watch Video Solution

2. In the given circuit, the reading of voltmeter V_1 and V_2 are 300 volts each. The reading of the voltmeter V_3 and ammeter A are

respectively

A. 150 V, 2.2 A

B. 220 V, 2.2 A

C. 220 V, 2.0 A

D. 100 V, 2.0 A

Answer: B

View Text Solution

3. 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. 3.6 ampere

B. 2.8 ampere

C. 2.5 ampere

D. 5.0 ampere

Answer: D

Watch Video Solution

4. A condenser of capacity C is charged to a potential difference of V_1. The plates of the condenser are then connected to an ideal inductor of inductance L. The current through the inductor wehnn the potential difference across the condenser reduces to V_2 is

A. $\left(\frac{C(V_1 - V_2)^2}{L}\right)^{1/2}$

B. $\frac{C\left(V_1^2 - V_2^2\right)}{L}$

C. $\frac{C(V_1^2 + V_2^2)}{L}$

D. $\left(\frac{C(V_1^2 - V_2^2)}{L}\right)^{1/2}$

Answer: D

Watch Video Solution

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

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

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

D. 0

Answer: B

Watch Video Solution

6. 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. 10mA

B. 100mA

C. 200mA

D. 20mA

Answer: D

Watch Video Solution

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

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

B. V_0

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

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

Answer: C

View Text Solution

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

A. 2.0A

B. 4.0A

C. 8.0A

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

Answer: B

Watch Video Solution

9. 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 power factor of the circuit is

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

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

C. 1

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

Answer: C

Watch Video Solution

10. In a circuit, the instantaneous values of alternating current and voltages in a circuit is given by

$I = \frac{1}{\sqrt{2}}\sin(100\pi t)A$ and

$E = \frac{1}{\sqrt{2}}\sin\left(100\pi t + \frac{\pi}{3}\right)V.$

The average power in watts consumed in the circui is

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

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

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

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

Answer: D

Watch Video Solution

11. In a coil of resistance 10Ω , the induced current developed by changing magnetic flux through it, is shown in figure as a function of time. The magnitude of change in flux through the coil in weber is

A. 8

B. 2

C. 6

D. 4

Answer: B

View Text Solution

12. A wire loop is rotated in magneitc field. The frequency of change of direction of the induced e.m.f. is.

A. four times per revolution

B. six times per revolution

C. once per revolution

D. twice per revolution

Answer: D

Watch Video Solution

13. 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. a capacitance of reactance $X_C = X_L$ is included in the same circuit

B. an iron rod is inserted in the coil.

C. frequency of the AC source is decreased.

D. number of turns in the coil is reduced.

Answer: B

Watch Video Solution

14. A thin semicircular conducting ring (POR) of radius r is falling with its Q B plane vertical in a horizontal magnetic field B, as shown in the figure. The potential difference developed across the ring when its speed is v, is

A. zero

B. $\frac{Bv\pi r^2}{2}$ and P is at higher potential

C. πrBv and R is at higher potential

D. $2rBv$ and R is at higher potential

Answer: D

View Text Solution

15. 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. 300 V, 15 A

B. 450 V, 15 A

C. 450 V, 13.5 A

D. 600 V, 15 A

Answer: B

 Watch Video Solution

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

B. P

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

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

Answer: C

Watch Video Solution

17. A conducting square frame of side 'a' and a long straight wire carrying current I are located in the same plane as shown in the figure. The frame moves to the right with a constant velocity 'V'. The emf induced in the frame will be proportional to

A. $\frac{1}{(2x+a)^2}$

B. $\frac{1}{(2x-a)(2x+a)}$

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

D. $\frac{1}{(2x-a)^2}$

Answer: B

View Text Solution

18. 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. $i_a > i_b$

B. $V_a = V_b$

C. $V_a < V_b$

D. $V_a > V_b$

Answer: D

Watch Video Solution

19. An electron moves on a straight line path XY as shown. The abcd is a coil adjacent to the path of electron. What will be the direction of current, if any, induced in the coil?

A. The current will reverse its direction as the electron goes past the coil

B. No current induced

C. abcd

D. adcb

Answer: A

View Text Solution

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

A. 0.76 W

B. 0.89 W

C. 0.51 W

D. 0.67 W

Answer: C

Watch Video Solution

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

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

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

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

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

Answer: D

Watch Video Solution

22. A long solenoid has 1000 turns. When a current of $4A$ flows through it, the magnetic flux linked with each turn of the solenoid is

$4 \times 10^{-3} Wb$. The self-inductance of the solenoid is

A. 2H

B. 1H

C. 4H

D. 3H

Answer: B

Watch Video Solution

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

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

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

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

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

Answer: C

Watch Video Solution

24. A uniform magnetic field is restricted within a region of radius r. The magnetic field changes with time at a rate $\frac{d\vec{B}}{dt}$. Loop 1 of radius R > r encloses the region r and loop 2 of radius R is outside the region of magnetic field as shown in the figure. Then the e.m.f. generated is

A. zero in loop 1 and zero in loop 2

B. $-\frac{d\vec{B}}{dt}\pi r^2$ in loop 1 and $-\frac{d\vec{B}}{dt}\pi r^2$ in loop 2

C. $-\frac{d\vec{B}}{dt}\pi R^2$ in loop 1 and zero in loop2

D. $-\frac{d\vec{B}}{dt}\pi r^2$ in loop 1 and zero in loop 2

Answer: D

View Text Solution

25. The potential differences across the resistance, capacitance and inductance are

$80V, 40V$ and $100V$ respectively in an $L-C-R$ circuit. The power factor of this circuit is

A. 0.4

B. 0.5

C. 0.8

D. 1

Answer: C

Watch Video Solution

26. A long solenoid of diameter 0.1 m has 2×10^4 turns per meter. At centre of the solenoid is 100 turns coil of radius 0.01 m placed with its axis coinciding with solenoid axis. The current in the solenoid reduce at a constant rate to 0A from 4 a in 0.05 s . If the resistance of the coil is $10\pi^2\Omega$, the total charge flowing through the coil during this time is

A. $16\mu C$

B. $32\mu C$

C. $16\pi\mu C$

D. $32\pi\mu C$

Answer: B

Watch Video Solution

27. Figure shows a circuit that contains three identical resistors with resistance R=9.0 Ωeach, two identical inductors with inductance L = 2.0 mH each, and an ideal battery with emf ε = 18 V. The current i through the battery just after

the switch closed is

A. 0.2A

B. 2A

C. 0 ampere

D. 2mA

Answer:

View Text Solution

28. The magnetic potential energy stored in a certain inductor is $25mJ$, when the current in the inductor is $60mA$. This inductor is of inductance

A. 0.138 H

B. 138.88 H

C. 1.389 H

D. 13.89 H

Answer: D

Watch Video Solution

Watch video solution

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

A. 0.79 W

B. 0.43 W

C. 2.74 W

D. 1.13 W

Answer: A

Watch Video Solution

30. In which of the following devices, the eddy current effect is not used ?

A. electric heater

B. induction furnance

C. magnetic breaking in train

D. electromagnet

Answer: A

Watch Video Solution

31. A 800 turn coil of effective area $0.05m^2$ is kept perpendicular to a magnetic field 5×10^{-5} T. When the plane of the coil is rotated by 90° around any of its coplanar axis in 0.1 s, the emf induced in the coil will be:

A. 0.02V

B. 2V

C. 0.2V

D. $2 \times 10^{-3} V$

Answer: A

 Watch Video Solution