Alternating Current JEE Main PYQ - 3

Total Time: 1 Hour **Total Marks:** 100

Instructions

Instructions

1. Test will auto submit when the Time is up.
2. The Test comprises of multiple choice questions (MCQ) with one or more correct answers.
3. The clock in the top right corner will display the remaining time available for you to complete the examination.

Navigating & Answering a Question

1. The answer will be saved automatically upon clicking on an option amongst the given choices of answer.
2. To deselect your chosen answer, click on the clear response button.
3. The marking scheme will be displayed for each question on the top right corner of the test window.

Alternating Current

1. Match List-I with List-II **(+4, -1)**

List-I	**List-II**
(A) AC generator	**(I)** Detects the presence of current in the circuit
(B) Galvanometer	**(II)** Converts mechanical energy into electrical energy
(C) Transformer	**(III)** Works on the principle of resonance in AC circuit
(D) Metal detector	**(IV)** Changes an alternating voltage for smaller or greater value

Choose the correct answer from the options given below.

a. (A) – (II), (B) – (I), (C) – (IV), (D) – (III)

b. (A) – (II), (B) – (I), (C) – (III), (D) – (IV)

c. (A) – (III), (B) – (IV), (C) – (II), (D) – (I)

d. (A) – (III), (B) – (I), (C) – (II), (D) – (IV)

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2. The equation of current in a purely inductive circuit is $5\sin(49\pi t - 30^\circ)$ If the inductance is $30\,mH$ then the equation for the voltage across the inductor, will be: $\{\text{Let } \pi = \frac{22}{7}\}$ **(+4, -1)**

a. $1.47\sin(49\pi t - 30^\circ)$

b. $1.47\sin(49\pi t + 60^\circ)$

c. $23.1\sin(49\pi t - 30^\circ)$

d. $23.1\sin(49\pi t + 60^\circ)$

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3. An unknown resistance $_1$ is connected in series with a resistance of 10Ω. This combination is connected to one gap of a metre bridge while a resistance $_2$ is connected in the other gap. The balance point is at 50 cm. Now, when the **(+4, -1)**

10Ω resistance is removed the balance point shifts to 40 cm. The value of $_1$ is (in ohms):

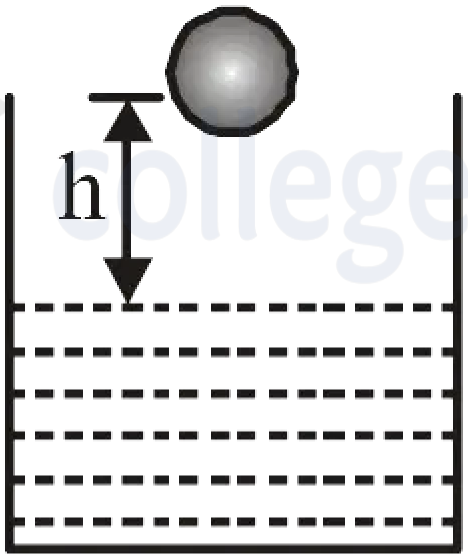
a. (A) 20

b. (B) 10

c. (C) 60

d. (D) 40

4. A ball of radius r and density falls freely under gravity through a distance h before entering the water. The velocity of the ball does not change even on entering the water. The viscosity of water is , the value of h is given by? (+4, -1)



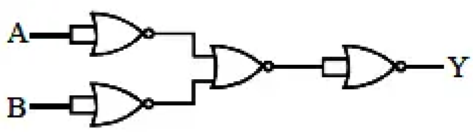
a. (A) $\frac{2}{9}r^2(\frac{1-}{})g$

b. (B) $\frac{2}{81}r^2(\frac{-1}{})g$

c. (C) $\frac{2}{81}r^4(\frac{-1}{})^2 g$

d. (D) $\frac{2}{9}r^4(\frac{-1}{})^2 g$

5. The output of the given combination gates represents: (+4, -1)



a. (A) XOR Gate

b. (B) NAND Gate

c. (C) AND Gate

d. (D) NOR Gate

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6. Find the amount of work done in rotating a dipole of dipole moment 3×10^{-3} from its position of stable equilibrium to the position of unstable equilibrium, in a uniform electric field of intensity 10^{4} $^{-1}$. **(+4, -1)**

a. (A) 50

b. (B) 60

c. (C) 80

d. (D) 70

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7. To increase the resonant frequency in seriesLCR circuit, **(+4, -1)**

a. Source frequency should be increased

b. Another resistance should be added in series with the first resistance.

c. Another capacitor should be added in series with the first capacitor

d. The source frequency should be decreased

---

8. Given below are two statements: one is labeled as Statement (1) and the other is labeled as Statement (2). **(+4, -1)**
Statement (1): Maximum power is dissipated in a circuit containing an inductor, a ca pacitor and a resistor connected in series with an AC source,

when resonance occurs

Statement (2): Maximum power is dissipated in a circuit containing pure resistor due to zero phase difference between current and voltage.

In the light of the above statements, choose the correct option:

a. (1) and (2) both are correct

b. (1) is correct but (2) is incorrect

c. (1) is incorrect but (2) is correct

d. Both (1) and (2) are incorrect

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9. The variation of impedance (Z) with angular frequency (w) for two electrical elements is shown in the graph given. If XL,Xc, and R are inductive reactance, capacitive reactance and resistance respectively, then **(+4, -1)**

a. A is resistor B is inductor

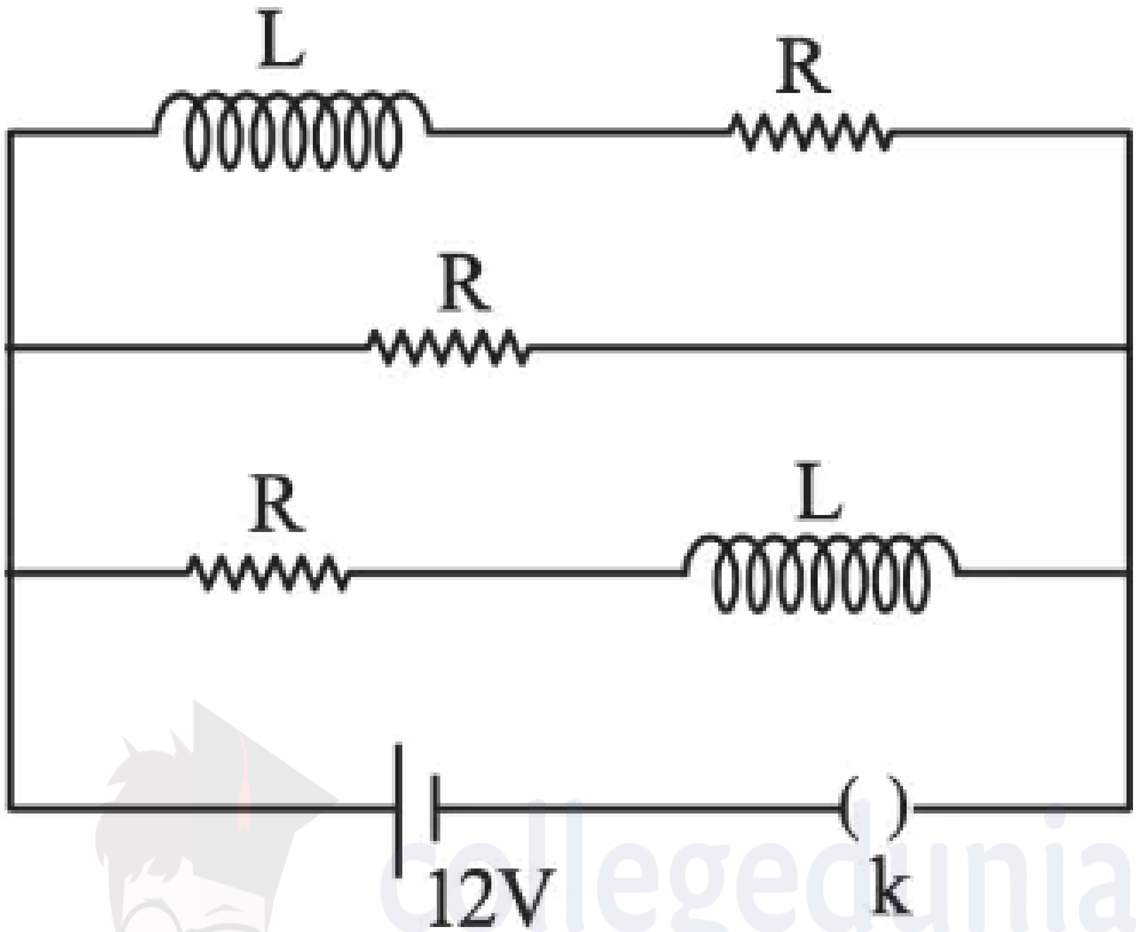
b. A is inductor B is capacitor

c. A is inductor B is resistor

d. A is capacitor B is inductor

---

10. Three identical resistors with resistance $R = 12\,\Omega$ and two identical inductors with self inductance $L = 5\,mH$ are connected to an ideal battery with emf of $12\,V$ as shown in figure. The current through the battery long after the switch has been closed will be ______A. **(+4, -1)**

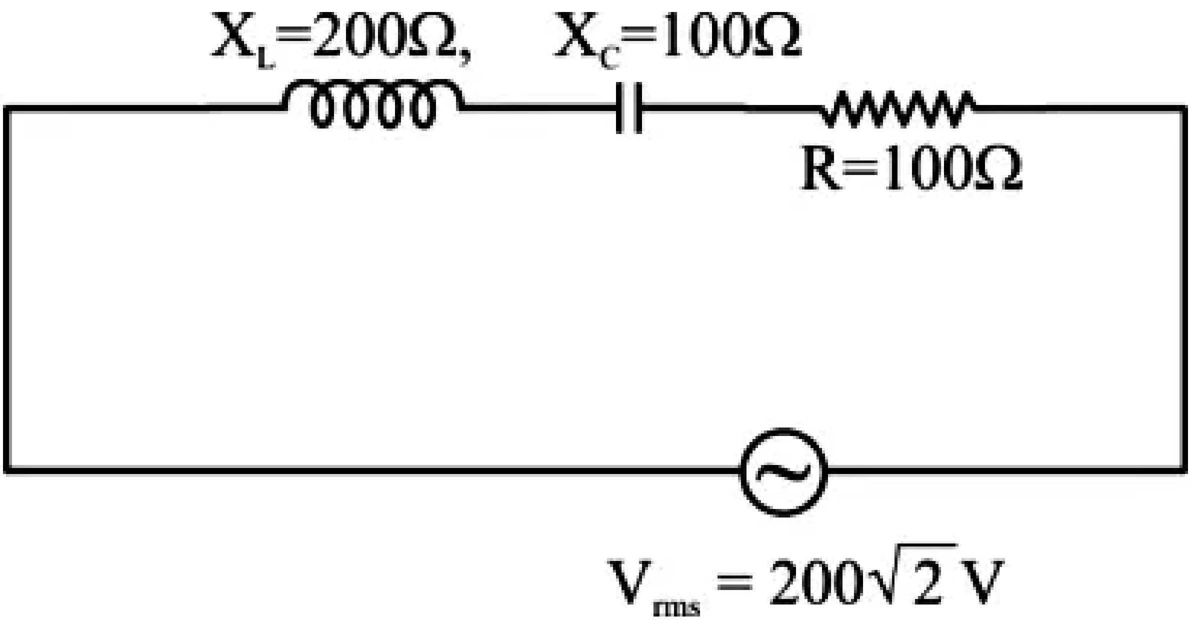


11. A series LCR circuit consists of $R = 80\Omega, X_L = 100\Omega$, and $X_C = 40\Omega$. The input voltage is 2500 $\cos(100\pi t)V$. The amplitude of current, in the circuit, is ___ A **(+4, -1)**

12. An inductor of $0.5mH$, a capacitor of $20\mu F$ and resistance of 20Ω are connected in series with a $220V$ ac source If the current is in phase with the emf, the amplitude of current of the circuit is $\sqrt{x}$ A The value of x is - **(+4, -1)**

13. A series LCR circuit is connected to an ac source of $220\,V, 50\,Hz$ The circuit contain a resistance $R = 100\,\Omega$ and an inductor of inductive reactance $X_L = 796\,\Omega$ The capacitance of the capacitor needed to maximize the average rate at which energy is supplied will be ________ μF **(+4, -1)**

14. In the given circuit, rms value of current (I_{rms}) through the resistor R is: **(+4, -1)**



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

b. $20A$

c. $2A$

d. $2\sqrt{2}A$

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15. In a series LR circuit with $X_L = R$, power factor is P_1 If a capacitor of capacitance C with $X_C = X_L$ is added to the circuit the power factor becomes P_2 The ratio of P_1 to P_2 will be : (+4, -1)

a. $1:2$

b. $1:3$

c. $1:1$

d. $1:\sqrt{2}$

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16. **An alternating voltage source $V = 260\sin(628t)$ is connected across a pure inductor of $5mH$ Inductive reactance in the circuit is :** (+4, -1)

a. 3.14Ω

b. $6.28S$

c. 0.318Ω

d. 0.5Ω

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17. Two spherical balls each of mass 1kg are placed 1cm apart. The gravitational force of attraction between them is: **(+4, -1)**

a. (A) 6.67×10^{-7} N

b. (B) 6.67×10^{-4} N

c. (C) 6.67×10^{-2} N

d. (D) 6.67×10^{-9} N

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18. Three equal capacitors when connected in series provide 1 capacitance. When in parallel, they provide a capacitance of___________. **(+4, -1)**

a. (A) $\frac{1}{3}$

b. (B) 3

c. (C) 6

d. (D) 9

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19. In a photoelectric experiment, if both the intensity and frequency of the incident light are doubled, then the saturation photoelectric current. **(+4, -1)**

a. (A) Remains constant

b. (B) is halved

c. (C) is doubled

d. (D) becomes four times

---

20. A resistor of 200Ω and a capacitor of 15.0 are connected in series to a 220 , 50 ac source. (a) Calculate the current in the circuit; (b) Calculate the voltage (RMS) across the resistor. **(+4, -1)**

a. (A) = 0.755 ˚, = 160.3

b. (B) = 0.785 ˚, = 161.3

c. (C) = 0.795 ˚, = 165.3

d. (D) None of these

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21. In a discharging RC circuit, at what time the electrical potential energy will become the half of its initial value? [in terms of time constant of RC circuit,] **(+4, -1)**

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22. In the pure inductive circuit, the curves between frequency and reciprocal of inductive reactance $\frac{1}{}$ is: **(+4, -1)**

a. inversely proportional

b. directly proportional

c. equivalent

d. None of these

---

23. When the rms voltages V_L, V_C and V_R are measured respectively across the inductor L, the capacitor C and the resistor R in a series LCR circuit connected to an AC source, it is found that the ratio $V_L : V_C : V_R = 1 : 2 : 3$. If the rms voltage of the AC sources is $100\,V$, the V_R is close to: **(+4, -1)**

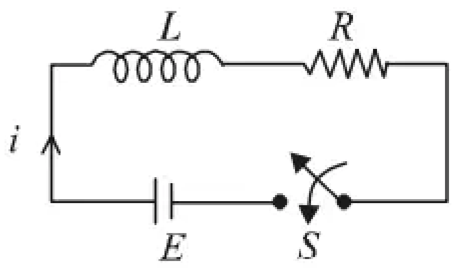
a. $50\,V$

b. $70\,V$

c. $90\,V$

d. $100\,V$

24. Consider the LR circuit shown in the figure. If the switch S is closed at $t = 0$ then the amount of charge that passes through the battery between $t = 0$ and $t = \frac{L}{R}$ is: **(+4, -1)**



a. $\frac{EL}{7.3R^2}$

b. $\frac{EL}{2.7R^2}$

c. $\frac{7.3EL}{R^2}$

d. $\frac{2.7EL}{R^2}$

25. An ideal capacitor of capacitance $0.2\,\mu F$ is charged to a potential difference of $10\,V$. The charging battery is then disconnected. The capacitor is then connected to an ideal inductor of self inductance $0.5\,mH$. The current at a time when the potential difference across the capacitor is $5\,V$, is : **(+4, -1)**

a. $0.34\,A$

b. $0.25\,A$

c. $0.17\,A$

d. $0.15\,A$

Answers

1. **Answer: a**

Explanation:

AC generator → Converts mechanical energy into electrical energy
Galvanometer → Detects the presence of current in the circuit
Transformer → Change AC voltage for smaller or greater value
Metal detector → Works on the principle of resonance in AC circuit

So, the correct option is (A): (A) – (II), (B) – (I), (C) – (IV), (D) – (III)

Concepts:

1. **Alternating Current:**

An alternating current can be defined as a current that changes its magnitude and polarity at regular intervals of time. It can also be defined as an electrical current that repeatedly changes or reverses its direction opposite to that of Direct Current or DC which always flows in a single direction as shown below.

Alternating Current Production

Alternating current can be produced or generated by using devices that are known as alternators. However, alternating current can also be produced by different methods where many circuits are used. One of the most common or simple ways of generating AC is by using a basic single coil AC generator which consists of two-pole magnets and a single loop of wire having a rectangular shape.

Application of Alternating Current

AC is the form of current that are mostly used in different appliances. Some of the examples of alternating current include audio signal, radio signal, etc. An alternating current has a wide advantage over DC as AC is able to transmit power over large distances without great loss of energy.

2. **Answer: d**

Explanation:

From the given options the correct answer is option (D): $23.1sin(49\pi t + 60^{\circ})$

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3. **Answer: a**

Explanation:

Explanation:
Balanced condition in meter bridge experiment is given by– = $\frac{}{100 -}$......(i)Where and are the equivalent resistances attached between the two gaps.Case-1:Balance

point is at = 50 cm : = $_1$ + 10 and = $_2$ Substituting values in eq. (i), we get $\frac{_1 + 10}{_2} = \frac{50}{50} = 1$ $_1 + 10 = {}_2$ ......(ii)Case-2:When only resistance $_1$ is used and balance point shifted to = 40cm : = $_1$ and = $_2$ $\frac{_1}{_2} = \frac{40}{60}$ Substituting value of $_2$ from eq. (ii), we get $\frac{_1}{_1 + 10} = \frac{40}{60}$ 60 $_1$ = 40 $_1$ + 400 $_1 = \frac{400}{20}\Omega = 20\Omega$ Hence, the correct option is (A).

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4. **Answer: c**

Explanation:

Explanation:
The Velocity of the ball when it strikes the water surface will be given by,
$v = \sqrt{2}$ ... ( )Terminal velocity of ball inside the water will be,$v = \frac{2}{9}r^2\ g\frac{(\ - 1)}{}$ ... ( )
Now, equating ( ) and ( ) we get $\sqrt{2gh} = \frac{2}{9}\frac{r^2\ g}{}(\ - 1)$ $h = \frac{2}{81}r^4\left(\frac{ - 1}{}\right)^2 g$ Hence, the correct option is (C).

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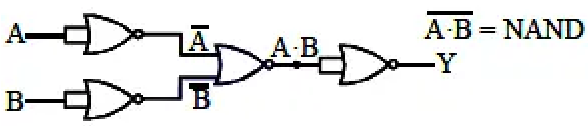
5. **Answer: b**

Explanation:

Explanation:
By De Morgan's theorem, we haveInitially in NAND gate,Step - (i) Input and output $^-$ and $^-$ Step - (ii) Input at NAND gate $^-$ and $^-$ output Step - (iii) Input at NAND gate output $\overline{\ }$.



Hence, the correct option is (B).

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6. **Answer: b**

Explanation:

Explanation:
Given that:Dipole Moment, $= 3 \times 10^{-3}$ Electric Field Intensity, $= 10^{4}$ $^{-1}$ We know that,In rotating the dipole from the position of stable equilibrium by an angle , the amount of work done is given by, $=$ $(1 - \cos\ )$For unstable equilibrium, $= 180$ $=$ $(1 - \cos 180\ )$ $[\ \cos 180\ = -1] = 2$ $= 2 \times 3 \times 10^{-3} \times 10^{4}$ $= 60$ Hence, the correct option is (B).

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7. **Answer: c**

Explanation:

The correct option is (C)

Concepts:

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8. **Answer: a**

Explanation:

Analysis of Statements on RLC Circuits and Power Dissipation:

Statement I:

In a series RLC circuit, resonance occurs when:

$X_L = X_C$, **where** $X_L = \omega L$ **and** $X_C = \frac{1}{\omega C}$.

At resonance:

- The impedance (Z) becomes purely resistive $(Z = R)$.
- The impedance is at its minimum, leading to the maximum current in the circuit.
- The average power dissipated in the circuit is given by:

$$P_{\text{avg}} = I_{\text{rms}}^2 R$$

Since I_{rms} is maximum at resonance, the power dissipated is also maximum. Therefore, **Statement I is true.**

Statement II:

In a purely resistive circuit:

- The current and voltage are in phase, meaning the phase difference (ϕ) is zero.
- The average power dissipated in a resistor is given by:

$$P_{\text{avg}} = V_{\text{rms}} I_{\text{rms}} \cos\phi$$

Since $\phi = 0$, $\cos\phi = 1$, so:

$$P_{\text{avg}} = V_{\text{rms}} I_{\text{rms}}$$

The power dissipation is maximum. Therefore, **Statement II is true.**

Conclusion:

Both Statement I and Statement II are **true.**

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9. **Answer: b**

Explanation:

The correct option is (B): A is inductor B is capacitor

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10. **Answer: 3 - 3**

Explanation:

Step 1: Behavior of inductors after a long time After a long time, the inductors behave as short circuits (resistance-less paths) because the current through them becomes steady, and there is no changing magnetic flux.

Step 2: Simplified circuit analysis With the inductors acting as short circuits, the circuit reduces to three resistors connected in parallel across the battery.

Step 3: Equivalent resistance of the parallel resistors The equivalent resistance (R_{eq}) of three identical resistors in parallel is given by:

$$\frac{1}{R_{eq}} = \frac{1}{R} + \frac{1}{R} + \frac{1}{R}$$

$$\frac{1}{R_{eq}} = \frac{1}{12} + \frac{1}{12} + \frac{1}{12} = \frac{3}{12}$$

$$R_{eq} = \frac{12}{3} = 4\,\Omega$$

Step 4: Total current through the battery Using Ohm's law, the total current through the battery is:

$$I = \frac{\text{EMF}}{R_{\text{eq}}} = \frac{12}{4} = 3\,\text{A}$$

Concepts:

1. Electromagnetic waves:

The waves that are produced when an electric field comes into contact with a magnetic field are known as Electromagnetic Waves or EM waves. The constitution of an oscillating magnetic field and electric fields gives rise to electromagnetic waves.

Types of Electromagnetic Waves:

Electromagnetic waves can be grouped according to the direction of disturbance in them and according to the range of their frequency. Recall that a wave transfers energy from one point to another point in space. That means there are two things going on: the disturbance that defines a wave, and the propagation of wave. In this context the waves are grouped into the following two categories:

- **Longitudinal waves:** A wave is called a longitudinal wave when the disturbances in the wave are parallel to the direction of propagation of the wave. For example, sound waves are longitudinal waves because the change of pressure occurs parallel to the direction of wave propagation.
- **Transverse waves:** A wave is called a transverse wave when the disturbances in the wave are perpendicular (at right angles) to the direction of propagation of the wave.

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11. Answer: 25 - 25

Explanation:

The total impedance Z in a series LCR circuit is given by:

$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

Substituting the given values:

$$Z = \sqrt{80^2 + (100 - 40)^2} = \sqrt{6400 + 3600} = \sqrt{10000} = 100\,\Omega$$

The voltage amplitude is given as $V = 2500\,\text{V}$, and the current amplitude I can be calculated using Ohm's law:

$$I = \frac{V}{Z} = \frac{2500}{100} = 25\,\text{A}$$

Concepts:

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12. **Answer: 242 - 242**

Explanation:

The correct answer is 242.
$X_L = X_C$
So, $Z = R = 20\Omega$

$i_{rms} = \frac{220}{20} = 11$
$i_{\max} = 11\sqrt{2} = \sqrt{242}$

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13. **Answer: 40 - 40**

Explanation:

The correct answer is 40.
To maximize the average rate at which energy supplied i.e. power will be maximum. So in LCR circuit power will be maximum at the condition of resonance and in resonance condition
$X_L = X_C$
$79.6 = \frac{1}{\omega C}$

$\therefore C = \frac{1}{2\pi \times 50 \times 79.6}$
$\therefore C = 40\mu F$

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14. Answer: c

Explanation:

The correct answer is (C) : $2A$
$z = \sqrt{100^2 + (200 - 100)^2}$
$= 100\sqrt{2}\Omega$
$i_{rms} = \frac{V_{rms}}{z} = \frac{200\sqrt{2}}{100\sqrt{2}}$
$= 2A$

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15. **Answer: d**

Explanation:

$$P = \frac{R}{Z} \Rightarrow P_1 = \frac{R}{\sqrt{R^2+X_L^2}} = \frac{R}{R\sqrt{2}} \text{ (as } X_L = R)$$
$$P_1 = \frac{1}{\sqrt{2}}$$
$$P_2 = \frac{R}{\sqrt{R^2+(X_L-X_L)^2}} = P_2 = 1$$
$$\frac{P_1}{P_2} = \frac{1}{\sqrt{2}}$$

Concepts:

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16. **Answer: a**

Explanation:

The inductive reactance X_L is given by the formula:

$$X_L = \omega L$$

where $\omega = 2\pi f$ is the angular frequency and L is the inductance. Given that $V = 260\sin(628t)$, we have:

$$\omega = 628\,\text{rad/s}$$

and $L = 5\,\text{mH} = 5 \times 10^{-3}\,\text{H}$. Thus, the inductive reactance is:

$$X_L = 628 \times 5 \times 10^{-3} = 3.14\,\Omega$$

Concepts:

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17. **Answer: a**

Explanation:

Explanation:
The gravitational force of attraction is given by:$F = \frac{Gm_1 m_2}{r^2}$Here $_1 = {}_2 = 1$ and $= 1$ cm $= 0.01$ m $= 6.67 \times 10^{-11}$ $F = \frac{6.67 \times 10^{-11} \times 1^2}{(0.01)^2}$$F = 6.67 \times 10^{-7}$ NHence, the correct option is (A).

---

18. **Answer: d**

Explanation:

Explanation:
Given that three equal capacitors in series provide 1 F capacitance.Let all the capacitors are .So their effective capacitance when connected in series,

$\frac{1}{} = \frac{1}{_1} + \frac{1}{_2} + \frac{1}{_3} \frac{1}{} = \frac{1}{} + \frac{1}{} + \frac{1}{} \frac{1}{} = \frac{3}{}$ $= 3$ $= 3 \times 1$ $= 3$ Each capacitors have capacity of 3 .effective capacitance when connected in parallel, $= _1 + _2 + _3$ $= + +$ $= 3$ $= 9$ Hence, the correct option is (D).

---

19. **Answer: c**

Explanation:

Explanation:
The saturation photoelectric current is directly proportional to the intensity of incident radiation but it is independent of its frequency. Therefore the saturation photoelectric current becomes doubled when both the intensity and frequency of the incident light are doubled.Hence, the correct option is (C).

---

20. **Answer: a**

Explanation:

Explanation:
Given, $= 200\Omega$, $= 15.0$ $= 15.0 \times 10^{-6}$ $= 220$, $= 50$ (a) In order to calculate the current, we need the impedance of the circuit. It is, $= \sqrt{^2 + ^2} = \sqrt{^2 + (2 \quad)^{-2}}$ $= \sqrt{(200\Omega)^2 + (2 \times 3.14 \times 50 \times 15.0 \times 10^{-6}\ F)^{-2}}$ $= \sqrt{(200\Omega)^2 + (212.3\Omega)^2}$ $= 291.67\Omega$Therefore, the current in the circuit is, $= - = \frac{220}{291.5\Omega} = 0.755$ (b) Since the current is the same throughout the circuit, we have $=$ $= (0.755\ )(200\Omega) = 151$ $=$ $= (0.755\ )(212.3\Omega) = 160.3$ Hence, the correct option is (A).

---

21. **Answer: 0.34 - 0.34**

Explanation:

Explanation:
Let $_0$ be the initial charge on the capacitor.
Thus, the initial electrical potential energy of the capacitor is $_0 = \frac{^2_0}{2}$
Let in time , the electrical potential energy will become half of its initial value.
The electrical potential energy of the capacitor at time is

$= \frac{\quad^{2}}{2}$

where is the charge on the capacitor at time .

In a discharging RC circuit, charge at any time is given as

$= \quad_{0} \quad^{- \; /}$

where is the time constant of the circuit.

$= \frac{1}{2} \quad^{2}_{0} \quad^{-2 \; /}$

Now, according to the given condition

$= \frac{1}{2} \quad_{0}$ or, $\frac{1}{2} \quad^{2}_{0} \quad^{-2} \quad = \frac{1}{2}\frac{^{2}_{0}}{2}$ or, $\frac{1}{2} = \quad^{-2}$

Taking natural logarithms of both sides, we get

In(12)=−2τor, $-0.693 = -\frac{2}{\;}$ or, $= 0.34$

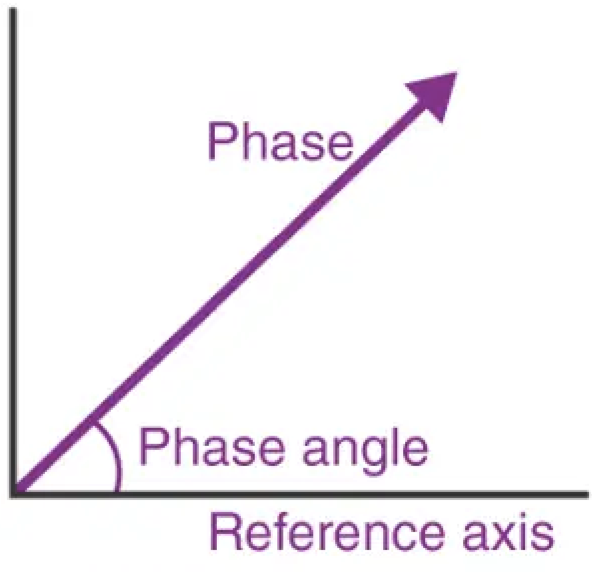
This is the time in which the electrical potential energy becomes half of its initial value.

Hence, the correct answer is 0.34 .

Concepts:

1. LCR Circuit:

An LCR circuit, also known as a resonant circuit, or an RLC circuit, is an electrical circuit consist of an inductor (L), capacitor (C) and resistor (R) connected in series or parallel.

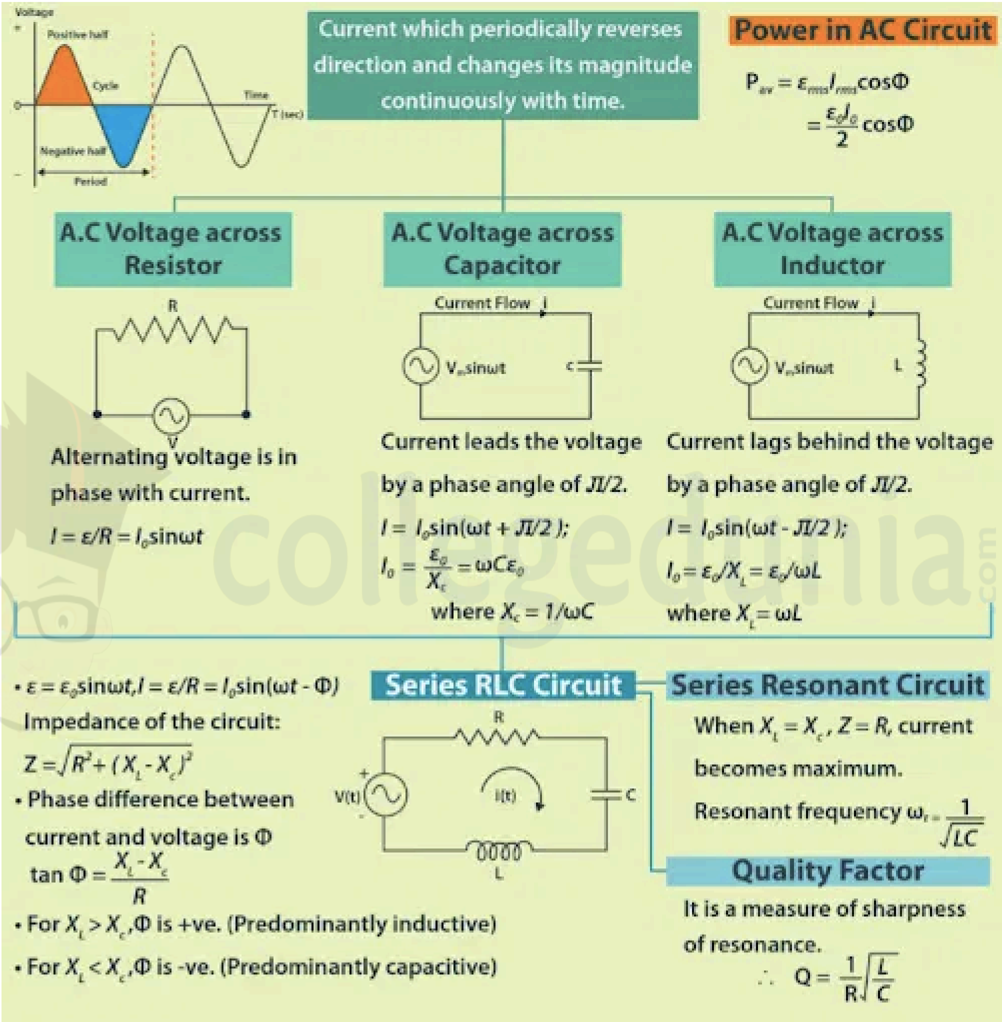


Current Vs Voltage Graph

Series LCR circuit

When a constant voltage source is connected across a resistor a current is induced in it. This current has a unique direction and flows from the negative to positive terminal. Magnitude of current remains constant.

Alternating current is the current if the direction of current through this resistor changes periodically. An AC generator or AC dynamo can be used as AC voltage source.



22. Answer: a

Explanation:

Correct option is (A)

$X_L = 2\pi f L$

$\Rightarrow X_L \propto f$

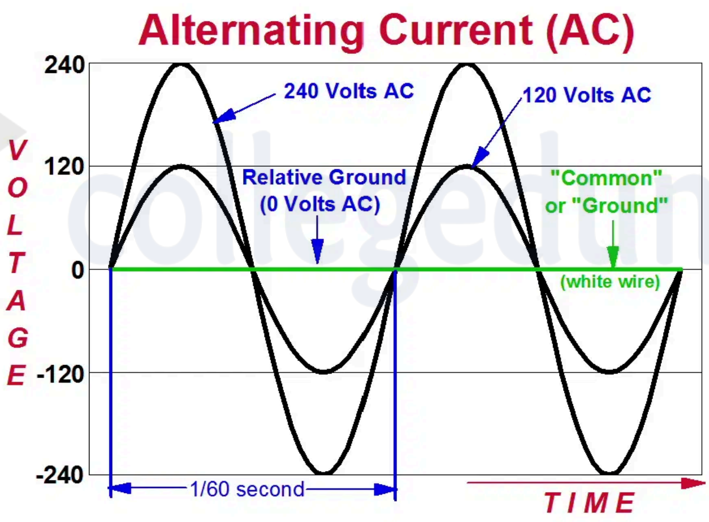
$\Rightarrow \frac{1}{X_L} \propto \frac{1}{f}$

i.e., graph between XL1 and f will be a hyperbola.

Concepts:

1. AC Voltage:

When voltage changes its direction after every half cycle is known as alternating voltage. The current flows in the circuit at that time are known as alternating current. The alternating current(AC) follows the **sine function** which changes its polarity concerning time. Most of the electrical devices are operating on the ac voltage.



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23. Answer: c

Explanation:

$I = \frac{V_{rms}}{Z} = \frac{V_{rms}}{\sqrt{R^2+(X_L-X_C)^2}} = \frac{100}{\sqrt{9x^2+x^2}} = \frac{100}{\sqrt{10x^2}}$

Since $V_L : V_C : V_R = 1:2:3$

$X_L = X_C : X_R = 1:2:3$

$= x : 2x : 3x$

now $V_R = I\,(3x)$

$= \frac{100}{\sqrt{10x^2}}.3x$
$\approx 94.87\,V$

Concepts:

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Alternating Current Production

Alternating current can be produced or generated by using devices that are known as alternators. However, alternating current can also be produced by different methods where many circuits are used. One of the most common or simple ways of generating AC is by using a basic single coil AC generator which consists of two-pole magnets and a single loop of wire having a rectangular shape.

Application of Alternating Current

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24. Answer: b

Explanation:

$q = \int I dt$
$q = \int_0^{L/R} \frac{E}{R}\left[1 - e^{\frac{-Rt}{L}}\right] dt$
$q = \frac{EL}{R^2}\frac{1}{e}$
$q = \frac{EL}{2.7R^2}$

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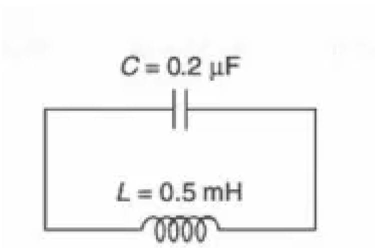
25. **Answer: c**

Explanation:

The given circuit is



Given: capacitor is charged to a potential difference of $10\,V \Rightarrow V_0 = 10\,V$

Therefore, charge on capacitor, $Q_0 = CV_0 = 0.2\,\mu F \times 10\,V$

Now, $E_c =$ Energy stored in capacitor $= \frac{1}{2}CV_0^2$

$\Rightarrow E_C = \frac{1}{2} \times 0.2\mu F \times (10V)^2 = 10\mu J = 10 \times 10^{-6}\,J$

When inductor is connected in parallel with the capacitor in the circuit, the energy stored in capacitor when potential difference across capacitor is $V' = 5K$ is

$E'_C = \frac{1}{2}CV^2 = \frac{1}{2} \times 0.2\mu F \times (5V)^2$

$= 2.5\mu\,J = 2.5 \times 10^{-6}\,J$

Therefore, Energy stored in inductor $= E_c - E'_c = 10 \times 10^{-6}J - 2.5 \times 10^{-6}\,J$

$= 7.5 \times 10^{-6}\,J$

Also, we know energy stored in inductor $= \frac{1}{2}LI^2$

$\Rightarrow \frac{1}{2}LI^2 = 7.5 \times 10^{-6}$

$\Rightarrow I^2 = \frac{7.5 \times 10^{-6} \times 2}{0.5\,mH} = 30 \times 10^{-3}$

$\Rightarrow I = \frac{\sqrt{3}}{10} = 0.17\,A$

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