PROBABLE QUESTIONS
AC MOD 1

1) A DC circuit has __________ as a load.

1. Resistance
2. Inductance
3. Capacitance
4. All of the above

ANSWER

Answer: (1)

EXPLANATION

DC Circuit has no field changing effect. So, there will be no inductance and capacitance effect in the circuit.

2) The purpose of load in an electric circuit is to

1. Increase the circuit current
2. Utilize electrical energy
3. Decrease the circuit current
4. None of the above

ANSWER

Answer: (2)

EXPLANATION

An electrical load is an electrical component or portion of a circuit that consumes electric power.

3) Electrical appliances are not connected in series because

1. Series circuit is complicated
2. Power loss is more
3. Appliances have different current ratings
4. None of the above

ANSWER

Answer: (3)

EXPLANATION

Electrical appliances are not connected in series because current will be same through all the appliances connected whereas appliances have different current ratings and also that voltage decreases as more no. Of appliances are connected.

4) Electrical appliances are connected in parallel because it

1. Is a simple circuit
2. Draws less current
3. Results in reduced power loss
4. Makes the operation of appliances independent of each other

ANSWER

Answer: (4)

EXPLANATION

When appliances are connected in a parallel arrangement, each of them can be put on and off independently.

5) Three resistance 14.5 Ω, 25.5 Ω and 60 Ω are connected in series across 200 V. What will be the voltage drop across 14.5 Ω

1. 29 V
2. 13.5 V
3. 14 V
4. 18 V

ANSWER

Answer: (1)

EXPLANATION

In this circuit, total current is calculated as

$R = 14.5+25.5+60$

$R = 100\ \Omega$

$I = V/R$

$I = 200/100$

$I = 2\ A$

Now, voltage drop across 14.5 Ω resistance is

$V = IR$

$V = 2\times14.5$

$V = 29\ V$

6) Two bulbs B_1 100 W, 200 V and B_2 40 W, 200 V are connected in series across 200 V battery, the total circuit resistance will be

1. 1000 Ω
2. 400 Ω
3. 1400 Ω
4. 135 Ω

ANSWER

Answer: (1)

EXPLANATION

In this circuit,

For B_1

$P_1 = V^2/R$

$R_1 = V^2/P$

$R_1 = (200)^2 / 100$

$R_1 = 400\ \Omega$

For B_2

$P_2 = V^2/R$

$R_2 = (200)^2 / 40$

$R_2 = 1000\ \Omega$

Total resistance in circuit R = R1 + R2

11) A wire has a resistance of 12 Ω. It is bent in the form of a circle. The effective resistance between the two points on any diameter of the circle is

1. 6 Ω
2. 3 Ω
3. 12 Ω
4. 24 Ω

ANSWER

Answer: (2)

EXPLANATION

Here, wire is connected by bending it in circle. After then, Taking two points at any diameter means circle is divided in two equal half that makes it parallel connected. So, 12 Ω is divided into two equal i.e. 6 Ω resistance each. By solving these two parallel connected resistance we get 3 Ω as equivalent resistance.

12) The total resistance of circuit by connecting 50 resistance of 1/4 Ω in parallel is

1. 50/4 Ω
2. 4/50 Ω
3. 200 Ω
4. 1/200 Ω

ANSWER

Answer: (4)

EXPLANATION

1/4=0.25 ohm

1/R=1/0.25+1/0.25+••••••••••50 resisters

1/R=1/0.25*50=200 ohm

R= 1/200 ohm

13) The internal resistance of a cell of e.m.f 2 V is 0.1 Ω. It is connected to a resistance of 3.9 Ω. The voltage across the cell is

1. 0.5 V
2. 1.95 V
3. 1.9 V
4. 2 V

ANSWER

Answer: (1)

EXPLANATION

Here Current $I = (E / (r+R))$

$I = 2 / (3.9+0.1)$

$I = 2 / 4$

$I = 0.5$

14) Three 2 Ω resistors are connected to form a triangle. The resistance between any two corners is

1. 6 Ω
2. 2 Ω
3. (3/4) Ω
4. (4/3) Ω

ANSWER

Answer: (4)

EXPLANATION

The total resistance of the triangle and between any two corners will be 1.33 ohm.

2 || (2+2)

2 || 4

(2×4)/(2+4)

8/6 = 1.33333

5) A cell with zero internal resistance and e.m.f of 2 V is connected across 2, 3 and 5 Ω. The potential difference across 3 Ω resistor will be

1. (2/3) V
2. 0.6 V
3. 3 V
4. 6 V

ANSWER

Answer: (2)

EXPLANATION

First find the total current within it.

$R^{t} = R^{1} + R^{2} + R^{3}$

$R^{t} = 10\ \Omega$

$V = IR^{t}$

$I = V / R$

$I = 2/10$

$I = 0.2$ A

Now, voltage drop across 3 ohm resistor.

$V = IR^{2}$

$V = 0.2 \times 3$

$V = 0.6$ V

10) G = 0.05 S

41) hree conductance G_1 , G_2 , G_3 are connected in parallel. If the total circuit current is 4 A, the current in G_1 will be

1. 1.2 A
2. 2 A
3. 0.8 A
4. 4 A

ANSWER

Answer: (2)

EXPLANATION

As conductance is reciprocal of resistance, so if conductance is assumed to be connected in parallel. Series resistance formula will apply on it. Thus,

$G = G_1 + G_2 + G_3$ $G = 0.5+0.3+0.2$ $G = 1$ S

Current in $G_1 = 4 \times (G_1 / G_2)$ Current in $G_1 = 4 \times (0.5/0.3)$ Current in $G_1 = 2$ A

42) A resistor in a circuit has a value of 560 Ω. It is desired to decrease its value to 344 Ω. The resistance to be

7) Three equal resistors when connected in series dissipates 10 W power, how much power will it dissipates when the same resistors are connected across same potential in parallel.

1. 90 W
2. 30 W
3. 180 W
4. 27 W

ANSWER

Answer: (4)

EXPLANATION

By changing from series to parallel, the total resistance decreases by a factor of 9. So by applying the power equation $P = (V^2)/R$, and assuming a constant supply voltage, the power dissipated in the resistor will increase by a factor of 9. So the new dissipation is 90W.

38) In a circuit two cells of 1.5 V and

5) Two bulbs 200 W and 100 W are connected across 220 V supply in series. Find the power consumed by both bulbs

1. 300 W
2. 200 W
3. 66 W
4. 50 W

ANSWER

Answer: (3)

EXPLANATION

Here first calculate the resistance of the circuit.

i.e.

$R^t = R^1 + R^2$

$R^1 = (V)^2 / P^1$

$R^1 = (220)^2 / 200$

$R^1 = 242$

$R^2 = (V)^2 / P^2$

$R^2 = (220)^2 / 100$

$R^2 = 484$

$R^t = 242 + 484$

$R^t = 726$

17) An electrical fan and heater are marked as 100 W and 1000 W respectively at 220 V supply. What will be the resistance of heater

1. Zero
2. Greater than that of the fan
3. Less than that of the fan
4. Equal to that of the fan

ANSWER

Answer: (3)

EXPLANATION

For constant voltage, we know that

$P \propto 1/R$

So higher the power, lower will be the resistance.

20) How many combination scheme of three resistors can be created

1. 2
2. 3
3. 4
4. 5

ANSWER

Answer (3)

EXPLANATION

Three resistors yield four combinations.

21) Two resistance in parallel gives combine effect of 6/5 Ω. If one resistance broke, the effective resistance becomes 2 Ω. The broken resistance will be

1. 3/5 Ω
2. 2 Ω
3. 3 Ω
4. 6 Ω

ANSWER

Answer: (3)

EXPLANATION

Apply series & parallel combination to calculate the value of resistance.

2) Two identical resistors connected in series send 10 A through 5 Ω resistor. When same cell connected in parallel sends 8 A. The internal resistance of each cell will be

1. 0 Ω
2. 5 Ω
3. 2.5 Ω
4. 7.5 Ω

ANSWER

Answer: (3)

EXPLANATION

When two identical cells are connected in parallel.

$2E = (5 + 2r) \times 10$

When these cells are connected in series.

$E = (5 + r/2) \times 8$

Rearrange both equation and calculate value of r

We get r = 2.5 Ω

24) When n resistance of r ohm connected in parallel give R total resistance. If all those resistance are connected in series, total resistance will be

1. $n \times R$
2. R / n^2
3. $n^2 \times R$
4. R / n

ANSWER

Answer: (3)

EXPLANATION

When connected in parallel.

$R = r / n$ i.e. $r = n \times R$

When resistance of each resistance is r×R in series and there are n total number of resistance. Total resistance will be

$n \times n \times R = n^2 \times R$

27) What will be the internal resistance of cell, if it supplies 0.9 A current through 2 Ω resistor and 0.3 A current through 7 Ω resistor.

1. 0.9 Ω
2. 1.2 Ω
3. 1 Ω
4. 0.5 Ω

ANSWER

Answer: (4)

EXPLANATION

Let E and r be the e.m.f and internal resistor of cell.

For first case,

0.9 = (E/2+r)

For second case,

0.3= (E/7+r)

Solving equations, we get

r = 5 Ω

28) A battery of 50 V connected across 10 Ω resistor draws 4.5 A current. The internal resistance of the battery is

1. 0 Ω
2. 5 Ω
3. 0.5 Ω
4. 4.05 Ω

ANSWER

Answer: (4)

EXPLANATION

E = v + iR

= 50 + 4.50 x 10

= 95

internal resistance r = R (E / v – 1)

= 4.5 (95 / 50)-1

= 4.05

34) Current divides itself through resistance connected in parallel by

1. Inverse ratio of resistance
2. Direct ratio of resistance
3. Direct ratio of potential
4. None of the above

ANSWER

Answer: (1)

EXPLANATION

The resistive value of each branch determines the amount of current flowing within that branch. Greater the resistance, smaller will be the current flowing through it.

5) Two bulb rated at 25 W, 110 V and 100 W, 110 V are connected across 220 V supply. What will happen ?

1. 100 W bulb will burn out
2. 25 W bulb will burn out
3. Both bulb will burn out
4. No bulb will burn out

ANSWER

Answer: (2)

EXPLANATION

Using the formula W = E^2/R, we can work out that the resistance of the 25W lamp is 484 ohms, and that of the 100W lamp is 121 ohms. From this we can work out that at 110V, the 25W bulb draws 22mA and the 100W bulb draws 91mA.

If you put the two lamps in series across 220V, the total resistance is 605 ohms, and so a current of 36.36mA flows through both lamps. The voltage drop across the 25W bulb is therefore now 176 volts. It is overloaded and will burn out.

41) hree conductance G_1 , G_2 , G_3 are connected in parallel. If the total circuit current is 4 A, the current in G_1 will be

1. 1.2 A
2. 2 A
3. 0.8 A
4. 4 A

ANSWER

Answer: (2)

EXPLANATION

As conductance is reciprocal of resistance, so if conductance is assumed to be connected in parallel. Series resistance formula will apply on it. Thus,

$G = G_1 + G_2 + G_3$ $G = 0.5+0.3+0.2$ $G = 1$ S

Current in $G_1 = 4 \times (G_1 / G_2)$ Current in $G_1 = 4 \times (0.5/0.3)$ Current in $G_1 = 2$ A

44) The power dissipated in a resistor can be calculated in term of conductance as

1. $I^2 G$
2. I^2 / G
3. G^2 / I
4. None of the above

ANSWER

Answer: (2)

EXPLANATION

Conductance is reciprocal of resistance. So, its power calculation formula will also be with reciprocal of resistance. i.e. I^2/G

1) An active element in a circuit is one which ____________

1. Receives energy
2. Supplies energy
3. Both receives and supplies energy
4. None of the above

ANSWER

Answer: (2)

EXPLANATION

An active component is an electronic component which supplies energy to a circuit.

2) A passive element in a circuit is one which __________

1. Receives energy
2. Supplies energy
3. Both receives and supplies energy
4. None of the above

ANSWER

Answer: (1)

EXPLANATION

A passive element is an electrical component that does not generate power, but instead dissipates, stores, and/or releases it.

3) A linear circuit is one whose parameter ________

1. Changes with change in current
2. Changes with change in voltage
3. Changes with both voltage and current
4. Do not changes with voltage and current

ANSWER

Answer: (4)

EXPLANATION

A linear circuit is an electric circuit in which circuit parameters (Resistance, inductance, capacitance, waveform, frequency etc) are constant. In other words, a circuit whose parameters are not changed with respect to Current and Voltage is called Linear Circuit.

4) The superposition theorem is used when the circuit contains

____

1. A single voltage sources
2. A number of voltage sources
3. Only passive elements
4. None of the above

ANSWER

Answer: (2)

EXPLANATION

The superposition theorem for electrical circuits states that for a linear system the response (voltage or current) in any branch of a bilateral linear circuit having more than one independent source equals the algebraic sum of the responses caused by each independent source acting alone.

5) Norton theorem is _____________ thevenin’s theorem.

1. The same as
2. Converse of
3. Cannot say
4. None of the above

ANSWER

Answer: (2)

EXPLANATION

Norton’s Thereom is identical to Thevenin’s Theorem except that the equivalent circuit is an independent current source in parallel with an impedance (resistor). Therefore, the Norton equivalent circuit is a source transformation of the Thevenin equivalent circuit.

7) Norton theorem is _______ form of an equivalent circuit.

1. Both current and voltage
2. Current
3. Voltage
4. None of the above

ANSWER

Answer: (2)

EXPLANATION

Norton’s Theorem is a way to reduce a network to an equivalent circuit composed of a single current source and parallel resistance.

8) In the analysis of transistor theorem, we usually uses ________ theorem.

1. Norton
2. Thevinin
3. Reciprocity
4. Superposition

ANSWER

Answer: (1)

EXPLANATION

Norton’s theorem is usually used in the analysis of transistor circuit.

6. In an AC circuit a low value of KVAR compared with KW indicates

A. Low efficiency
B. High power factor
C. Unity power factor
D. Maximum load current

✔ View Answer

B. High power factor

1. In a parallel circuit, we consider ____________ instead of impedance.

a) Resistance

b) Capacitance

c) Inductance

d) Admittance

View Answer

Answer: d

Explanation: In a parallel circuit, we consider admittance instead of impedance, where admittance is the reciprocal of impedance.

3. Which, among the following is the correct expression for impedance?

a) $Z=Y$

b) $Z=1/Y$

c) $Z=Y^2$

d) $Z=1/Y^2$

View Answer

Answer: b

Explanation: We know that impedance is the reciprocal of admittance, hence the correct expression for impedance is: $Z=1/Y$.

4. Which, among the following is the correct expression for admittance?

a) Y=Z

b) Y=1/Z

c) $Y=Z^2$

d) $Y=1/Z^2$

View Answer

Answer: b

Explanation: We know that admittance is the reciprocal of impedance, hence the correct expression for admittance is: Y=1/Z.

6. As the impedance increases, the admittance ____________

a) Increases
b) Decreases
c) Remains the same
d) Becomes zero

View Answer

Answer: b
Explanation: As the impedance increases, the admittance decreases because admittance is equal to 1/impedance.

7. if the impedance of a system is 4 ohm, calculate its admittance.

a) 0.25 ohm^{-1}

b) 4 ohm^{-1}

c) 25 ohm^{-1}

d) 0.4 ohm^{-1}

View Answer

Answer: a

Explanation: We know that: Y=1/Z.

Substituting the value of Z from the question, we get Y = 1/4 = 0.25 => Y= 0.25 ohm^{-1}.

8. The admittance of a system is 10 ohm^{-1}, calculate its impedance.

a) 10 ohm

b) 0.1 ohm

c) 1 ohm

d) 1.1 ohm

View Answer

Answer: b

Explanation: We know that: Z=1/Y.

Z = 1/10 = 0.1 => Z = 0.1 ohm.

9. In A parallel circuit, with any number of impedances, The voltage across each impedance is?

a) equal

b) divided equally

c) divided proportionaly

d) zero

View Answer

Answer: a

Explanation: In parallel circuits, the current across the circuits vary whereas the voltage remains the same. So, voltage across each impedance is equal in parallel circuit.

1. In a series RLC circuit, the phase difference between the current in the capacitor and the current in the resistor is?

a) 0^0

b) 90^0

c) 180^0

d) 360^0

View Answer

Answer: a

Explanation: In a series RLC circuit, the phase difference between the current in the capacitor and the current in the resistor is 0^0 because same current flows in the capacitor as well as the resistor.

2. In a series RLC circuit, the phase difference between the current in the inductor and the current in the resistor is?

a) 0^0

b) 90^0

c) 180^0

d) 360^0

View Answer

Answer: a

Explanation: In a series RLC circuit, the phase difference between the current in the inductor and the current in the resistor is 0^0 because same current flows in the inductor as well as the resistor.

3. In a series RLC circuit, the phase difference between the current in the capacitor and the current in the inductor is?

a) 0^0

b) 90^0

c) 180^0

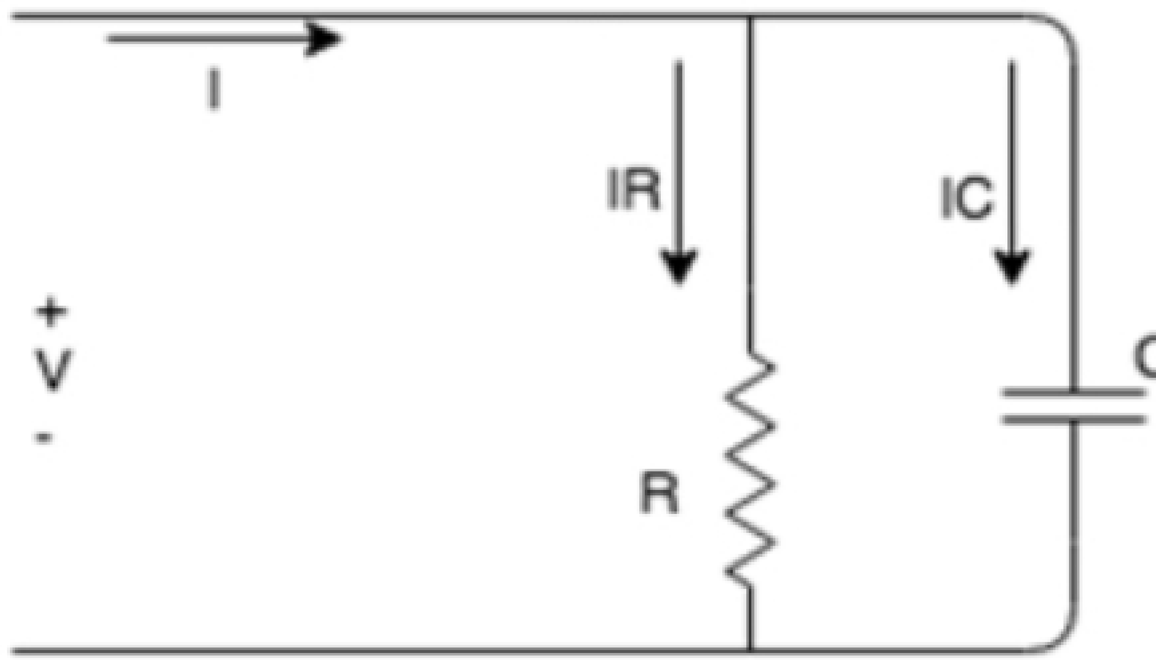
d) 360^0

View Answer

Answer: a

Explanation: In a series RLC circuit, the phase difference between the current in the inductor and the current in the capacitor is 0^0 because same current flows in the inductor as well as the capacitor.

1. From the given circuit, find the value of I_R.



a) 0

b) V/I

c) V/R

d) Cannot be determined

View Answer

Answer: c

Explanation: In the given circuit, the voltage across the resistor is the same as the source voltage as they are connected in parallel. The current in the resistor is I_R hence I_R=V/R.

ite down the equation for a sinusoidal voltage of 50 Hz and its peak value is 20 V. Draw the corresponding voltage versus time graph.

Solution

$f = 50\,Hz; \qquad V_m = 20\ V$

Instantaneous voltage, $\upsilon = V_m \sin\omega t$
$= V_m \sin 2\pi\nu t$

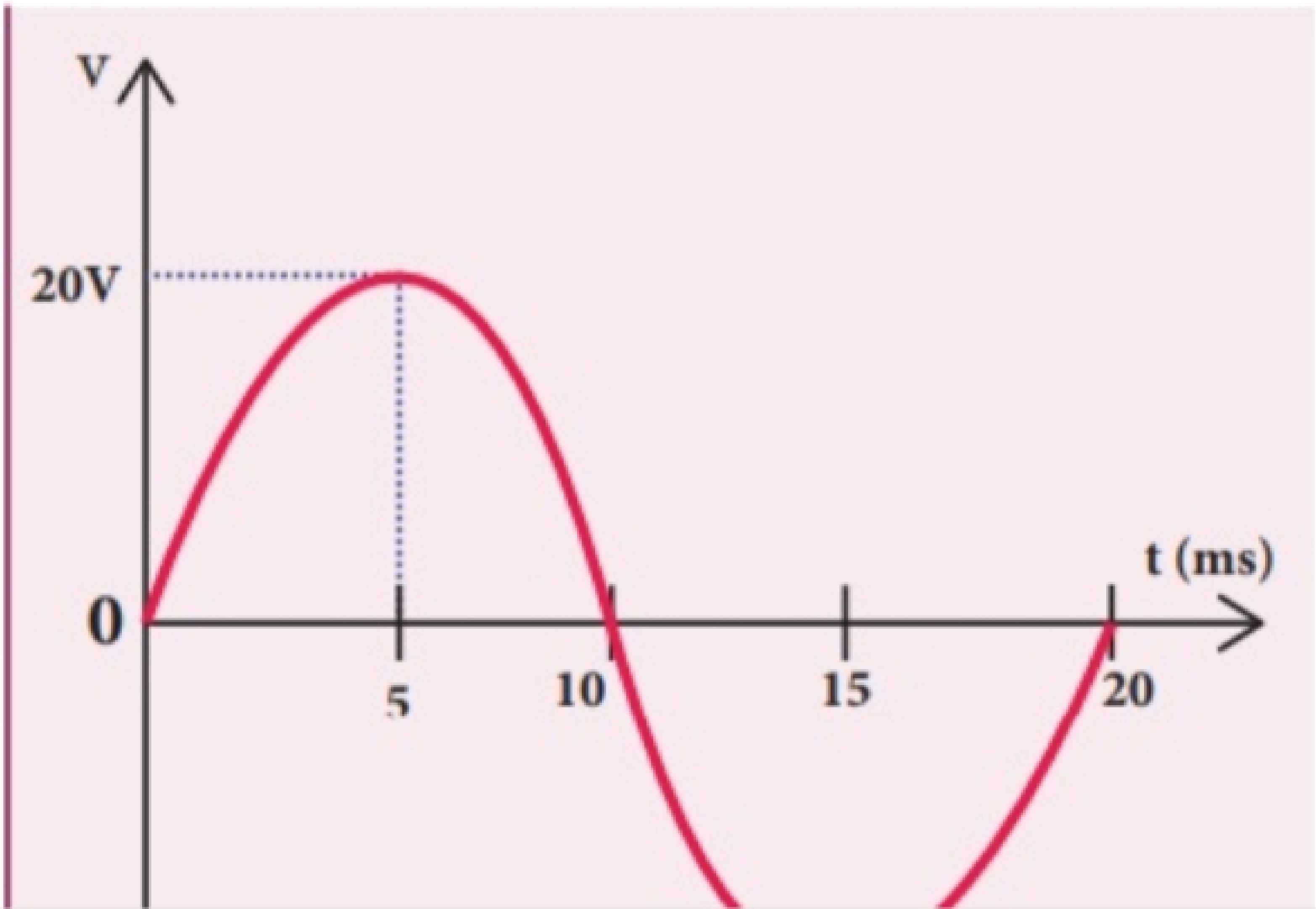
$= 20\sin(2\pi \times 50)t = 20\sin(100 \times 3.14)t$

$\upsilon = 20\sin 314t$

Time for one cycle, $T = \frac{1}{f} = \frac{1}{50} = 0.02\,s$

$= 20 \times 10^{-3}\,s \quad = 20\,ms$

The wave form is given below.



The equation for an alternating current is given by $i = 77 \sin 314t$. Find the peak value, frequency, time period and instantaneous value at t = 2 ms.

Solution

$i = 77 \sin 314t$; $t = 2$ ms $= 2\times10^{-3}$ s

The general equation of an alternating current is $i = I_m \sin \omega t$. On comparsion,

(i) Peak value, $I_m = 77$ A

(ii) Frequency, $f = \omega/2\pi = 314 / 2 \times 3.14 = 50$ Hz

Time period, $T = 1/f = 150 = 0 .02\ s$

(iv) At t = 2 m s,

Instantaneous value,

$i = 77\sin(314\times2\times10^{-3})$

$i = 45.24$ A

A 400 mH coil of negligible resistance is connected to an AC circuit in which an effective current of 6 mA is flowing. Find out the voltage across the coil if the frequency is 1000 Hz.

Solution

$L = 400 \times 10^{-3}$ H; $I_{eff} = 6 \times 10^{-3}$ A

$f = 1000$ Hz

Inductive reactance, $X_L = L\omega = L \times 2\pi f$

$= 2 \times 3.14 \times 1000 \times 0.4$

$= 2512\ \Omega$

Voltage across L,

$V = I X_L = 6 \times 10^{-3} \times 2512$

$V = 15.072 V (RMS)$

apacitor of capacitance $10^2/\pi$ μF is connected across a 220 V, 50 Hz A.C. mains. Calculate the capacitive reactance, RMS value of current and write down the equations of voltage and current.

Solution

$$C = \frac{10^2}{\pi} \times 10^{-6} F, \; V_{RMS} = 220\,V; f = 50 Hz$$

(i) Capacitive reactance,

$$X_C = \frac{1}{\omega C} = \frac{1}{2\pi f C}$$

$$= \frac{1}{2 \times \pi \times 50 \times \frac{10^{-4}}{\pi}} = 100\,\Omega$$

(ii) RMS value of current,

$$I_{RMS} = \frac{V_{RMS}}{X_C} = \frac{220}{100} = 2.2\,A$$

(iii) $V_m = 220 \times \sqrt{2} = 311\,V$

$$I_m = 2.2 \times \sqrt{2} = 3.1 A$$

Therefore,

$$\upsilon = 311 \sin 314 t$$

Find the impedance of a series RLC circuit if the inductive reactance, capacitive reactance and resistance are 184 Ω, 144 Ω and 30 Ω respectively. Also calculate the phase angle between voltage and current.

Solution

$X_L = 184\ \Omega$; $X_C = 144\ \Omega$

$R = 30\ \Omega$

(i) The impedance is

$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$
$$= \sqrt{30^2 + (184 - 144)^2}$$
$$= \sqrt{900 + 1600}$$

Impedance, Z = 50 Ω

(ii) Phase angle is

$$\tan\phi = \frac{X_L - X_C}{R}$$

$$= \frac{184 - 144}{30} = 1.33$$

$$\phi = 53.1^\circ$$

A 500 μH inductor, $80/\pi^2$ pF capacitor and a 628 Ω resistor are connected to form a series RLC circuit. Calculate the resonant frequency and Q-factor of this circuit at resonance.

Solution

$L=500\times10^{-6}$H; $C = 80/\pi^2 \times10^{-12}$ F; R = 628Ω

(i) Resonant frequency is

(i) Resonant frequency is

$$f_r = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{500\times10^{-6}\times\frac{80}{\pi^2}\times10^{-12}}}$$

$$= \frac{1}{2\sqrt{40{,}000\times10^{-18}}}$$

$$= \frac{10{,}000\times10^{3}}{4}$$

$$f_r = 2500\ KHz$$

(ii) Q–factor

$$= \frac{\omega_r L}{R} = \frac{2\times3.14\times2500\times10^{3}\times500\times10^{-6}}{628}$$

$$Q = 12.5$$

Find the instantaneous value of alternating voltage υ = 10 sin(3 π×10⁴ t) volt at i) 0 s ii) 50 μs iii) 75 μs.

Solution

The given equation is υ = 10sin (3 π×10⁴ t)

(i) At t = 0 s,

$$\upsilon = 10\sin 0 = 0\ V$$

(ii) At t = 50 μs,

$$\upsilon = 10\sin\left(3\pi \times 10^{4} \times 50 \times 10^{-6}\right)$$
$$= 10\sin\left(150\pi \times 10^{-2}\right)$$
$$= 10\sin(4.71\ rad)$$
$$= 10 \times -0.99$$
$$= -9.9\ V$$

(iii) At t = 75 μs,

$$\upsilon = 10\sin\left(3\pi \times 10^{4} \times 75 \times 10^{-6}\right)$$
$$= 10\sin\left(225\pi \times 10^{-2}\right)$$
$$= 10\sin(7.071\ rad)$$
$$= 10 \times 0.709$$
$$= 7.09\ V$$

The current in an inductive circuit is given by 0.3 sin (200t – 40°) A. Write the equation for the voltage across it if the inductance is 40 mH.

Solution

$L = 40 \times 10^{-3}$ H; $i = 0.1 \sin (200t - 40^\circ)$

$X_L = \omega L = 200 \times 40 \times 10^{-3} = 8\ \Omega$

$V_m = I_m X_L = 0.3 \times 8 = 2.4$ V

In an inductive circuit, the voltage leads the current by 90o Therefore,

$v = Vm \sin (\omega t + 90^\circ)$

$v = 2.4 \sin(200t - 40 + 90^\circ)$

$v = 2.4 \sin(200t + 50^\circ)$volt

A capacitor of capacitance $10^{-4}/\pi$ F, an inductor of inductance $2/\pi$ H and a resistor of resistance 100 Ω are connected to form a series RLC circuit. When an AC supply of 220 V, 50 Hz is applied to the circuit, determine (i) the impedance of the circuit (ii) the peak value of current flowing in the circuit (iii) the power factor of the circuit and (iv) the power factor of the circuit at resonance.

Solution

$$L = \frac{2}{\pi} H; C = \frac{10^{-4}}{\pi} F; R = 100\Omega$$

$$V_{RMS} = 220\ V; f = 50\,Hz$$

$$X_L = 2\pi f L = 2\pi \times 50 \times 2/\pi = 200\Omega$$

$$X_C = \frac{1}{2\pi f C} = \frac{1}{2\pi \times 50 \times \frac{10^{-4}}{\pi}} = 100\Omega$$

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

$$=\sqrt{100^2+(200-100)^2}=141.4\,\Omega$$

(ii) Peak value of current,

$$I_m=\frac{V_m}{Z}=\frac{\sqrt{2}V_{RMS}}{Z}$$

$$=\frac{\sqrt{2}\times 220}{141.4}=2.2\text{ A}$$

(iii) Power factor of the circuit,

$$\cos\phi=\frac{R}{Z}=\frac{100}{141.4}=0.707$$

(iv) Power factor at resonance

$$\cos\phi=\frac{R}{Z}=\frac{R}{R}=1$$