1.

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

1. 0.2 sec
2. 0.25 sec
3. $25 \text{ x } 10^{-3}$ sec
4. $2.5 \text{ x } 10^{-3}$ sec

2.

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

(1) Zero

(2) 10 *W*

(3) 5 *W*

(4) 2.5 *W*

3.

The resistance of a coil for dc is in ohms. In ac, the resistance

(1) Will remain same

(2) Will increase

(3) Will decrease

(4) Will be zero

4.

A generator produces a voltage that is given by V = 240 sin 120 t, where t is in seconds. The frequency and *r.m.s*. voltage are

(1) 60 *Hz* and 240 V

(2) 19 *Hz* and 120 V

(3) 19 *Hz* and 170 V

(4) 754 *Hz* and 70 V

5.

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

(1) 20 *watts*

(2) 40 *watts*

(3) 1000 *watts*

(4) 0 *watt*

6.

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

(1) 0.2 *sec*

(2) 0.25 *sec*

(3) 25×10^{-3} *sec*

(4) 2.5×10^{-3} *sec*

7.

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

(1) $\tan^{-1}\frac{4}{3}$

(2) $\tan^{-1}\frac{3}{4}$

(3) $\tan^{-1}\frac{3}{2}$

(4) $\tan^{-1}\frac{2}{5}$

8.

In a *LCR* circuit having L = 8.0 *henry*, C = 0.5 *μF* and R = 100 *ohm* in series. The resonance frequency in radian *per second* is

(1) 600 *radian*

(2) 600 *Hz*

(3) 500 *radian*

(4) 500 *Hz*

9.

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

(1) 0

(2) π/2

(3) π

(4) –π

10.

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

(1) 30°

(2) 45°

(3) 60°

(4) 90°

11.

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

(1) $\pi/3$

(2) $\pi/2$

(3) $\pi/4$

(4) $\pi/6$

12.

The capacity of a pure capacitor is 1 *farad*. In dc circuits, its effective resistance will be

(1) Zero

(2) Infinite

(3) 1 *ohm*

(4) 1/2 *ohm*

13.

In a *LCR* circuit the pd between the terminals of the inductance is 60 *V*, between the terminals of the capacitor is 30*V* and that between the terminals of resistance is 40*V*. the supply voltage will be equal to ……

(1) 50 *V*

(2) 70 *V*

(3) 130 *V*

(4) 10 *V*

14.

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

(1) $\frac{E_0^2}{R}$

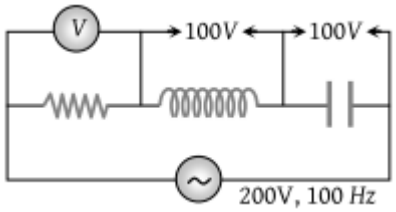
(2) $\frac{E_0^2}{2R}$

(3) $\frac{E_0^2}{4R}$

(4) $\frac{E_0^2}{8R}$

15.

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



(1) 300 *V*

(2) 900 *V*

(3) 200 *V*

(4) 400 *V*

16.

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

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

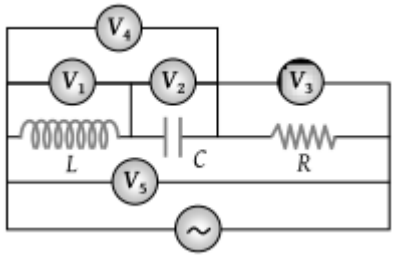
(2) $\frac{\sqrt{5}R}{2}, \tan^{-1}\left(\frac{1}{2}\right)$

(3) $\sqrt{5}X_C, \tan^{-1}\left(2\right)$

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

17.

In the adjoining ac circuit the voltmeter whose reading will be zero at resonance is



(1) V_1

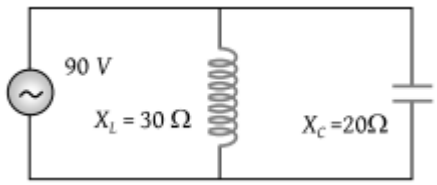
(2) V_2

(3) V_3

(4) V_4

18.

In the adjoining figure the impedance of the circuit will be



(1) 120 *ohm*

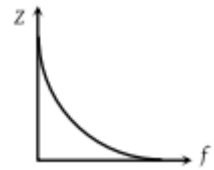
(2) 50 *ohm*

(3) 60 *ohm*

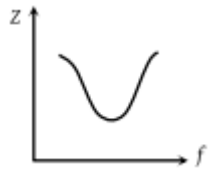
(4) 90 *ohm*

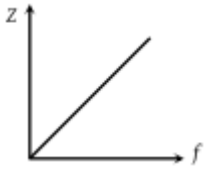
19.

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

(1) 

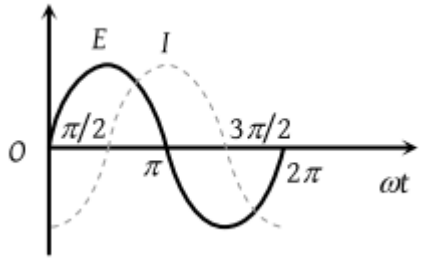
(2) 

(3) 

(4) 

20.

The variation of the instantaneous current (I) and the instantaneous emf (E) in a circuit is as shown in fig. Which of the following statements is correct



(1) The voltage lags behind the current by $\pi / 2$

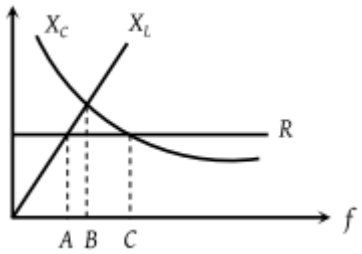
(2) The voltage leads the current by $\pi / 2$

(3) The voltage and the current are in phase

(4) The voltage leads the current by π

21.

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



(1) *A*

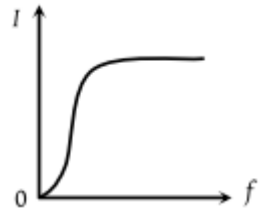
(2) *B*

(3) *C*

(4) All points

22.

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

(1) 

(2) 

(3) 

(4) 

23.

A filament bulb (500 W,100 V) is to be used in a 230 V main supply. When a resistance R is connected in series, it works perfectly and the bulb consumes 500 W. The value of R is

(a) 230Ω (b) 46Ω

(c) 26Ω (d) 13Ω

24.

The potential differences across the resistance, capacitance and inductance are 80V, 40Vand 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) 1.0

25.

An inductor 20 mH, a capacitor 50μF and a resistor 40Ω are connected in series across a source of emf V=10sin340t. The power loss in the AC circuit is :

(a) 0.67 W (b) 0.78W (c) 0.89 W (d) 0.46 W

26.

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

1. When capacitor is air filled.

2. When capacitor is mica filled.

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

(a)$V_a<V_b$

(b)$V_a>V_b$

(c)$i_a>i_b$

(d)$V_a=V_b$

27.

The instantaneous values of alternating current and voltages in a circuit are given as

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

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

The average power in Watts consumed in the circuit is

(a) $\frac{1}{4}$

(b) $\frac{\sqrt{3}}{4}$

(c) $\frac{1}{2}$

(d) $\frac{1}{8}$

28.

In an AC circuit an alternating voltage $\mathrm{e}=200\sqrt{2}\sin 100\mathrm{t}$ volt is connected to a capacitor $1\ \mu\mathrm{F}$. The rms value of the current in the circuit is

(a) 100 mA

(b) 200 mA

(c) 20 mA

(d) 10 mA

29.

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

$e=E_o\ \sin\ \omega t$

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

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

(a)$\frac{E_oI_o}{2}$

(b) $\frac{E_oI_o}{2}\sin\ \phi$

(c) $\frac{E_oI_o}{2}\cos\ \phi$

(d) E_oI_o

30.

Assertion: In transistor common emitter mode as an amplifier is preferred over common base mode.

Reason: In common emitter mode the input signal is connected in series with the voltage applied to the base emitter junction.

31.

A wire of resistance R is connected in series with an inductor of reactance ωL. Then quality factor of RL circuit is

1. $\frac{R}{\omega L}$
2. $\frac{\omega L}{\mathrm{R}}$
3. $\frac{R}{\sqrt{R^2+\omega^2L^2}}$
4. $\frac{\omega L}{\sqrt{R^2+\omega^2L^2}}$

32.

For a series LCR circuit, the power loss at resonance is

1. $\frac{V^2}{\left(\omega L-\frac{1}{\omega C}\right)}$
2. $I^2L\omega$
3. $\mathrm{I^2R}$
4. $\frac{V^2}{C\omega}$

33.

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

1. $\frac{1}{2\pi \mathrm{f}(2\pi \mathrm{f\,L}-\mathrm{R})}$
2. $\frac{1}{2\pi \mathrm{f}(2\pi \mathrm{f\,L}+\mathrm{R})}$
3. $\frac{1}{\pi \mathrm{f}(2\pi \mathrm{f}\,L-R)}$
4. $\frac{1}{\pi \mathrm{f}(2\pi \mathrm{f}\,L+R)}$

34.

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

1. 0.56
2. 0.64
3. 0.80
4. 0.33

35.

What is the value of inductance L for which the current is maximum in a series LCR circuit with C = 10μF and ω = 1000 $\mathrm{s^{-1}}$?

1. 1 mH
2. cannot be calculated unless R is known
3. 10 mH
4. 100 mH

36.

The primary and secondary coils of a transformer have 5O and 1500 turns respectively. If the magnetic flux ϕ linked with the primary coils is given by $\phi = \phi_0 + 4t$, where ϕ is in webers, t is time in second and ϕ_0 is a constant, the output voltage across the secondary coil is

1. 120 V
2. 220 V
3. 30 V
4. 90 V

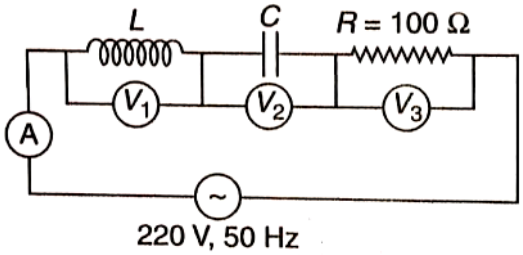
37.

The power dissipated in an LCR series circuit connected to an A.C. source of emf ε is

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

38.

In the given circuit the reading of voltmeter V_1 and V_2 are 300V each. The reading of the voltmeter $\mathrm{V_3}$ and ammeter A are respectively



1. 100 V, 2.0 A
2. 150 V, 2.2 A
3. 220 V, 2.2 A
4. 220 V, 2.0 A

39.

A 220 V input is supplied to a transformer. The output circuit draws a current of 2.0 A at 440 V. If the efficiency of the transformer is 80%, the current drawn by the primary windings of the transformer is

1. 5.0 A
2. 3.6 A
3. 2.8 A
4. 2.5 A

40.

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

1. zero
2. $\pi/6$
3. $\pi/4$
4. $\pi/2$

41.

In an ac circuit an alternating voltage e = $200\sqrt{2}$ sin100t V is connected to capacitor of capacity 1 μF. rms value of the current in the circuit is

1. 20 mA
2. 10 mA
3. 100 mA
4. 200 mA

42.

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

1. 2.0 A
2. 4.0 A
3. 8.0 A
4. $\frac{20}{\sqrt{13}}$ A

43.

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 C is removed from the circuit, the phase difference is again $\pi/3$. The power factor of the circuit is

1. $\frac{1}{2}$
2. $\frac{1}{\sqrt{2}}$
3. 1
4. $\frac{\sqrt{3}}{2}$

44.

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

1. Current I(t) is in phase with voltage V(t)
2. current I(t) leads voltage V(t) by 180°
3. current I(t) lags voltage V(t) by 90°
4. Over a full cycle, the capacitor C does not consume any energy from the voltage source.

45.

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

1. R = 25 Ω, L = 2.5 h, C = 45 μF
2. R = 15 Ω, L = 3.5 h, C = 30 μF
3. R = 25 Ω, L = 1.5 h, C = 45 μF
4. R = 20 Ω, L = 1.5 h, C = 35 μF

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