PHYSICS (DPP - 1)

AC

1. r.m.s. value of current i = 3 + 4 sin (ωt + π/3) A is :

(A) 5 A (B) $\sqrt{17}$ A (C) $\frac{5}{\sqrt{2}}$ A (D) $\frac{7}{\sqrt{2}}$ A

2. The peak value of an alternating e.m.f E given by E = E_0 cos ωt is 10 volt and frequency is 50 Hz. At time t = (1/600) sec, the instantaneous value of e.m.f is :

(A) 10 volt (B) $5\sqrt{3}$ volt (C) 5 volt (D) 1 volt

3. An alternating voltage is given by : e = e_1 sinωt + e_2 cosωt. Then the root mean square value of voltage is given by :

(A) $\sqrt{e_1^2 + e_2^2}$ (B) $\sqrt{e_1 e_2}$ (C) $\sqrt{\frac{e_1 e_2}{2}}$ (D $\sqrt{\frac{e_1^2 + e_2^2}{2}}$

4. An AC voltage is given by :

$$E = E_0 \sin \frac{2\pi t}{T}$$

Then the mean value of voltage calculated over time interval of T/2 seconds :
(A) is always zero (B) is never zero (C) is ($2E_0/\pi$) always (D may be zero

5. If the frequency of the source e.m.f. in an AC circuit is n, the power varies with a frequency :
(A) n (B) 2 n (C) n/2 (D) zero

6. An AC voltage of $V = 220\sqrt{2}\ \sin\left(2\pi 50\, t + \frac{\pi}{2}\right)$ is applied across a DC voltmeter, its reading will be:

(A) $220\sqrt{2}$ V (B) $\sqrt{2}$V (C) 220 V (D zero

7. The r.m.s value of an A.C. of 50 Hz is 10 amp. The time taken by the alternating current in reaching from zero to maximum value find the peak value will be -
(A) 2×10^{-2} sec and 14.14 amp (B) 1×10^{-2} sec and 7.07 amp
(C) 5×10^{-3} sec and 7.07 amp (D 5×10^{-3} sec and 14.14 amp

8. If instantaneous current is given by i = 4 cos (ωt + ϕ) amperes, then the r.m.s value of current is -

(A) 4 amperes (B) $2\sqrt{2}$ amperes (C) $4\sqrt{2}$ amperes (D) zero amperes

9. The potential difference V across and the current I flowing through an instrument in an AC circuit are given by :

V = 5 cos ωt volt

I = 2 sin ωt volt

The power dissipated in the instrument is :
(A) zero (B) 5 watt (C) 10 watt (D) 2.5 watt

10. A sinusoidal AC current flows through a resistor of resistance R. If the peak current is I_p, then average power dissipated is :

(A) $I_p^2 R\cos\theta$ (B) $\frac{1}{2} I_p^2 R$ (C) $\frac{4}{\pi} I_p^2 R$ (D) $\frac{1}{\pi^2} I_p^2 R$

PHYSICS (DPP - 2)

AC

1. A coil of inductance 5.0 mH and negligible resistance is connected to an alternating voltage V = 10 sin (100 t). The peak current in the circuit will be :
(A) 2 amp (B) 1 amp (C) 10 amp (D 20 amp

2. An alternating voltage $E = 200\sqrt{2}$ sin (100 t) is connected to a 1 microfarad capacitor through an A.C. ammeter. The reading of the ammeter shall be -
(A) 10 mA (B) 20 mA (C) 40 mA (D) 80 mA

3. A 0.21-H inductor and a 88-Ω resistor are connected in series to a 220-V, 50-Hz AC source. The current in the circuit and the phase angle between the current and the source voltage are respectively. Use $\pi = 22/7$.
(A) 2 A, $\tan^{-1} 3/4$ (B) 14.4 A, $\tan^{-1} 7/8$ (C) 14.4 A, $\tan^{-1} 8/7$ (D) 3.28 A, $\tan^{-1} 2/11$

4. In an L-R series circuit ($L = \frac{175}{11}$ mH and R = 12Ω), a variable emf source ($V = V_0 \sin \omega t$) of $V_{rms} = 130\sqrt{2}$ V and frequency 50 Hz is applied. The current amplitude in the circuit and phase of current with respect to voltage are respectively(Use $\pi = 22/7$)

(A) 14.14A, 30° (B) $10\sqrt{2}$ A, $\tan^{-1}\frac{5}{12}$ (C) 10 A, $\tan^{-1}\frac{5}{12}$ (D 20 A, $\tan^{-1}\frac{5}{12}$

5. In an AC circuit, a resistance of R ohm is connected in series with an inductance L. If phase angle between voltage and current be 45°, the value of inductive reactance will be.
(A) R/4 (B) R/2 (C) R (D) cannot be found with the given data

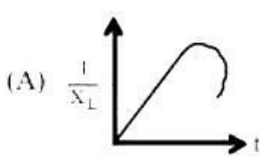
6. In an AC circuit the potential differences across an inductance and resistance joined in series are respectively 16 V and 20 V. The total potential difference across the circuit is
(A) 20 V (B) 25.6 V (C) 31.9 V (D) 53.5 V

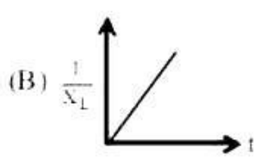
7. In a pure inductive circuit or in an A.C. circuit containing inductance only, the current-
(A) Leads the e.m.f. by 90°
(B) Lags behind the e.m.f. by 90°
(C) Sometimes leads and sometime lags behind the e.m.f.
(D) Is in phase with the e.m.f.

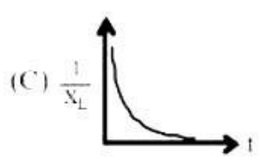
8. A bulb is rated at 100 V, 100 W, it can be treated as a resistor. Find out the inductance of an inductor (called choke coil) that should be connected in series with the bulb to operate the bulb at its rated power with the help of an ac source of 200V and 50 Hz.

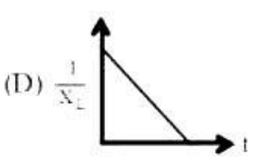
(A) $\frac{\pi}{\sqrt{3}}$ H (B) 100 H (C) $\frac{\sqrt{2}}{\pi}$ H (D) $\frac{\sqrt{3}}{\pi}$ H

9. In pure inductive circuit, the curves between frequency f and inductive reactance $1/X_L$ is –

(A) 

(B) 

(C) 

(D) 

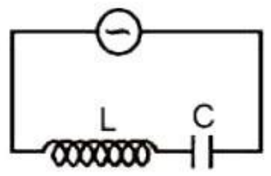
10. A 60 W/120 V bulb is connected to a 240/60 Hz supply with an inductance in series. Find the value of inductance so that bulb gets correct voltage –

(A) $\frac{2.3}{\pi}$ H (B) $2\sqrt{3}$ H (C) π H (D) $\frac{2\sqrt{3}}{\pi}$ H

PHYSICS (DPP - 3)

AC

1. In following diagram voltage on L and C is -

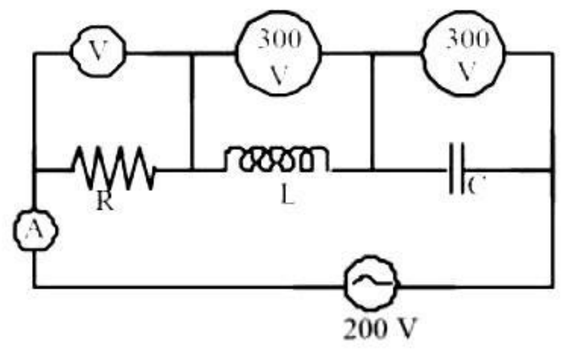


(A) In same phase
(B) With phase angle of 90°
(C) In phase angle of 180°
(D) It will depends on the value of L and C

2. A 100 volt AC source of angular frequency 500 rad/s is connected to a LCR circuit with L = 0.8 H, C = 5 μF and R = 10 Ω, all connected in series. The potential difference across the resistance is

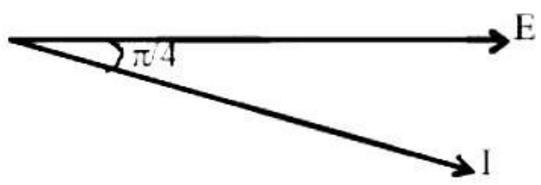
(A) $\frac{100}{\sqrt{2}}$ volt (B) 100 volt (C) 50 volt (D) $50\sqrt{3}$

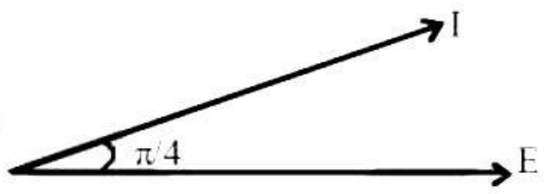
3. In the series circuit shown in the figure the voltmeter reading will be –

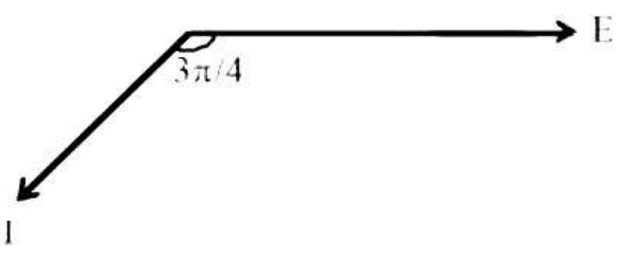


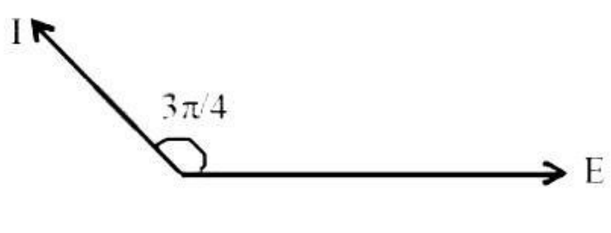
(A) 300 V (B) 900 V (C) 200 V (D) 100 V

4. In a certain circuit E = 200 cos (314t) and I = sin (314t + π/4). Their vector representation is –

(A)


(B)


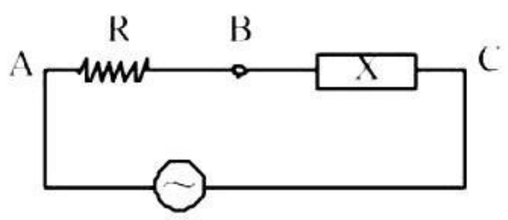
(C)


(D)


5. A choke coil is preferred to a rheostat in AC circuit as-

(A) It consumes almost zero power (B) It increases current
(C) It increases power (D) It increases voltage

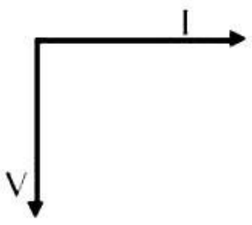
6. A unknown circuit element X is connected in series with a resistor R to an ac source. If $V_{AB} = V_{AC}$ (rms value), then X is-

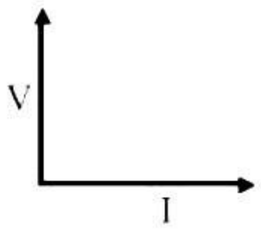


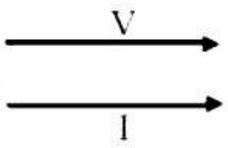
(A) Pure resistor (B) Pure capacitor
(C) Pure conductor (D) Combination of conductor & capacitor at resonance

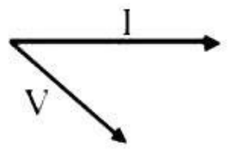
7. A coil when connected to a dc source of 12 V, carries a current of 4 A. If this coil is connected to an ac source of 12 V and 50 rad/s, then it carries a current of 2.4 A. The inductance of the coil is -
(A) 48 H (B) 4 H (C) 12.5 H (D) 8×10^{-2} H

8. Which of the following figure showing the phase relationship is correct phase diagram for an R–C circuit-

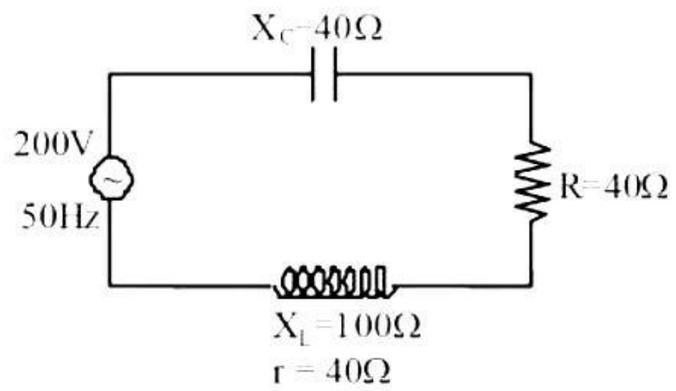
(A) 

(B) 

(C) 

(D) 

9. The power factor of the following circuit will be-



(A) 0.2 (B) 0.4 (C) 0.6 (D) 0.8

10. The reactance of a capacitor is X_1 for frequency n_1 and X_2 for frequency n_2 then $X_1 : X_2$ is -
(A) 1 : 1 (B) $n_1 : n_2$ (C) $n_2 : n_1$ (D) $n_1^2 : n_2^2$

PHYSICS (DPP - 4)

AC

1. The value of power factor cosϕ in series LCR circuit at resonance is :
(A) zero (B) 1 (C) 1/2 (D) 1/2 ohm

2. A series LCR circuit containing a resistance of 120 ohm has angular resonance frequency 4×10^3 rad s^{-1}. At resonance, the voltage across resistance and inductance are 60V and 40 V respectively. The values of L and C are respectively :
(A) 20 mH, 25/8 μF (B) 2mH, 1/35 μF (C) 20 mH, 1/40 μF (D) 2mH, 25/8 nF

3. In an LCR circuit, the capacitance is made one-fourth, when in resonance. Then what should be the change in inductance, so that the circuit remains in resonance ?
(A) 4 times (B) 1/4 times (C) 8 times (D) 2 times

4. A resistor R, an inductor L and a capacitor C are connected in series to an oscillator of frequency n. If the resonant frequency is n_r, then the current lags behind voltage, when :
(A) n = 0 (B) $n < n_r$ (C) $n = r_r$ (D $n > n_r$

5. A 10 ohm resistance 0.5 mH coil and 10μF capacitor are joined in series when a suitable frequency of alternating current source is joined to this combination, the circuit resonates. If the resistance is halved the resonance frequency-
(A) is halved (B) is doubled (C) remains unchanged (D) is quadrupled

6. At a frequency more than the resonance frequency, the nature of an anti resonant circuit is-
(A) resistive (B) capacitive (C) inductive (D) all of the above

7. A power (step up) transformer with an 1 : 8 turn ratio has 60 Hz, 120 V across the primary; the load in the secondary is 10^4 Ω. The current in the secondary is
(A) 96 A (B) 0.96 A (C) 9.6 A (D 96 mA

8. A transformer is used to light a 140 watt, 24 volt lamp from 240 V AC mains. The current in the main cable is 0.7 amp. The efficiency of the transformer is :
(A) 48% (B) 63.8% (C) 83.3% (D) 90%

9. In an alternating RL circut expression of the value of quality factor is-
(A) $\frac{\omega L}{R}$ (B) $\sqrt{LC}$ (C) $\frac{L}{R}$ (D) None of these

10. In a step-up transformer the turns ratio is 10. If the frequency of the current in the primary coil is 50 Hz then the frequency of the current in the secondary coil will be
(A) 500 Hz (B) 5 Hz (C) 60 Hz (D 50 Hz