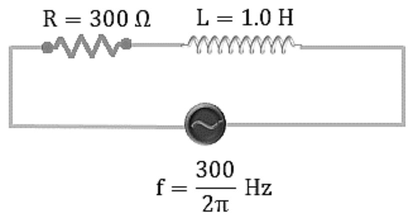
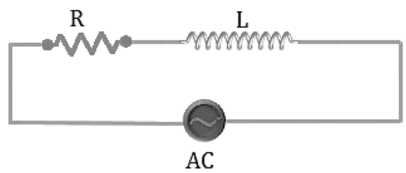
Q.1 A coil of resistance $\mathbf{300\ \Omega}$ and inductance $\mathbf{1.0\ H}$ is connected across an alternating voltage of frequency $\frac{\mathbf{300}}{\mathbf{2\pi}}$ **Hz.** Calculate the phase difference between the voltage and current in the circuit.



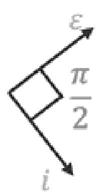
(A) $\frac{\pi}{3}$ (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{4}$ (D) π

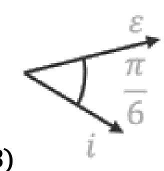
Q.2 A circuit contains a resistance **R** and an inductance **L** in series. An alternating voltage $\mathbf{V = V_0 \sin \omega t}$ is applied across it. The currents in **R** and **L** respectively will be ($\mathbf{I_0}$ is the peak current)

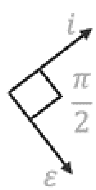


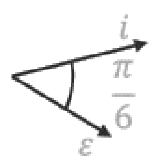
(A) $I_R = I_0 \cos \omega t, I_L = I_0 \cos \omega t$ (B) $I_R = I_0 \sin \omega t, I_L = I_0 \cos \omega t$
(C) $I_R = I_0 \sin \omega t, I_L = -I_0 \cos \omega t$ (D) $I_R = I_L = I_0 \sin \omega t$

Q.3 An AC voltage $\boldsymbol{\varepsilon = 220 \sin(\omega t - \pi/6)}$ is connected across a certain device. The current flowing through this device is $\mathbf{i = 115 \sin(\omega t + \pi/3)}$. the correct phasor diagram, of applied voltage and current flowing in the circuit is.

(A)


(B)


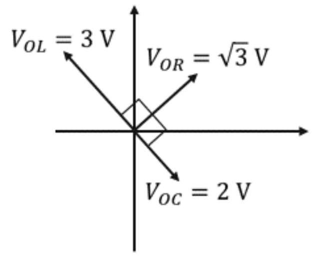
(C)


(D)


Q.4 An inductive circuit contains resistance of 1 2 and an inductance of 2.0 H. If an AC voltage of 120 V and frequency 60 Hz is applied to this circuit, the current would be nearly

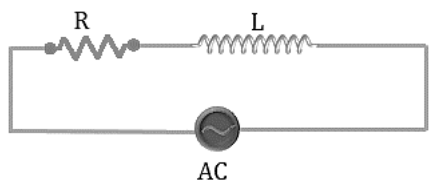
(A) 0.8 A (B) 0.48 A (C) 0.16 A (D) 0.32 A

Q.5 The given figure represents the phasor diagram of a series **LCR** circuit connected to an **AC** source. At instant **t** when the source voltage is given by $\mathbf{V = V_0 \cos \omega t}$, the current in the circuit in terms of peak current $\mathbf{I_0}$ will be



(A) $I = I_0\cos(\omega t + \frac{\pi}{6})$ **(B)** $I = I_0\cos(\omega t - \frac{\pi}{6})$ **(C)** $I = I_0\cos(\omega t + \frac{\pi}{3})$ **(D)** $I = I_0\cos(\omega t - \frac{\pi}{3})$

Q.6 When **100 VDC** is applied across a solenoid, a current of **1 A** flows in it. When **100 VAC** is applied across the same coil, the current drops to **0.5 A.** If the frequency of the **AC** source is **50 Hz**, the impedance and inductance of the solenoid are



(A) 100 Ω, 0.93 H **(B)** 200 Ω, 1.0 H **(C)** 10 Ω, 0.86 H **(D)** 200 Ω, 0.55 H

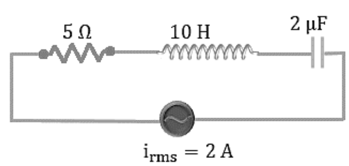
Q.7 A **12 Ω** resistance and an inductance of $\frac{0.05}{\pi}$ **H** with negligible resistance are connected in series. Across the ends of this circuit a **130 V** alternating voltage of frequency **50 Hz** is connected. Calculate the alternating current in the circuit and the potential difference across the resistance.

(A) 10 A, 50 V **(B)** 10 A, 120 V **(C)** 5 A, 50 V **(D)** 10 A, 120 V

Q.8 In an **AC** circuit, the impedance is $\sqrt{3}$ times the**R.** Then, the phase angle is

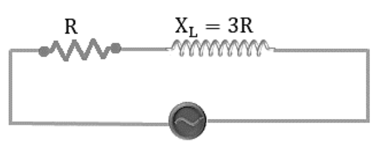
(A) $\cos^{-1}\left(\frac{1}{\sqrt{2}}\right)$ **(B)** $\cos^{-1}\left(\frac{1}{3}\right)$ **(C)** $\cos^{-1}\left(\frac{1}{2}\right)$ **(D)** $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$

Q.9 A capacitor $\mathbf{C = 2\ \mu F}$ and an inductor with $\mathbf{L = 10\ H}$ and coil resistance **5 Ω** are in series in a circuit. When an alternating current of **rms** value **2 A** flows in the circuit, the average power (in **W**) in the circuit is



(A) 100 **(B)** 50 **(C)** 20 **(D)** 10

Q.10 In series **LR** circuit, $\mathbf{X_L = 3R}$. Now a capacitor with $\mathbf{X_C = R}$ is added in series. Ratio of new to old power factor is



(A) 1 **(B)** 2 **(C)** $\frac{1}{\sqrt{2}}$ **(D)** $\sqrt{2}$

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(C)	(D)	(C)	(C)	(B)	(D)	(D)	(D)	(C)	(D)