JEE 2023

Alternating Current

DPP-04

1. The current in series LCR circuit will be maximum when ω is

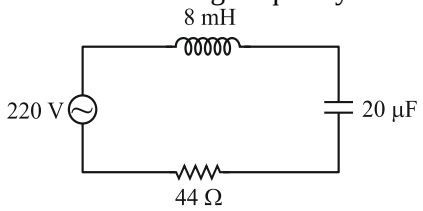
(1) As large as possible

(2) Equal to natural frequency of LCR system

(3) $\sqrt{LC}$

(4) $\sqrt{\frac{1}{LC}}$

2. For the series LCR circuit shown in the figure, what is the resonance frequency and the amplitude of the current at the resonating frequency



(1) $2500\,rad-s^{-1}$ and $5\sqrt{2}A$

(2) $2500\,rad-s^{-1}$ and 5 A

(3) $2500\,rad-s^{-1}$ and $\frac{5}{\sqrt{2}}A$

(4) $25\,rad-s^{-1}$ and $5\sqrt{2}A$

3. The quality factor of LCR circuit having resistance (R) and inductance (L) at resonance frequency (ω) is given by

(1) $\frac{\omega L}{R}$ (2) $\frac{R}{\omega L}$

(3) $\left(\frac{\omega L}{R}\right)^{\frac{1}{2}}$ (4) $\left(\frac{\omega L}{R}\right)^{2}$

4. At resonance, the value of the power factor in an LCR series circuit is

(1) Zero (2) 1

(3) $\frac{1}{2}$ (4) Not defined

5. In LCR circuit the resonance frequency is 500 kHz. If the value of L is doubled and value of C is decreased to $\frac{1}{8}$ times of its initial values, then the new resonating frequency in kHz will be

(1) 250 (2) 500

(3) 1000 (4) 2000

6. In series LCR circuit voltage leads the current when (Given that ω_0 = resonant angular frequency)

(1) $\omega < \omega_0$ (2) $\omega = \omega_0$

(3) $\omega > \omega_0$ (4) None of these

7. A transmitter transmits at a wavelength of 300 m. A condenser of capacitance $2.4\mu F$ is being used. The value of the inductance for the resonant circuit is approximately.

(1) $10^{-4}H$ (2) $10^{-6}H$

(3) $10^{-8}H$ (4) $10^{-10}H$

8. A capacitor of capacitance $1\mu F$ is charged to a potential of 1 V. It is connected in parallel to an inductor of inductance $10^{-3}H$. The maximum current that will flow in the circuit has the value

(1) $\sqrt{1000}mA$ (2) 1 mA

(3) $1\mu A$ (4) 1000 mA

9. For an LCR series circuit with an ac source of angular frequency ω,

(1) circuit will be capacitive if $\omega > \frac{1}{\sqrt{LC}}$

(2) circuit will be inductive if $\omega = \frac{1}{\sqrt{LC}}$

(3) power factor of circuit will be unity if capacitive reactance equal inductive reactance

(4) current will be leading voltage if $\omega > \frac{1}{\sqrt{LC}}$

10. The value of current in two series LCR circuit at resonance is same. Then

(1) Both circuits must be having same value of capacitance and inductance

(2) in both circuits ratio of L and C will be same

(3) for both the circuits X_L / X_C must be same at the frequency

(4) both circuits must have same impedance at all frequencies

Answer Key

1. **(4)**
2. **(1)**
3. **(1)**
4. **(2)**
5. **(3)**
6. **(3)**
7. **(3)**
8. **(1)**
9. **(3)**
10. **(3)**