Physicsaholics

DPP – 2 (Alternating Current)

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Q 1. An alternating e.m.f. is applied to purely capacitive circuit. The phase relation between e.m.f. and current flowing in the circuit is or In a circuit containing capacitance only
(a) e.m.f. is ahead of current by π/2
(b) Current is ahead of e.m.f. by π/2
(c) Current lags behind e.m.f. by π
(d) Current is ahead of e.m.f. by π

Q 2. In a circuit containing an inductance of zero resistance, the current leads the applied a.c. voltage by a phase angle at
(a) 90° (b) 180°
(c) 0° (d) None of these

Q 3. The current in a circuit containing a capacitance C and a resistance R in series leads over the applied voltage of frequency $\frac{\omega}{2\pi}$ by.
(a) $\tan^{-1}\left(\frac{1}{\omega CR}\right)$ (b) $\tan^{-1}(\omega CR)$
(c) $\tan^{-1}\left(\frac{\omega C}{R}\right)$ (d) $\cos^{-1}(\omega CR)$

Q 4. In a series LCR circuit R=200(Ω) and the voltage and the frequency of the main supply is 220V and 50 Hz respectively. On taking out the capacitance from the circuit the current lags behind the voltage by 30°. On taking out the inductor from the circuit the current leads the voltage by 30°. The power dissipated in the LCR circuit is
(a) 305 W (b) 210 W
(c) zero (d) 242 W

Q 5. In a series LCR circuit the voltage across an inductor, capacitor and resistor are 20 V, 20 V and 40 V respectively. The phase difference between the applied voltage and the current in the circuit is
(a) 30° (b) 45°
(c) 60° (d) 0°

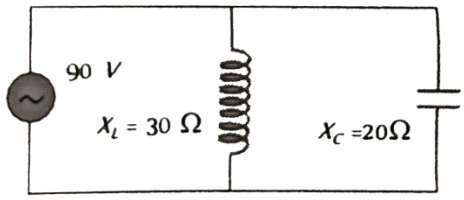
Q 6. In an LCR series circuit the voltages across R, L and C at resonance are 40V, 60V and 60V` respectively the applied voltage is
(a) 60 V (b) 40 V
(c) 160 V (d) $\sqrt{40^2 + 120^2}$

Q 7. In a series resonant LCR circuit the voltage across R is 100 volts and R = 1 kΩ with C = 2 μF. The resonant frequency ω is 200 rad/s. At resonance the voltage across L is

(a) 2.5×10^{-2}V (b) 40 V

(c) 250 V (d) 4×10^{-3}V

Q 8. In the adjoining figure the impedance of the circuit will be



(a) 120 Ω (b) 50 Ω

(c) 60 Ω (d) 90 Ω

Q 9. An e.m.f. E = 4 cos(1000t) volt is applied to an LR-circuit of inductance 3 mH and resistance 4 ohms. The amplitude of current in the circuit is

(a) $\frac{4}{\sqrt{7}}$ A (b) 1.0 A

(c) $\frac{4}{7}$ A (d) 0.8 A

Q 10. 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) $\frac{R}{4}$ (b) $\frac{R}{2}$

(c) R (d) Cannot be found with the given data

Q 11. The coefficient of induction of a choke coil is 0.1H and resistance is 12Ω. If it is connected to an alternating current source of frequency 60 Hz, then power factor will be

(a) 0.56 (b) 0.30

(c) 0.16 (d) 0.74

Q 12. What will be the phase difference between voltage and current, when the current in the circuit is wattless

(a) 90° (b) 45°

(c) 180° (d) 60°

Q 13. In the non-resonant circuit, what will be the nature of the circuit for frequencies higher than the resonant frequency

(a) Resistive (b) Capacitive

(c) Inductive (d) None of the above

Q 14. An LCR circuit contains R = 50 Ω, L = 1 mH and C = 0.1 μF. The impedance of the circuit will be minimum for a frequency of

(a) $\frac{10^5}{2\pi}\ s^{-1}$ (b) $\frac{10^6}{2\pi}\ s^{-1}$

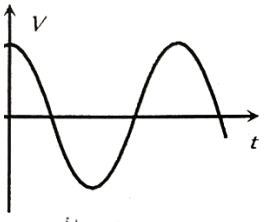
(c) $2\pi \times 10^5\ s^{-1}$ (d) $2\pi \times 10^6\ s^{-1}$

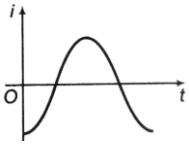
Q 15. A circuit has a resistance of 11Ω, an inductive reactance of 25Ω and a capacitive resistance of 18Ω. It is connected to an ac source of 260V and 50Hz. The current through the circuit (in amperes) is

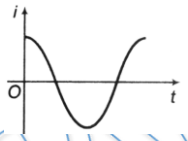
(a) 11 (b) 15

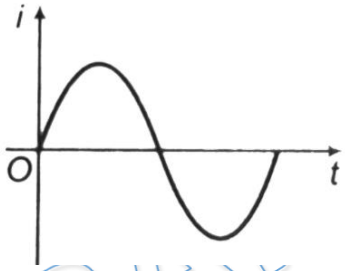
(c) 17 (d) 20

Q 16. The voltage across a pure inductor is represented by the following diagram. Which one of the following diagrams will represent the current ?



(a) 

(b) 

(c) 

(d) none of these

Answer Key

Q.1 b	**Q.2 d**	**Q.3 a**	**Q.4 d**	**Q.5 d**
Q.6 b	**Q.7 c**	**Q.8 c**	**Q.9 d**	**Q.10 c**
Q.11 b	**Q.12 a**	**Q.13 c**	**Q.14 a**	**Q.15 d**
Q.16 c				