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NEET ALTERNATING CURRENT — POWER IN AC CIRCUITS, POWER FACTOR AND WATTLESS CURRENT — PYQS

Max. Marks: 44 **Questions:** 11

Section A (MCQ) — 11 questions

Q.1 A series LCR circuit is connected to an ac voltage source. When L is removed from the circuit, the phase difference between current and voltage is $\frac{\pi}{3}$. If instead C is removed from the circuit, the phase difference is again $\frac{\pi}{3}$ between current and voltage. The power factor of the circuit is : [NEET (UG) 2020]

(1) 0.5 (2) 1.0 (3) −1.0 (4) zero

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Q.2 An inductor 20 mH, a capacitor 100 μF and a resistor 50 Ω are connected in series across a source of emf, $V = 10\sin 314t$. The power loss in the circuit is [NEET 2018]

(1) 0.79 W (2) 0.43 W (3) 2.74 W (4) 1.13 W

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Q.3 An inductor 20 mH, a capacitor 50 μF and a resistor 40 Ω are connected in series across a source of emf $V = 10\sin 340t$. The power loss in A.C. circuit is [NEET 2016 (Phase 1)]

(1) 0.76 W (2) 0.89 W (3) 0.46 W (4) 0.67 W

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Q.4 The potential differences across the resistance, capacitance and inductance are 80 V, 40 V and 100 V respectively in an L-C-R circuit. The power factor of this circuit is [NEET 2016 (Phase 2)]

(1) 0.4 (2) 0.5 (3) 0.8 (4) 1.0

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Q.5 A resistance 'R' draws power 'P' when connected to an AC source. If an inductance is now placed in series with the resistance, such that the impedance of the circuit becomes 'Z', the power drawn will be [AIPMT 2015 (Cancelled)]

(1) $P\left(\frac{R}{Z}\right)$ (2) P (3) $P\left(\frac{R}{Z}\right)^2$ (4) $P\sqrt{\frac{R}{Z}}$

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Q.6 The instantaneous values of alternating current and voltage in a circuit are given as

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

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

The average power in watts consumed in the circuit is [AIPMT 2012 (Mains)]

(1) $\frac{1}{4}$ (2) $\frac{\sqrt{3}}{4}$ (3) $\frac{1}{2}$ (4) $\frac{1}{8}$

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Q.7 In an electrical circuit R, L, C and a.c. 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 $\frac{\pi}{3}$. If instead, C is removed from the circuit, the phase difference is again $\frac{\pi}{3}$. The power factor of the circuit is [AIPMT 2012 (Prelims)]

(1) $\frac{1}{2}$ (2) $\frac{1}{\sqrt{2}}$ (3) 1 (4) $\frac{\sqrt{3}}{2}$

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Q.8 Power dissipated in an LCR series circuit connected to an A.C. source of emf ε is [AIPMT 2009]

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

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

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

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

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Q.9 In an a.c. circuit the e.m.f. (ε) and the current (i) at any instant are given respectively by

$\varepsilon = E_0 \sin \omega t, \quad i = I_0 \sin(\omega t - \varphi)$

The average power in the circuit over one cycle of a.c. is [AIPMT 2008]

(1) $\frac{E_0 I_0}{2}\cos\phi$ (2) $E_0 I_0$

(3) $\frac{E_0 I_0}{2}$ (4) $\frac{E_0 I_0}{2}\sin\phi$

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Q.10 A coil of inductive reactance 31 Ω has a resistance of 8 Ω. It is placed in series with a condenser of capacitative reactance 25 Ω. The combination is connected to an a.c. source of 110 V. The power factor of the circuit is [AIPMT 2006]

(1) 0.33 (2) 0.56 (3) 0.64 (4) 0.80

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Q.11 For a series LCR circuit the power loss at resonance is [AIPMT 2002]

(1) $\frac{V^2}{\left[\omega L - \frac{1}{\omega C}\right]}$ (2) $I^2 L\omega$

(3) $I^2 R$ (4) $\frac{V^2}{C\omega}$

Scan or tap for the full solution

ANSWER KEY

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	**2**	**1**	**3**	**3**	**3**	**4**	**3**	**4**	**1**	**4**	**3**