Class 12 Physics · Chapter 7: Alternating Current

Worksheet · 20 marks · about 40 minutes · based on NCERT

Name _____ Class and section _____ Date _____

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1. In a series LCR circuit R = 40 Ω, X_L = 10 Ω and X_C = 50 Ω. The current in the circuit [1]

(a) is in phase with the source voltage
(b) lags the source voltage by 45°
(c) leads the source voltage by 90°
(d) leads the source voltage by 45°

2. An inductor of inductance (0.50/π) H and negligible resistance is connected to a 200 V (rms) source whose frequency can be changed. At what frequency does it draw an rms current of 2.0 A? [1]

(a) 628 Hz
(b) 100 Hz
(c) 141 Hz
(d) 71 Hz

3. An ac voltage is applied across an ideal inductor. The current in the inductor [1]

(a) lags the voltage by π/2
(b) leads the voltage by π/2
(c) is in phase with the voltage
(d) lags the voltage by π

4. An inductor of negligible resistance has a reactance of 30 Ω at 50 Hz. Its reactance at 150 Hz is [1]

(a) 30 Ω
(b) 10 Ω
(c) 90 Ω
(d) 270 Ω

5. An ac voltmeter connected across a laboratory socket reads 230 V. During each cycle the voltage between the socket's terminals varies between [1]

(a) 325 V and −325 V
(b) 230 V and −230 V
(c) 163 V and −163 V
(d) 0 V and 325 V

6. A coil of negligible resistance has a reactance of 40 Ω at 50 Hz. Find its inductance and its reactance at 200 Hz. [2]

7. An ideal capacitor is connected to a 50 Hz ac source. Which reaches its maximum first, the current or the voltage, and by how many milliseconds? [2]

8. A resistor and an ideal inductor in series are connected to a 100 V (rms) ac source. The rms voltage across the resistor is 60 V. Meena says the voltage across the inductor must be 40 V. Is she right? Find the voltage across the inductor. [2]

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9. An ac voltage $v = v_m \sin \omega t$ is applied across an ideal inductor L. Obtain the expression for the current, and show that it lags the voltage by $\pi/2$. Write the expression for the inductive reactance. [3]

10. Explain how a radio set uses resonance to pick out one station. The tuning circuit of a receiver has an inductor of 0.25 mH. Find the capacitance needed to tune to a station broadcasting at 1.0 MHz, and how the capacitance must change to tune to 2.0 MHz. [3]

11. A series LCR circuit with L = 0.40 H and C = 2.5 μF is driven by a 50 V (rms) source of variable frequency. (a) Find the resonant angular frequency. (b) Find the resistance R for which the rms voltage across the capacitor at resonance is ten times the source voltage. (c) With this R, find the average power drawn from the source at resonance. [3]