



ST. LAWRENCE HIGH SCHOOL
A JESUIT CHRISTIAN MINORITY INSTITUTION
SOLUTION TO WORK SHEET: 32.
Subject : PHYSICS



Date : 20.07.2020

CLASS : XII

Chapter: Alternating current.

Topic: Pure resistance, pure inductance, pure capacitance circuits & phasor diagrams, power factor.

- 1: In a purely resistive AC circuit, the current
- (a) lags behind the emf in phase (b) is in phase with the emf
(c) leads the emf in phase (d) leads the emf in half the cycle behind it in the other half

Ans. (b) is in phase with the emf

- 2: The frequency of an alternating voltage is 50 cycles/s and its amplitude is 120 V. Then, the rms value of voltage is

(a) 101.3 V (b) 84.8 V (c) 70.7 V (d) 56.5 V

Ans. (b) 84.8 V

- 3: What is the speed of a phasor which rotates about the origin ?

(a) 2ω (b) $\omega / 2$ (c) ω (d) $\omega / 4$

Ans. (c) ω

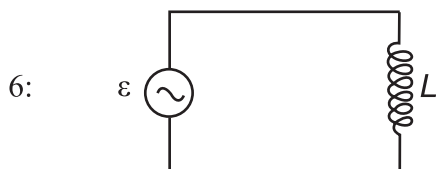
- 4: In an AC circuit, $I = 100 \sin 200 \pi t$. The time required for the current to achieve its peak value will be

(a) $\frac{1}{100}$ s (b) $\frac{1}{200}$ s (c) $\frac{1}{300}$ s (d) $\frac{1}{400}$ s

Ans. (d) $\frac{1}{400}$ s

- 5: In an AC circuit the power factor
- (a) is zero when the circuit contains an ideal resistance only
(b) is unity when the circuit contains an ideal resistance only
(c) is unity when the circuit contains a capacitance only
(d) is unity when the circuit contains an ideal inductance only

Ans. (b) is unity when the circuit contains an ideal resistance only



From the above figure, which one of the following option is correct ?

(a) $V - L \frac{di}{dt} = 0$ (b) $L - V \frac{di}{dt} = 0$ (c) $L + V \frac{di}{dt} = 0$ (d) $2L - V \frac{di}{dt} = 0$

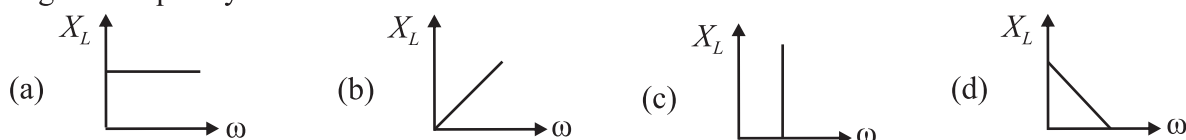
Ans. (a) $V - L \frac{di}{dt} = 0$

- 7: A pure inductor of 25.0 mH is connected to a source of 220 V. Find the inductive reactance if the frequency of the source is 50 Hz.

(a) 785 Ω (b) 6.50 Ω (c) 7.85 Ω (d) 8.75 Ω

Ans. (c) 7.85 Ω

- 8: Which of the following graphs represents the correct variation of inductive reactance X_L with angular frequency ω ?



Ans. (b)

- 9: In a purely inductive AC circuit, $L = 30.0 \text{ mH}$ and the rms voltage is 150 V , frequency $\nu = 50 \text{ Hz}$. The inductive reactance is
 (a) 15.9Ω (b) 9.42Ω (c) 10Ω (d) 8.85Ω

Ans. (b) 9.42Ω

- 10: In a circuit containing an inductance of zero resistance, the emf of the applied AC voltage leads the current by
 (a) 90° (b) 45° (c) 30° (d) 0°

Ans. (a) 90°

- 11: Current I across the capacitor in a purely capacitive AC circuit is

(a) $i_m \sin(\omega t + \pi/4)$ (b) $i_m \sin(\omega t + \pi/2)$ (c) $i_m \cos(\omega t + \pi/4)$ (d) $i_m \cos(\omega t + \pi/2)$

Ans. (b) $i_m \sin(\omega t + \pi/2)$

- 12: The amplitude of the oscillating current in the above capacitive AC circuit is

(a) $\omega C V_m$ (b) $2\omega C V_m$ (c) $\frac{\omega C V_m}{4}$ (d) $\frac{3\omega C V_m}{2}$

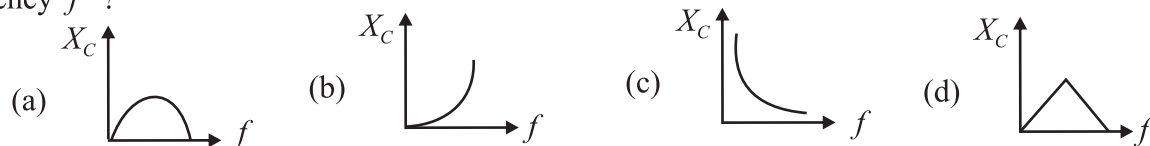
Ans. (a) $\omega C V_m$

- 13: Which of the following is called capacitive reactance and is denoted by X_C ?

(a) ωC (b) $1/\omega C$ (c) $2/\omega C$ (d) $\omega C / R$

Ans. (b) $1/\omega C$

- 14: Which of the following graphs represents the correct variation of capacitive reactance X_C with frequency f ?



Ans. (c)

- 15: A $60 \mu\text{F}$ capacitor is connected to a 110 V , 60 Hz AC supply. The rms value of the current in the circuit is

(a) 2 A (b) 2.49 A (c) 1.85 A (d) 2.05 A

Ans. (b) 2.49 A