



**ST. LAWRENCE HIGH SCHOOL**  
**A JESUIT CHRISTIAN MINORITY INSTITUTION**  
**SOLUTION TO WORK SHEET : 33**  
**Subject : PHYSICS**



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CLASS : XII

**Topic : L-R circuit, C-R circuit their phasor diagram , impedance.**

Chapter: Alternating current.

**Multiple Choice Questions :**

**1 x 15 = 15**

- 1: In an AC circuit, the current lags behind the voltage by  $\pi/2$ . The components of the circuit are  
(a)  $R$  and  $L$       (b)  $L$  and  $C$       (c)  $R$  and  $C$       (d) only  $R$   
Ans. (a)  $R$  and  $L$
- 2: A resistance of  $300 \Omega$  and an inductance of  $1 / \pi$  henry are connected in a series to an AC voltage of 20 V and 200 Hz frequency. The phase angle between the voltage and current is  
(a)  $\tan^{-1} 4/3$       (b)  $\tan^{-1} 3/4$       (c)  $\tan^{-1} 3/2$       (d)  $\tan^{-1} 2/5$   
Ans. (a)  $\tan^{-1} 4/3$
- 3: A resistor and a capacitor are connected in series with an AC source. If the potential drop across the capacitor is 5V and that across the resistor is 12 V, then applied voltage is  
(a) 13 V      (b) 17 V      (c) 5 V      (d) 12 V  
Ans. (a) 13 V
- 4: A resistor of  $200 \Omega$  and a capacitor of  $15 \mu\text{F}$  are connected in series to a 220 V, 50 Hz AC source. The current in the circuit is  
(a) 755 A      (b) 7.55 mA      (c) 0.755A      (d) 0.775 mA  
Ans. (c) 0.755A
- 5: In an  $LR$  circuit, the phase angle between alternating voltage and alternating current is  $45^\circ$ . The value of inductive reactance will be  
(a)  $\frac{R}{4}$       (b)  $\frac{R}{2}$       (c)  $R$       (d) data insufficient  
Ans. (c)  $R$
- 6: Which quantity in an ac circuit is not dependent on frequency ?  
(a) resistance      (b) impedance      (c) inductive reactance      (d) capacitive reactance  
Ans. (a) resistance
- 7: A coil has resistance  $30 \Omega$  and inductive reactance  $20 \Omega$  at 50 Hz frequency. If an ac source of 200 V, 100 Hz is connected across the coil, the current in the coil will be  
(a) 2.0 A      (b) 4.0 A      (c) 8.0 A      (d)  $\frac{20}{\sqrt{13}}$  A  
Ans. (b) 4.0 A

- 8: A fully charged capacitor  $C$  with initial charge  $q_0$  is connected to a coil of self-inductance  $L$  at  $t = 0$ . The time at which the energy is stored equally between the electric and the magnetic field is

(a)  $\frac{\pi}{4}\sqrt{LC}$       (b)  $2\pi\sqrt{LC}$       (c)  $\sqrt{LC}$       (d)  $\pi\sqrt{LC}$

Ans. (a)  $\frac{\pi}{4}\sqrt{LC}$

- 9: A voltage  $V_0 \sin \omega t$  is applied across a series combination of resistance  $R$  and inductor  $L$ . The peak value of the current in the circuit is

(a)  $\frac{V_0}{\sqrt{R^2 + \omega^2 L^2}}$       (b)  $\frac{V_0}{\sqrt{R^2 - \omega^2 L^2}}$       (c)  $\frac{V_0}{\sqrt{R^2 + \omega^2 L^2}} \sin \omega t$       (d)  $\frac{V_0}{R}$

Ans. (a)  $\frac{V_0}{\sqrt{R^2 + \omega^2 L^2}}$

- 10: When an ideal choke is connected to an ac source of 100 V and 50 Hz, a current of 8 A flows through the circuit. A current of 10 A flows through the circuit when a pure resistor is connected instead of the choke coil. If the two are connected in series with an ac supply of 100 V and 40 Hz, then the current in the circuit is

(a) 10 A      (b) 8 A      (c)  $5\sqrt{2}$  A      (d)  $10\sqrt{2}$  A

Ans. (c)  $5\sqrt{2}$  A

- 11: The power factor of an  $LR$  circuit carrying an ac of angular frequency  $\omega$  is

(a)  $\frac{R}{\omega L}$       (b)  $\frac{\omega L}{R}$       (c)  $\frac{R}{\sqrt{R^2 + \omega^2 L^2}}$       (d)  $\frac{R}{\sqrt{R^2 - \omega^2 L^2}}$

Ans. (c)  $\frac{R}{\sqrt{R^2 + \omega^2 L^2}}$

- 12: In an a.c. circuit, a resistance of  $R \Omega$  is connected in series with an inductance  $L$ . If phase angle between voltage and current be  $45^\circ$ , the value of inductive reactance will be

(a)  $\frac{R}{4}$       (b)  $\frac{R}{2}$       (c)  $R$       (d) cannot be found with given data.

Ans. (c)  $R$

- 13: A 220 V, 50 Hz a.c. source is connected to an inductor of 0.2 H and a resistor of  $20 \Omega$  in series. What is the current in the circuit?

(a) 10 A      (b) 5 A      (c) 33.3 A      (d) 3.33 A

Ans. (d) 3.33 A

- 14: In an a.c. circuit, the potential difference across an inductor and resistor joined in series are respectively 16 V and 20 V. The total potential difference across the circuit is

(a) 20 V      (b) 25.6 V      (c) 31.9 V      (d) 53.5 A

Ans. (b) 25.6 V

- 15: A  $12 \Omega$  resistor and a 0.21 H inductor are connected in series to an a.c. source operating at 20 V, 50 cycles. The phase angle between the current and source voltage is

(a)  $30^\circ$       (b)  $40^\circ$       (c)  $80^\circ$       (d)  $90^\circ$

Ans. (c)  $80^\circ$