

Question 10) When the rms voltage V_L , V_C and V_R are measured respectively across the inductor L, the capacitor C and the resistor R in a series LCR circuit connected to an AC source, it is found that the ratio $V_L : V_C : V_R = 1 : 2 : 3$. If the rms voltage of the AC sources is 100 V, The V_R is close to

- (A) 50 V
- (B) 70 V
- (C) 90 V
- (D) 100 V

Solution:

Given,

$$V_L : V_C : V_R = 1 : 2 : 3$$

$$V = 100 \text{ V}$$

$$\Rightarrow V_R = 3K, V_L = K, V_C = 2K$$

We know,

$$V = \sqrt{V_R^2 + (V_L - V_C)^2}$$

$$100 = \sqrt{9K^2 + K^2}$$

$$100 = \sqrt{10} K$$

$$K = 100/\sqrt{10}$$

$$V_R = 3K = (3 \times 100)/\sqrt{10}$$

$$= 94.86 \text{ volts}$$

So, V_R is close to 90 V