7.6 An inductor of reactance 1 Ω and a resistor of 2 Ω are connected in series to the terminals of a 6 V (rms) a.c. source. The power dissipated in the circuit is

(a) 8 W.

(b) 12 W.

(c) 14.4 W.

(d) 18 W.

6. We know that average power dissipated in an L-R circuit is:-

$$P_{av} = (\mathcal{E}_{rms})(I_{rms})\cos\phi$$

$X_L = 1\Omega$, $R = 2\Omega$ (X_R), $V_{rms} = 6V$ (Given)

$$\therefore Z = \sqrt{X_R^2 + X_L^2}$$
$$= \sqrt{4+1}$$
$$= \sqrt{5}\Omega$$

Hence, $P_{av} = (\mathcal{E}_{rms})\left(\frac{\mathcal{E}_{rms}}{Z}\right)\left(\frac{R}{Z}\right)$ $\left(\because \cos\phi = \frac{R}{Z}\right)$

$$\Rightarrow P_{av} = \frac{(\mathcal{E}_{rms}^2) R}{(Z)^2}$$

$$= \frac{(6)^2(2)}{(5)} = \frac{72}{5} = 14.4\,W$$

$$\therefore \boxed{P_{av} = 14.4\,W}$$

$\Rightarrow$ option (c) is the answer.