

2-5 A 100Ω load is connected to a power supply of $100V$ at $50Hz$. At time, $t = 0$, the instantaneous value for voltage across the load was zero and the current through the load was $0.7A$.

Determine:

- The phase shift, ϕ , between voltage and current;
- The time interval, Δt , that corresponds to this phase shift;
- The power factor;
- The apparent power
- The active power consumed in the resistor.

2-5a)	$Load = 100\ \Omega$ $V_{rms} = 100V$ $50Hz$ $2\pi f = \omega$ $\frac{360}{8} = 45^\circ = \frac{2\pi}{8} = \frac{\pi}{4}$ $0.7A * \sqrt{2}$ $0.7A * \sqrt{2} * \sin(45) = \frac{7}{10} = 0.7A$ $\frac{0.7}{0.7\sqrt{2}} = \frac{1}{\sqrt{2}} 45^\circ$ $= \frac{\pi}{4}$
2-5b)	$\omega = \frac{\pi}{4} \quad t = \frac{\pi}{4} \div 2\pi * f$ $t = \frac{\pi}{4} \div 2\pi * 50$ $\frac{T}{8} = \frac{1}{50*8} = \frac{1}{400} = 2.5ms$
2-5c)	$\cos(45)$ $\cos\left(\frac{\pi}{4}\right) = 0.7$
2-5d)	$V_{rms} = 100V$ $Impedance = 100\ \Omega$ $V_{rms} = I_{rms} * 100$ $I_{rms} = \frac{V_{rms}}{100} = 1$ $I_{rms} = 1$ $V_{rms} = 1 * 100 = 100\ V$