ICP – Find T, f and Vpeak (O'Scope Screen)

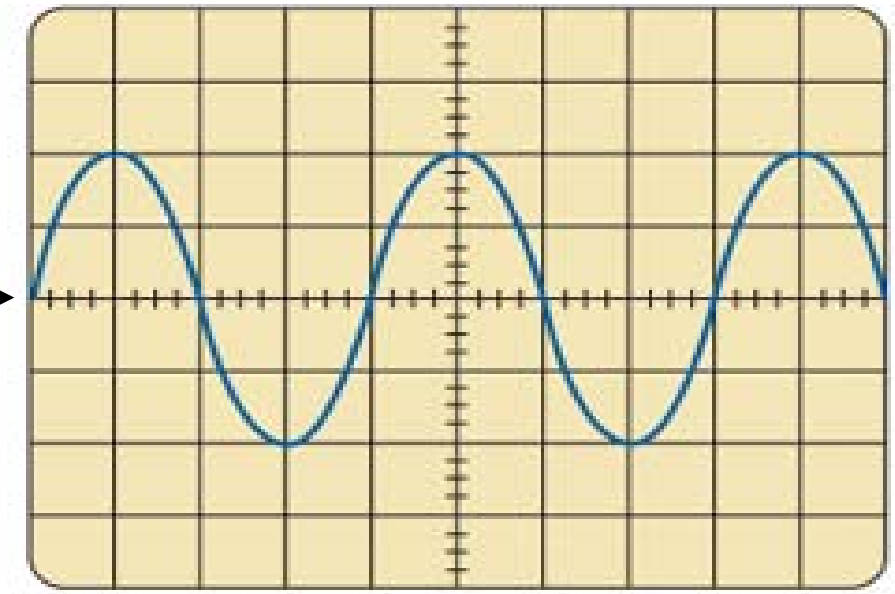


FIG. 13.38
Example 13.13.

T = 4 divisions
=4 div * 50us/div
= 200usec

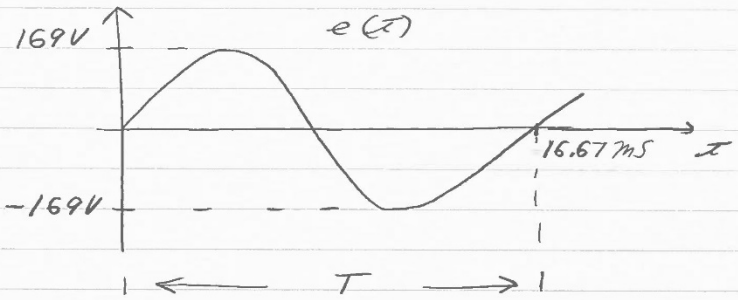
F=1/T = 5kHz

Vpeak = 2 divisions
= 2 div * 0.1V/div
= 0.2V or 200mV

NP

ICP

CONSIDER



FIND: f, W, EQUATION

$T = 16.67\,ms$

$\therefore f = 1/T \cong \boxed{60\,Hz}$

$W = \frac{\alpha}{t} = \frac{2\pi \text{ radians}}{16.67\,ms}$ OR $\frac{2\pi}{T}$

BUT $T = 1/f$

$\therefore W = 2\pi f = \boxed{376.99\,rad/sec}$

$E_m \sin(\alpha) \rightarrow E_m \sin(Wt)$

$\Rightarrow \boxed{169 \sin(376.99t)}$

$e(t) = 169 \sin(376.99t)$

NP

FIND: $e(t)$ AT $t = 5\,ms$, $10\,ms$
& t WHEN $e(t) = 169V, -169V$

$e(t) = 169 \sin(376.99t)$ V

$t = 5 \times 10^{-3}$ sec $\rightarrow e(5ms) =$ **160.73 V**

$t = 10ms \rightarrow e(10ms) =$ **−99.33 V**

TO FIND "t" WHEN $e(t) = 169V, -169V$:

169V: $169 = 169 \sin(376.99t)$

$1 = \sin(376.99t)$

$\sin^{-1}(1) = 376.99t$

$1.5708 = 376.99t \rightarrow \therefore$ **$t = 4.17\,ms$**

-169V: $-169 = 169 \sin(376.99t)$

$-1 = \sin(376.99t)$

$\sin^{-1}(-1) = 376.99t$

$-1.5708 = 376.99t \rightarrow \therefore t = -4.16\overline{6}\,ms$

RECALL $T = 16.6\overline{6}\,ms$

$\therefore t = -4.16\overline{6}\,ms + 16.6\overline{6}\,ms =$ **12.5 ms**

ICP – Find The Relationship Between i(t) and e(t), f

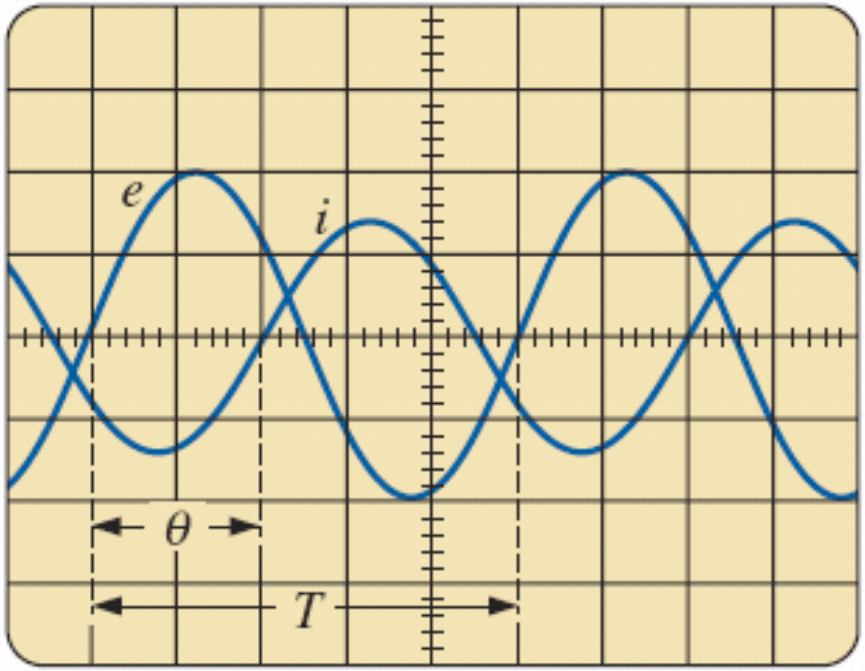


FIG. 13.39 *Finding the phase angle between waveforms using a dual-trace oscilloscope.*

e(t) leads i(t) by 2 divisions

One period (T) = 5 divisions
Therefore 5 div = 360 deg

Ratio:
360deg/5div = theta/2div
therefore
2 divisions = 144 deg

e(t) LEADS i(t) by 144 degrees

F=1/T = 1/1msec = 1kHz

NP