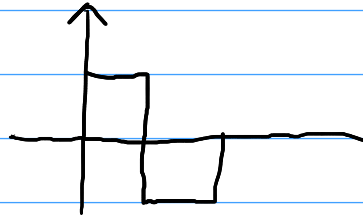


Chapter 11

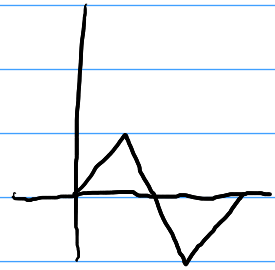
Sinusoidal Alternating waveform



Sine wave



Square wave



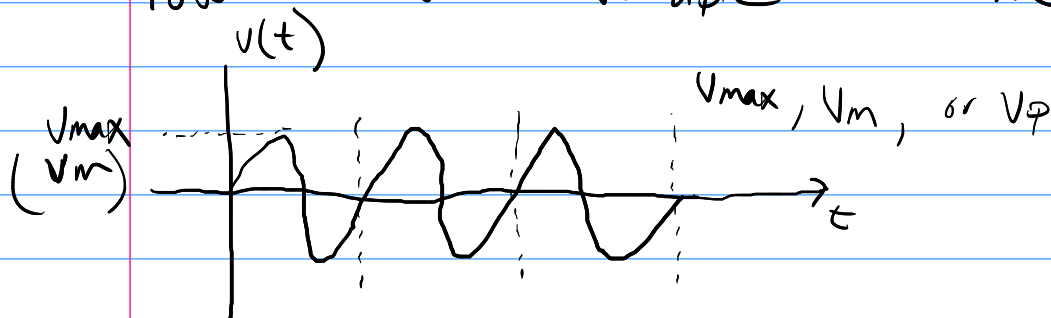
Triangle wave

Most common is sine wave

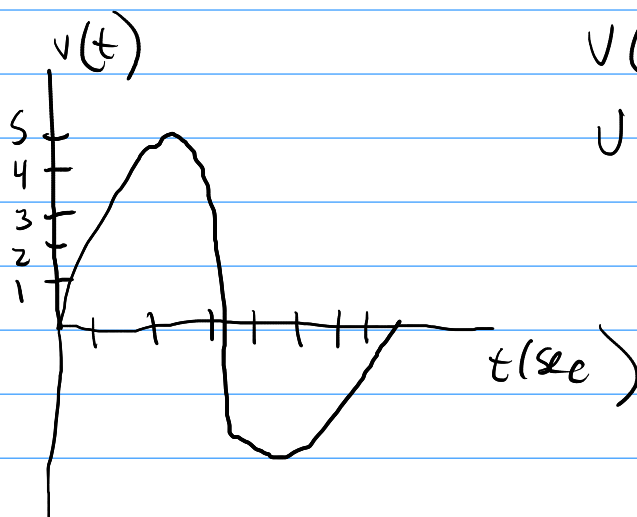


Upper-case variable on DC V I

Lower-case variable on AC $v(t)$ $i(t)$



instantaneous value: the value of the waveform at any instant



$$v(t=1) = 2V$$

$$v(t)$$

$$V_{\max} = V_m = V_p = SV$$

amplitude: the max value of a waveform

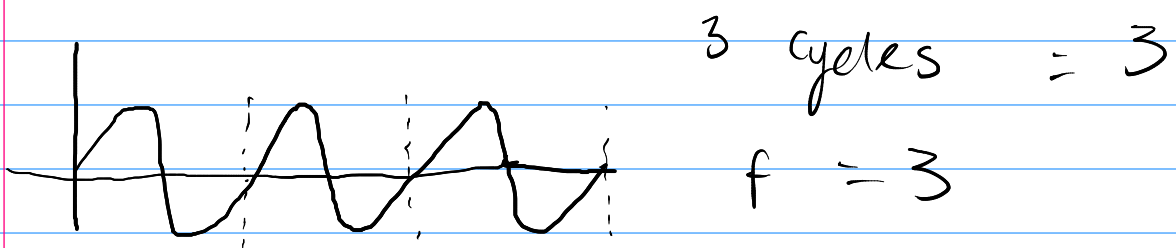
Peak value: the max instantaneous value of a function as measured from 0 volt

periodic waveform: a waveform continuously repeat itself

$$f(t+T) = f(t)$$

period: The time interval between successive repetition of a periodic waveform

Frequency: The number of cycles per second



cycle = the waveform containing in one period

The unit of frequency is Hz

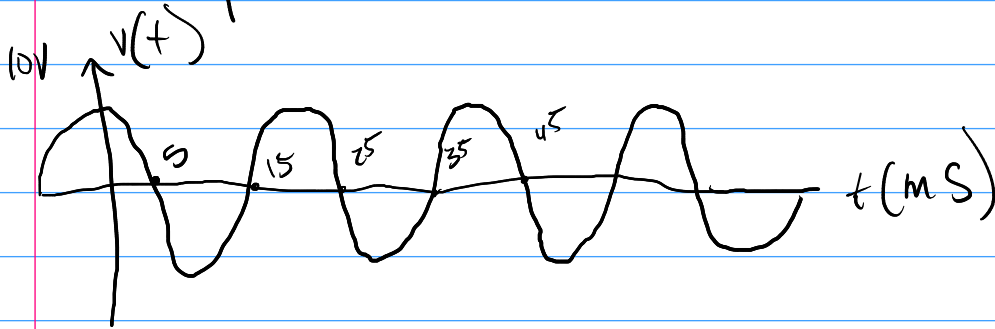
1 Hz = 1 cycle in a second

$$f = 3 \text{ Hz}$$

$$f = \frac{1}{T}$$

$$f = 60 \text{ Hz} \quad T = \frac{1}{f} = \frac{1}{60} = 0.0166 \text{ sec}$$

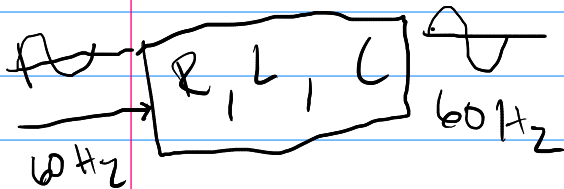
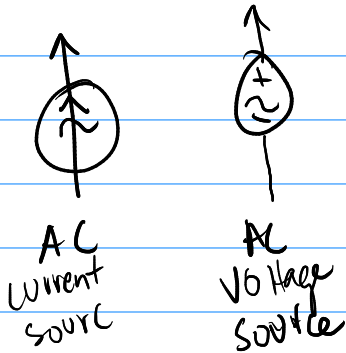
example:



$$T = 25 - 5 = 20 \text{ ms}$$

$$f = \frac{1}{20 \text{ ms}} = \frac{1000}{20} = 50 \text{ Hz}$$

Sinusoidal waveform



Sine wave is the only waveform whose shape are unaffected by the response characteristics of R, L, C elements

ω is angular velocity

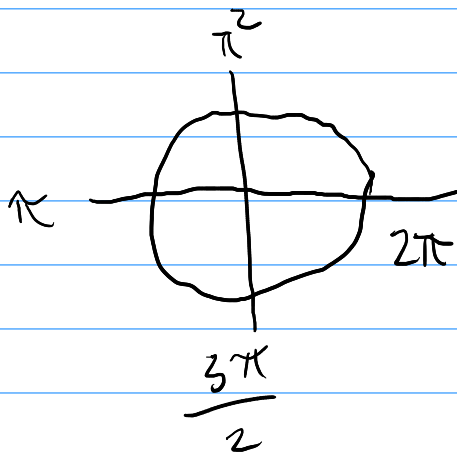


$$V(t) = V_m \sin \omega t$$

$$\omega = 2\pi f = 2\pi \frac{1}{T} = \frac{2\pi}{T} \text{ rad/sec}$$

Complete circle is 2π radian

$$2\pi \text{ radian} = 360^\circ$$



$$2\pi R = 360 D$$

$$R = \frac{360}{2\pi} D = \frac{180}{\pi} D$$

$$D = \frac{2\pi}{360} R = \frac{\pi}{180} R$$

$$2\pi \text{ radians} = 360^\circ$$

$$2\pi \text{ rad} \quad 360$$

R

D

$$360 \text{ R} = 2\pi \text{ D} \quad \text{R} = \frac{2\pi}{360} \text{ D} \quad \text{D} = \frac{360}{2\pi} \text{ R}$$

$$v = 3 \sin 2\pi t$$

$$= 3 \sin \alpha$$