ALTERNATIVE CURRENT

eleventh lecture

Electrical engineering

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Department:

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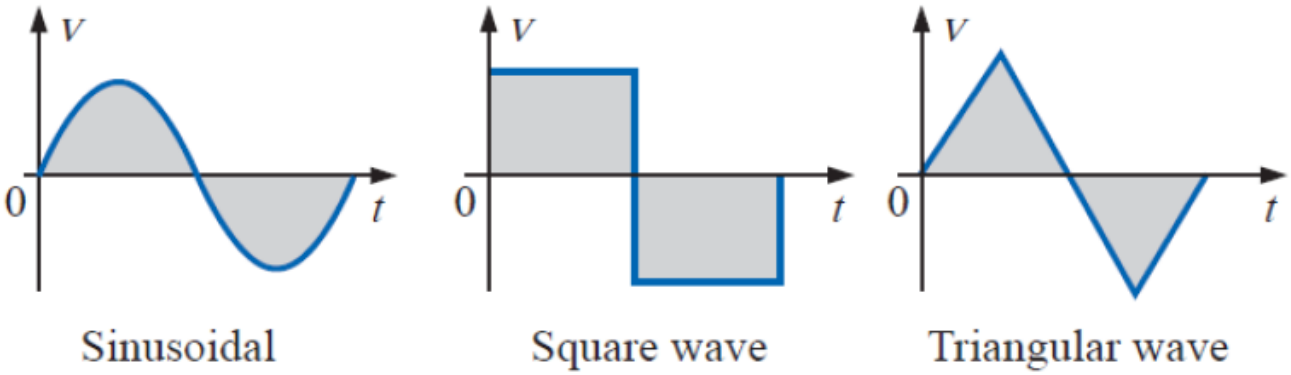
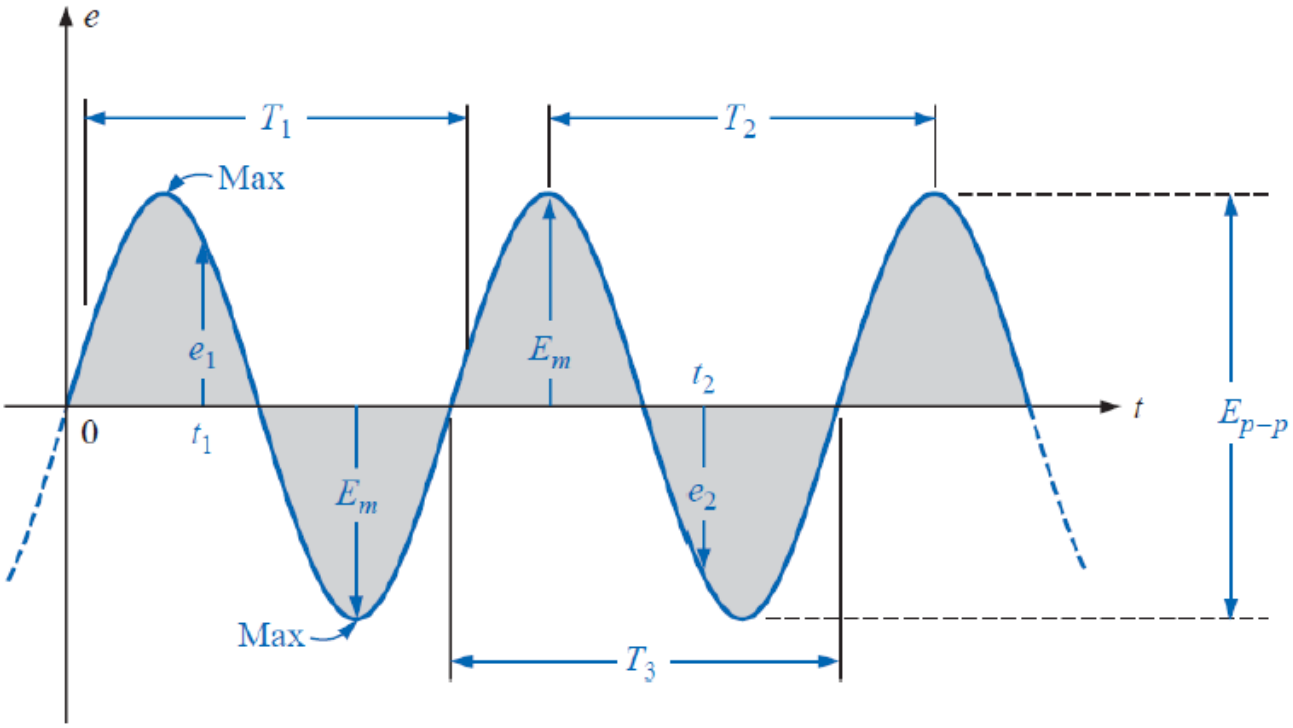
Sinusoidal Alternating Waveforms: The term alternating indicates that waveforms alternate between two prescribed levels in a set time sequence. To be absolutely correct the term sinusoidal, square, triangular must be also applied.



- The vertical scaling is in volts or amperes and the horizontal scaling is always in units of time.



Instantaneous (لحظي) value: The magnitude of a waveform at any instant of time; denoted by lowercase letters (e1, e2).

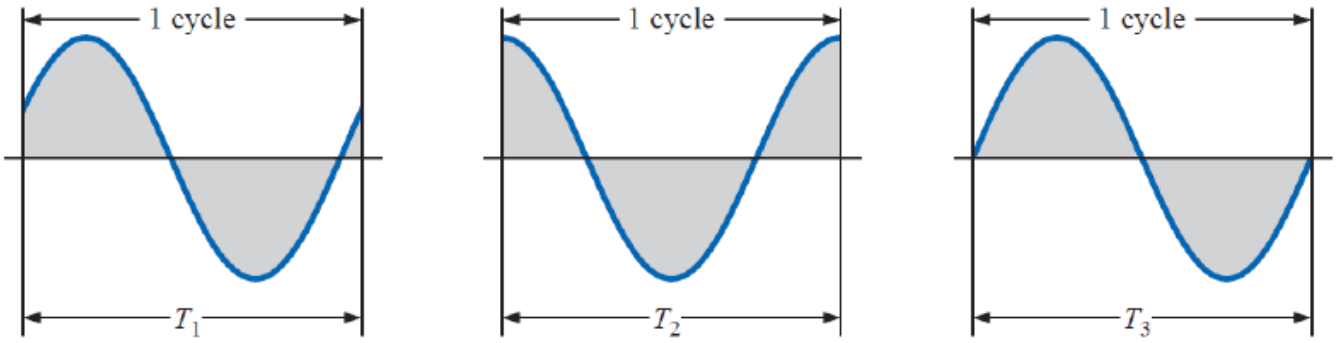
Peak value: The maximum instantaneous value of a function as measured from the zero-volt level.

Peak-to-peak value: Denoted by Ep-p or Vp-p, the full voltage between positive and negative peaks of the waveform, that is, the sum of the magnitude of the positive and negative peaks.

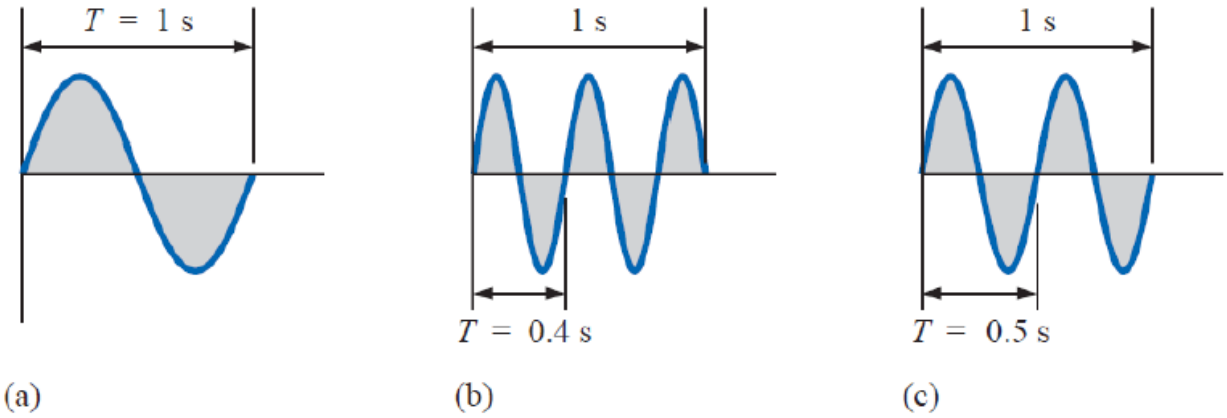
Periodic waveform: A waveform that continually repeats itself after the same time interval.

Period (T)**:** The time interval between successive repetitions of a periodic waveform (the period T 1 = T 2 = T 3),

Cycle: The portion of a waveform contained in one period of time.



Frequency (f)**:** The number of cycles that occur in 1 s.



(a) The frequency is 1 cycle per second, (b), the frequency 2 + 1⁄2 cycles per second. (c), the frequency would be 2 cycles per second.

1 hertz (Hz) = 1 cycle per second (c/s)

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

f = Hz
T = seconds (s)

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

EXAMPLE: Find the period of a periodic waveform with a frequency of a. 60 Hz. b. 1000 Hz.

Solutions:

a. $T = \frac{1}{f} = \frac{1}{60\ \text{Hz}} \cong 0.01667\ \text{s}$ or **16.67 ms**

(a recurring value since 60 Hz is so prevalent)

b. $T = \frac{1}{f} = \frac{1}{1000\ \text{Hz}} = 10^{-3}\ \text{s} = \mathbf{1\ ms}$

- **Capacitor:** a capacitor essentially consists of two conducting surfaces separated by a layer on an insulation media called dielectric. The purpose of capacitor is to store electrical energy by electrostatic stress in the dielectric. It measures with farad unit.
- The capacitor has many shapes such as rectangular spherical or cylindrical.

- **Inductor**: Inductors are component (مركب) that consisting of coils of insulated copper wire wound around (يلف حوب) a former that will have some type of core at its center. This core might be a metal such as iron that can be easily magnetized or in high frequency inductors, it will more likely to be just air.

- Inductors depend for their action on the magnetic field that is present (تقدمه) around any conductor when it is carrying a current.