Islamic University of Technology

EEE 4483
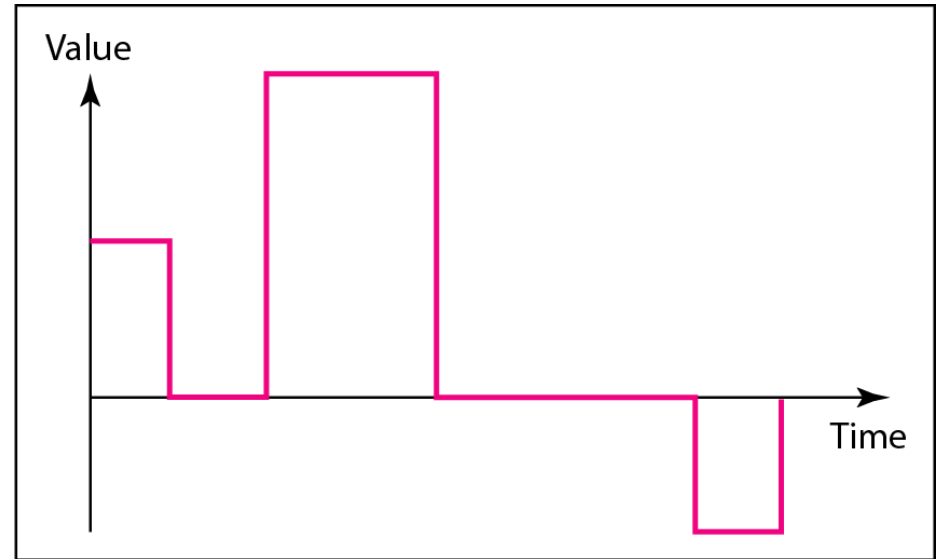Digital Electronics & Pulse Techniques

Lecture-1

Analog and Digital Signals

- Signals can be analog or digital.

- Analog signals can have an infinite number of values in a range.

- Digital signals can have only a limited number of values.

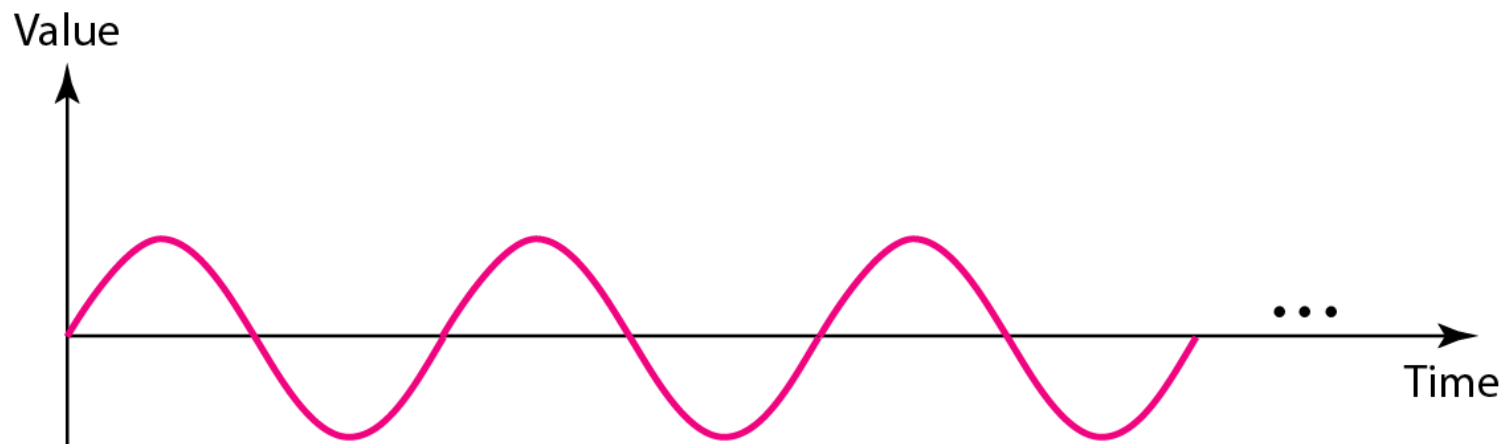# Comparison of Analog and Digital signals

a. Analog signal

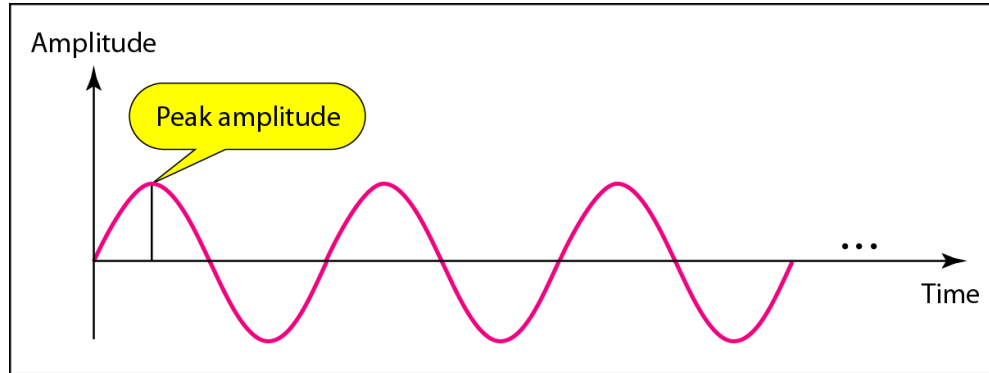b. Digital signal

A sinusoidal wave

Period and frequency

The period and frequency are reciprocals of each other.
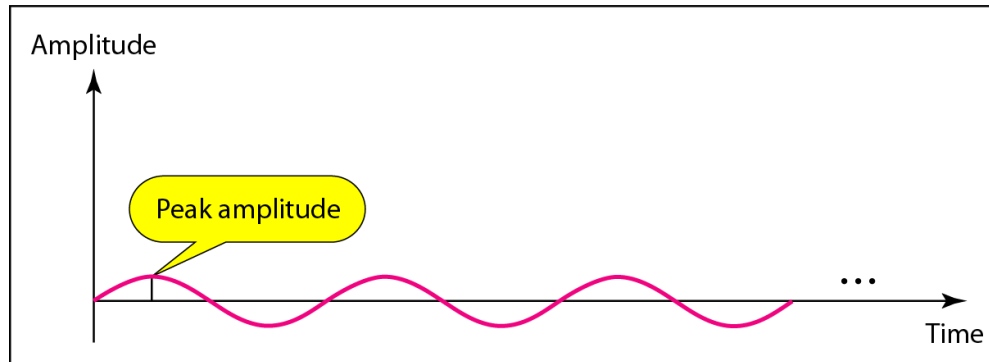
$$f = \frac{1}{T} \qquad\qquad T = \frac{1}{f}$$

- If the period is 50 μs, the frequency is   0.02 MHz = 20 kHz.

Two signals with same phase and frequency but different amplitudes
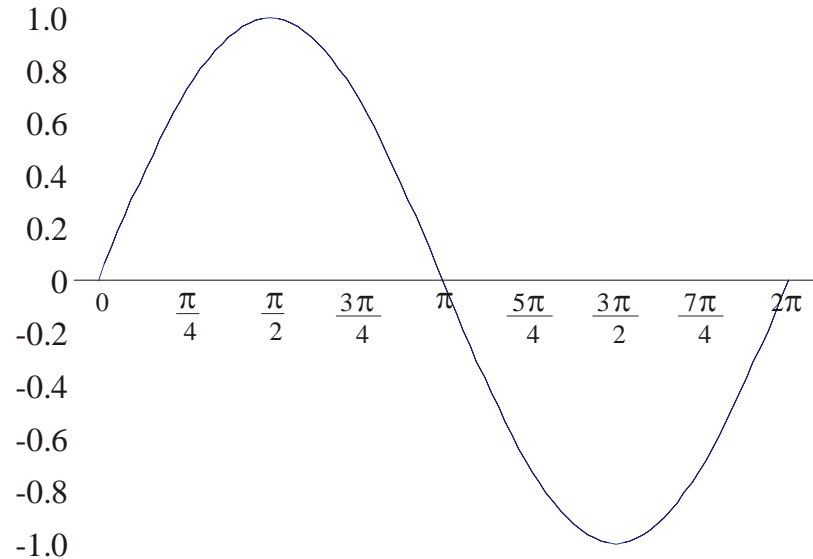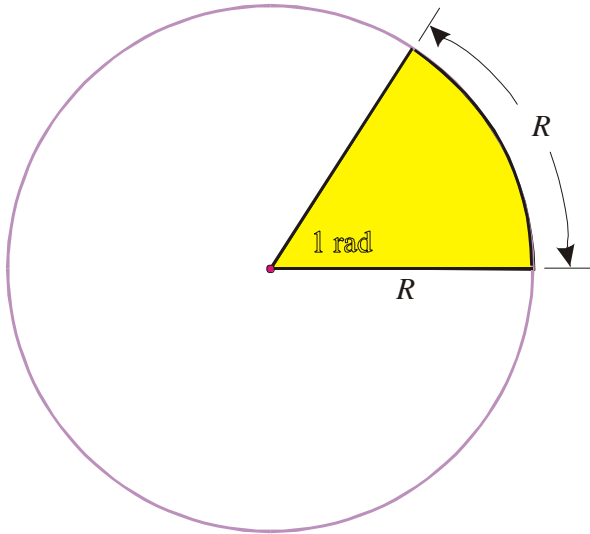

a. A signal with high peak amplitude

b. A signal with low peak amplitude

Angular Measurement

Angular measurements can be made in degrees (º) or radians.
 The radian (rad) is the angle that is formed when the arc is equal to the radius of a circle.
There are 360º or 2π radians in one complete revolution

Because there are 2π radians in one complete revolution and 360° in a revolution, the conversion between radians and degrees is easy to write. To find the number of radians, given the number of degrees:

$$\text{rad} = \frac{2\pi \text{ rad}}{360^\circ} \times \text{degrees}$$

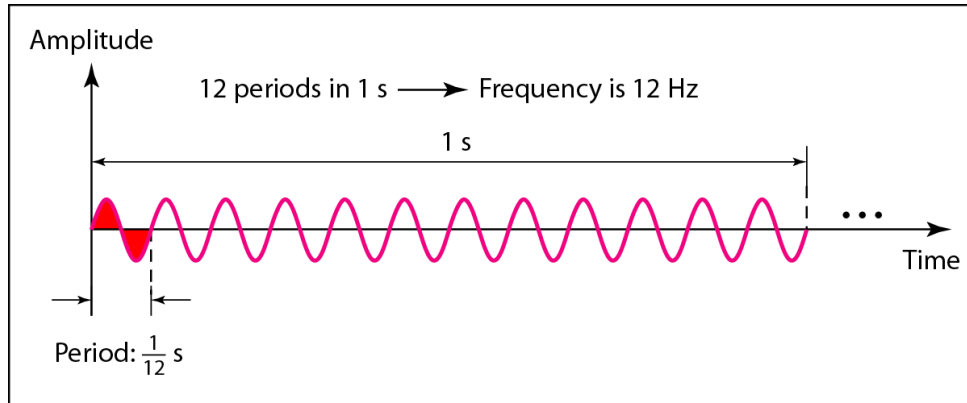To find the number of degrees, given the radians:

$$\text{deg} = \frac{360^\circ}{2\pi \text{ rad}} \times \text{rad}$$
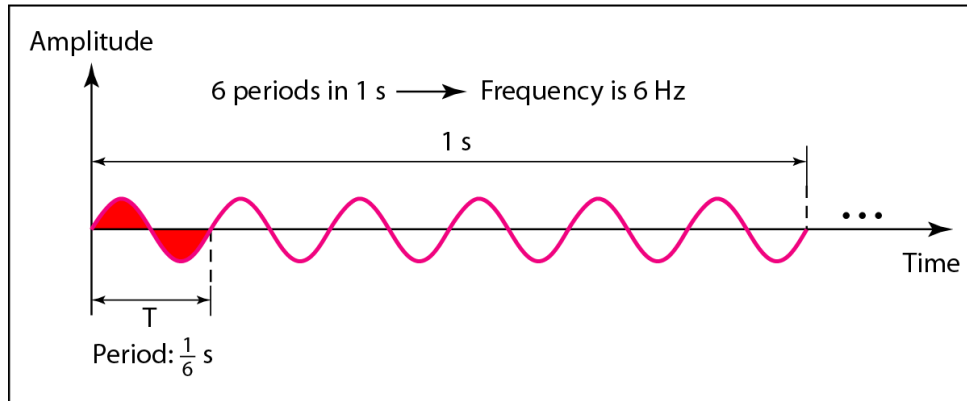
Instantaneous values of a wave are shown as *v* or *i*.
The equation for the instantaneous voltage (*v*) of a sine wave is

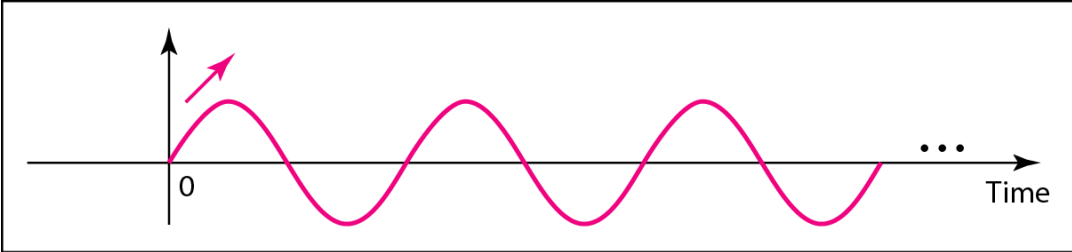# Two signals with same phase and amplitude but different frequency

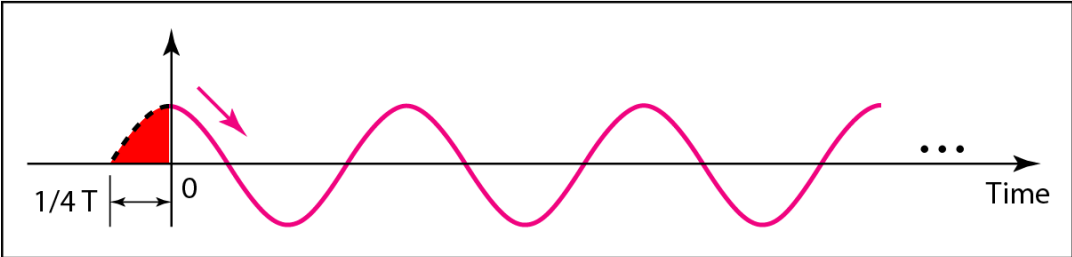a. A signal with a frequency of 12 Hz

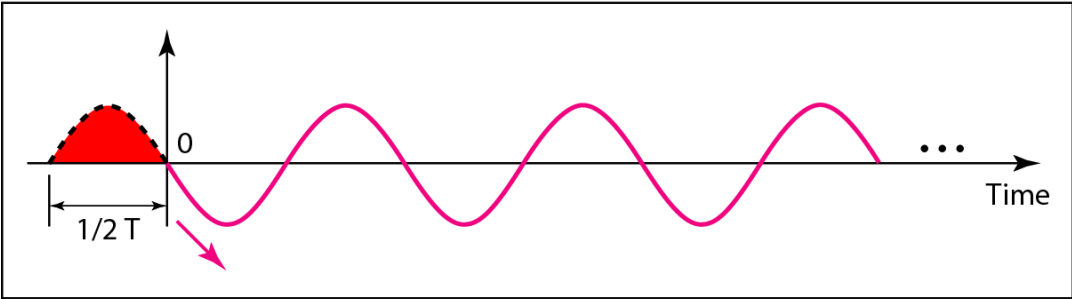b. A signal with a frequency of 6 Hz

Three sine waves with the same amplitude and frequency, but different phases

a. 0 degrees

b. 90 degrees

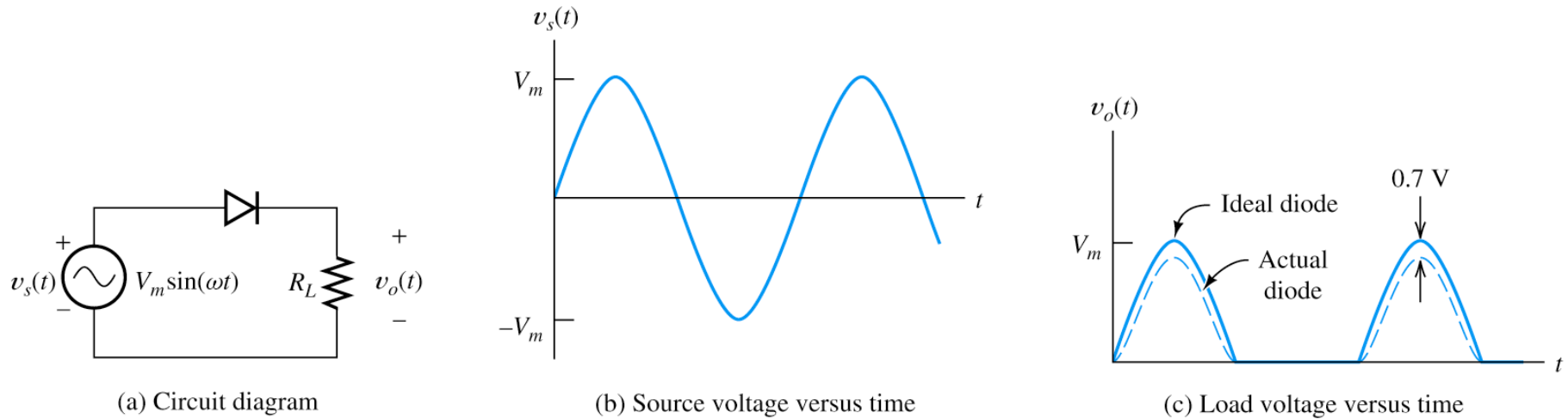c. 180 degrees

Half-wave rectification

(a) Circuit diagram

(b) Source voltage versus time

(c) Load voltage versus time
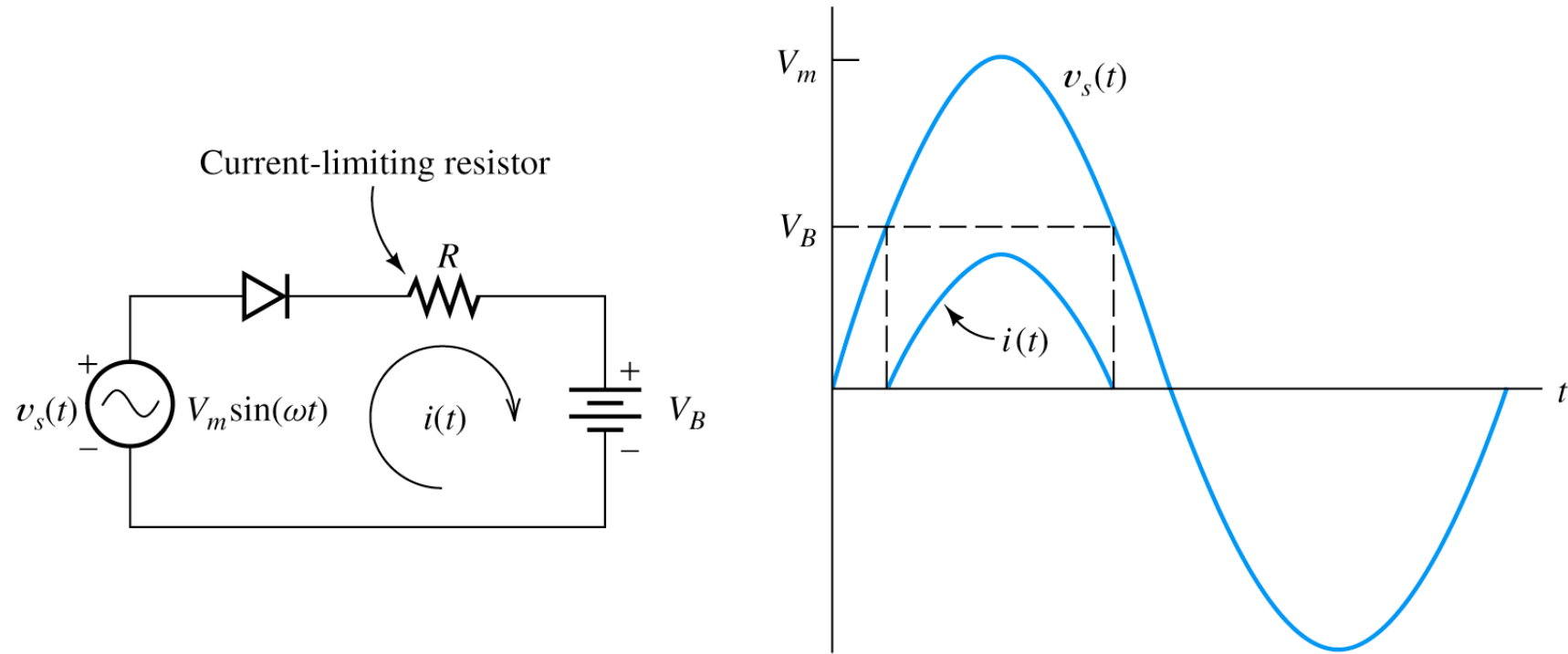
Figure 10.24 Half-wave rectifier with resistive load.

Continued..

Figure 10.25 Half-wave rectifier used to charge a battery.