



كلية الرشيد الجامعة قسم هندسة تقنيات الحاسوب

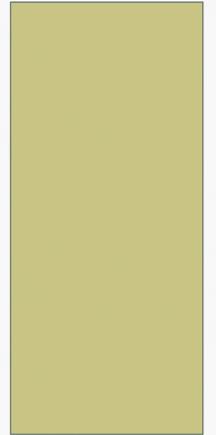
المرحلة الثانية

اسس الاتصالات

المحاضرة رقم (٢)

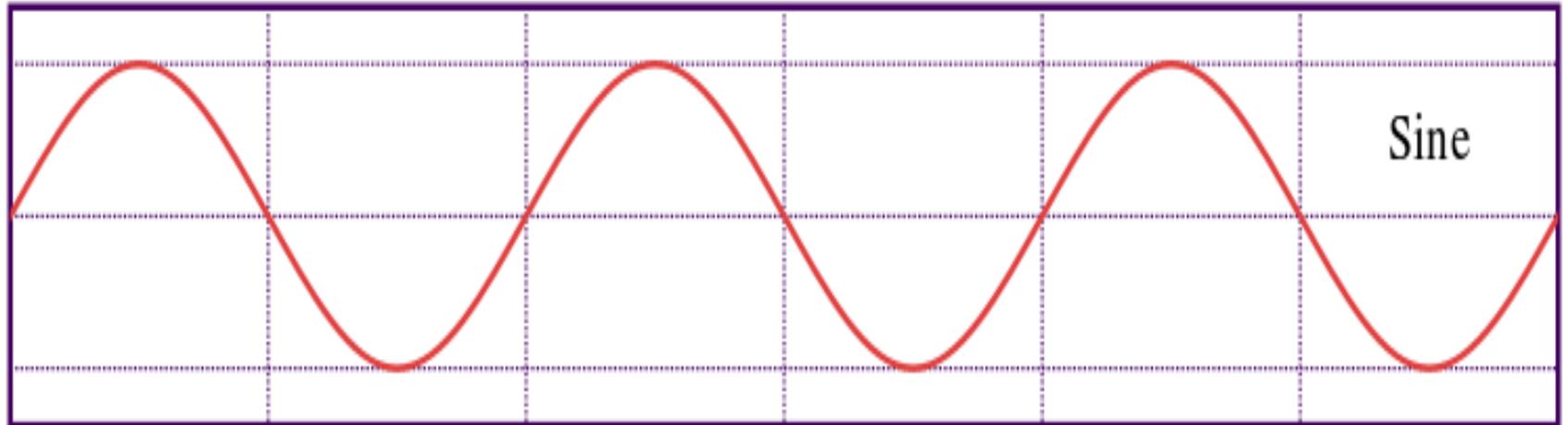
مدرس المادة : م.م. تميم محمد

SIGNAL TYPES



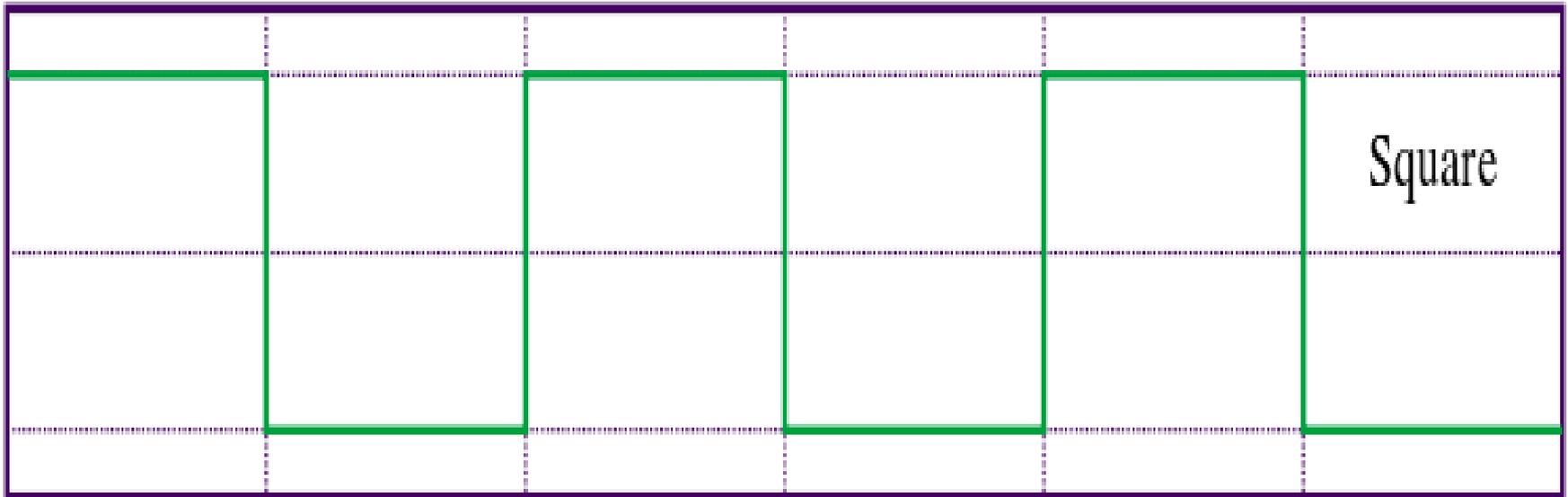
SINE

Sine waves are typically smooth and clear sounding as the human ear is designed to pick of the waves as they are the only naturally occurring waveform



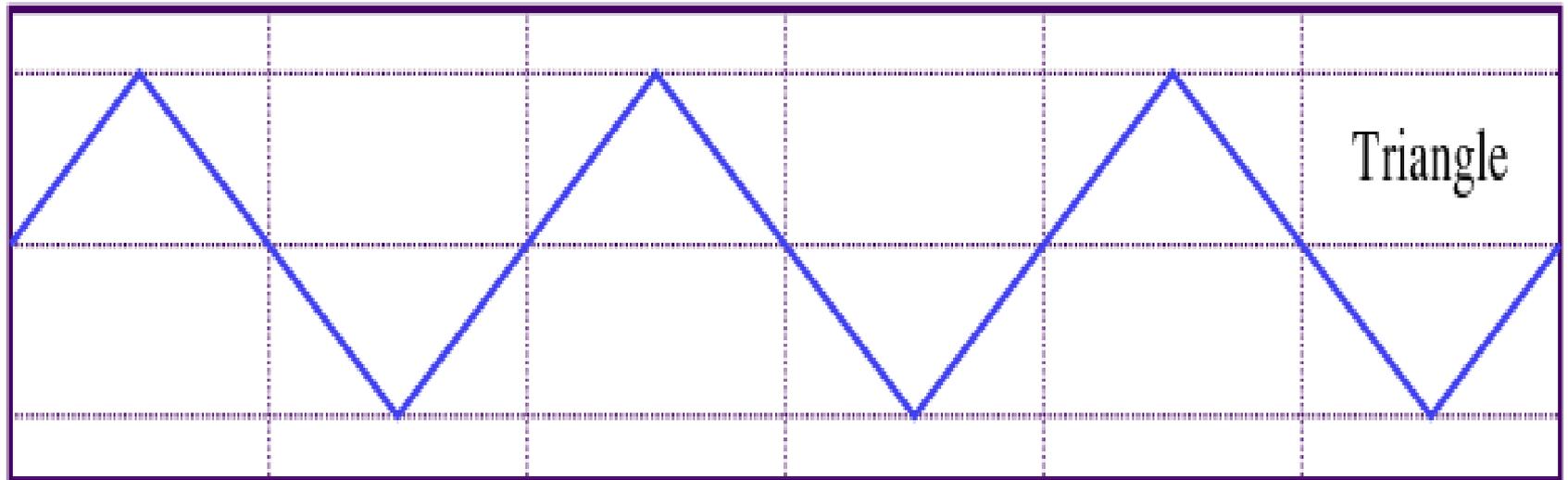
SQUARE

They are similar to square waves but they depend of the pulse width which is the percentage width of the crest of the wave in comparison to the trough.



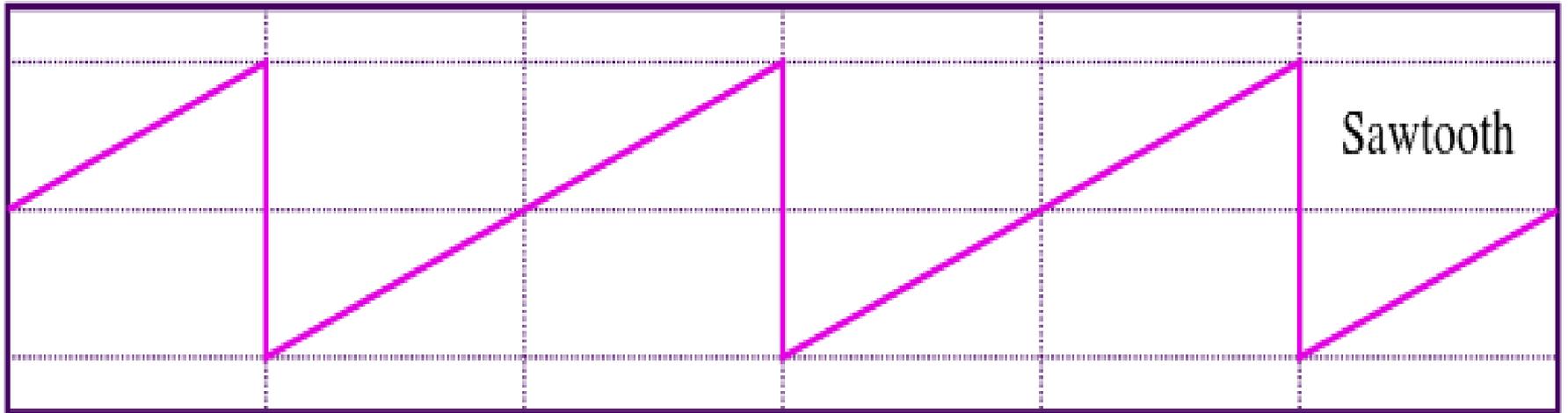
TRIANGLE

Triangle waveforms sounds similar to both square and sine waveforms and share characteristics of both. It has the same harmonics as a square wave.



SAWTOOTH

the saw wave shown is a Ramp Up saw wave. a Ramp Down saw wave is a normal Ramp Up saw wave in reverse. They both sound the same however.



SIGNAL CLASSIFICATION

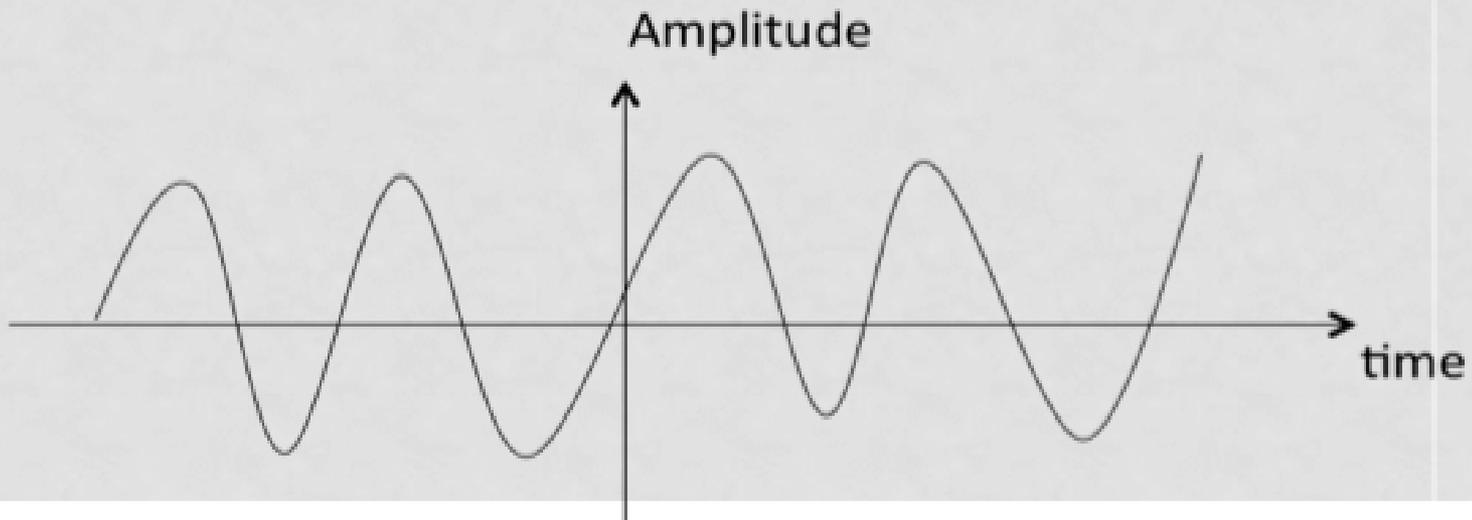
signal can be classified into:

1. Continues and Discrete signals
2. Analog and Digital signals
3. Periodic and Non-periodic signals
4. Deterministic and Random signals
5. Symmetric and Asymmetric signals
6. Energy and Power Signals

1. CONTINUES AND DISCRETE SIGNALS

Continues Signals

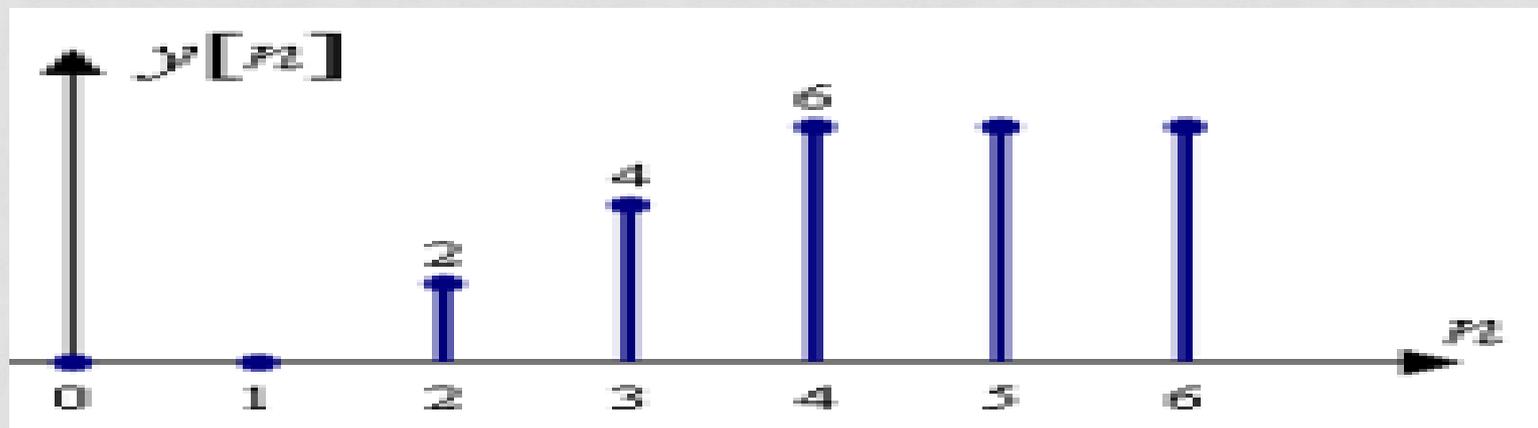
- ❑ An Continues *signal* $\mathbf{x(t)}$ is a continuous function of time; that is, $\mathbf{x(t)}$ is uniquely defined for all \mathbf{t}
- ❑ Analog is a continues signal that vary in time and amplitude in a **continuous** manner, we can compute a value in all time.



1. CONTINUES AND DISCRETE SIGNALS

discrete signals

A *discrete signal* $x(kn)$ is one that exists only at discrete times; it is characterized by a sequence of numbers defined for each time, kn , where



k is an integer

n is a fixed time interval.

1. CONTINUOUS AND DISCRETE SIGNALS

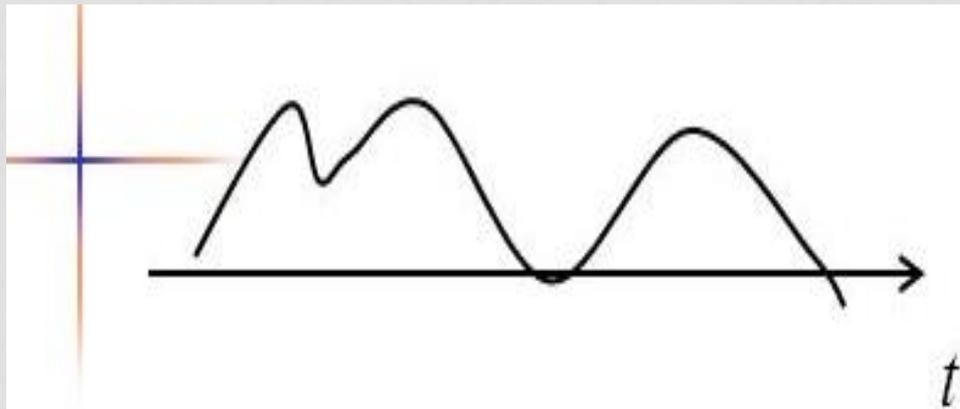
Continuous signals

Denote as $x(t)$, Continuous signals Take on real or complex values as a function of independent variable that range over real numbers.

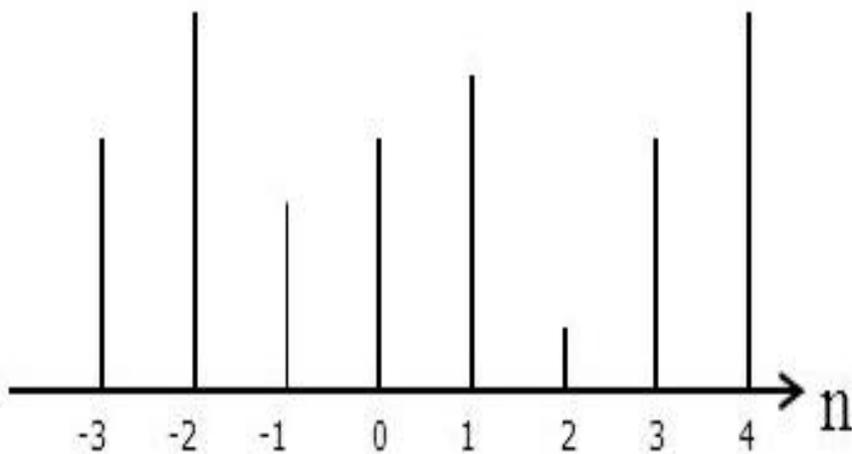
Discrete signals

Denote as $x[n]$, discrete signals Take on real or complex values as a function of independent variable that range over integers numbers.

1. CONTINUES AND DISCRETE SIGNALS



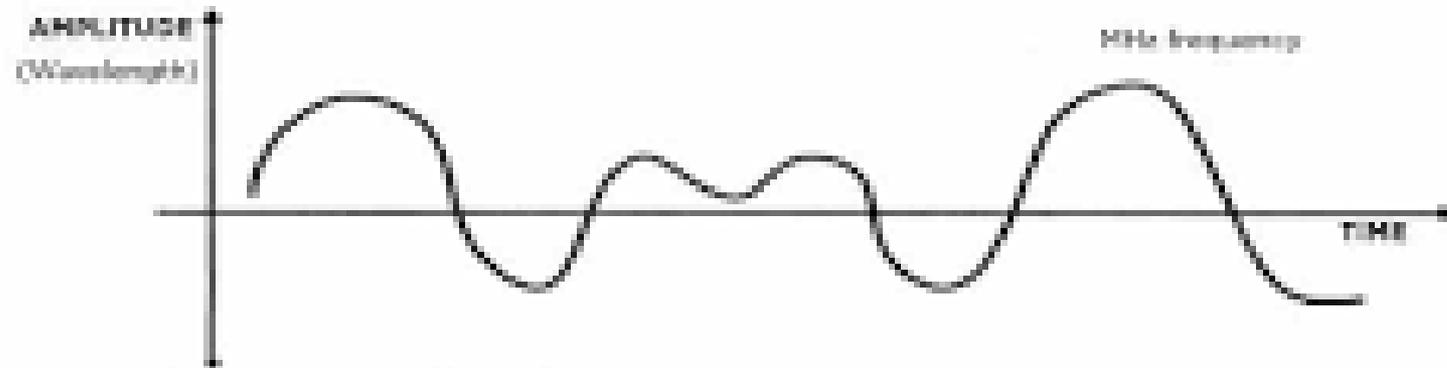
→ Continuous Signal



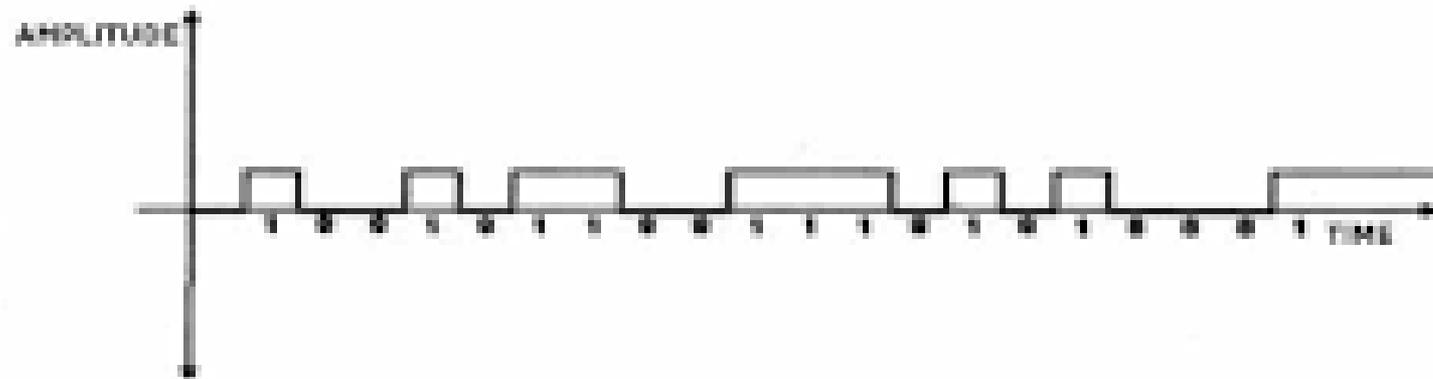
→ Discrete Signal

2. ANALOG AND DIGITAL

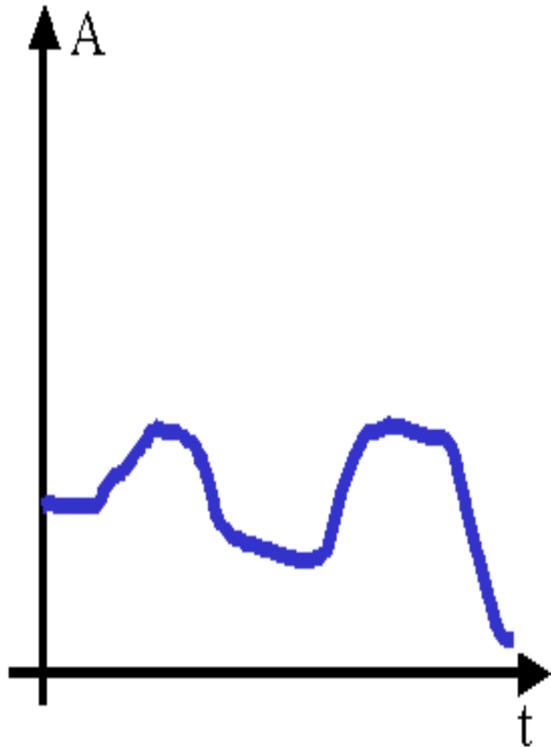
ANALOG SIGNAL



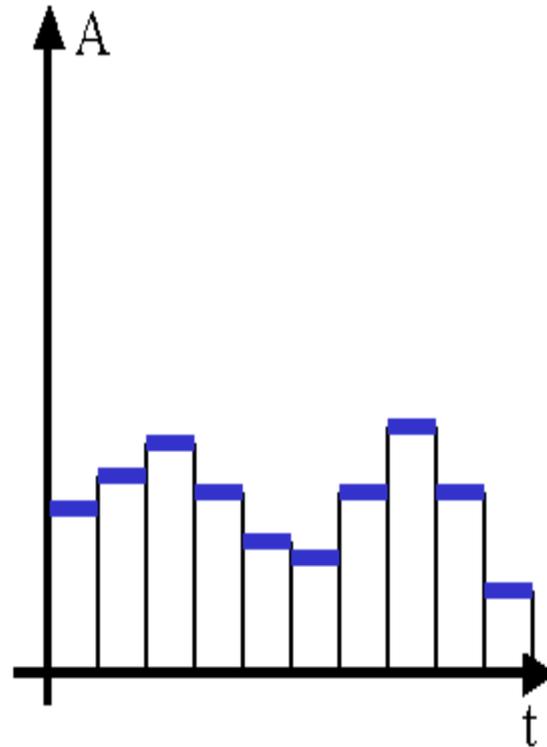
DIGITAL SIGNAL



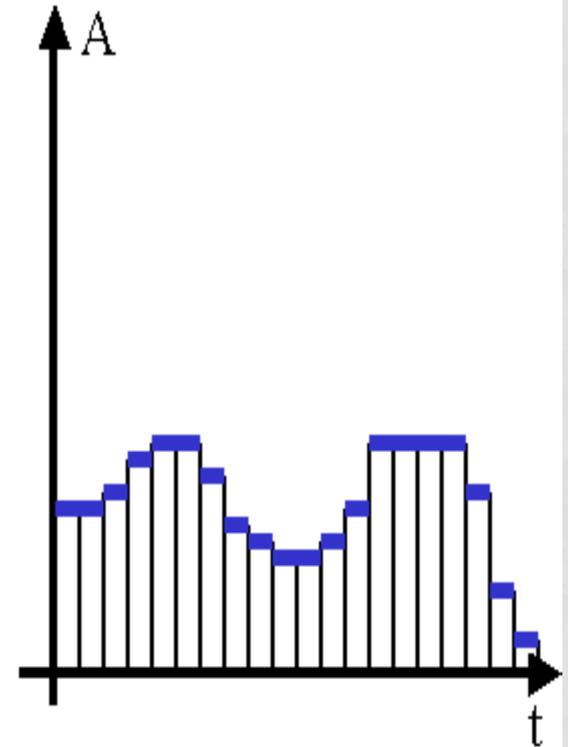
2. ANALOG AND DIGITAL



Analog signal –
continuously varying



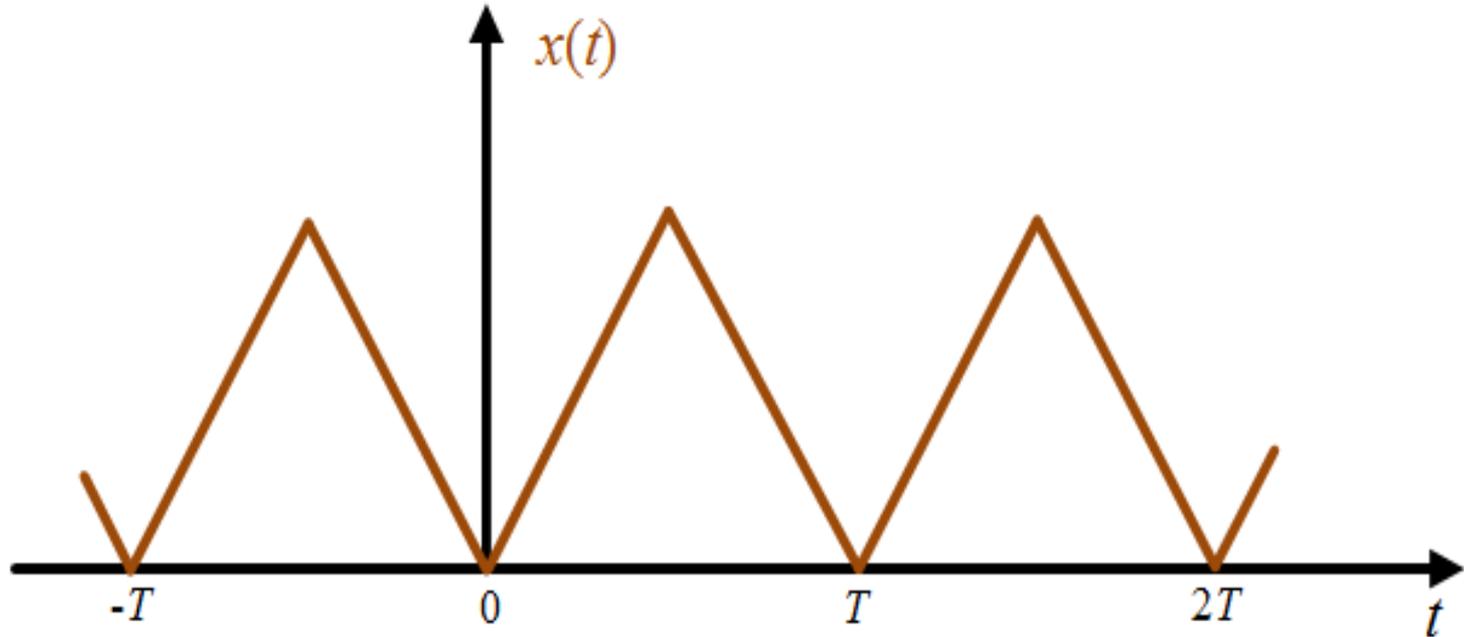
Digital signal – large
time divisions



Digital signal – small
time divisions

3. PERIODIC AND NON-PERIODIC SIGNALS

❖ A **periodic Signal** representing as



3. PERIODIC AND NON-PERIODIC SIGNALS

- ❖ A **periodic signal** is a signal that repeats the sequence of values exactly after a fixed length of time, known as the period.
- ❖ A signal $x(t)$ is called *periodic in time* if there exists a constant $T_0 > 0$ such that

$$x(t) = x(t + T_0) \quad \text{for} \quad -\infty < t < \infty$$

t denotes time

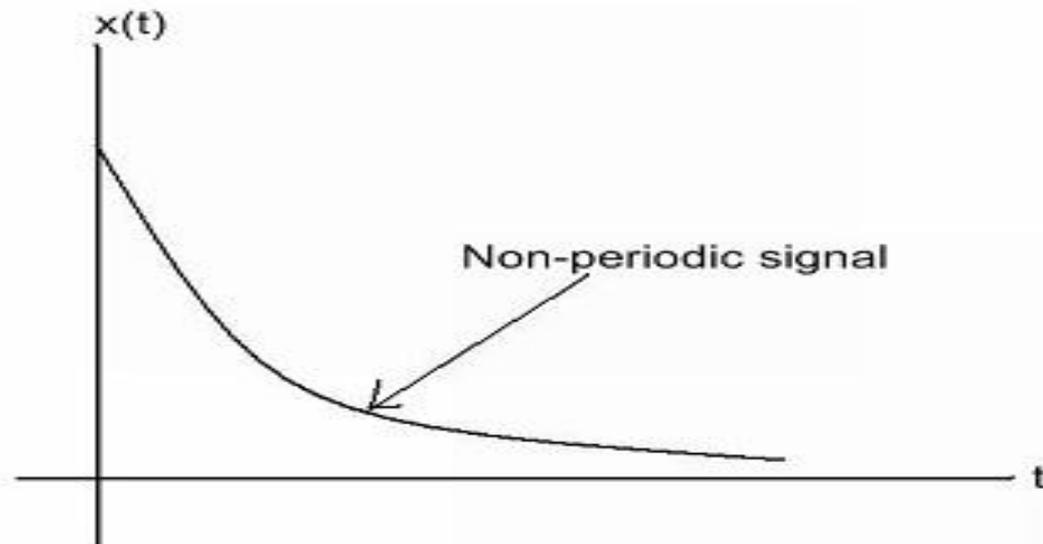
T_0 is the period of $x(t)$.

3. PERIODIC AND NON-PERIODIC SIGNALS

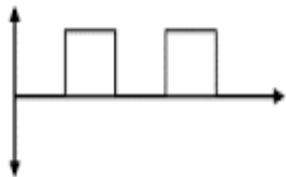
❖ Non - periodic signal :

The non periodic signal do not satisfy the condition of periodicity stated in equation

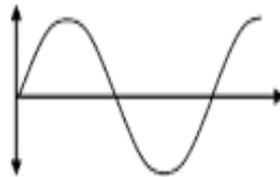
$$x(t) \neq x(t+T_0)$$



WHAT IS TYPE OF SIGNALS



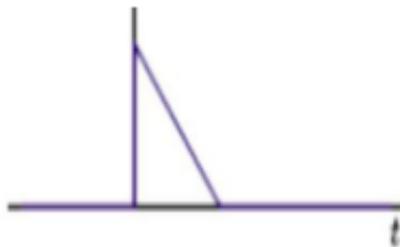
Square and periodic



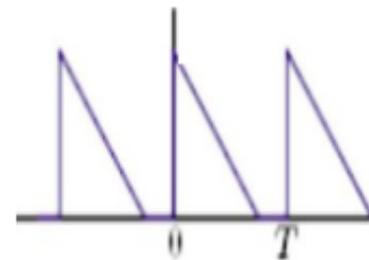
Contiuous and periodic



Contiuous and non periodic



Sawtooth and non periodic



Sawtooth and periodic