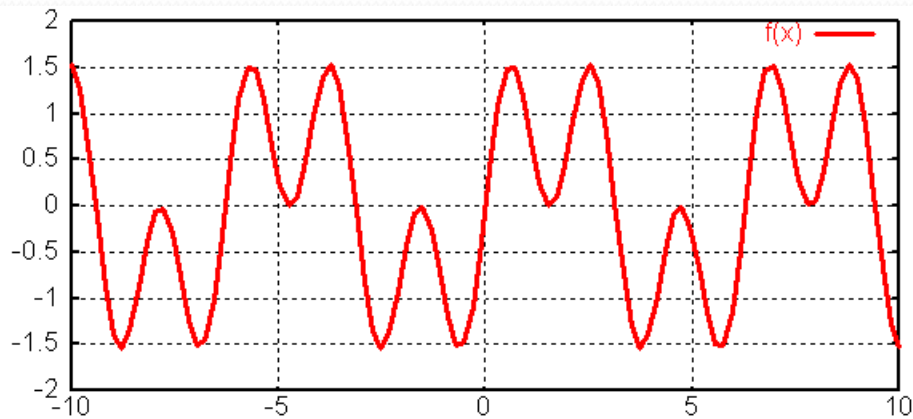


Communication Systems

Classification of Signals

Topic Covered:The essentials of a Communication system, modes and media's of Communication

Signal is a set of data or information collected over time.



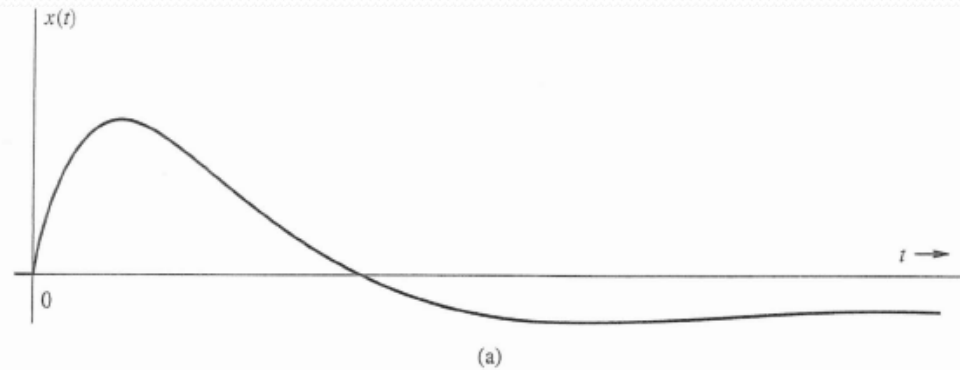
Signal Classification

Signals may be classified into:

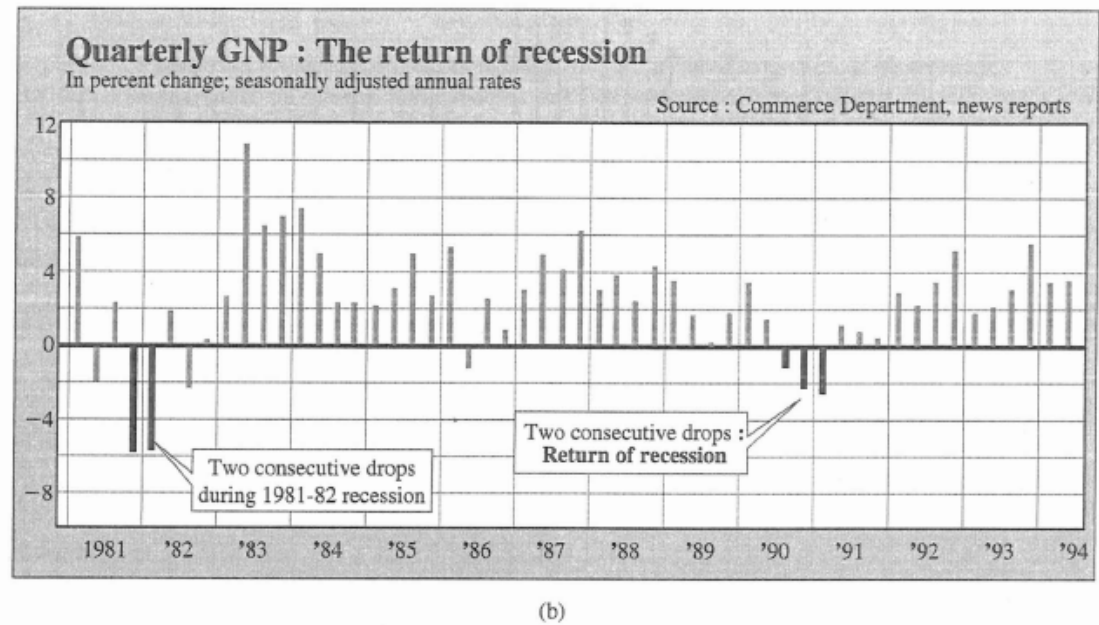
1. Continuous-time and discrete-time signals
2. Analog and digital signals
3. Periodic and aperiodic signals
4. Energy and power signals
5. Deterministic and probabilistic signals
6. Causal and non-causal
7. Even and Odd signals

Signal Classification- Continuous vs Discrete

Continuous-time

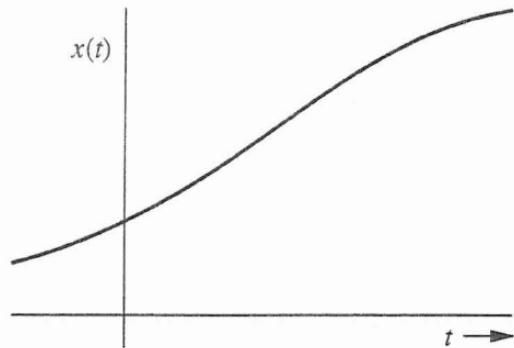


Discrete-time

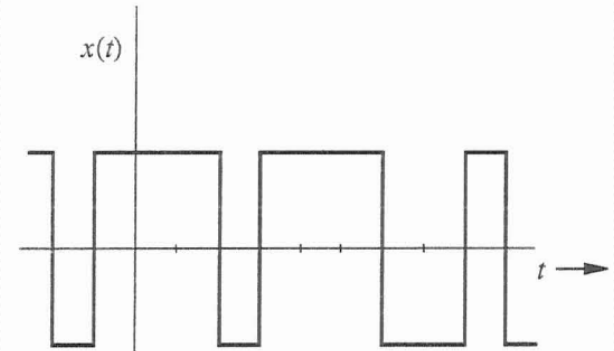


Signal Classification- Analog vs Digital

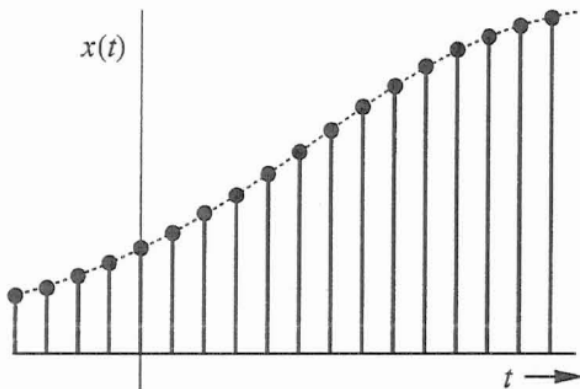
Analog, continuous



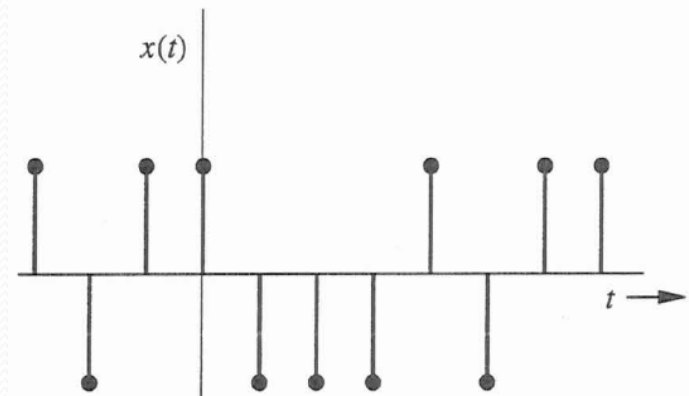
Digital, continuous



Analog, discrete



Digital, discrete

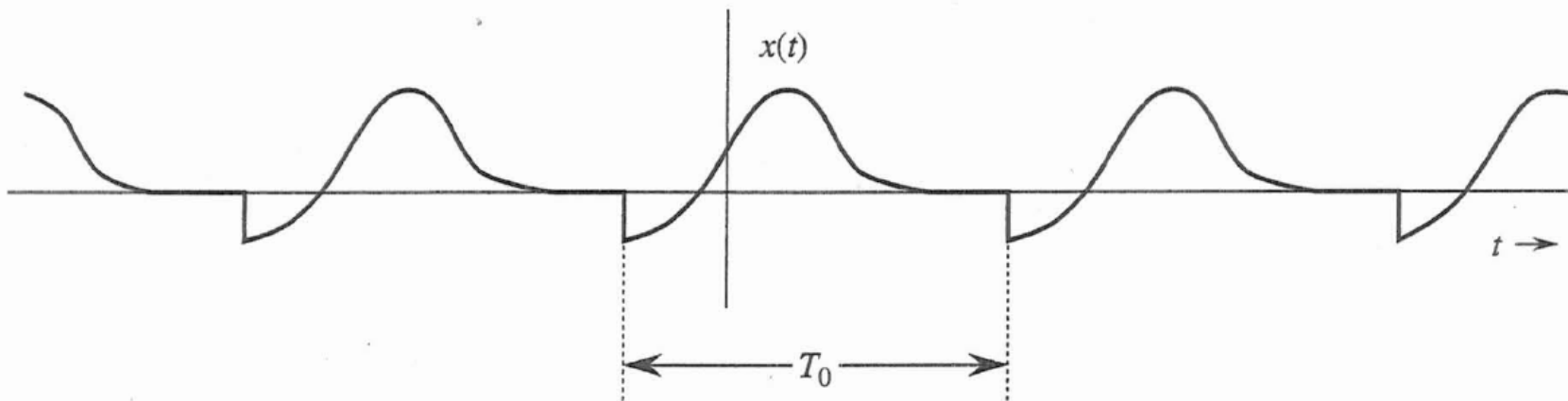


Signal Classification- Periodic Vs Aperiodic

A signal $x(t)$ is said to be periodic if for some positive constant T_0

$$x(t) = x(t + T_0) \quad \text{for all } t$$

The smallest value of T_0 that satisfies the periodicity condition of this equation is the *fundamental period* of $x(t)$.



Signal Classification- Energy v/s Power

- Energy of a signal $x(t)$ is given by:

$$E_x = \int_{-\infty}^{\infty} |x(t)|^2 dt$$

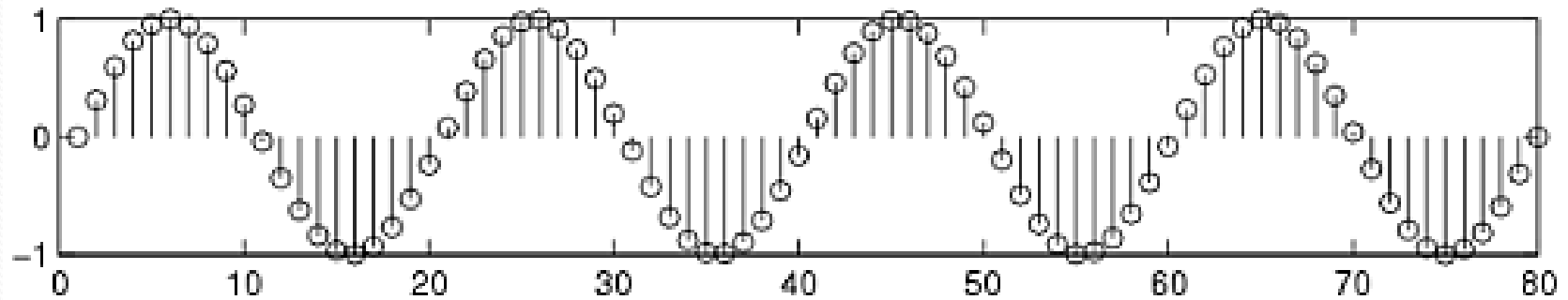
- Power of a signal $x(t)$ is given by:

$$P_x = \lim_{T \rightarrow \infty} \frac{1}{T} \int_{-T/2}^{T/2} |x(t)|^2 dt$$

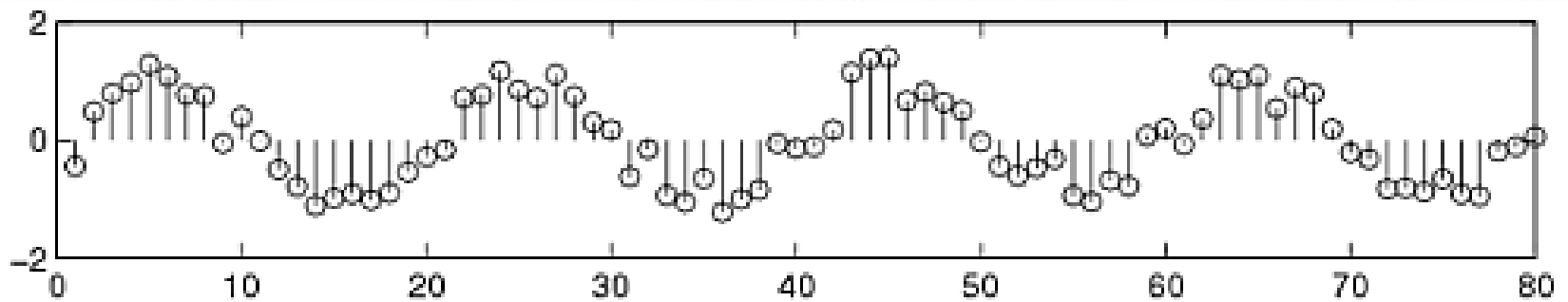
- A signal is Energy signal if $0 < E_x < \infty$
- A signal is Power signal if $0 < P_x < \infty$

Signal Classification- Deterministic vs Random

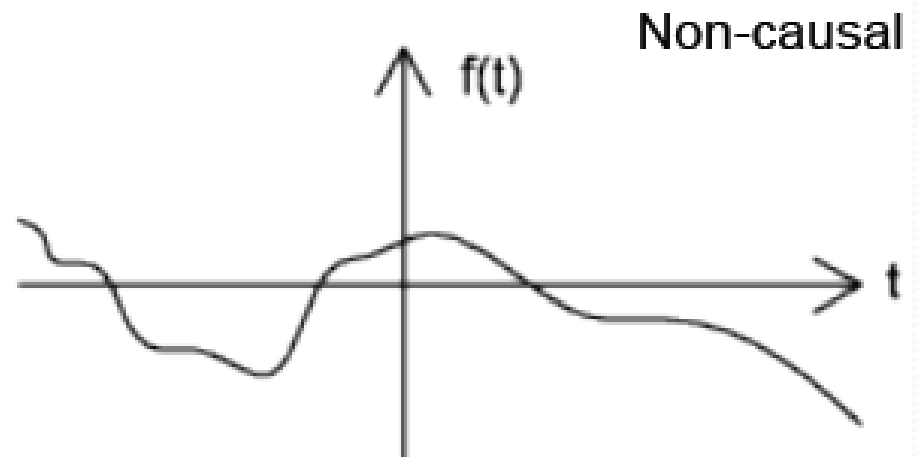
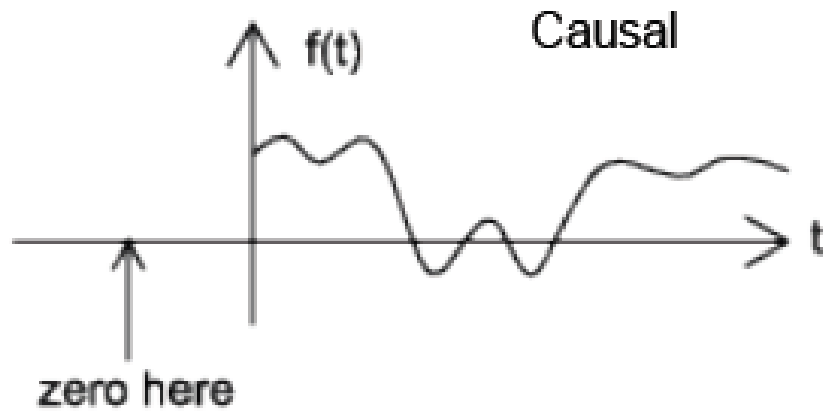
Deterministic



Random



Signal Classification- Causal Vs Non-causal



Signal Classification- Even(symmetric) vs Odd (Antisymmetrical)

