# SNS COLLEGE OF TECHNOLOGY

**(An Autonomous Institution)**

**COIMBATORE-35**

**Accredited by NBA-AICTE and Accredited by NAAC – UGC with A++ Grade**
**Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai**

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

**COURSE NAME: 19EEB301/ CONTROL SYSTEMS**

III YEAR / V SEMESTER

Unit II – TIME RESPONSE

Topic : Standard Input Signals and its types

# Standard Test Signals

- Standard test signals are used to estimate the performance and characteristics of the system by analyzing the responses of the signals.
- These signals are applied one by one as input to the system to determine different responses of the system such as Stability, Linearity, Transient response, and Frequency response.

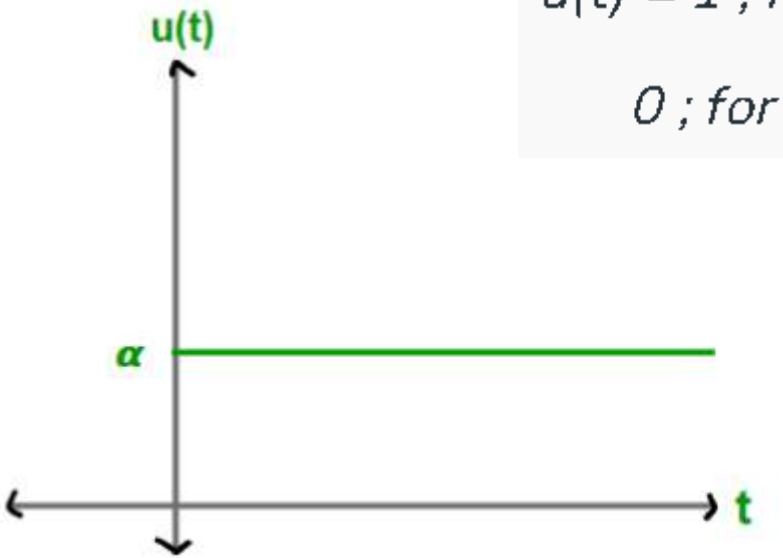

- ✓ Step signal
- ✓ Ramp signal
- ✓ Impulse signal
- ✓ Parabolic signal

# Step and Unit Step Signal

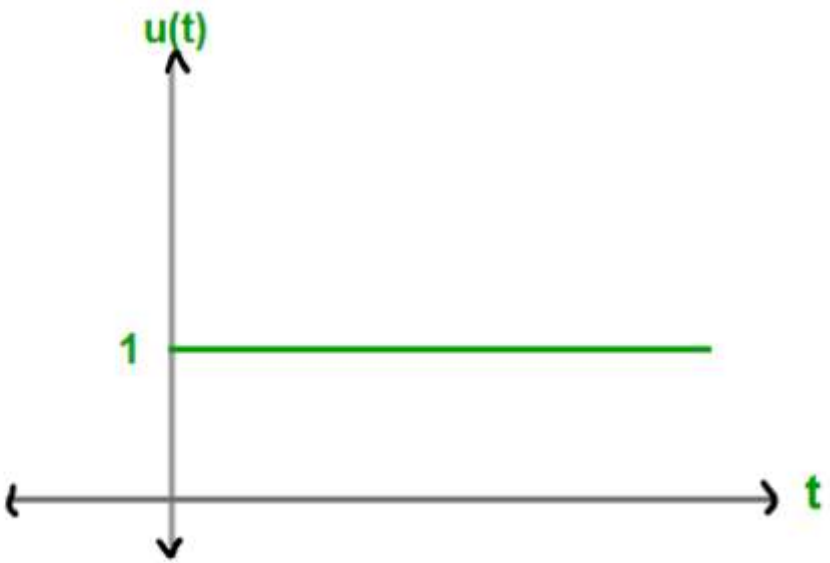
- The magnitude of step signal is constant.
- A Step signal exists only for positive values and zero for negative values.
- It is used to analyze system response to sudden changes in the reference input.
- It is defined by its magnitude.

$$u(t) = 1 \text{ ; for } t>=0$$

$$0 \text{ ; for } t<0$$




(i) Step signal



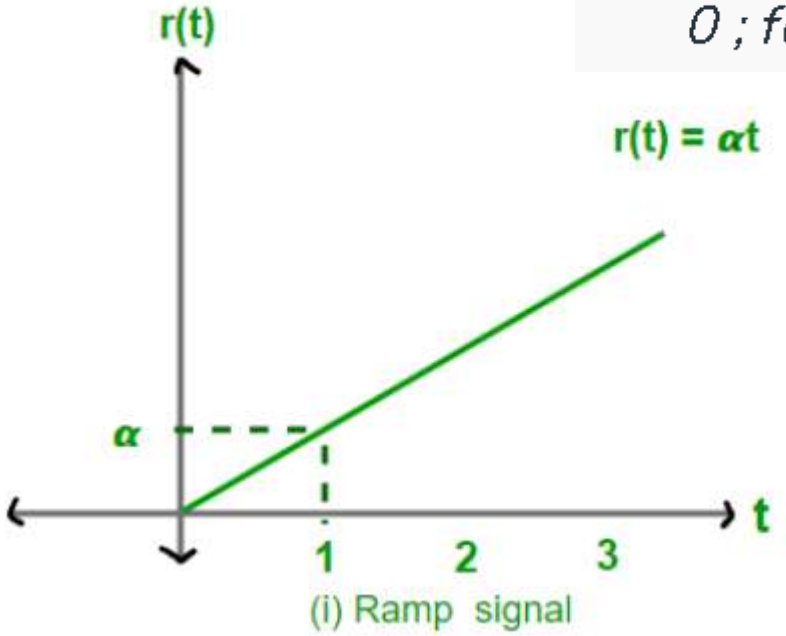

(ii) Unit Step signal

# Ramp and Unit Ramp Signal

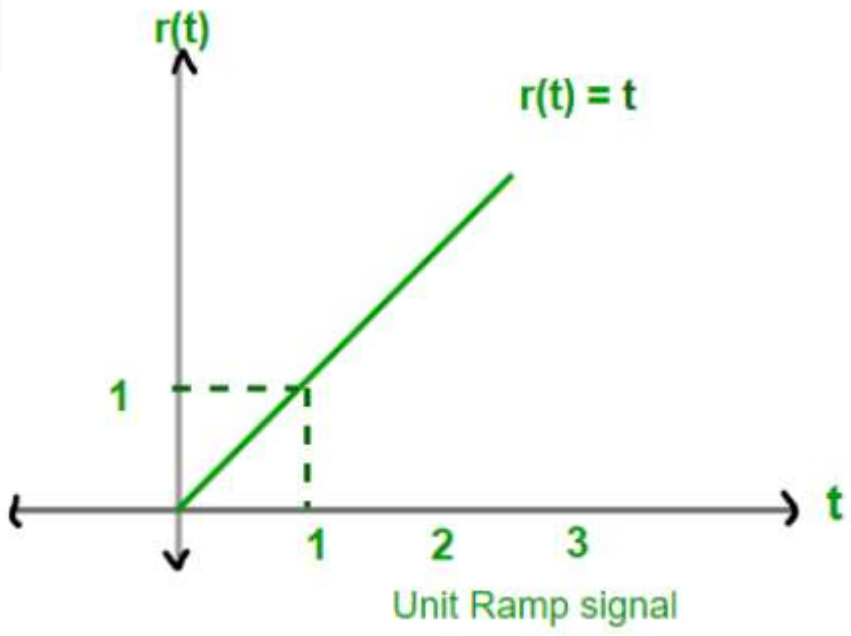
- It is an increasing function which increases linearly with Time.
- Ramp signal is used to analyze system response to linearly changing inputs.
- It is also known as velocity type input. Ramp input is defined by its **slope**.

$$r(t) = t \text{ ; for } t>=0$$

$$0 \text{ ; for } t<0$$



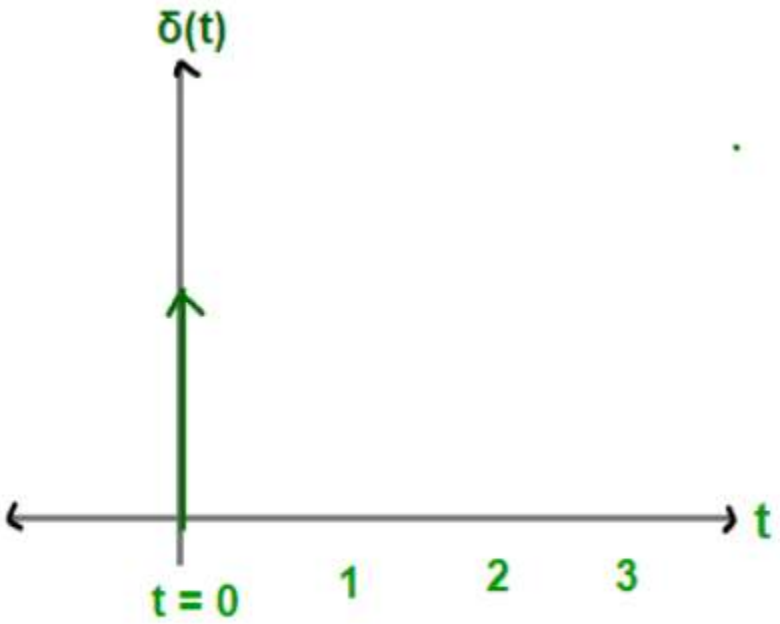
(i) Ramp signal



Unit Ramp signal

# Impulse Signal

- An Impulse signal exists only at zero.
- An impulse signal is an infinitesimally narrow pulse with unit area and infinite amplitude.
- It is used to analyze system response to Impulse – like inputs.



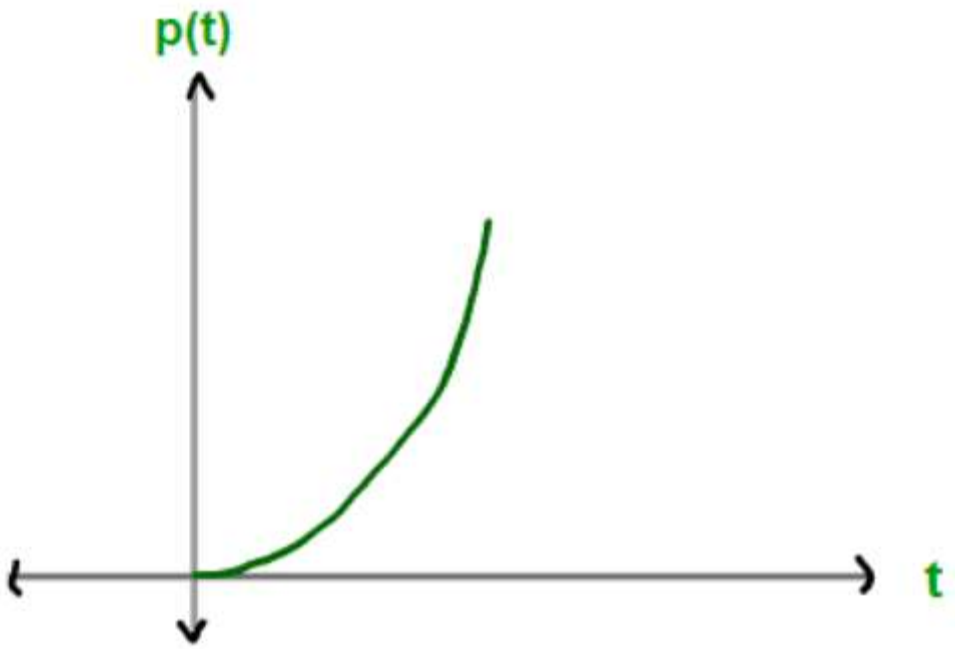

(i) Continuous-time Unit Impulse signal

$$\delta(t) = \infty \; ; \; for \; t = 0$$

$$0 \; ; \; for \; t \neq 0$$

# Parabolic Signal

- Parabolic signal is the signal whose magnitude varies as square of time.
- It is also called acceleration type input.
- It is used to analyze system response to Non linear inputs.




Continuous-time Parabolic signal

$p(t) = t^2/2$ ; for $t >= 0$

$0$ ; for $t < 0$


# Thank You