DT) / CT)

DT)		CT)	
Gösterim	$[\ ]$		Surekli
Tip	Ayrık		
Grafik	$\uparrow\uparrow$		$\int dt$
Toplam	Σ		t
Degişken	n		$\frac{d}{dt}$
fark	$-$		

Even - Odd

$x(-t) = x(t)$ even

$x(t) = -x(-t)$ odd

$x_e = \frac{1}{2}[x(t) + x(-t)]$

$x_0 = \frac{1}{2}[x(t) - x(-t)]$

Periodic - NonPeriodic

$f = \frac{1}{T}$ $w = 2\pi f$

DT)

$x[n] = x[n+N]$

$\Omega = \frac{2\pi m}{N}$ radians

for min (m,N)

$w = a\pi$

$T = \frac{2}{a}$

CT) $x_1(t) , x_2(t)$ periodic

$x_1(t_1 + T) = x_2(t_2 + T)$

$x_1(t) = x_1(t + mT_1)$

$x_2(...)$ $t\ T_2$

$1.dg\ \frac{t}{m} = \frac{T_1}{T_2}$ rasyonelse

= OKEK (T_1, T_2)

degilse periodik degil

Power Or Energy

CT)

$E = \int_{-\infty}^{\infty} x^2(t)\, dt$ $P = \frac{1}{T}\int_{-T/2}^{T/2} x^2(t)\, dt$

energy   avg pow

$0 < E < \infty \rightarrow$ energy

$0 < P < \infty \rightarrow$ power

can not both

DT)

$E = \Sigma\ x^2[n]$ $P = \frac{1}{N}\sum_{n=0}^{N} x^2[n]$

E signal $\rightarrow 0\ P$

P signal $\rightarrow \infty\ E$

Step func

$u[n] = \begin{cases} 1, & n \geq 0 \\ 0, & \text{otherwise} \end{cases}$

$u[n] - u[n-a] = 0 \leq n < a$

all periodic Sinisoudal Signal

$x(t) = A\cos(wt + \emptyset)$

not all $x[n] = A\cos(\Omega n + \emptyset)$

$x[n] = x[n+N]$

Time Scaling

$y(t) = x(a.t)$

$a > 1$ genleşme

$0 < a < 1$ küçülme

Reflection

$y[n] = x[-n]$

$y(t) = x(-t)$

Time Shifting

$x(t-a)$

Exponential

$x(t) = B.e^{at}$ $x[n] = B.r^n$

Decay - $a < 0$ $0 < r < 1$

Grow - $a > 0$ $r > 1$

Impulse Func

$\delta[n] = \begin{cases} 1, & n=0 \\ 0, & \text{otherwise} \end{cases}$

• $\delta(n - n_0) * x(n) = x(n_0)$

• $\delta(a.t) = \frac{1}{a}\delta(t)$ $[a > 0]$

✓ even func

• $\delta(t) = \frac{d}{dt} u(t)$ $\delta[n] = u[n] - u[n-1]$

• $u(t) = \int_{-\infty}^{t} \delta(t)\, dt$ $u[n] = \sum_{-\infty}^{n} \delta(k)$

Ramp Func

$r(t) = \begin{cases} t, & t \geq 0 \\ 0, & \text{otherwise} \end{cases}$

$\forall$ for all $\mathbb{Z}$ int

$\exists$ there exist $\mathbb{Z}^+$ positive int

Systems

$x(t) \rightarrow \boxed{CT} \rightarrow y(t)$ $H\{x(t)\} = y(t)$

$x[n] \rightarrow \boxed{DT} \rightarrow y[n]$ $x(t) \xrightarrow{H} y(t)$

$x[n] \rightarrow \boxed{H_0, H_1, H_2} \rightarrow (+) \rightarrow \boxed{c} \rightarrow y[n]$

c.(H_0 , H_1, H_2)

Stability

• Bounded I/O

$y(t) = H\{x(t)\}$

1. $x(t) \leq m_x < \infty$ $\forall x, M_x \in \mathbb{R}^+$

2. $y(t) \leq M_y < \infty$ $\forall t, M_y \in \mathbb{R}^+$

if x done $y < x$ ise sağlar.

Memoryless

Sadece bu ana bağlı olm. Geçmiş veya gelecek varsa non-memoryless.

$y[n] = x[n-1]$ has memory

$y(t) = (t+1)\,x(t)$ memoryless

Casuality

Geçmiş ve/veya bu ana bağlı. Gelecek olmayacak.

Invertibility

Tersi yok (f^{-1})

$y(t) \rightarrow x(t)$

1 tane çıkmıyorsa olmaz.

Time Invariance

Zamanda ileri geri gidince değişmiyorsa.

$H\{x[n-n_0]\} \stackrel{?}{=} y[n-n_0]$

aksi halde Time-Variant

Linearity

• Superposition

$H\{x_1 + x_2\} = y_1 + y_2$ ikiside oluyorsa linearity

• Homogenity

$H\{ax\} = ay$

(LTD) Linear time Invarted

Convulution Sum / Integral

$x[n]$ x'i impulse ile çarpma.

$\delta[n]$
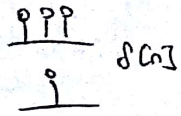
$$x[n] = \sum_{k=-\infty}^{\infty} x[k]\, \delta(n-k)$$

$$H\left\{ \delta(n-k) \right\} = h[n-k] \quad \Big\} \text{impulse response}$$

$$y[n] = \sum_{k=-\infty}^{\infty} x[k] \cdot \underbrace{h[n-k]}_{w_n[k]} \quad \Big\} \text{conv sum}$$

$w_n[k]$ → k parametreli fonksiyon yapma

Property

Değişme (Commutative)
Dağılma (Distrubative)
Birleşme (Associative)

Memoryless

$h[k] = c \cdot \delta(k)$

$h[k] = 0$ folk $k \neq 0$

Casuality

$h[k] = 0$ for $k < 0$

Stable

$$\sum_{k=-\infty}^{\infty} |h[k]| < \infty$$

Step Responce

$$S[n] = \sum_{k=-\infty}^{n} h[k] \quad \left(u[n] = \sum_{-\infty}^{n} \delta(k) \right)$$

- -k olduğundan negatif
- impulse punctaki özellikler.