Systems →

Set of elements or functional blocks which are connected together and produces an output in response to an input signal. The response or output of the system depends upon transfer function of the system.

$$y(t) = f\,x(t)$$

Basic System Properties →

1 Dynamic or static
2 time variant or invariant
3. Linearity
4. Causality
5. Stability

Static System →

System in which output at any instant of time depends on input sample at the same time

$$y(n) = 5x(n)$$
$$y(n) = x^2(n) + 5x(n) + 10$$

Memory less

Dynamic System →

System in which o/p of any instant of time depends on input sample at the same time as well as at other times

past
It may be present or future time

$$y(n) = x(n) + 5x(n-1)$$
$$y(n) = 3x(n+2) + x(n-1)$$

Dynamic System has a memory.

Time Variant and Invariant →

Step 1 → Delay the input $x(n)$ by k units that means $x(n-k)$. Denote the corresponding output by $y(n,k)$

Step 2 → In the given eqn of System $y(n)$ replace 'n' by 'n-k' throughout. This output is $y(n-k)$

Step 3 → If $y(n,k) \neq y(n-k)$ then System is time Variant and if $y(n,k) = y(n-k)$ then System is time invariant TIV.

$y(n) = x(n) - x(n-1)$
$y(n,k) = y(n-k)$ TIV

$y(n) = x(n) + nx(n-1)$
$y(n,k) \neq y(n-k)$ TV

Linear or Non Linear →

A System is said to be linear if the combined response of $a_1x_1(n)$ and $a_2x_2(n)$ is equal to the addition of individual response

@

$$T[a_1x_1(n) + a_2x_2(n)] =$$
$$a_1 T[x_1(n)] + a_2 T[x_2(n)]$$

FEBRUARY							2015
WK	M	T	W	T	F	S	S
05							1
06	2	3	4	5	6	7	8
07	9	10	11	12	13	14	15
08	16	17	18	19	20	21	22
09	23	24	25	26	27	28	

A C.T system is said to be BIBO stable ... for every bounded input. The system ... bounded o/p for every bounded input. The system which does not satisfy this condition is an unstable system.

Step 1 → Apply zero input and check the output if output is zero then system is linear. If this step is satisfied then follow the remaining steps.

Step 2 → Apply individual input to the system & note down corresponding output. Then add all o/p's. Denote this addition by $y'(n)$

Step 3 → Combine all I/P apply it to the system and find out $y''(n)$

Step 4 → If $y'(n) = y''(n)$ the system is linear

$y(n) = n x(n)$

Step 1: $n \cdot 0 = 0$

Step 2: $x_1(n) \longrightarrow y_1(n) = n x_1(n)$

$x_2(n) - y_2(n) = n x_2(n)$

Now add these o/p get $y'(n)$

$y'(n) = y_1(n) + y_2(n) =$

$n x_1(n) + n x_2(n)$

$y'(n) = n[x_1(n) + x_2(n)]$

Step 3: $[x_1(n) + x_2(n)] -$

$y''(n) = T[x_1(n) + x_2(n)]$

$n[x_1(n) + x_2(n)]$

$y'(n) = y''(n)$

linear

$T[x(n)] = e^{x(n)}$

Step 1: $e^0 = 1$

Step 2:

$x_1(n) = y_1(n) = e^{x_1(n)}$

$x_2(n) = y_2(n) = e^{x_2(n)}$

$x_1(n) + x_2(n) = e^{x_1(n)} + e^{x_2(n)}$

Step 3: $[x_1(n) + x_2(n)] = y''(n)$

$e^{[x_1(n) + x_2(n)]}$

$e^{x_1(n)} \cdot e^{x_2(n)}$

Step 4: $y'(n) \neq y''(n)$

$T x(n) = a x(n) + 6$

$y(n) = x(n) + n x(n+1)$

JANUARY							2015
Wk	M	T	W	T	F	S	S
01				1	2	3	4
02	5	6	7	8	9	10	11
03	12	13	14	15	16	17	18
04	19	20	21	22	23	24	25
05	26	27	28	29	30	31	