Course Title — Signal and System

Module — 4th

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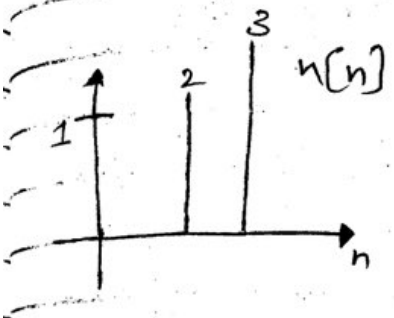
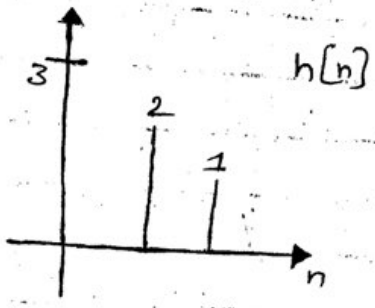
Signature — 

Q.No1 Part (a)

Evaluate $Y[n]$ using Convolution Summation.





The Summation is called the Convolution Sum of the Sequance $x[n]$ & $h[n]$ represented Compactly as

$$Y[n] = x[n] * h[n]$$

As we know

$$x[n] = 2u[n] + 2[u-1] + 3u[n-2]$$

and

$$Y[n] = 3u[n] + 2u[n-1] + u[n-2]$$

$$x[n] = x[0]\delta[n] + x[1]\delta[n-1] + x[2]\delta[n-2]$$

$$Y[n] = x[0]\delta[n] + x[1]\delta[n-1] + x[2]\delta[n-2]$$

$$x[n] = \sum_{k=0}^{2} x[m]\,\delta[n-k]$$

For $y[n]$

$$Y[n] = \sum_{k=0}^{2} x[m]\,\delta[n-k]$$

QN.1 Part (b)

Sketch block diagram for the given system.

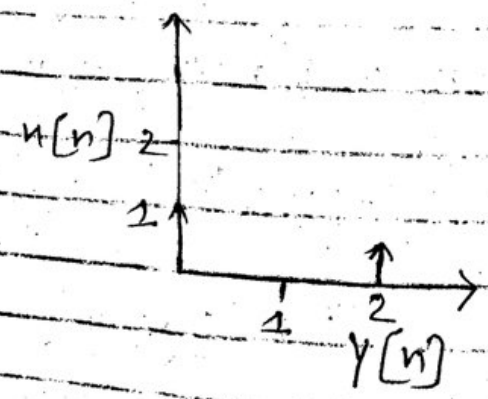
$$Y[n] = x[n] + x[n-2]$$

Answer:-

Given:-

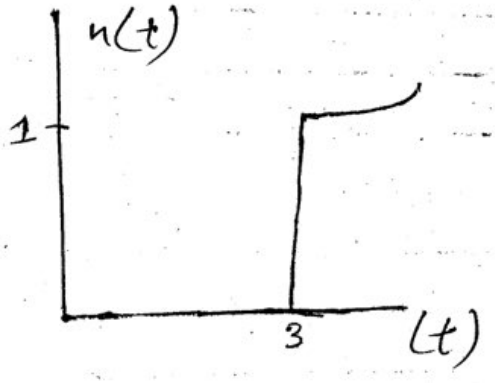
$$Y[n] = x[n] + x[n-2]$$

the graph is:-



Q2:- Part (a)
Sketch the Transform version for Signal $n(t)$ in

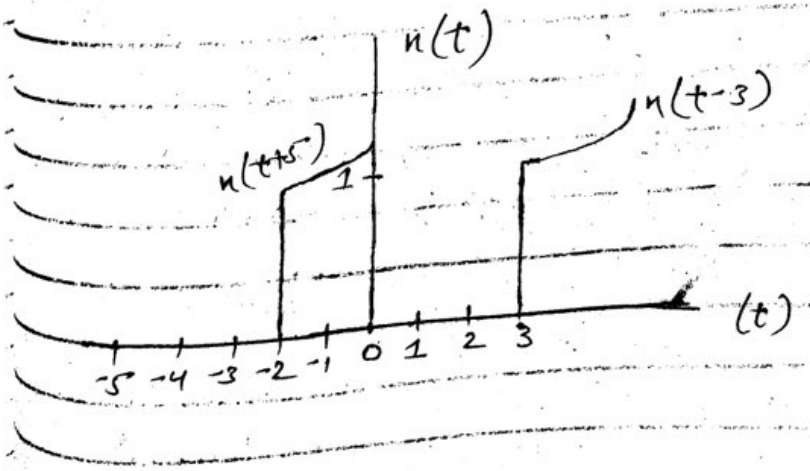
(i) $n(t+5)$ and $n(3t)$
(ii) $n(t/4)$ and $n(t-2)$



Answer:-

(i) $n(t+5)$ and $n(3t)$

$Y(t) = n(t-3)$, $Z(t) = n(t+5)$



The above figure shows Translation which is from right to left.

At $t=3$, $u(t)=1$

At $t+5=3$, $u(t)=1$

$t=-5+3$

$t=-2$

Compression $u(3t)$

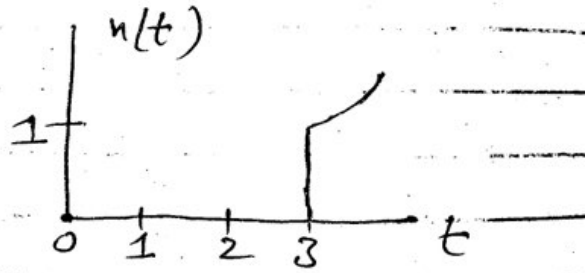
At $t=3$, $u(t)=1$

At $3t=3$, $u(3t)=1$

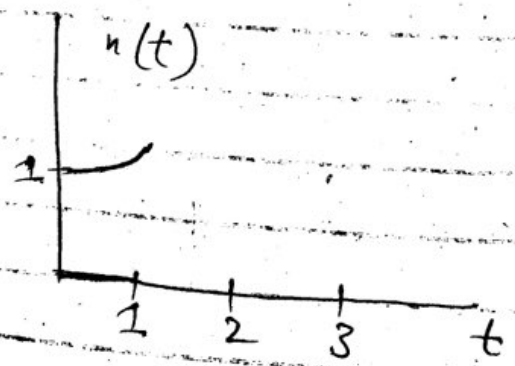
$3t=3$

$t=3/3$

$t=1$



So $x(t)=u(t-3)$, $z(t)=u(3t)$



(ii) $u(t/4)$ and $u(t-2)$

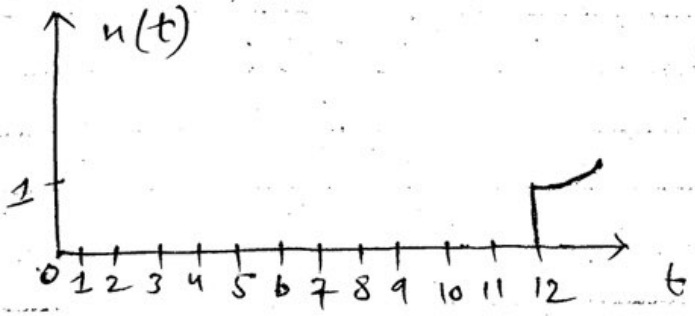
$u(t/4)$:-

At $t = 3$, $u(t) = 1$

At $t/4 = 3$, $u(t/4) = 1$

$t/4 = 3$

$\boxed{t = 12}$



Time delay :-

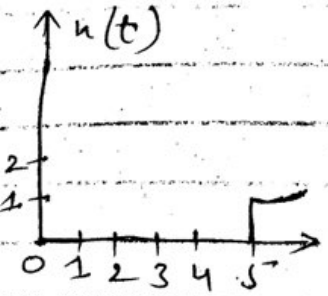
$u(t-2)$

At $t = 3$, $u(t) = 1$

At $t - 2 = 3$, $u(t) = 1$

$t = 2 + 3$

$\boxed{t = 5}$



Q2 Part (b)

outline the given system as invertible or non-invertible Linear or non-Linear, causal or non-causal. Give the reason for you answer too.

(i) $y[n] = x^2[n]$

(ii) $y[n] = x[n+2]$

Ans:- (i) $y[n] = x^2[n]$

the system is non-invertible because we cannot determine the sign of the input from knowledge of output.

(ii) $y[n] = x[n+2]$

the system is non-causal. its output involves future value of the input.

Q3e- Fill in the blanks.

If a time shift in the input signal results in an identical time shift in the output signal, the system is said to be even.