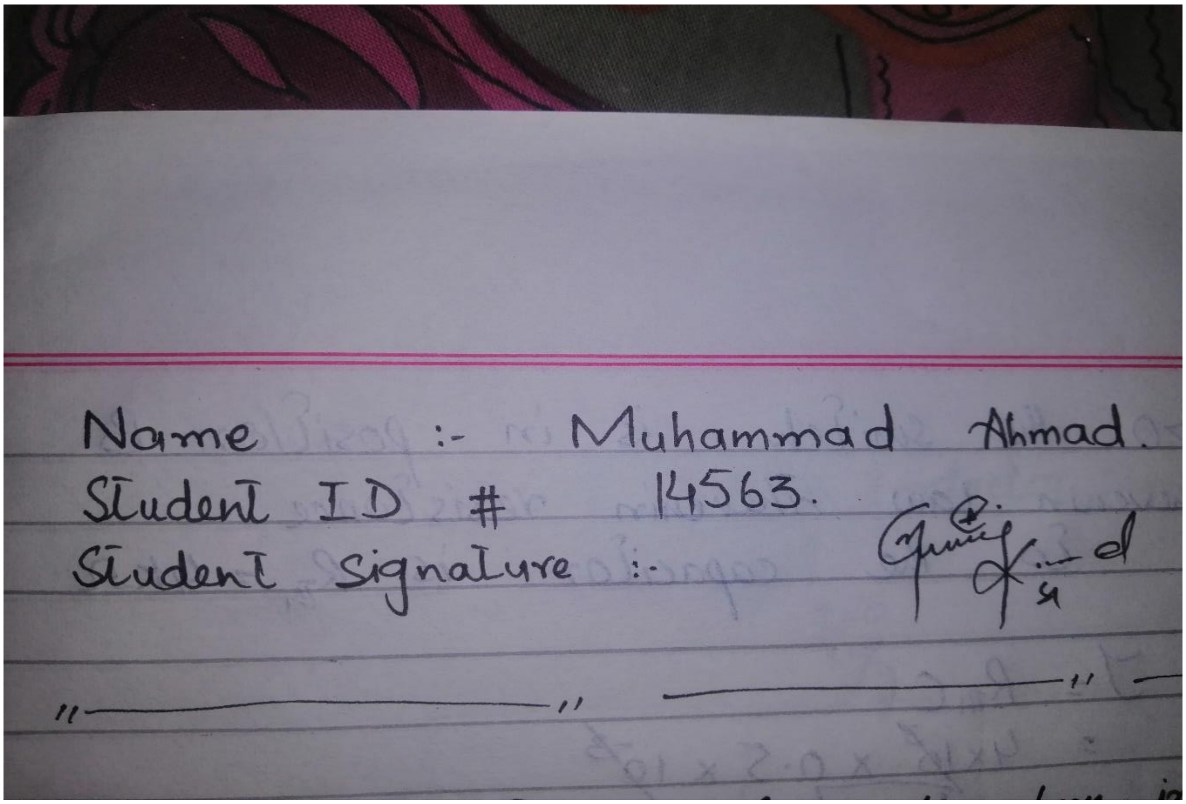
<u>**Department of Electrical Engineering**</u>

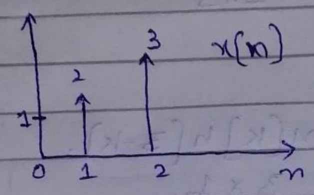
Course Title: Signal And System

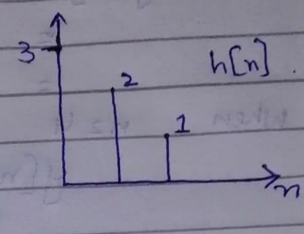
Module: 4th semester

<u>**Student Detail**</u>



QNo1 (a):- Evaluate $y[n]$ using convolution summation.

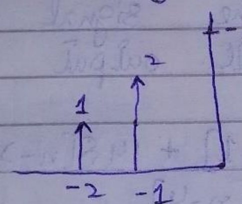




Solve:-

Step No 1.

Reflect signal $h(x)$ to $h[k]$.



$h(-n)$ OR $h(-k)$.

Formula for convolution

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

As we know.

$y[0] =$ ~~x[k]~~ 0.

when $n < 0$.

Now for $n \geq 0$.

$$y[0] = x[k]\ h[0-k]$$
$$= 1 \times 3$$
$$= 3$$

when $n = 1$.

$$y[n] = x[k] \cdot h[1-k].$$
$$= 1 \times 2 + 2 \times 3$$
$$= 8$$

when $n = 2$.

$$y[n] = x[n]\ h[n-k].$$
$$= 1 \times 1 + 2 \times 2 + 3 \times 3$$
$$= 1 + 4 + 9 = 14$$

Ske

when $n = 3$

$y[n] = x[k] . h[n-k]$.

$= 1 \times 2 + 2 \times 3$

$= 8$

when $n = 4$

$y[n] = x[k] h[3-k]$.

$= 3 \times 1$.

$= 3$.

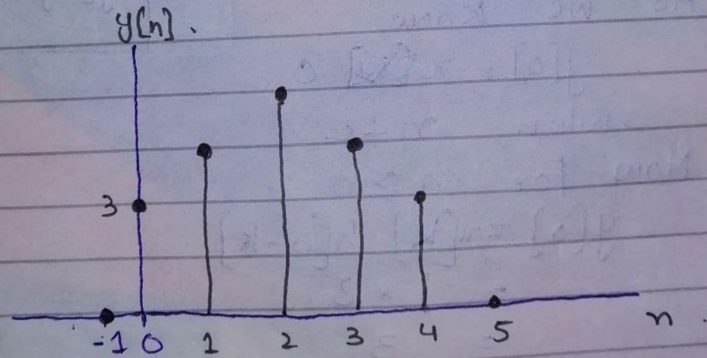
when $n > 4$

$y[n] = 0$.

Overlaping of the signal $x[k]$ & $h[n-k]$

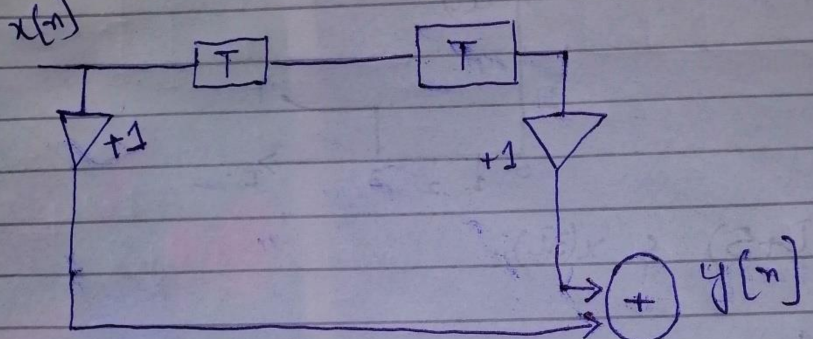
Hence. over all. output $y[n]$.

$$y[n] = 3\delta[n] + 8\delta[n-1] + 14\delta[n-2] + 8\delta[n-3] + 3\delta[n-4].$$



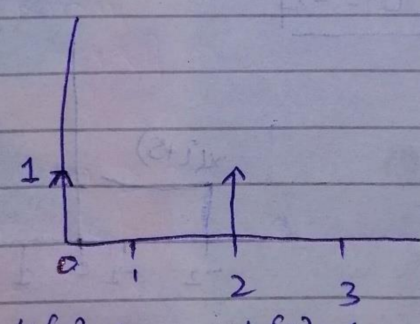
Q NO 1 (b)

Sketch the diagram for the given system.



$h[n] = \delta[n] + \delta[n-2]$.

$h[0] = 1$; $h[1] = 0$; $h[2] = +1$ and $h[n] = 0$ $n \geq 3$.



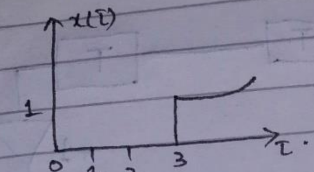
$h[0] = 1$ $h[2] = 1$.

" ——————— " ——————— "

(4)

QNo2 part (a)

QNo2(a) Sketch the transformed versions for the signal $x(t)$ mentioned



(1) $x(t+5)$ & $x(3t)$.

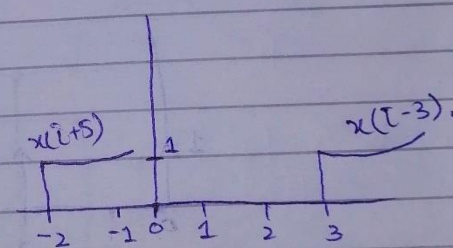
Sol:-

$x(t+5)$

$t = 3$, $x(t) = 1$.

At $t + 5 = 3$, $x(t) = 1$.

$\boxed{t = -2}$



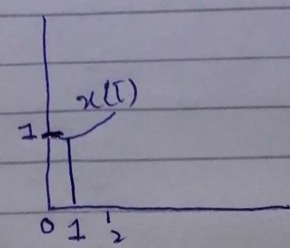
Sol

$t = 3$, $x(t) = 1$

At $3t = 3$, $x(t) = 1$.

$t = \cancel{3}/\cancel{3}$

$\boxed{t = 1}$



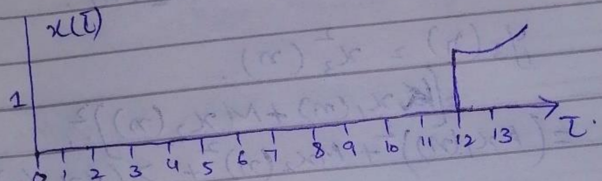
(ii) $x(t/4)$ & $x(t-2)$.

At $t = t = 3$, $x(t) = 1$.

At $t/4 = 3$, $x(t/4) = 1$.

$t = 3 \times 4$

$\boxed{t = 12}$



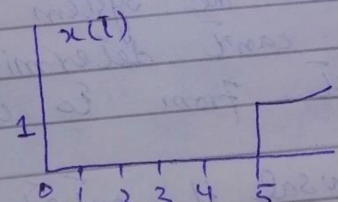
$x(t-2)$

At $t = 3$, $x(t) = 1$.

At $t-2 = 3$, $x(t) = 1$.

$\boxed{t = 5}$

Now



QNo2:- Outline the given system as invertible or non-invertible, linear or non linear, causal or non causal. Given Reason.

Ans:- $y[n] = x^2[n]$.

Sol:- let $x_1(t)$ be the input to the

system then,

$y_1(n) = x_1^2[n]$.

Similarly the response to the input $x_2[n]$

$y_2(n) = x_2^2(n)$.

let another input $x_3(t)$

$x_3(n) = ax_1(n) + bx_2(n)$.

Now.

$y_3(n) = x_3^2(n)$.

$= [Kx_1(n) + Mx_2(n)]^2$.

$= (Kx_1(n))^2 + Mx_2(n)^2 + 2(Kx_1(n)\cdot(Mx_2(n))$

$y_3(n) = Kx_1^2(n) + Mx_2^2(n)$.

↳ As super position principle is not satified, the given system is non linear. Also the system is non-invertible because we can't determine the sign of input. From to output.

↳ A system is causal if output of any time depends on the valuse of input.

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

A system that whose output involves future or anticipated values of the input is said be non-causal system.

$y[n] = x[n+1]$.

$y[n] = x[n] + x[n+2]$.

Non-causal system.

QNo 3 Fill in the blanks.

Answer:-

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

Time Invariance

—————— " ——————

—————— " ——————

→ This system is also linear because it satisfied the super position.