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Module	4^{th}
Subject	Signal And System
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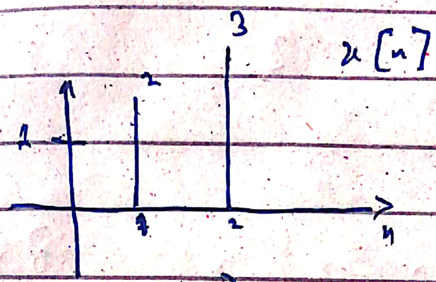
Q No 1

(part a)

Evalute x[n] .....



$x[n] = \{ \underset{\uparrow}{1}, 2, 3 \}$

Then

$h[n] = \{ \underset{\uparrow}{3}, 2, 1 \}$

convolution sum:-

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

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

so

$x[n] = \{ \underset{\uparrow}{1}, 2, 3 \}$

$h[-n] = \{ 1, 2, \underset{\uparrow}{3} \}$

Then

$y[-1] = 0$

$y[0] = 3 \times 1 = 3$

$y[1] = 3 \times 2 + 2 \times 1 = 8$

$y[2] = 3\times3 + 2\times2 + 1\times1 = 14$

$y[3] = 2\times3 + 1\times2 = 8$

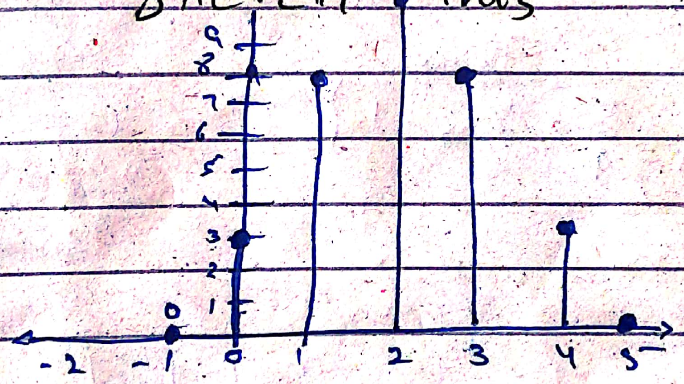
$y[4] = 1\times3 = 3$

$y[5] = 0$

so

$y[n] = \{0, \underset{\uparrow}{3}, 8, 14, 8, 3, 0\}$

sketch This



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part (b)

sketch block diagram
$y[n] = x[n] + x[n-2]$

Ans:

we know That

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

so

$y[-1] = x[-1] + x[-3] = 0+0 = 0 \rightarrow (i)$

$y[0] = x[0] + x[-2] = 1+0 = 1 \rightarrow (ii)$

$y[1] = x[1] + x[-1] = 2+0 = 2 \rightarrow (iii)$

$y[2] = x[2] + x[0] = 3+1 = 4 \rightarrow$ (iv)

$y[3] = x[3] + x[1] = 0+2 = 2 \rightarrow$ (v)

$y[4] = x[4] + x[2] = 0+3 = 3 \rightarrow$ (vi)

$y[5] = x[5] + x[3] = 0+0 = 0 \rightarrow$ (vii)

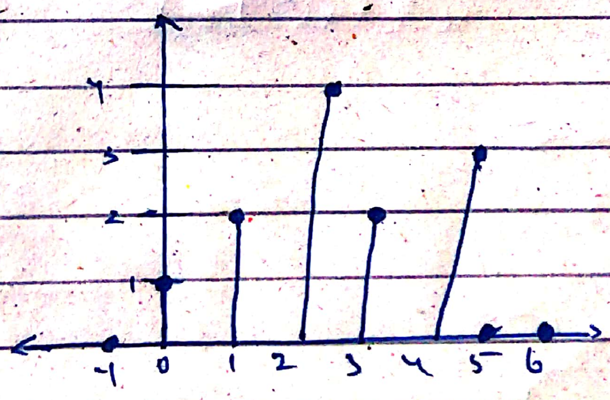
$y[6] = 0$

Then

$$y[n] = \{0, \underset{\uparrow}{1}, 2, 4, 2, 3, 0, 0\}$$

↓

(sketch)

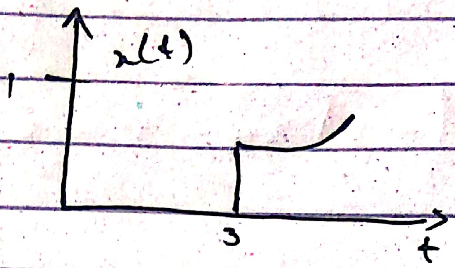


P.T.O.

Q No 2

(part a)

sketch The tersformed



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

solution:

$x(t+5)$

At

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

$= t+5=3$ $x(t+5)=1$

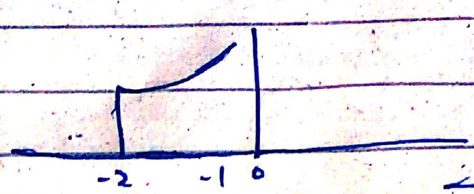
~~$\Leftrightarrow t-3=-5$~~

$\Rightarrow t+5=3$

$\Rightarrow t = 3-5$

$\Rightarrow t = -2 \Rightarrow$ ~~*~~

Then



The signal is generated for to be zero for $t<-2$

and $x(3t)$

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

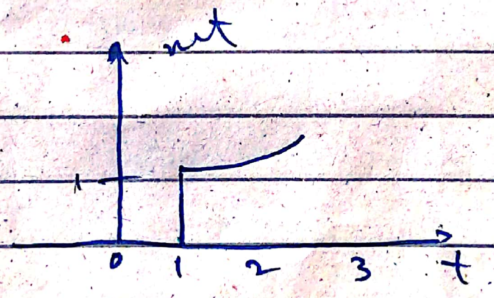
$3t = 3$ $x(3t) = 1$

$\Rightarrow 3t = 3$

$\Rightarrow \frac{3t}{3} = \frac{3}{3}$

$\Rightarrow \boxed{t = 1}$

so.



The signal is generated to to be zero for $t < 1$

P.T.O

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

for

$x(t/4)$

$t = 3$ and

$x(t) = 1$

Then

$\frac{t}{4} = 3$ $x(t/4) = 1$

so

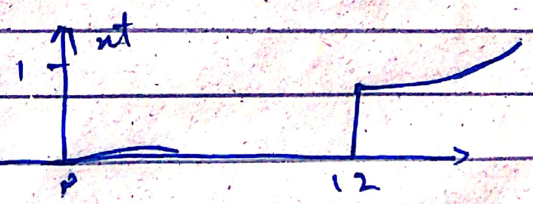
$t/4 = 3$

(x) Both seid by (4)

$t =$ ~~[illegible]~~

$t = 3 \times 4$

$t = 12$ =>



Then the signal is generated to zero for $t < 12$

and

$x(t-2)$

so.

$t = 3$

and

$x(t) = 1$

Then

$t-2 = 3$ and $x(t-2) = 1$

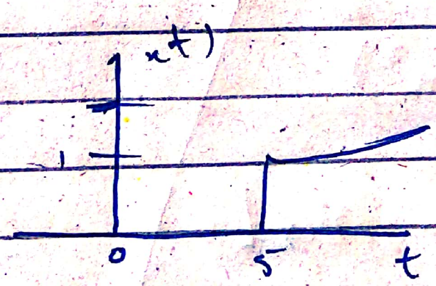
so

$\Rightarrow t-2 = 3$

$\Rightarrow t = 3+2$

Then

$\boxed{t = 5} \Rightarrow *$



P.T.O

Q no 2
part (b)

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

Ans.
causal = Yes
Because depends on present value

Linearty = Yes

$y[n] = x^2[n]$

$y_1[n] = x_1^2[n]$

$y_2[n] = x_2^2[n]$

$y_3[n] = x_3^2[n]$

$x_3^2[n] = x_1^2[n] + x_2^2[n] \rightarrow$ (i)

Then

$y_3[n] = y_1[n] + y_2[n] \rightarrow$ (ii)

(i) and (ii) are compair.

$y_3[n] = x_1^2[n] + y_2[n]$

$x_3^2[n] = y_1[n] + y_2[n]$ so this Linear.

Invertibility =

I Think we can not determain The invertibility Becuse we can not determain the sing of The input from The knowlode of output.

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

Ans:-

causal = No

Becuase of the given value.

Linear = Yes

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

$y_1[n] = x_1[n+2]$

$y_2[n] = x_2[n+2]$

$y_3[n] = x_3[n+2]$

$x_3[n+2] = x_1[n+2] + x_2[n+2] \rightarrow (i)$

$Y_3[n] = Y_1[n] + Y_2[n] \rightarrow (ii)$

(i) and (ii) are comper.

$y_3[n] = x_1[n+2] + x_2[n+2]$

$y_3[n] = y_1[n] + y_2[n]$.

Then so This is Linear.

Invertibility = Yes

Becuse The inverse is

$y[n-2]$

Q NO: 3

Fill in The Blanks.

If a time shift in the input signal result in an identical time shift in The output signal, The system is said to be Time-Invarient.
