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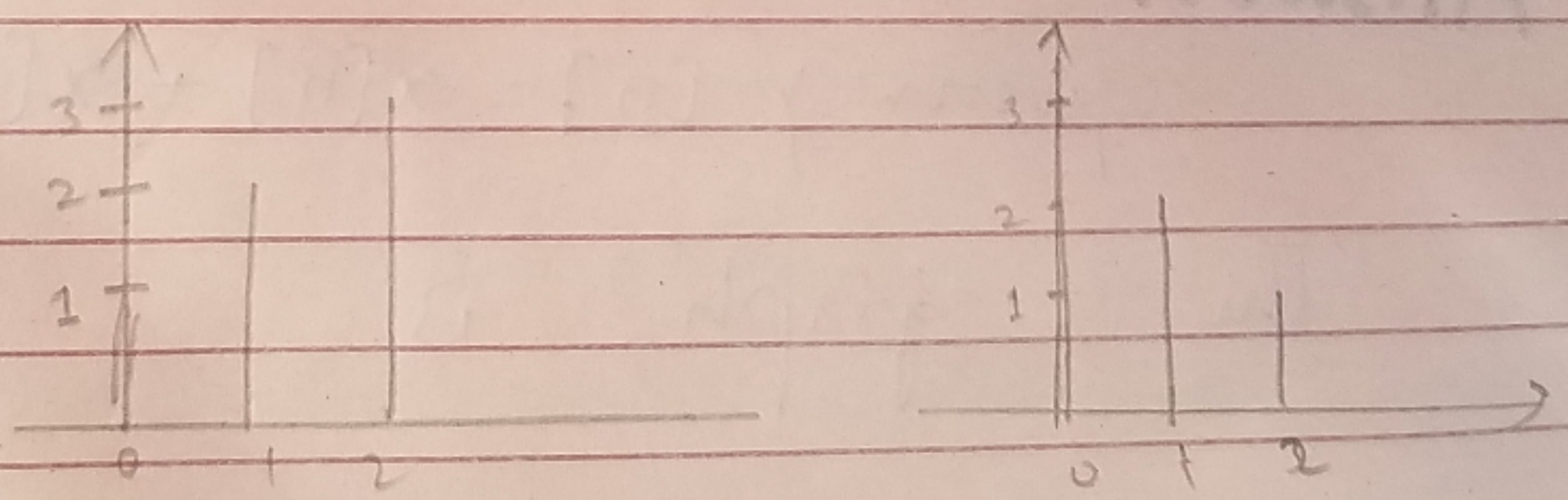
Department: BE(E)

Subject : Signal & System.

Assignment Paper

QNo.1 part (a)

Evaluate y[n] using convolution summation:



Answer:- The summation is called the convolution sum of the sequance x[n] and h[n] and represented compactly as

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

As we know

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

and

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

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

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

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

for $y[n]$

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

QNo.1 Part (b)

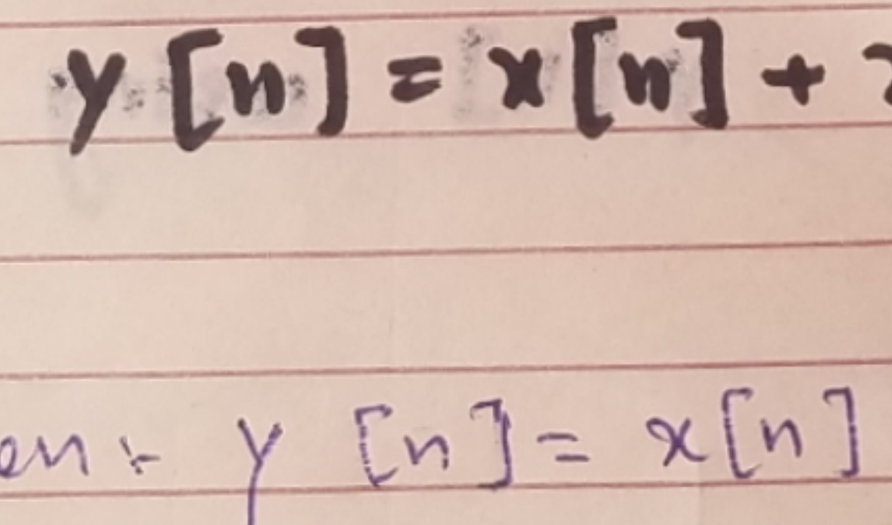
Sketch block diagram for the given system.

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

Answer:-

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

The graph is



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Q No. 2 Part (b)

Outline the given system as invertible or non-invertible, linear or non-linear, causal or non-causal. Give reason.

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

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

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

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

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

This system is non-causal, because its output involves future value of the input so its non-causal.

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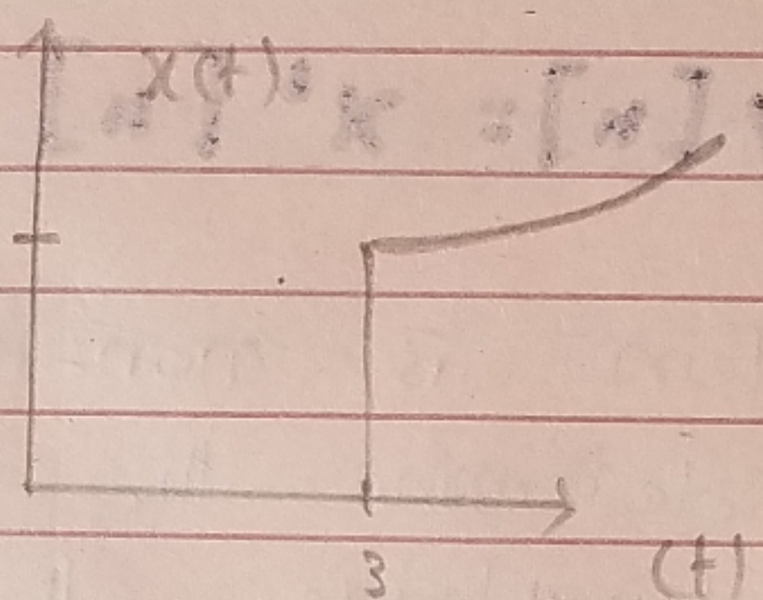
Q No. 2 part (a)

Sketch the transform version for signal x(t) in

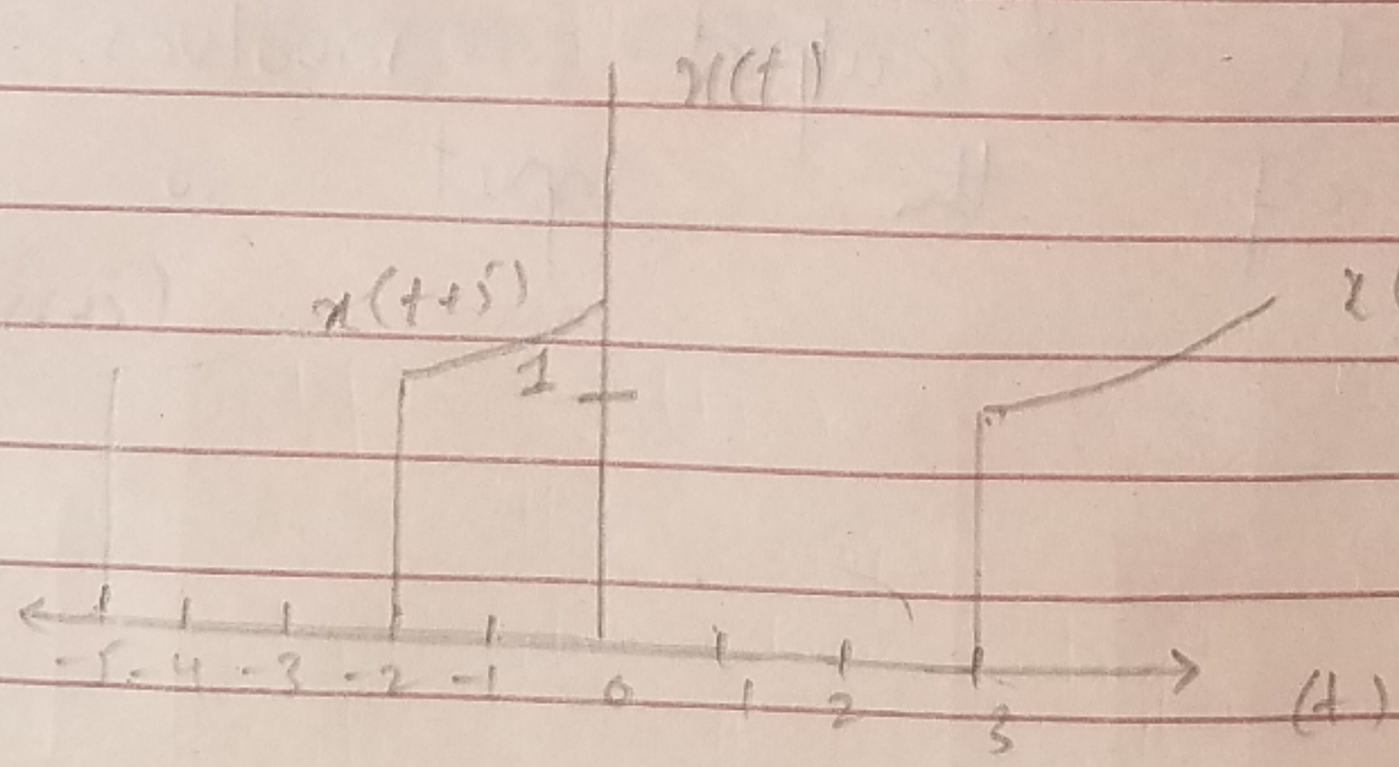
(i) x(t+5) and x(3t)

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



Answer:- (i) x(t+5) and x(3t)

$x(t) = x(t-3)$, $z(t) = x(t+5)$



Translation :-

above figure shows translation which is from right to left.

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

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

$t = -5+3$

$\boxed{t = -2}$

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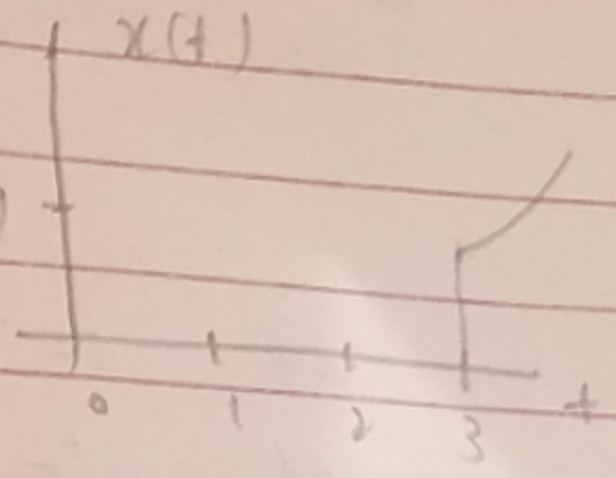
Compression → $x(3t)$

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

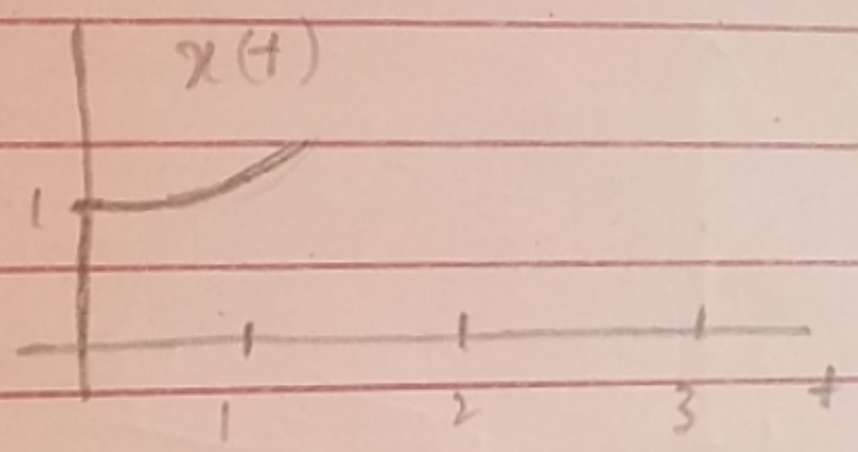
At $3t = 3$, $x(3t) = 1$

$t = 3/3$

$\boxed{t = 1}$



So $Y(t) = x(t-3)$, $Z(t) = x(3t)$



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

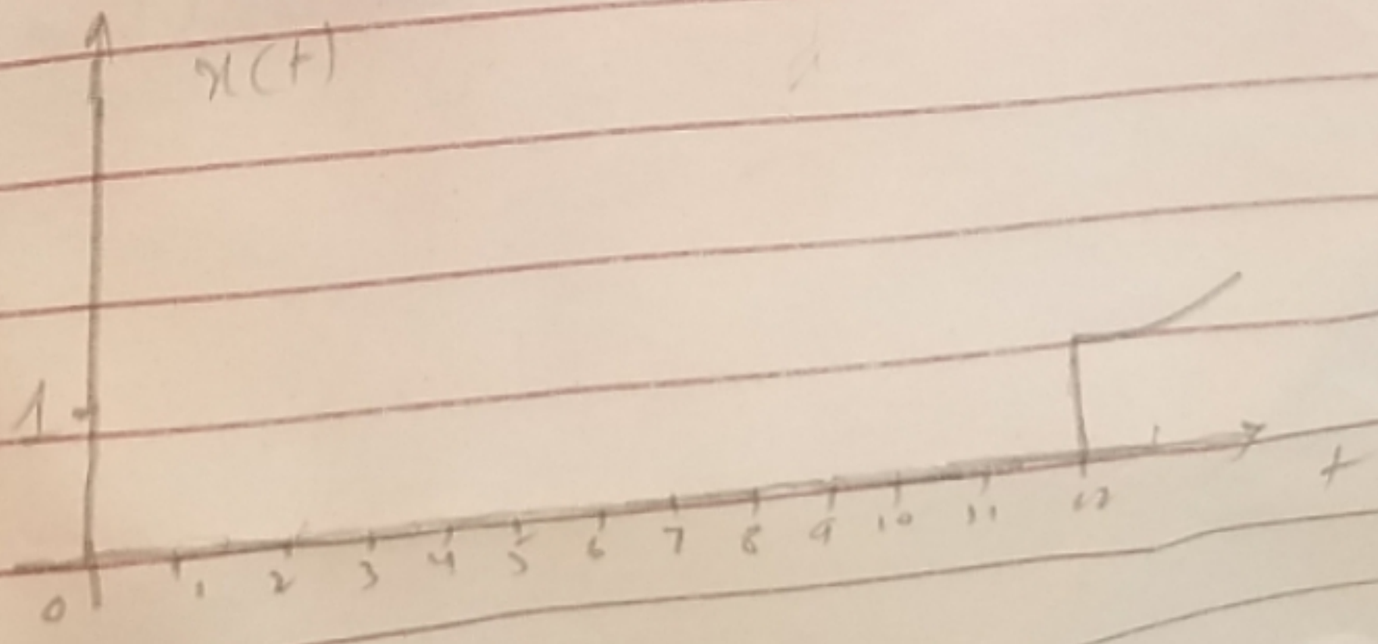
Expansion $x(t/4)$ →

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

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

$\frac{t}{4} = 3$

$\boxed{t = 12}$



Time delay :-

$x(t-2)$

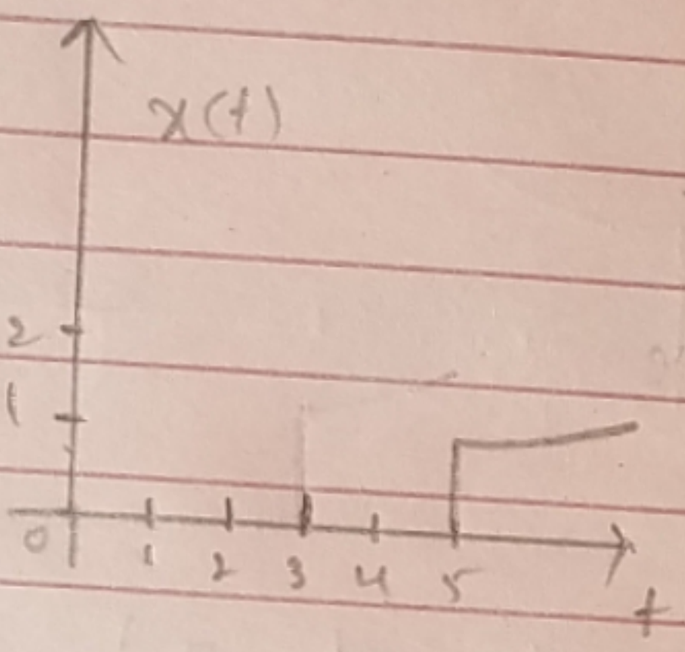
At $t = 3$, $x(t) = 1$

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

$t = 2 + 3$

$\boxed{t = 5}$

So



Q No. 3 :- Fill in the blanks.

Answer :-

If ~~ther~~ a time shift in the input signal result in an identical time shift in the output signal, the system is said to be Even.