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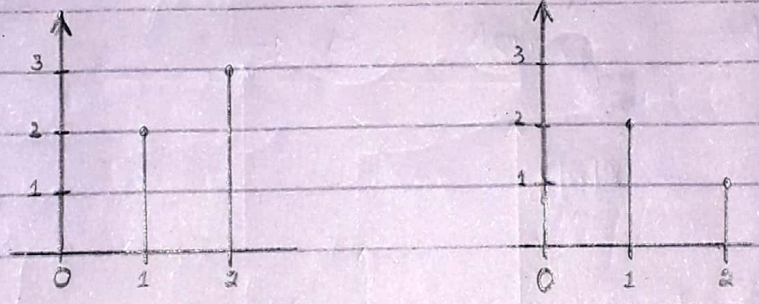
Dept :- BE(E)
Subject :- Signal & Systems.

Q1 :-

a)

Ans :- As we are given the graphs :-



The summation is called the convolution sum of the sequence $x[n]$ & $h[n]$ and represented compacitly as:

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

As we know :-

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

and

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

So :-

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

Then:-

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

for

$$Y[n] \rightarrow$$

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

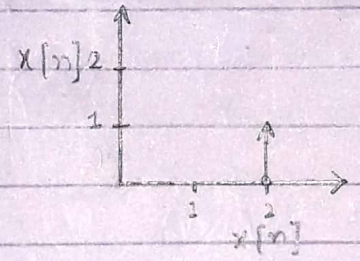
Q1 :-

b)-

Ans:- Given :-

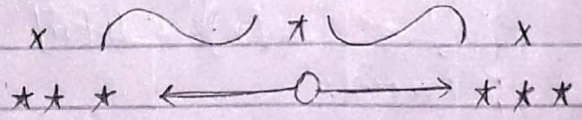
$$Y[n] = x[n] + x[n-2]$$

The graph is :-



(a)

So the graph "a" shows us the given system.



Q.2 :-

b)-

i)-

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

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

Q2:-

b)

ii)-

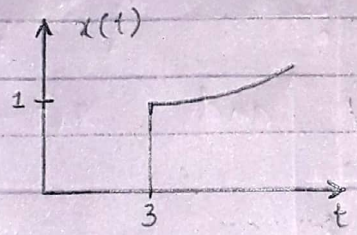
Ans:- $Y[n] = x[n+2]$.

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

Q2:-

a)-

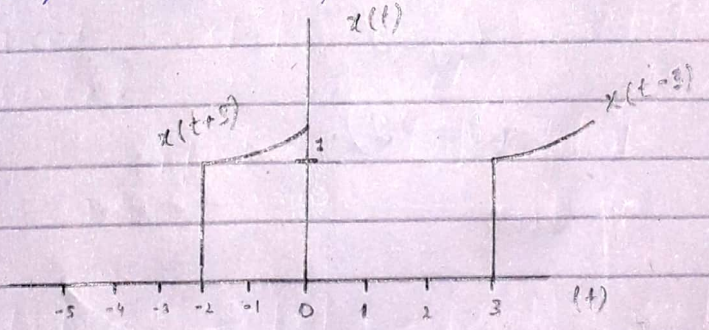
Ans:- Given graph:-



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

$Y(t) = x(t-3)$, $(t) = x(t+5)$.

So:-



Above figure shows translation which is from right to left.

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

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

$t = -5+3$

$(t = -2)$

Compression → $x(3t)$.

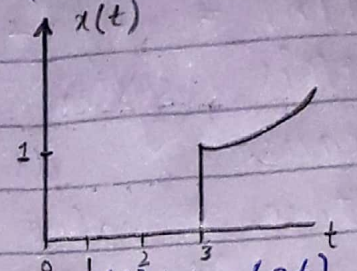
At $t = 3$, $x(t) = 1$.

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

$3t = 3$

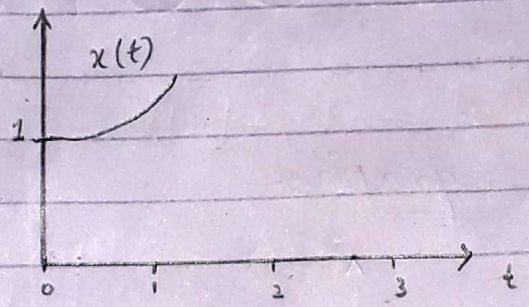
$t = 3/3$

$t = 1$



So:-

$y(t) = x(t-3)$, $z(t) = x(3t)$.



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

Expansion:-

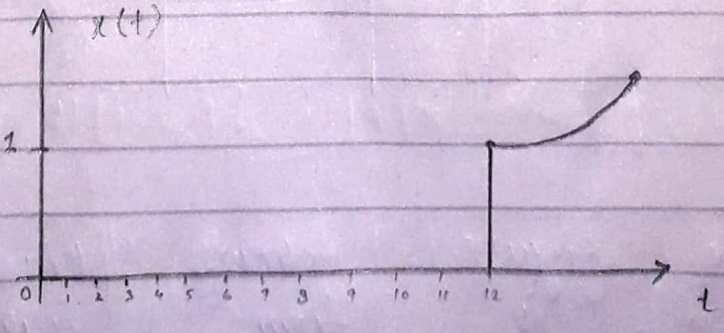
$x(t/4)$:-

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

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

$t/4 = 3$

$(t = 12)$.



Time delay :-

$x(t-2)$

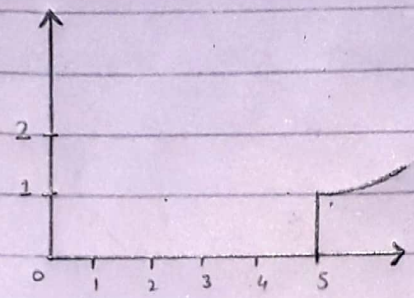
At $t = 3$, $x(t) = 1$

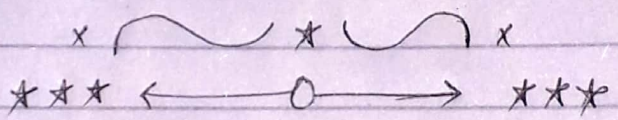
At $t - 2 = 3$, $x(t) = 1$.

$t = 2 + 3$

$(t = 5)$.

So :-





Q3 :-

Ans :- If a time shift in the input signal result in an identical time shift in the output signal, the system is said to be "Even".

The End