Department of Electrical Engineering
Assignment
Date: 20/04/2020

Course Details

Course Title: Signals & Systems **Module:** 04
Instructor: Engr.Mujtaba Ihsan **Total Marks:** 30

Student Details

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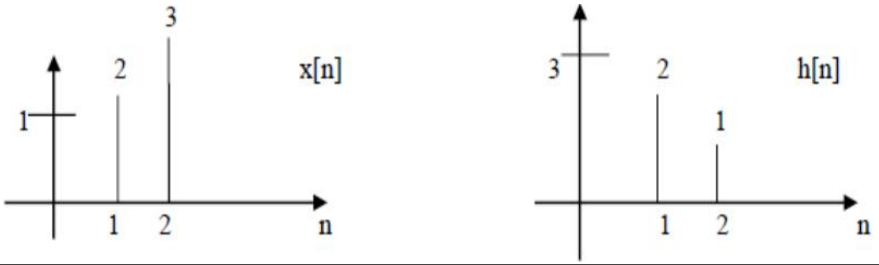
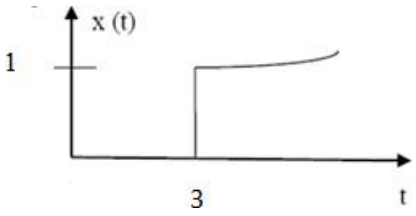
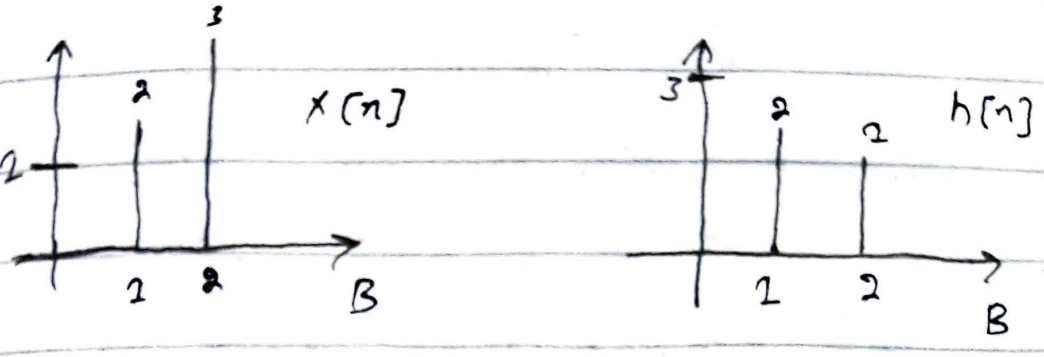
Q1.	(a)	**Evaluate** y[n] using convolution summation. 	Marks 08 CLO 2
	(b)	**Sketch** block diagram for the given system. $y[n] = x[n] + x[n-2]$	Marks 06 CLO 2
Q2.	(a)	**Sketch** the transformed versions for the signal x (t) mentioned in i. and ii.  i. $x(t+5)$ and $x(3t)$ ii. $x(\ /4)$ and $x(t-2)$	Marks 08 CLO 1
	(b)	**Outline** the given system as invertible or non-invertible, linear or non-linear, causal or non-causal. Give the reason for you answers too. i. $y[n] = x^2[n]$ ii. $y[n] = x[n+2]$	Marks 06 CLO 1
Q3.		Fill in the blank. If a time shift in the input signal results in an identical time shift in the output signal, the system is said to be _____	Marks 02 CLO 1

Q 1 (a) :-

Evalute $y[n]$ using convolution Summation



Ans :- The summation is called the convolution sum of the sequence $x[n]$ and $h[n]$ and represented compactly as

$$y[n] = x[n] \times h[n]$$

As we know that

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

and

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

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

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

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

for $y[n]$

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

Q NO 1 :· part (b)

Sketch block diagram for the given system.

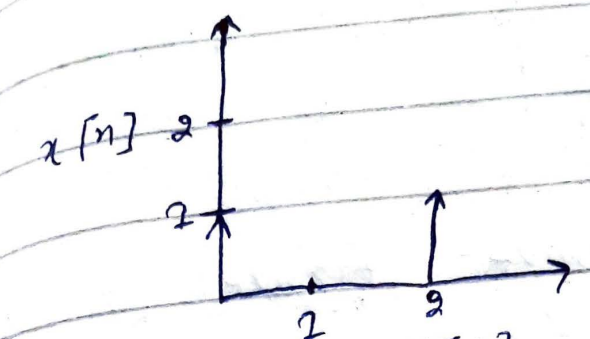
$$y[n] = x[n] + x[n-2]$$

Ans :·

Given data

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

The graph is

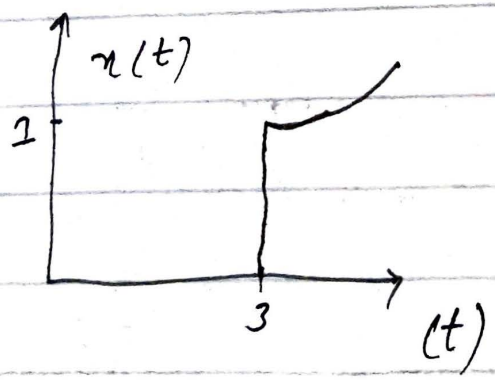


Q2 :- a :-

Sketch the transform version for signal $x(t)$ in

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

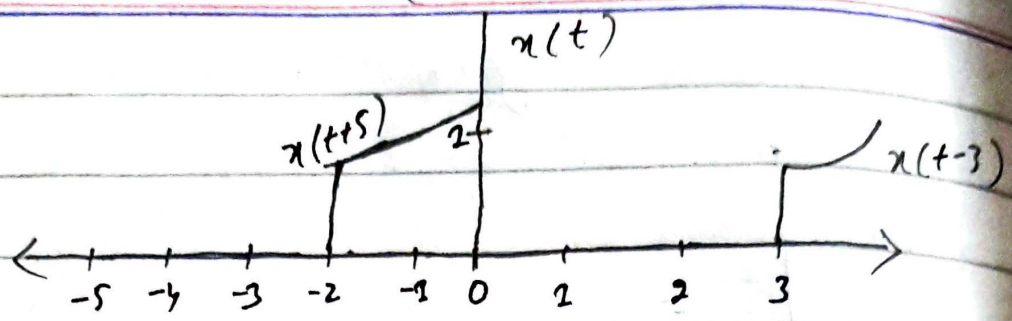
(ii) $x(t/4)$ and $(t-2)$



Ans :- (i) $x(t+5)$ and $x(3t)$

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

(4)



Translation :- above figure shows that translation which is from right to left.

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

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

$t = -5 + 3$

$\boxed{t = -2}$

Compression :- $x(3t)$

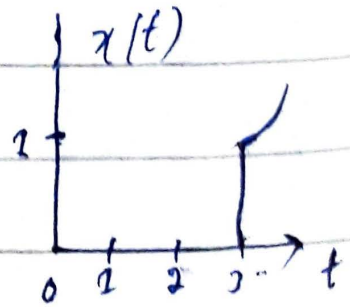
At $t = 3$, $x(t) = 1$

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

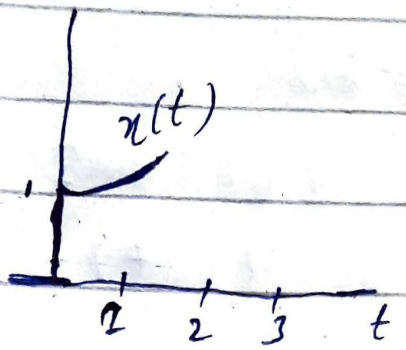
$3t = 3$

$t = 3/3$

$t = 1$



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



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

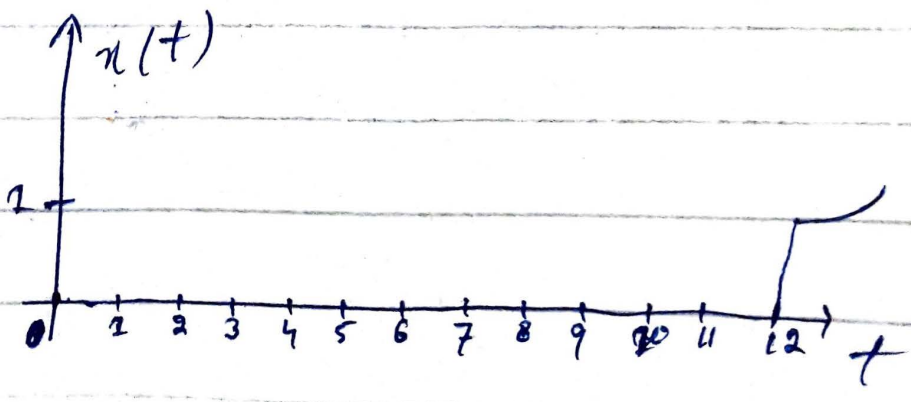
Expansion $x(t/4)$:-

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

At $t/4 = 3$, $x(t/4) = 2$

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

$\boxed{t = 12}$



Time delay :-

$x(t-2)$

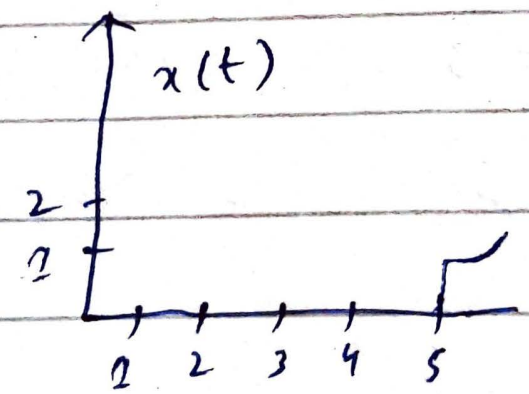
At $t=3$, $x(t) = 1$

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

$t = 2+3$

$\boxed{t = 5}$

so the graph is



Q 2 (b) :- Outline the given system as invertible or non-invertible, linear or non-linear, casual or non-casual. Give the reason for your 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 the output

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

This system is non-casual because it's output involves in future value of the input so it's non-casual.

Q#3 :- Fill in the blanks.

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