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

Course Details

Course Title: Signals & Systems **Module:** 04 **Instructor: Total Marks:** 30

Student Details

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Student ID: 16637

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)

i. ii.

Sketch the transformed versions for the signal x (t) mentioned in i. and ii.

x (t + 5) and x (3t) x (t/4) and x(t-2)

Marks 08 CLO 1

(b)

i. ii.

Outline the given system as invertible or non-invertible, linear or non-linear, causal or non-causal. Give the reason for you answers too.

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

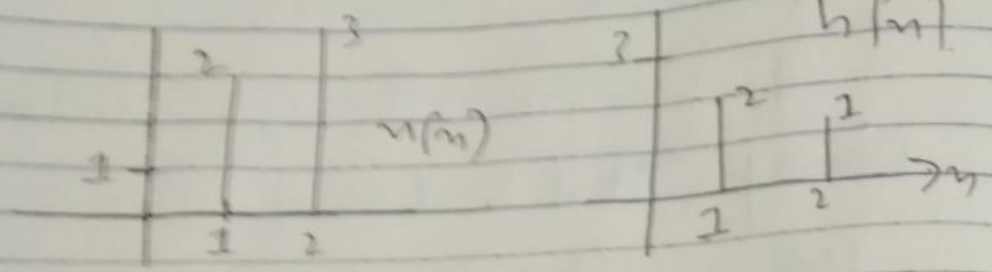
Marks 06 CLO 1

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 _____

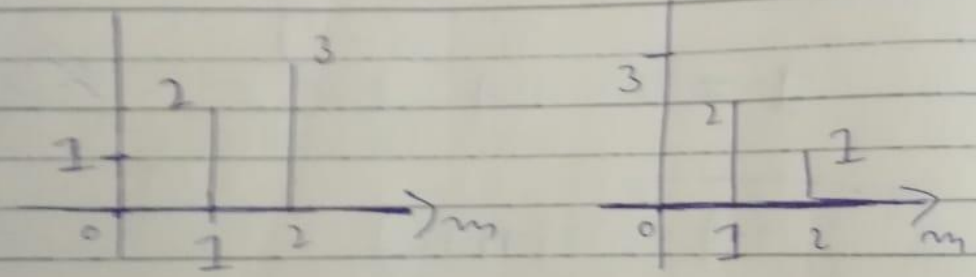
Marks 02 CLO 1

Q1 (a)

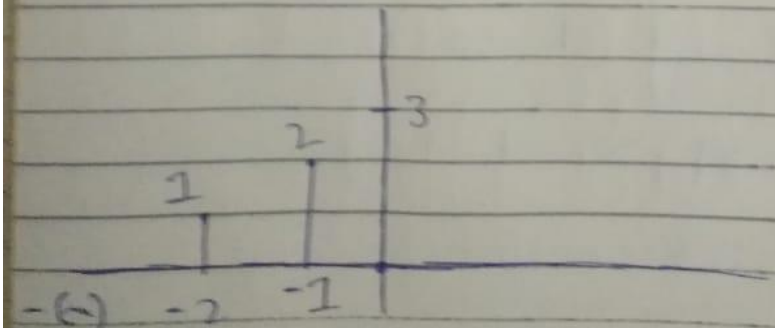


Firstly convert $x[n] = x[m]$

and $h[n] = h[m]$

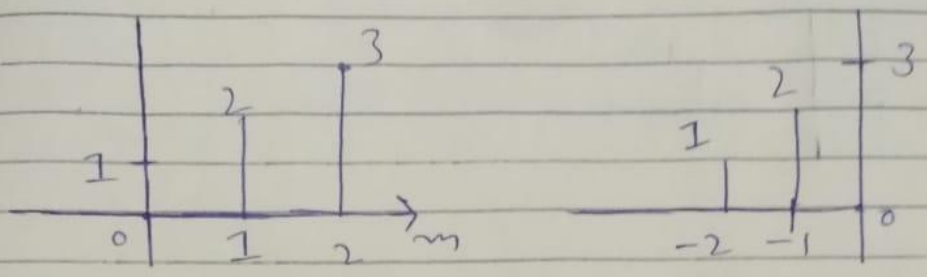


⇒ Now take $h(-m)$ ⇒

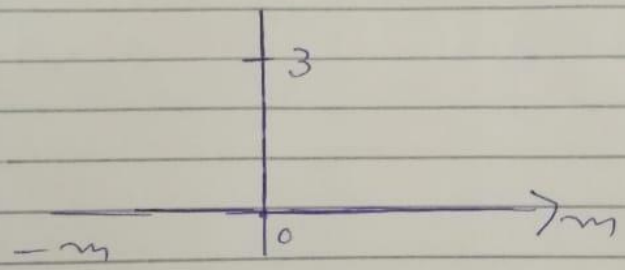


(2)

$x(m)$ $h(0-m)$.



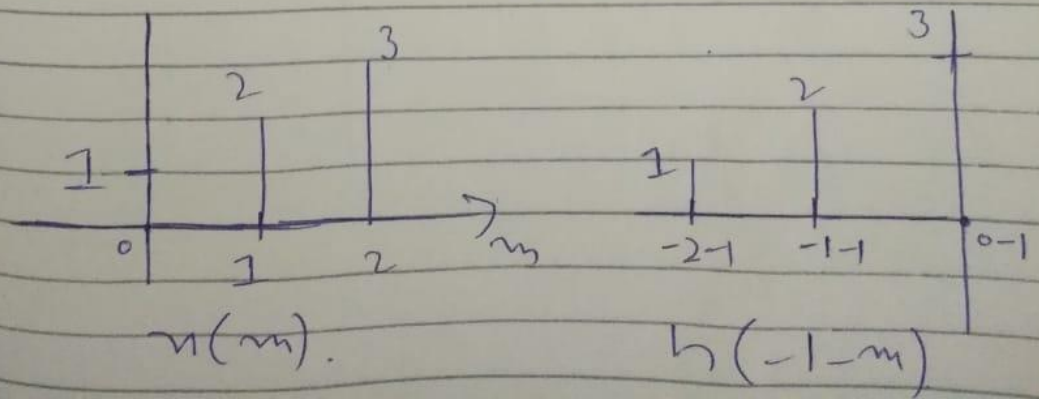
$\Rightarrow x(m) * h(0-m)$. is



$x(0) = 1$ and $h(0) = 3$

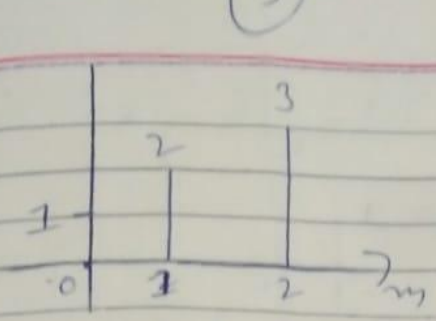
$= 3$

$\Rightarrow$ Now taking $h(-1-m)$.

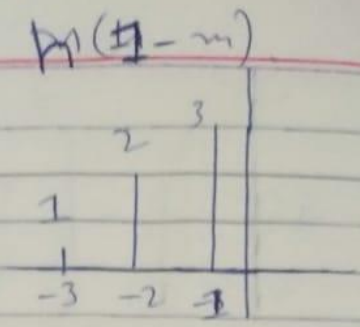


$x(m)$. $h(-1-m)$

(3)

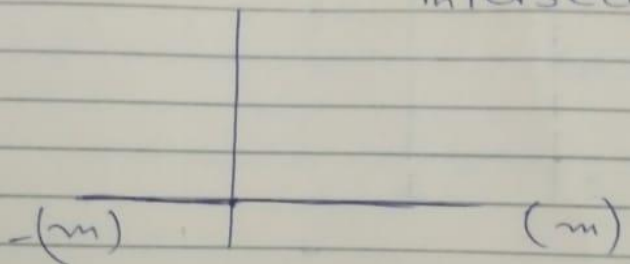


x(m)



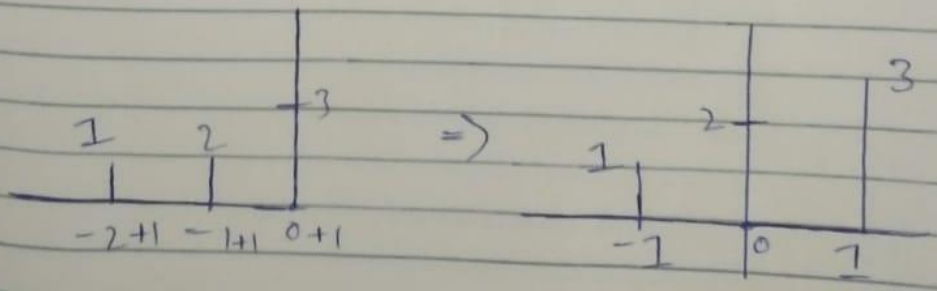
$x(m) * h(-1-m)$

$= 0$ (Because no value intersect)

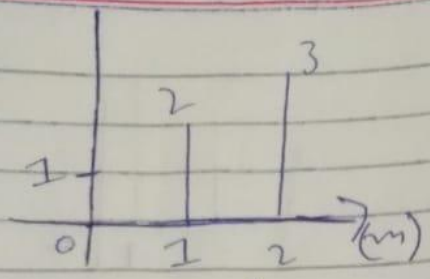


⇒ Now taking $h(1-m)$.

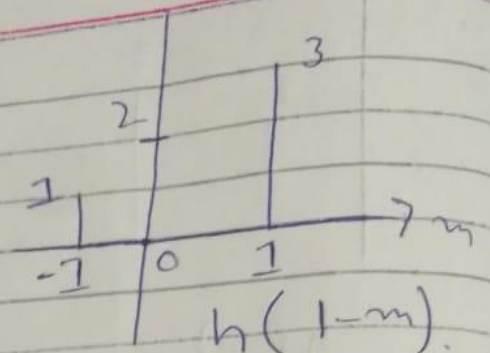
$h(1-m)$



(4)

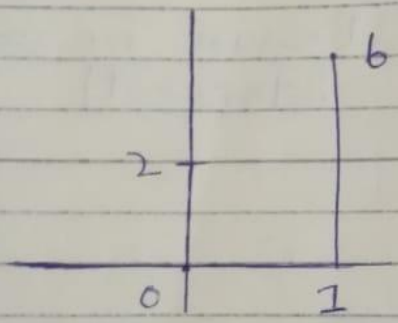


$x(n)$



$h(1-n)$.

$x(n) * h(1-n)$



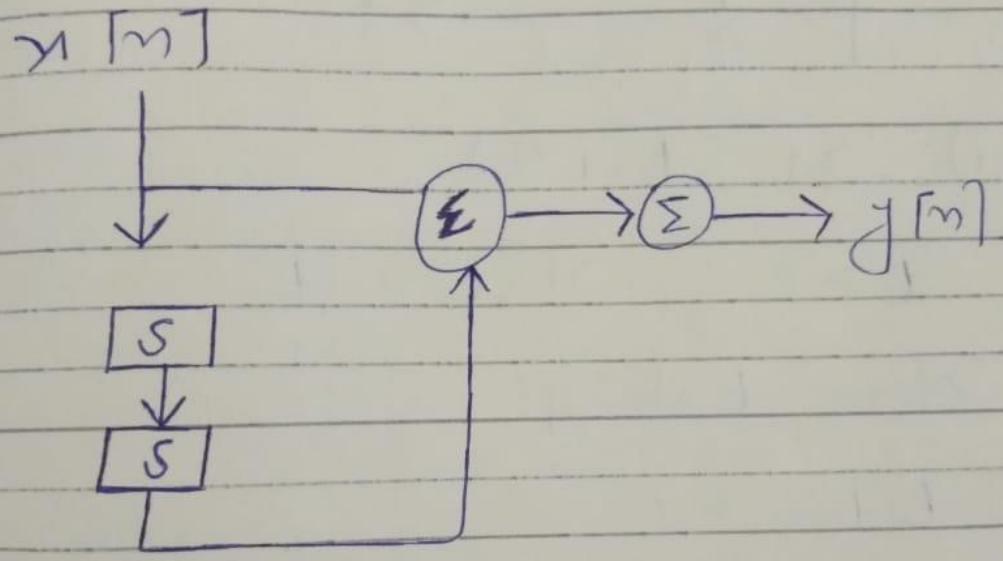
$2+6 = \boxed{8}$

" — " — " — "

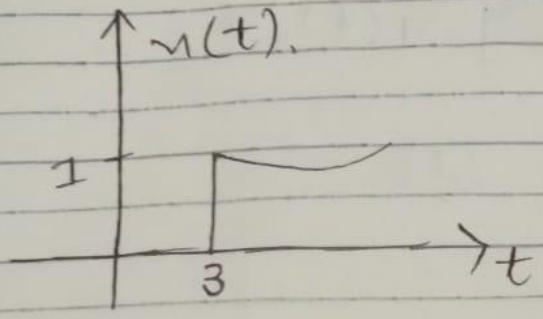
(5).

Q1 (b):

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



Q(2) (a).



i) $x(t+5)$.

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

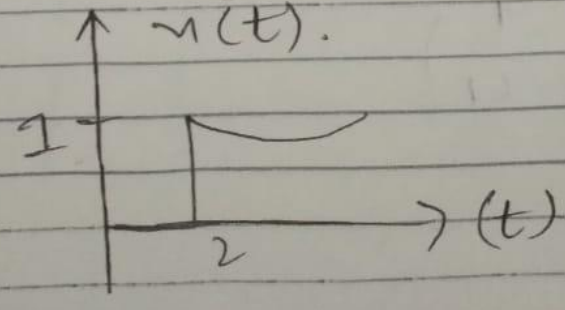
$t + 5 = 3$

-ing 5 on b/s

$t + 5 - 5 = 3 - 5$

$$\boxed{t = -2}$$

Taking mirror.



(7).

(ii) $x(3t)$.

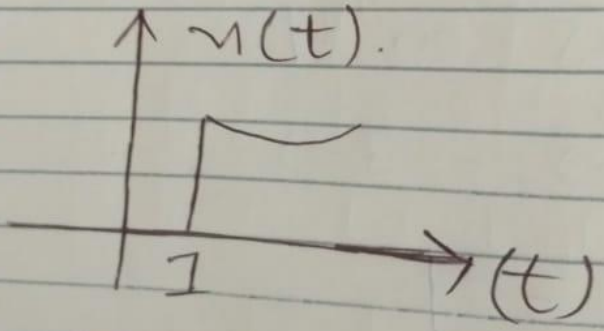
$t = 3$ & $x(t) = 1$

$3t = 3$

÷ing 3 on b/s

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

$\boxed{t = 1}$



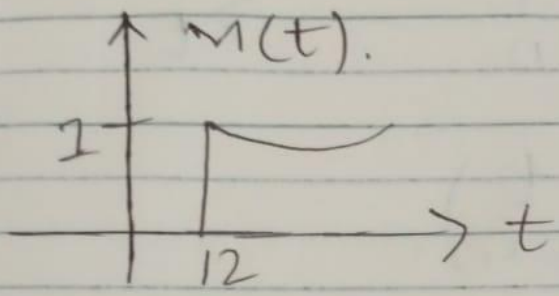
Q(2) (5).

$x\left(\frac{t}{4}\right)$.

(8)

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

$\frac{t}{4} = 3 \Rightarrow \boxed{t = 12}$

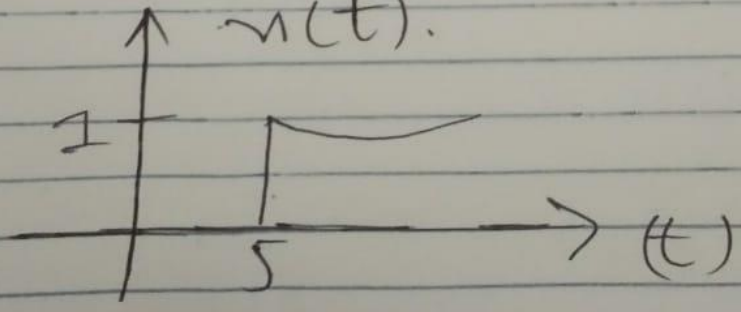


$x(t-2)$

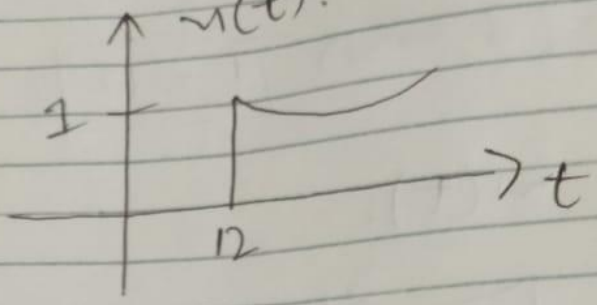
$t = 3, \quad x(t) = 2.$

$t - 2 = 3$

$\boxed{t = 5}$



(9).



$x\left(\frac{t}{4}\right)$.

Q 2 (b).

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

putting $n = 0$

$y[0] = x^2[0]$.

$y[0] = 0$

putting $n = 1$

$y[1] = x^2[1]$.

$y[1] = x^2$

present.

This give past and future value so it is non-causal for causal values must be past and present.

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

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

$n = 0$

$y[0] = x[0+2]$.

$y[0] = 2x$.

So:
Not causal beause value is not present value.

1) $y[n] = x^2[n]$.

Delaying $y[n, K]$.

$y[n] = x^2[n-K]$. → (i)

Replace $(n-K) = n$

$y[n] = x^2[n-K]$ → (2)

So (1) is equal to 2.

$1 = 2$

Not invertible.

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

Delaying $y[n, K]$.

$y[n] = x[n+K+2]$. –

Replacing $n = n-K$

$y[n] = x[n-K+2] \rightarrow (2)$.

$1 = 2$ so not invertible

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

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

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

$y'[n]: y'[n] = x_1^2[n] + x_2^2[n]$.

$x_1[n] + x_2[n]: y''[n] = x_1^2[n] + x_2^2[n]$.

$y'[n] = y''[n]$.

So Linear.

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

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

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

$y'[n] = x_1[n+2] + x_2[n+2]$.

(13).

$y''[n] = x_1[n+2] + x_2[n+2]$

$y'[n] = y''[n]$

So Linear:

" — " — " — "

Q # 3

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