

student details

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Student ID: **13876**

Q1.	(a)	Evaluate $y[n]$ using convolution summation.	Marks 06
			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.	Marks 08
		<p>i. $x(t + 5)$ and $x(3t)$ ii. $x(t/4)$ and $x(t-2)$</p>	CLO 1

Q3.	(b)	Outline the given system as invertible or non-invertible, linear or non-linear, causal or non-causal. Give the reason for your answers too.	Marks 06
		<p>i. $y[n] = x^2[n]$ $y[n] = x[n + 2]$</p>	CLO 1
		Fill in the blank.	Marks 02
		If a time shift in the input signal results in an identical time shift in the output signal, the system is said to be _____.	CLO 1

NAME :

majid mahmoud

ID :

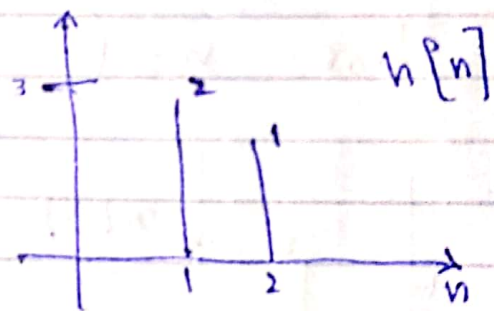
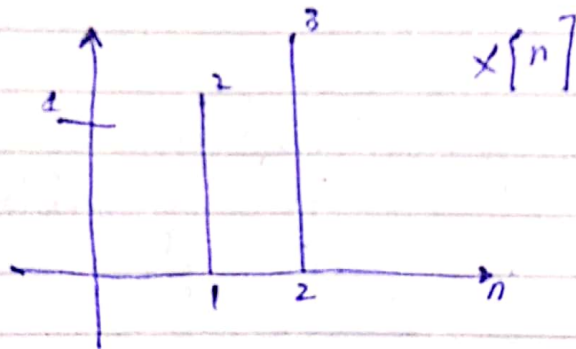
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Subject:

Signal and system.

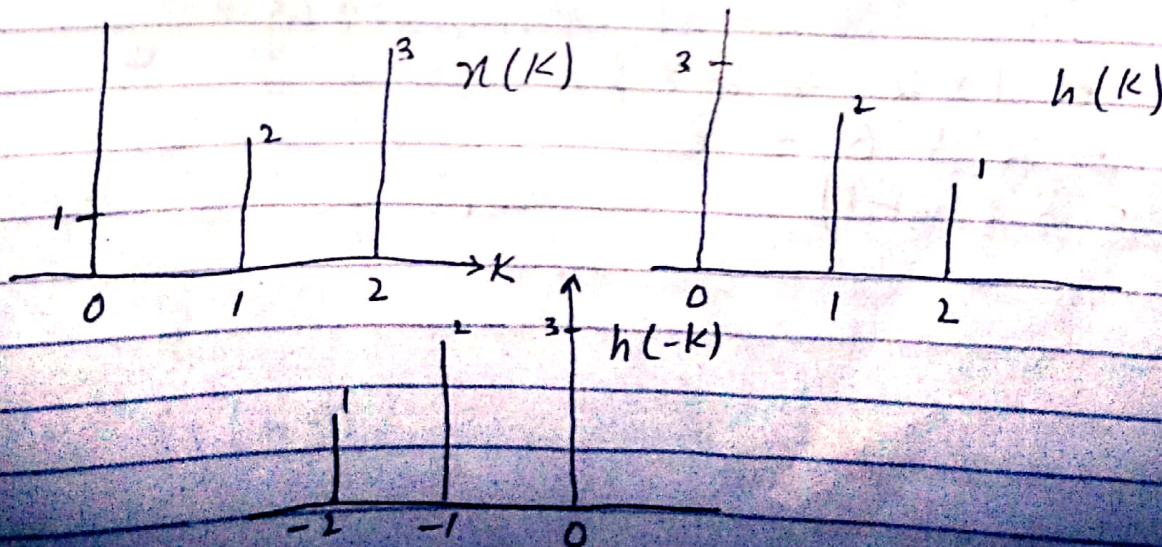
Question No 1:
Part (A)

Evaluate $y[n]$ using Convolution Summation.

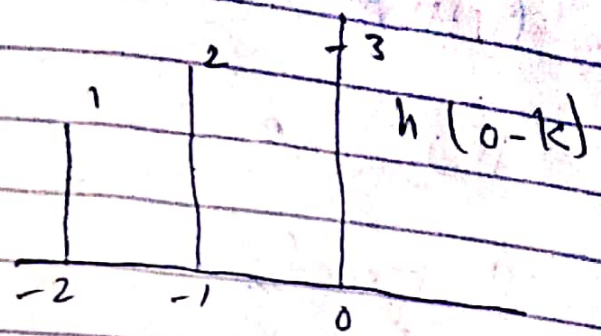
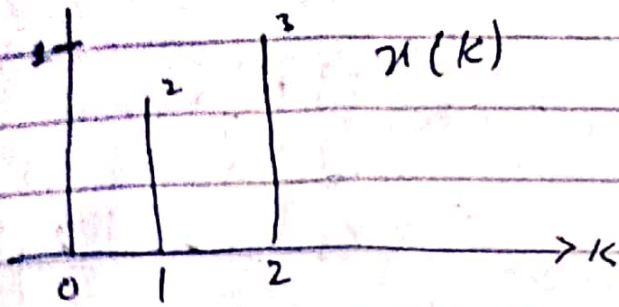


Solution:

Step(1) : Replace n by k and impulse Response.



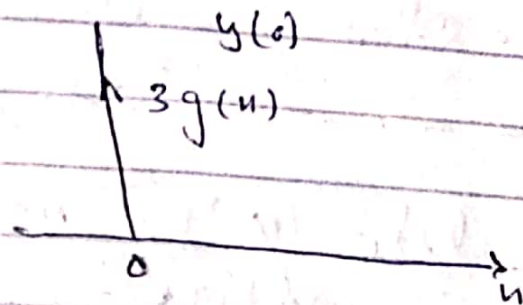
for $n = 0$



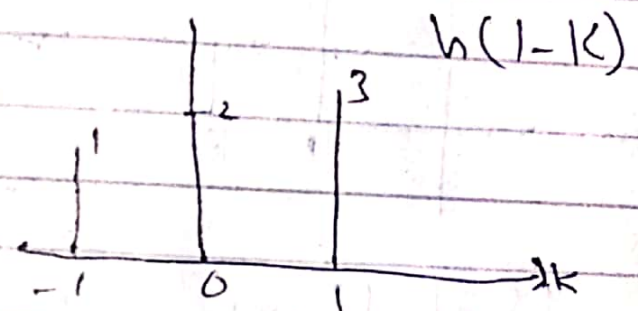
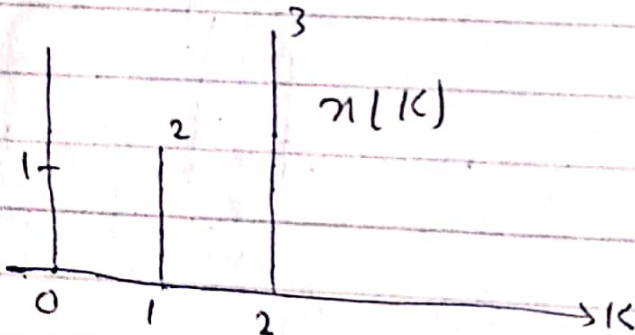
$$y(0) = \sum_{k=-\infty}^{\infty} x(k) h(0-k)$$

$$= 1 \times 3$$

$$= 3g(n)$$



for $n = 1$

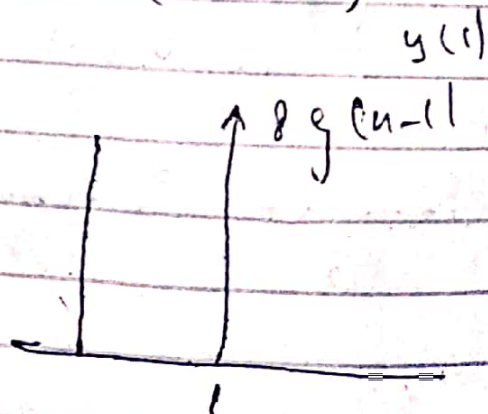


$$y(1) = \sum_{k=-\infty}^{\infty} x(k) h(1-k)$$

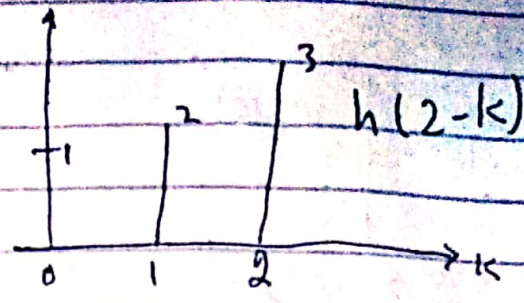
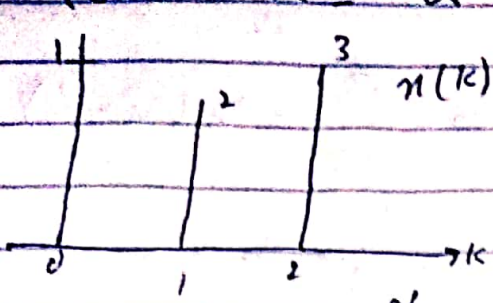
$$= 1 \times 2 + 2 \times 3$$

$$= 2 + 6 = 8$$

$$= 8g(n+1)$$



for $n = 2$



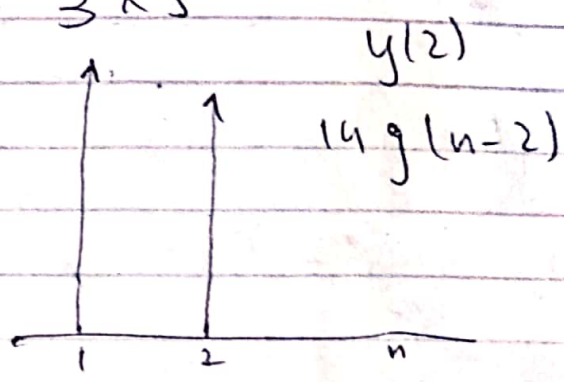
$$y(2) = \sum_{k=-\infty}^{\infty} n(k) h(2-k)$$

$$= 1 \times 1 + 2 \times 2 + 3 \times 3$$

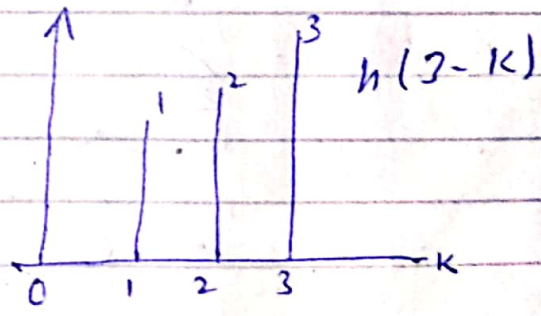
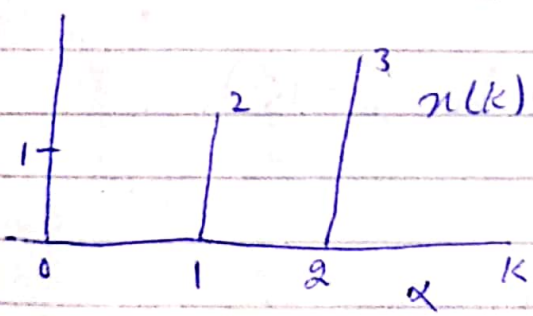
$$= 1 + 4 + 9$$

$$= 14$$

$$14 \delta(n-2)$$



for $N = 3$

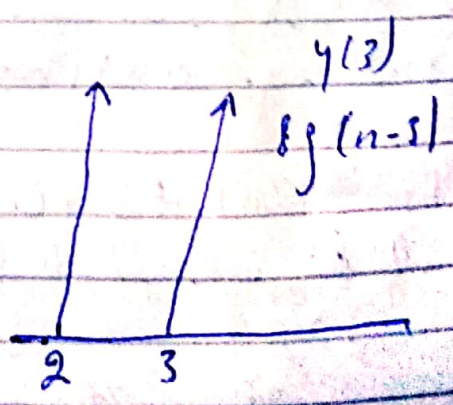


$$y(3) = \sum_{k=-\infty}^{\infty} n(k) h(3-k)$$

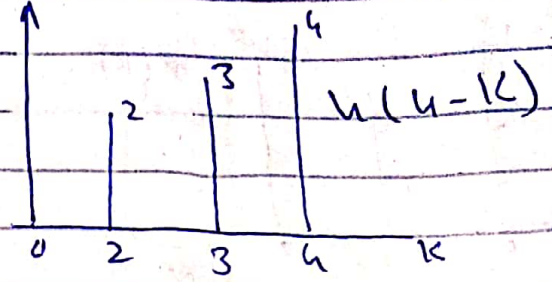
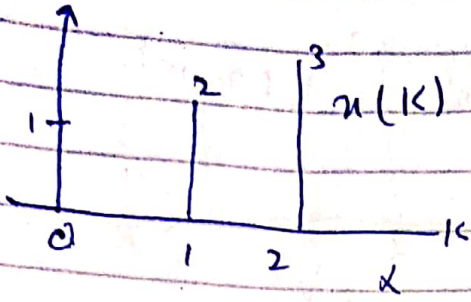
$$= 2 \times 1 + 3 \times 2$$

$$= 2 + 6$$

$$= 8 \delta(n-3)$$



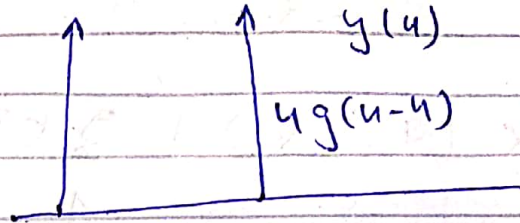
for $n = 4$



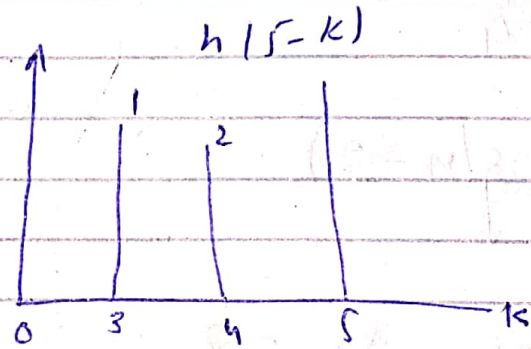
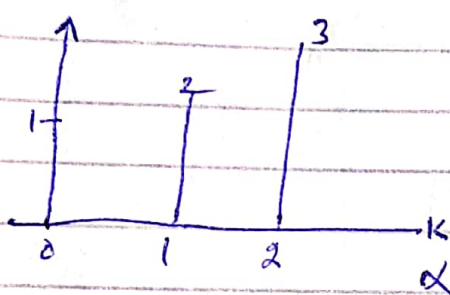
$$y(n) = \sum_{k=-\infty}^{\infty} n(k) h(4-k)$$

$$= 3 + 1$$

$$= 4g(n-4)$$



for $n = 5$



$$y(5) = \sum_{k=-\infty}^{\infty} n(k) h(5-k)$$

$$= 0$$

there is no overlapping after $n = 5$

overall output $y(n)$ is $y(n)$

$$y(n) = 3g(n) + 8g(n-1) + 14g(n-2) + 8g(n-3) + 4g(n-4)$$

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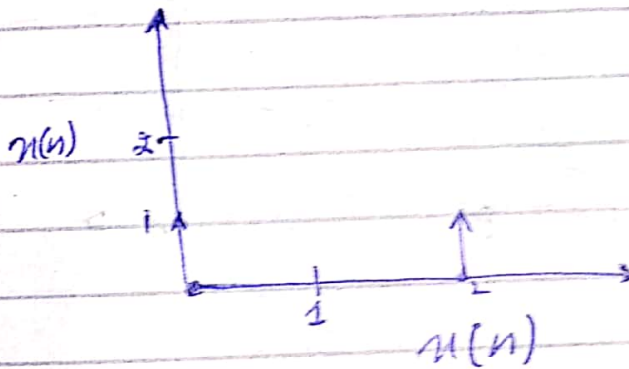
Question No 1:
Part (B)

Answer:

block diagram for
given system.

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

the graph is

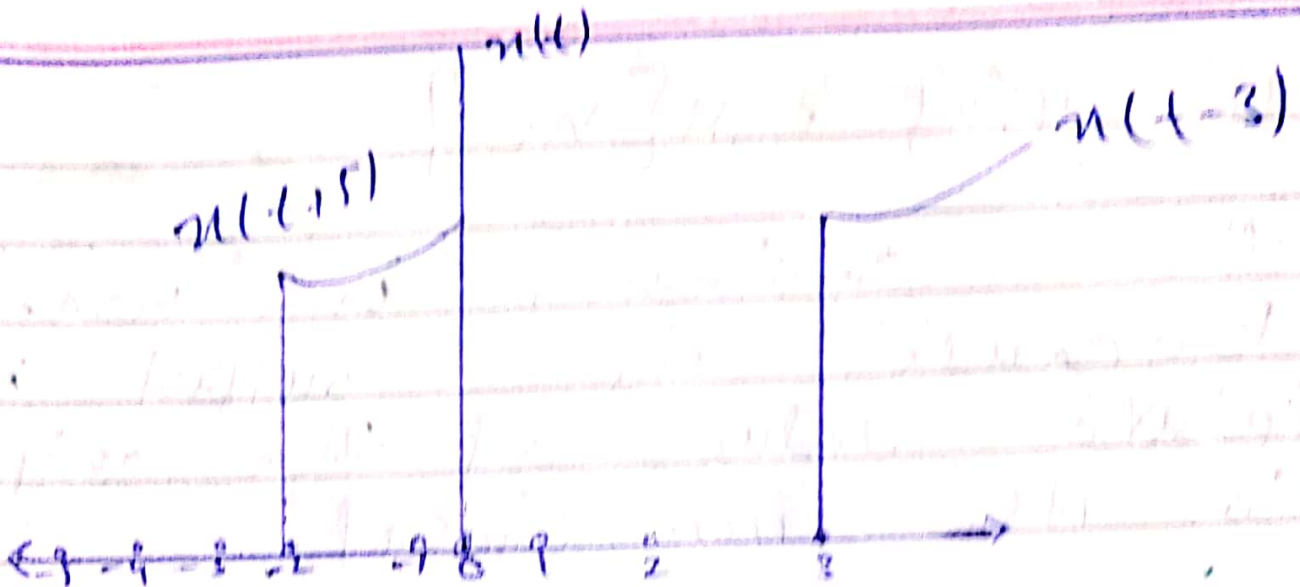


Question No 2:
Part (A)

Answer: (i) $x(t+5)$ and $x(3-t)$
(ii) $x(t/4)$ and $x(t-2)$

Sketch the transformed
version for signal $x(t)$

$$(i) x(t+5) \text{ and } x(3-t) \\ = y(t) = x(t-3), \quad z(t) = x(t+5)$$



Translation. above the figure shows translation which is from right to left.

$$\text{At } t=3, n(t) = 1$$

$$\text{At } t-5=3, n(t) = 1$$

$$t = -5 + 3$$

$$t = -2$$

Compression: $x(3t)$

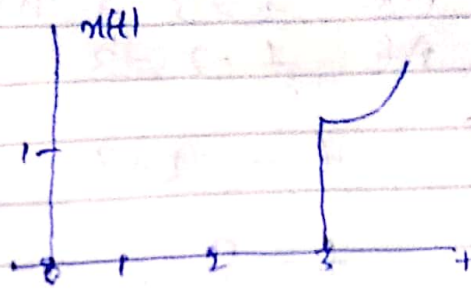
At $t=3$, $x(t) = 1$

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

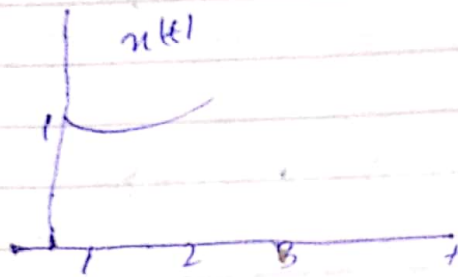
$3t=3$

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

$t=1$



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



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

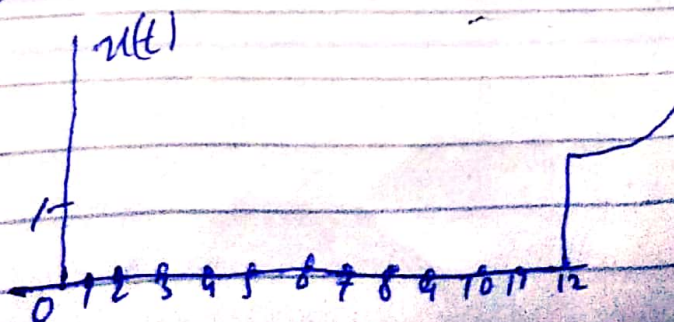
Expansion $x(t/4)$

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

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

$t/4 = 3$

$t = 12$



time delay:

$$u(t-2)$$

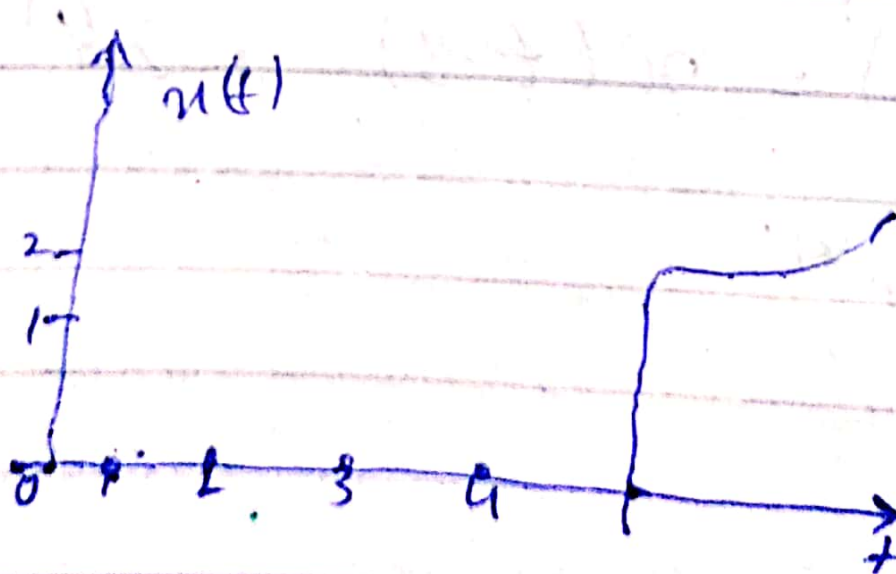
$$\text{At } t=3, u(t) = 1$$

$$\text{At } t-2=3, u(t) = 1$$

$$t = 2+3$$

$$t = 5$$

So



Question No 2:
Part (B)

Answer:

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

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

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

this system is non-causal because its output involves future value of the output so its non-causal.

Question No 3 :

Answer: if ~~the~~ A time shift in the input signal result in an identical time shift in the output signal the system is said to be Even.

