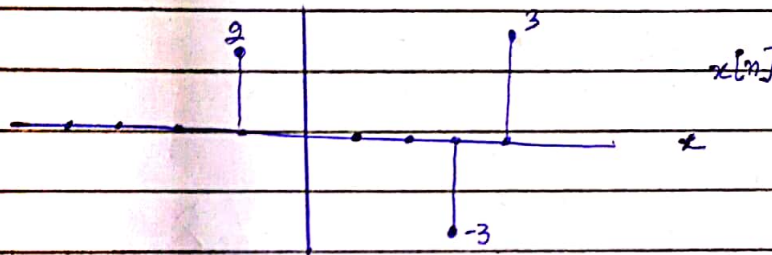
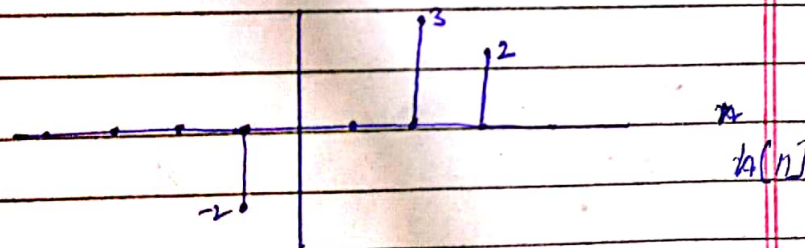


Q.#1 For the input signal $x[n]$ and System's impulse $h[n]$ given below, compute and plot the given Convolution.

$$x[n] = 2\delta[n+1] - 3\delta[n-3] + 3\delta[n-4]$$



$$h[n] = -2\delta[n+1] + 3\delta[n-2] + 2\delta[n-3]$$



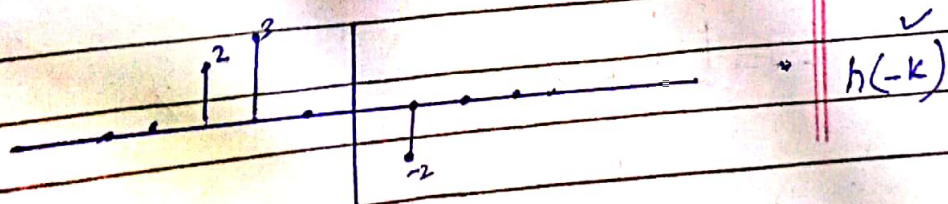
(i) $y_1[n] = x[n] * h[n]$

Sol:

As we know Convolution

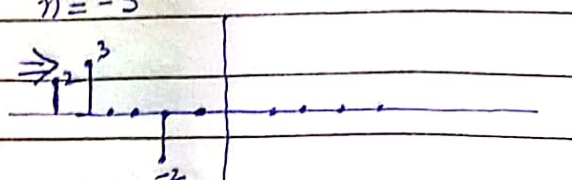
$$\sum x[k] * h[n-k]$$

So



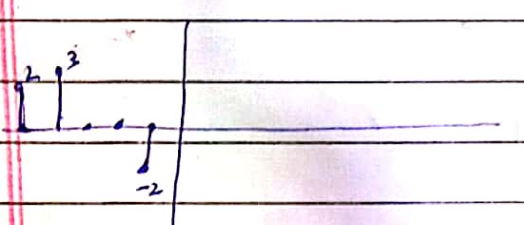
Now for Different N value

① $n = -3$



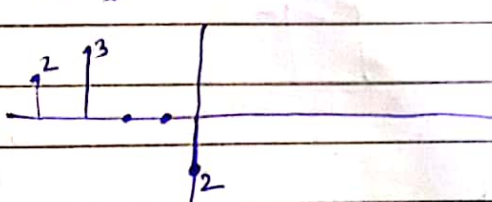
\Rightarrow Output = 0

② $n = -2$



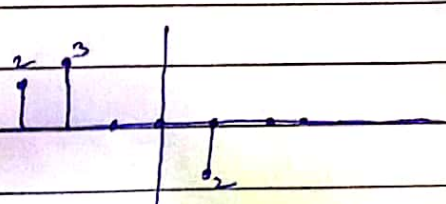
\Rightarrow output = -4

③ $n = -1$



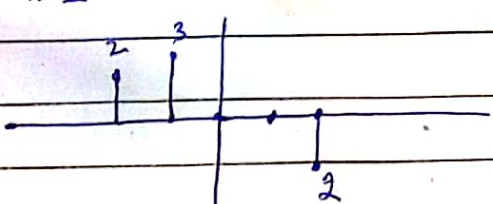
\Rightarrow output = 0

④ $n = 0$



\Rightarrow output = 0

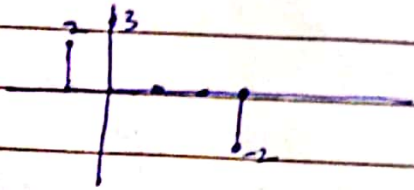
⑤ $n = 1$



\Rightarrow output = 6

⑥

$$n=2$$

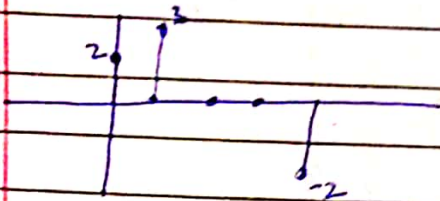


\Rightarrow

$$\text{output} = 10$$

⑦

$$n=3$$

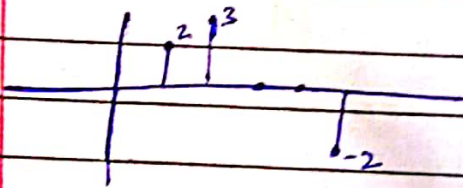


\Rightarrow

$$\text{output} = -6$$

⑧

$$n=4$$

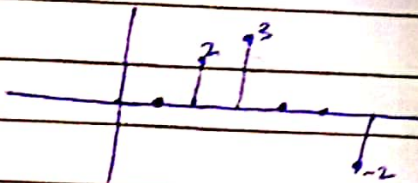


\Rightarrow

$$\text{output} = 0$$

⑨

$$n=5$$

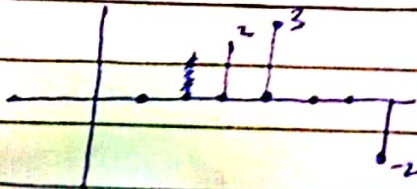


\Rightarrow

$$\text{output} = -9$$

⑩

$$n=6$$

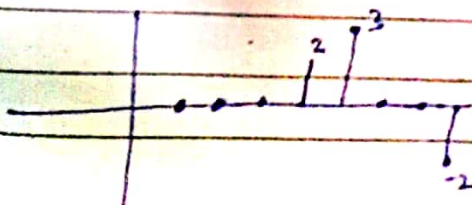


\Rightarrow

$$\text{output} = 3$$

⑪

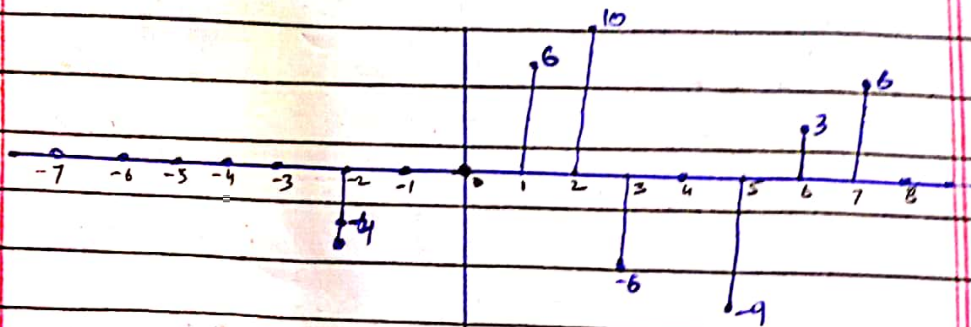
$$n=7$$



\Rightarrow

$$\text{output} = 6$$

So the Final Convolution is



(*) A

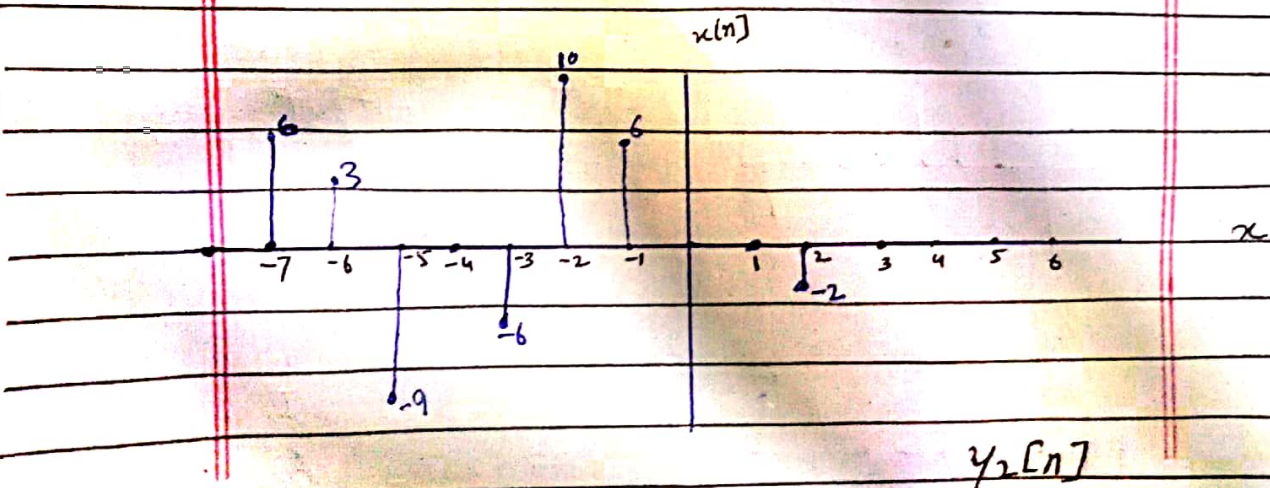
$$(ii) \quad y_2[n] = x[-n] * h[-n]$$

Sol:

As we see this Signals Convolution is the time Reversal of question 1 part (A). When we do the time Reversal on the (*) A Signal we will get

$$y_2[n] = x[-n] * h[-n]$$

So



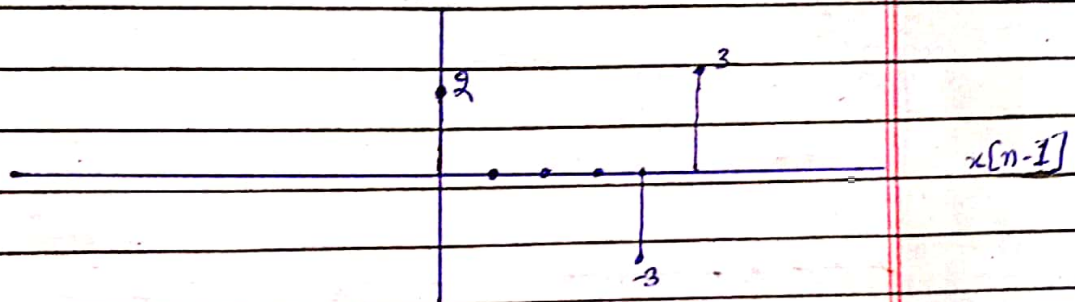
Date: ___/___/20___

$$(iii) y_3[n] = x[n-1] * h[n-2]$$

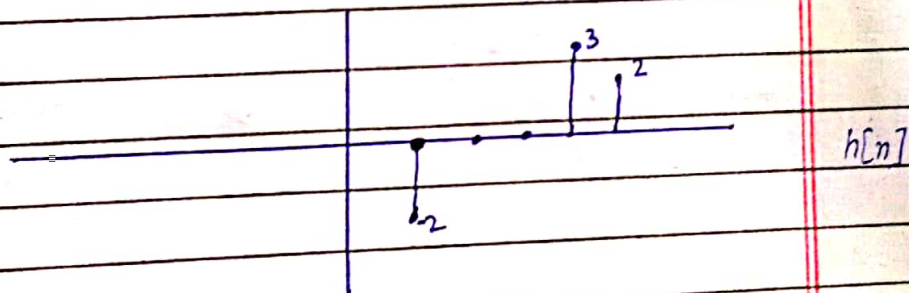
Sols-

From the question data

$$x[n-1]$$

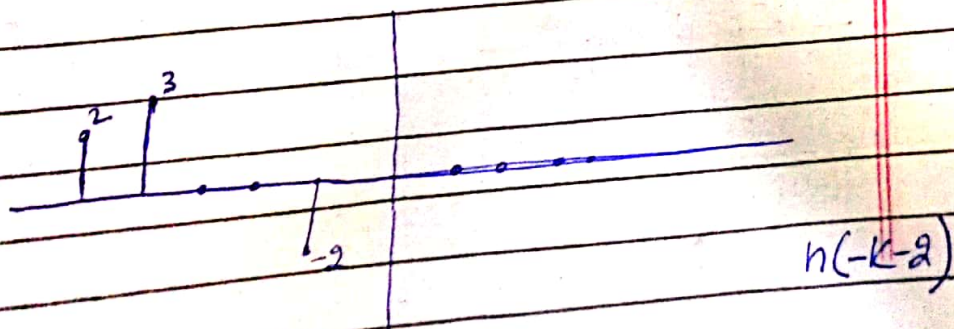


$$h[n-2]$$



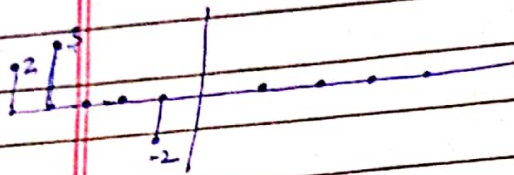
Now we will replace $n \Rightarrow k$
 $x(k-1)$ $h(k-2)$

Now $h(-k-2)$



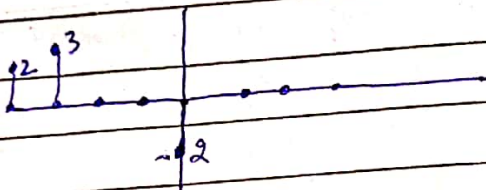
Now Put the value of N

(1) $n=0$


 \Rightarrow

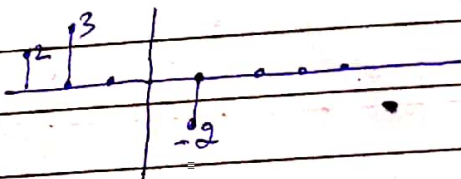
output
= 0

$n=1$


 \Rightarrow

output
= -4

$n=2$


 \Rightarrow

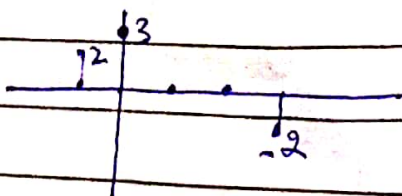
output
= 0

$n=3$


 \Rightarrow

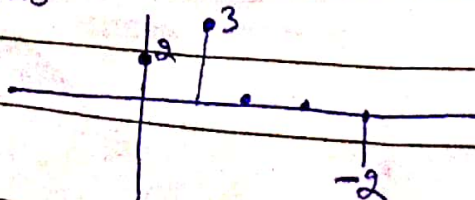
output
= 0

$n=4$


 \Rightarrow

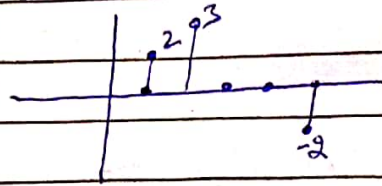
output
= 6

$n=5$


 \Rightarrow

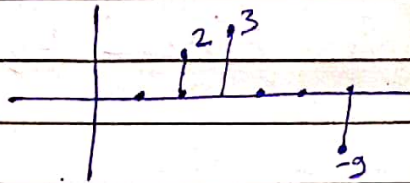
output
= 10

$n=6$



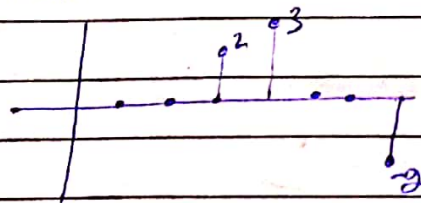
output
= -6

$n=7$



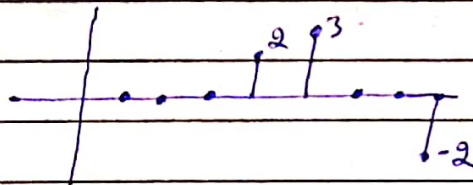
output
= 0

$n=8$



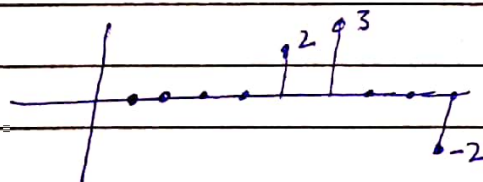
output
= -9

$n=9$

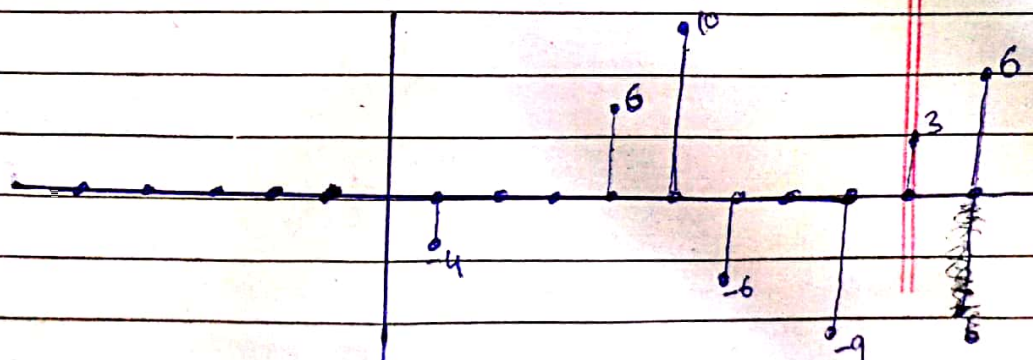


output
= 3

$n=10$



output
= 6



Comparing (a) (b)

When we compare the (a) & (b) we see the pattern is flipped. The signal in a is the flip in signal (b). This is because of Time Reversal ($-n$).

Comparing (a) (c)

When we compare the signal a & c. we see the signal Convolution is shifted in c by 3. The Convolution of c is delay by $t \Rightarrow 3$ from signal a Convolution.