Department of Electrical Engineering

Sessional Assignment

Course Detail

Course title: Signal & System.
Module: 04 Total Marks: 20
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Student Detail

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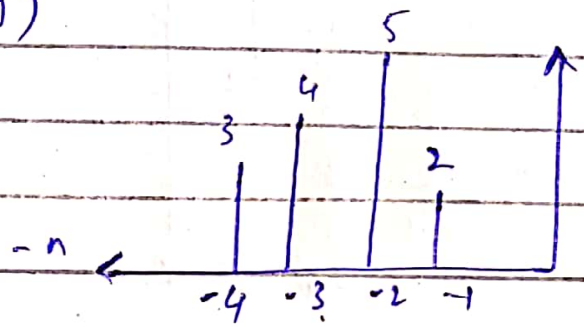
Q:- 1 Ans:-

Sol:-

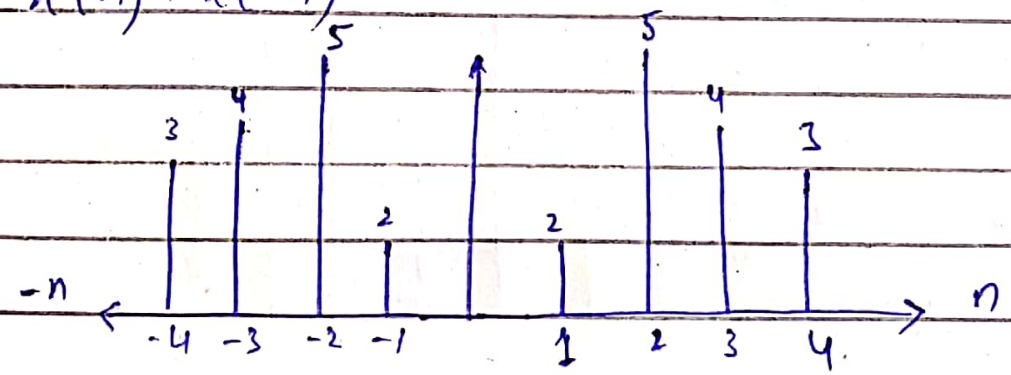
· Even part

$$x_e(n) = \frac{x(n) + x(-n)}{2}$$

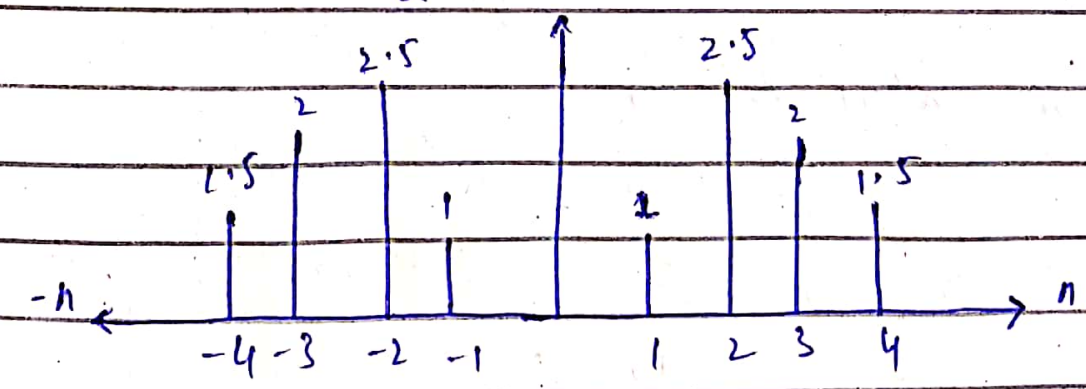
$x(-n)$



$x(n) + x(-n)$



$$x_e(n) = \frac{x(n) + x(-n)}{2}$$

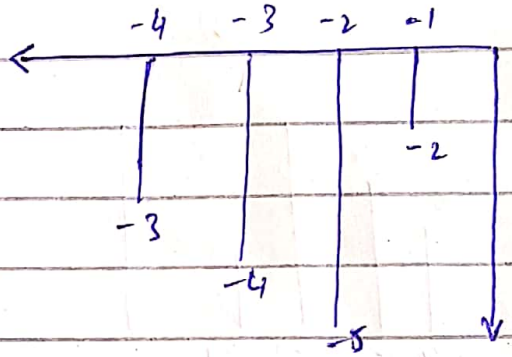


P.NO 3

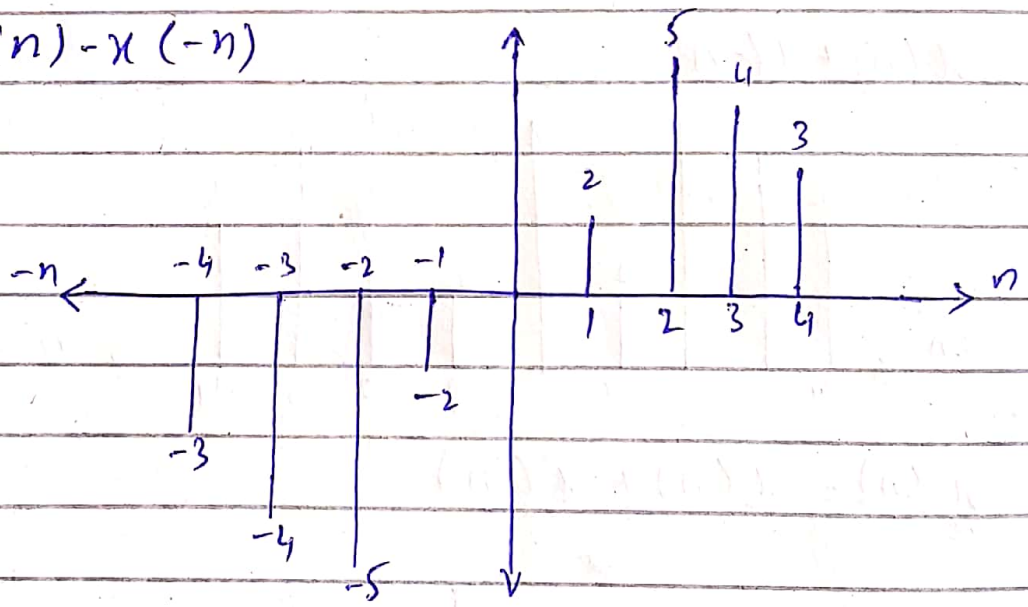
odd part:

$$x_e(n) = x(n) - x(-n)$$

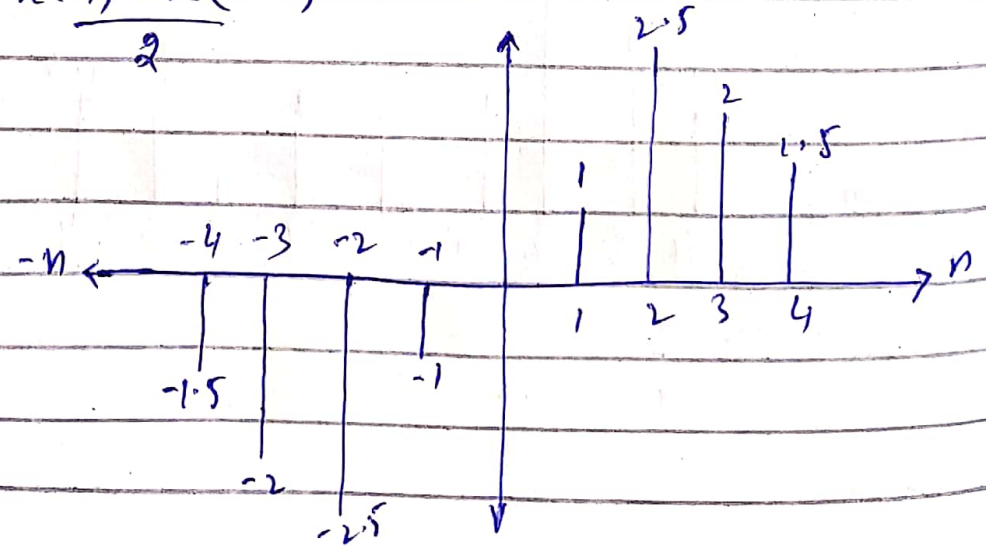
$-x(-n)$



$x(n) - x(-n)$



$$x_e(n) = \frac{x(n) - x(-n)}{2}$$



Q.2 ANS.

Sol:

$$Y(s) = \frac{s+4}{s^2+4s-12}$$

$$= \frac{s+4}{s^2+6s-2s-12}$$

$$= \frac{s+4}{s(s+6)-2(s+6)}$$

$$= \frac{s+4}{(s+6)(s-2)}$$

Using partial fraction.

$$\frac{s+4}{(s+6)(s-2)} = \frac{A}{s+6} + \frac{B}{s-2} \rightarrow (*)$$

Multiplying both sides by $(s+6)(s-2)$.

$$\frac{(s+6)(s-2)}{(s+6)(s-2)} \cdot \frac{s+4}{} = \frac{A}{(s+6)} \frac{(s+6)(s-2)}{(s+6)}$$

$$\rightarrow + \frac{B}{(s-2)} \frac{(s+6)(s-2)}{}$$

$$s+4 = A(s-2)+B(s+6)$$

put $s=2$

$$2+4 = A(2-2)+B(2+6)$$

$$6 = 8B$$

$$B = \frac{6}{8}$$

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

Now

put $s=-6$

$$-6+4 = A(-6-2)+B(-6+6)$$

$$-2 = -8A$$

$$\frac{+2}{+8} = A$$

$$A = \frac{1}{4}$$

put A & B in eq (*)

$$\frac{s+4}{(s+6)(s-2)} = \frac{1/4}{s+6} + \frac{3/4}{s-2}$$

$$e^{-1}\left[\frac{s+4}{s^2+4s-12}\right] = \frac{1}{4}e^{-6t} + \frac{3}{4}e^{2t}.$$

Q.3

(i)

Ans:- In signal processing, sampling is the reduction of a continous / analog signal into a digital one.
The analog signal is sampled using an analog to digital Converted (ADC) and convert it into digital signal.

(ii)

Ans:

$F_m = 60\ Hz$

$F_N = 2F_m$

$F_N = 2(60\ Hz)$

$F_N = 120\ Hz$

To avoid aliasing

$F_S > F_N$.

Q.4

Ans: As we have given:

$$x[n] \times [h_1[n] \times h_2[n]] = [x[n] \times h_1[n]] \times h_2[n]$$

Consider

$$y[n] = [x[n] \times h_1[n]] \times h_2[n]$$

$$x[n] \times h_1[n] = w_1[n].$$

Now

$$y[n] = [x[n] \times h_1[n]] \times h_2[n].$$

$$y[n] = w_1[n] \times h_2[n]$$

$x[n] \longrightarrow \boxed{h_1[n]} \longrightarrow \boxed{h_2[n]} \rightarrow Y[n]$

Now consider that,

$$w_2[n] = h_1[n] \times h_2[n]$$

$$y[n] = x[n] \times [h_1[n] \times h_2[n]]$$

$$y[n] = x[n] \times w_2[n]$$

$x[n] \longrightarrow \boxed{w_2[n]} \rightarrow Y[n]$

As we can see both the block diagram have given same response. So

L.H.S = R.H.S

prove.