"Assignment"

Course Title	Signal and System
Module	4th
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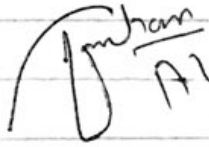
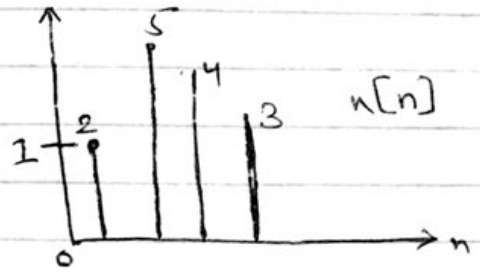
Signature	

Q1:- Evalute the even and odd Components for the given Function.

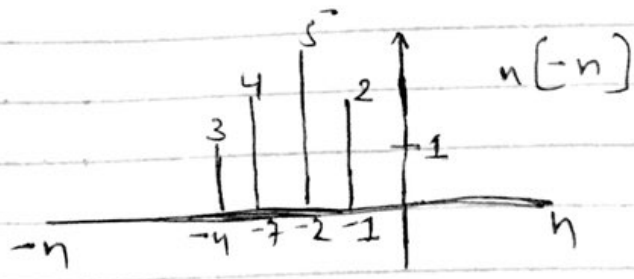


Sol:-

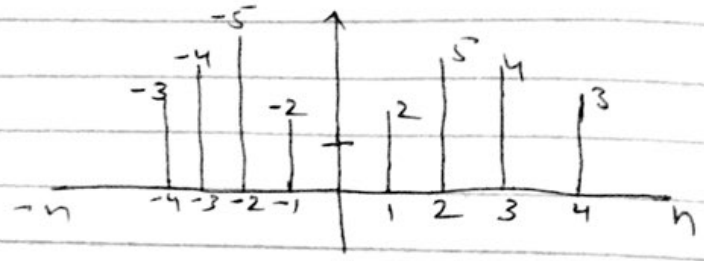
As we know that the even Components of a function can be written as

$$x[n] = \frac{x[n] + x[-n]}{2}$$

Reflect $x[n]$ to get $x[-n]$



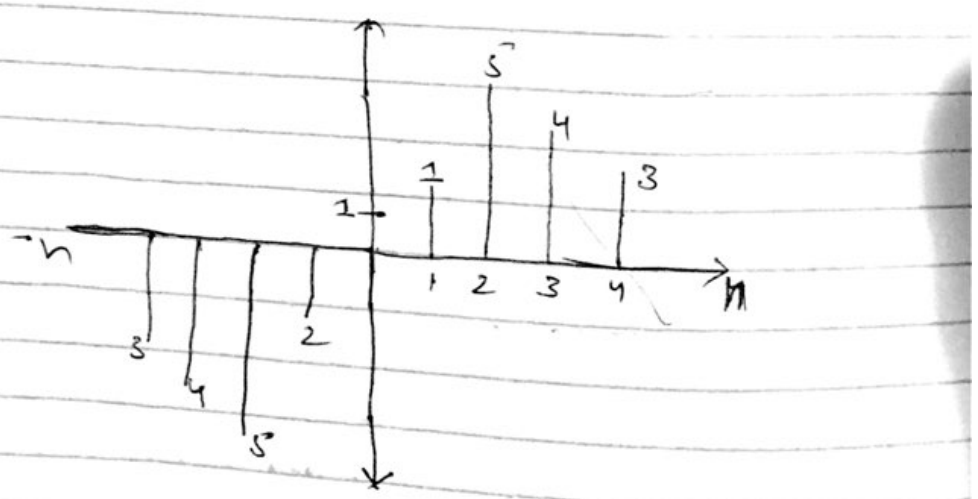
$x_e[n]$



odd Components of a function be written as

$$x_o[n] = \frac{x[n] - x[-n]}{2}$$

$x_o[n]$



Q 3

Part (ii) :-

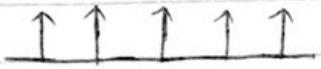
Supose an analog Signal has a highest frequency of 60Hz. outline the steps that will ensure that no aliasing occurs.

f = 60 Hz ensure that there is no eliasing occurs.

f = 60 Hz

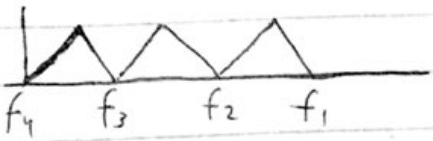
From Niquist Criteria.

$f_s \geq 2f_m$



$f_s \geq 2 \times 60$

$f_s \geq 120$



if $f_s = 120$ Hz there will be no aliasing occurs as Niquist Criteria proved it.

Q3 Part (i):-

Discuss the procedure of converting an analoge signal into a digital signal.

Ans:-

Analoge Signal is Convert to a digital using a two step Process.

* Sampling
* Quantization

the device used to do this is called as ADC (Analog to Digital Converter)

Step 1:-

Sampling Converts a Continuous time Continuous amplitude (real valued) Signal to discrete time Continuous amplitude (a Real value) Signal.

Remember only time axis is discretized and not the amplitude axis.

Step 2:-

Quantization converts the discrete time continuous amplitude signal to discrete time and discrete valued.

(From a set of finite values so that it can be represented by finite bits and can be stored on a computer.

Q4g-

Show that:

$$x[n] * [h_1[n] * h_2[n]] = [x[n] * h_1[n]] * h_2(n)$$

Consider

$$y[n] = [x[n] * h_1[n]] * h_2[n]$$
$$x[n] * h_1[n] = w_1[n]$$

Now

$$y[n] = [x[n] * h_1[n]] * h_2[n]$$
$$y[n] = w_1[n] * h_2[n]$$

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

Now Consider that:-

$$w_2[n] = h_1[n] * h_2[n]$$
$$y[n] = x[n] * [h_1[n] * h_2[n]]$$

$$y[n] = x[n] * w_2[n]$$

$x[n] \longrightarrow \boxed{w_2[n]} \longrightarrow y[n]$.

As both block diagrams given the same response

So:

L.H.S = R.H.S

Q2 g-

Calculate the inverse laplace transform of the given equation.

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

Sol g-

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

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

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

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

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

$$s+4 = A(s-2) + B(s+2) \quad \text{---(i)}$$

let $s=2$ in eq (1)

$$2+4 = A(2-2) + B(2+2)$$
$$2+4 = A(0) + B(4)$$

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

$$\frac{6}{4} = \frac{B(4)}{4}$$

$$\frac{3}{2} = B$$

Now let $s=-2$

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

$$2 = A(-4) + B(0)$$

$$\frac{2}{-4} = \frac{A(-4)}{-4}$$

$$A = \frac{1}{-2}$$

Now put them Back

$$= \frac{\frac{1}{-2}}{s+6} + \frac{\frac{3}{2}}{s-2}$$

$$= \frac{1}{-2}\left[\frac{1}{s+6} + \frac{3}{2}\left(\frac{1}{s-2}\right)\right.$$

$$= \frac{1}{-2}e^{-6t} + \frac{3}{2}e^{2t}.$$