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Subject = Signal and system

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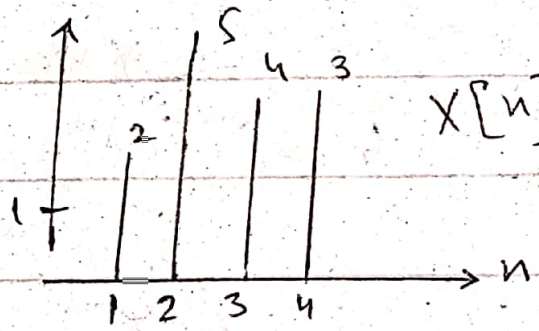
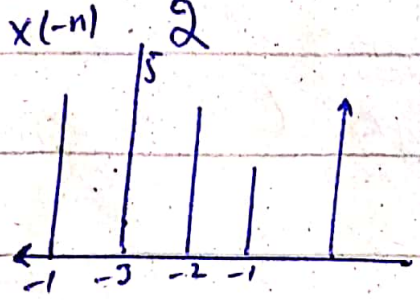
Q1: Calculate the even and odd Components of the given function.

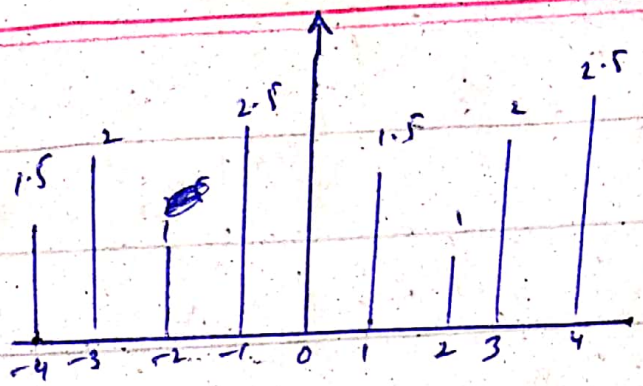


Ans: $x_e(n) = \frac{x(n) + x(-n)}{2}$

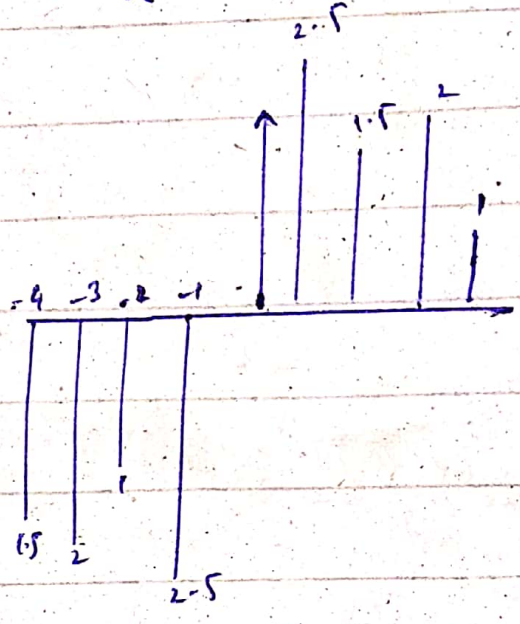
$x_o(n) = \frac{x(n) - x(-n)}{2}$



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



$$x_e(n) = \frac{x(n) + x(-n)}{2} = \frac{1}{2}\left[x(n) + x(-n)\right]$$



Q2: Calculate the invese Laplace transform of f/n

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

Ans: $$y(s) = \frac{s+1}{s^2+4s-12} + \frac{3}{s^2+4s+12}$$

$$y(s) = \frac{s+1}{(s+2)^2-(4)^2} + \frac{3}{(s+2)^2-(4)^2}$$

$$L^{-1}[y(s)] = L^{-1}\left[\frac{s+1}{(s+2)^2-(4)^2}\right] + L^{-1}\left[\frac{3}{(s+2)^2-(4)^2}\right]$$

$$f(t) = e^{-t}\cos 4 + 3\, e^{-t}\sin 4t$$

Q3 = Part (i)

Ans: Analog signal is Converted to a digital signal using a two step process. The device used to do this is called as ADC (Analoge to Digital Converter).

Sampling & Quantization

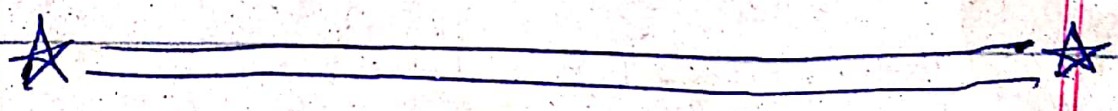
The device used to do this is called as ADC (Analoge to Digital Converter).

Step 1: Sampling Converters a Continuous time Continuous

amplitude (real valued) signal to discrete time Continuous amplitude (still real valued) 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 ~~time and~~ (from a set of finite values so that it can be represented by finite bits and can be stored on computer.



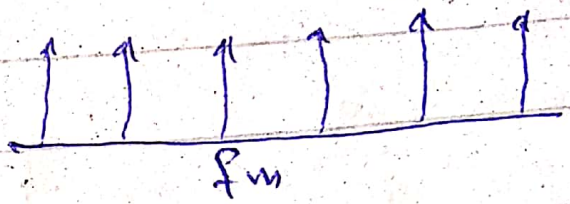
Q3: Part (ii)

$f = 60$ Hz ensure that there is no eliasing occur.

Ans: $f = 60$ Hz

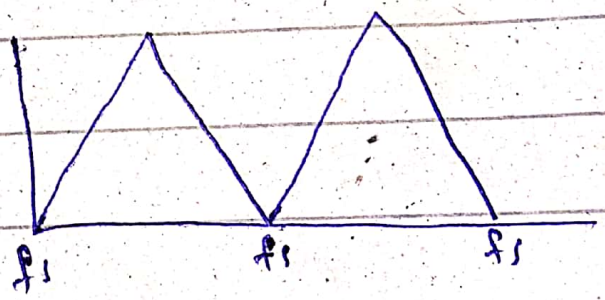
from Niquist Criterin

$f_s \geq 2f_m$



$f_s \geq 2 \times 60$

$f_s = 120$



if $f_s = 120$ Hz there will be no aliasing occurs as Niquist proves its.