PNS SCHOOL OF ENGINEERING &TECHNOLOGY

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DEPARTEMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING

1ST INTERNAL ASSESSMENT EXAM QUESTIONS & ANSWER

SUB-Digital Signal Processing (TH-3)

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Internal Assessment : 2023

Subject : Digital Signal Processing (Th-3)

6th Semester

Branch : Electronics & Telecommunication Engineering

Time : 1 Hour **F.M. : 20**

1. Answer all questions. [2 x 5]

   (a) Define Signal Processing.

   (b) Define Discrete Time System.

   (c) Define Periodic & Aperiodic Signals.

   (d) Write down different types of elementary discrete time signals.

   (e) Write down any 2 properties of convolution.

2. Answer questions any Two. [5 x 2]

   (a) State & explain Sampling Theorem.

   (b) Determine whether the system is time-variant or invariant of the given system $y(n) = x\left(\frac{n}{2}\right)$?

   (c) Determine the convolution Sum of 2 sequences. $x(n) = \{\underset{\uparrow}{1}, 1, 2, 1\}$ and $h(n) = \{1, \underset{\uparrow}{2}, 3, 1\}$?

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1-(a) <u>Signal processing</u>

→ It is any operation that Changes the characteristics of a signal.

(b) <u>Discrete Time System</u>

→ It is a device or algorithm, that operates on discrete time signal, according to some well defined Rules.

(c) <u>Periodic Signal</u>

→ If x(N+n)=x(n) [N is the period]

<u>Aperiodic Signal</u>

→ If $x(N+n) \neq x(n)$

(d) <u>Elementary DTS</u>

→ Unit Step signal.
→ Unit Impulse signal.
→ Unit Ramp signal.

(e) <u>Properties of convolution</u>

Commutative-

$x(n) * h(n) = h(n) * x(n)$

Associative

$[x(n) * h1(n)] * h2(n) = x(n) * [h1(n) * h2(n)]$

2-(a) <u>Sampling theorem</u>

→ A continuous time signal may be completely represented in this samples and recovered back, if $f_s \geq 2f_m$.

Where f_s = Sampling frequency

f_m = Maximum frequency component.

→ Process of converting on Analog signal in to a discrete signal.
→ Time taken by the next sample to occur, Known as sampling period.
→ Reciprocal of sampling period known as sampling Rate.
→ Quantization refers to the use of a finite set of amplitude levels are nearest to a particular sample value of the message signal.

2-(b) Given system

$Y(n)=x(\frac{n}{2})$

Let $T[x(n)]= x(\frac{n}{2})$

→ $T[x(n-k)]= x(\frac{n}{2} - k)$

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

$y(n)= x(\frac{n}{2})$

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

Since $y(n,k) \neq y(n-k)$; System is Time variant.

2-(c) Given

x(n)={1,1,2,1}

h(n)={1,2,3,1}

h(n) \ X(n)	1	1	2	1
1	1	1	2	1
2	2	2	4	2
3	3	3	6	3
1	1	1	2	1

y(n)= {1,3,7,9,9,5,1}