

# Digital Signal Processing Systems

## Assignment -1

B. Tech CSE (Semester: V)

Name :\_\_\_\_\_

PRN Number :\_\_\_\_\_

**Note:** All the students must finish the Assignment#1 and submit before 1 Oct. 2021.  
Write the answers in given space only.

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1. Find the Nyquist rate and Nyquist interval of following signal.

(10 Mark)

(a)  $x(t) = 5.Cos1000\pi t.Cos4000\pi t$

(b)  $x(t) = \frac{Sin200\pi t}{\pi t}$

**Ans:**

2. Band pass signal have spectral range extent from 20 KHz to 82 Khz. Find sampling frequency? (5 Marks)

**Ans:**

3. Find the even and odd component of the signal. (15 Marks)

(a)  $x(n) = u(n)$

(b)  $x(n) = u(n) - u(n - 1)$

(c)  $x(n) = [1, 1, -\mathbf{1}, 1, 2]$

*Bold is origin*

**Ans:**

4. Sketch the following Signals.

(10 marks)

(a)  $y(n) = u(n) + u(n-2) + u(n-4) - 3u(n-6)$

(b)  $x(n) = -n$ , where  $-4 \leq n \leq 0$   
 $= n$ , where  $-2 \leq n \leq 2$   
 $= 0$ , otherwise

**Ans:**

5. Determine the system of equation is a) Linear b) stable c) recursive d) Time Invariant  
e) Static Dynamic. (10 Marks)

(a)  $y(n) = 1/3x(n) + x(n-1) + x(n-2)$

(b)  $y(n) = \log_{10}(|x(n)|)$

(c)  $y(n) = 8.\cos x(n)$

**Ans:**

6. Verify the Associative and Distributive Property of convolution. (10 Marks)

$$h_1(n) = [-\mathbf{2}, -3, 4], h_2(n) = [1, \mathbf{1}, 1] \text{ and } h_3(n) = [1, -\mathbf{2}, 0, 1].$$

**Ans:**

7. Determine convolution using Tabulation. Method?

(10 Marks)

$$x_1(n) = [1, 1, \mathbf{0}, 1, 1],$$

$$x_2(n) = [1, \mathbf{-2}, -3, 4].$$

**Ans:**

8. A discrete time system is given as:  $y(n) = y^2(n-1) + x(n)$ , A bounded input of  $x(n) = 2\delta(n)$ , is applied to the system. Assume that the system is initially relaxed. Check whether this system is stable or unstable. (10 Marks)

**Ans:**

9. Determine the range of the values of parameter  $a$  for which the linear time invariant system with impulse response  $h(n)$  is stable, (10 Marks)
- $h(n) = a^n$ , where  $n \geq 0$ , and  $n$  even.  
 $= 0$  otherwise

**Ans:**



10. Determine the cross correlation sequence  $r_{xy}(l)$  of the following sequences: (10 Marks)

$$x(n) = [2, -1, 3, 7, \mathbf{1}, 2, -3] \text{ and}$$

$$y(n) = [1, -1, 2, -2, 4, \mathbf{1}, -2, 5]$$

**Ans:**